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THÈSE DE DOCTORAT

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Four Essays on Financing for Development

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**Soutenue le 03.07.2017
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Remerciements

Bon, m’y voilà. DIAL (base Enghien), dimanche 14 mai 2017, 16h46, bureau du fond, 21 degrés, belles éclaircies (d’après l’Iphone, mais nous sommes rarement d’accord), vent force 0.5¹. Après multiples relectures, “trackage” de guillemets, recherches d’espaces en trop, en moins, et vérifications bibliographiques, je me retrouve enfin à faire l’ultime sauvegarde du fichier thèse²⁷ que je considère comme —allez n’ayons pas peur des mots— “pas trop mal”. Je m’attaque donc à la partie qui “sur le papier” (la seule et unique² référence footballistique que vous trouverez dans ces 227 pages) semble être la plus facile à rédiger mais qui s’avère en fait être plus compliquée que prévue (déjà 5 minutes pour rédiger ces quelques phrases, je vais sûrement rater le film du dimanche soir). J’avoue avoir vaguement envisagé un “Merci à tous” puis m’être ravisé en me disant que je vous devais quand même plus. En réalité, je vous dois énormément.

Par où commencer? Le commencement sans doute. Je crois que mon désir de faire une thèse a d’abord été précédé d’une volonté de me pencher sérieusement sur les problématiques de développement. Une volonté qui s’est vite transformée en passion (le lien de causalité restant difficilement identifiable) lors de mes années de licence-master et surtout, surtout, au contact de Marc Raffinot. Marc, en relisant les introductions et remerciements des thèses de dialiens (sélection non-exhaustive), je me suis vite rendu compte qu’aucun de ces ouvrages n’omettait de mentionner votre nom. C’est assez frappant de voir à quel point vous avez réussi à susciter chez chacun d’entre nous la passion du développement (celui avec un grand “D”) et cette envie de contribuer à ce champ d’étude. Alors forcément, comme tous les autres, je me suis fait prendre au piège... mais pour mon plus grand plaisir.

Néanmoins, avant d’entreprendre une thèse —comme tout bon homo-economicus averse au risque— on sonde un peu autour de soi pour savoir si les quatre prochaines années vont être un calvaire, une longue traversée du désert (un peu comme celle de Renaud, de laquelle on est même pas sûr de sortir en très bon état) ou au contraire une promenade stimulante au paradis des curieux qu’on se félicitera d’avoir empruntée. Alors sans langue de bois (nécessaire après ces derniers mois), je dois dire que les retours penchaient plus pour le chemin de croix que pour le super road-trip scientifique. Mais j’y suis allé... et j’ai adoré. Si la chance a avoir quelque chose là-dedans, je dirais que j’ai eu la chance de vous avoir. Ces années à votre contact ont été extrêmement enrichissantes et m’ont permis de réfléchir aux questions qui me passionnent dans le meilleur des cadres. Je vous remercie de m’avoir fait confiance en acceptant de diriger cette thèse. Je vous remercie pour votre accompagnement, votre bienveillance, vos interrogations qui m’ont permis de me remettre en question et de faire progresser mes recherches, d’avancer, toujours (j’ai failli écrire d’être “En Marche” mais d’autres m’auraient qualifié de plagiat). Merci pour ces années de collaboration qui, je l’espère, laisseront place à de nombreuses autres.

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¹cf. Nico Mear.

²Les tautologies c’est la vie.

pensais pas retrouver un endroit où l'on apprend autant de choses en si peu de temps. Une fois de plus je m'étais trompé. Lisa, nos collaborations m'ont permis d'acquérir cette rigueur nécessaire au métier de chercheur qui se doit de remettre en question ses intuitions économiques et de challenger continuellement ses résultats. Je te remercie de m'avoir transmis tous ces outils (cf. Kit de survie du chercheur - section advanced robustness checks) qui m'ont conduit à améliorer significativement (at the 1% level) la qualité de mes travaux (et accessoirement d'accroître la longueur de mes papiers). J'espère sincèrement que ce quatrième chapitre ne sera que le début d'une longue série de co-écritures. Merci pour ta générosité et ton accompagnement, qui tout comme celui de Marc, m'ont permis de réaliser cette thèse, et d'en être fier...

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Je remercie ensuite mes compagnons de route, les doctorants de DIAL et des autres pôles du LEDa. Merci à Pierre, Marion, Homero, Lexane, Sandra, Charlotte, Etienne, Muhammad, et tant d'autres pour votre accueil chaleureux à chacune de mes visites à Dauphine (et pour votre générosité qui m'autorise toujours à grignoter ce qu'il reste sur la table basse avant d'aller en cours).

Je remercie également les anciens doctorants de Dauphine et de la rue d'Enghien que j'ai

³<https://www.youtube.com/watch?v=lpClvLlYI8E>

⁴<https://www.youtube.com/watch?v=eBpYgpF1bqQ>

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⁵D’après Saxo Grammaticus, (moine danois, à la toute fin du 12e siècle) Lathgertha possédait le caractère d’un homme dans le corps d’une femme, et allait à la bataille en première ligne devant les guerriers les plus courageux.

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DIAL (base Enghien), dimanche 14 mai 2017, 23h15 (oui je suis assez lent), bureau
du fond, 17 degrés, dégagé (enfin nuit).

à *Laura*

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General Introduction

Development is costly. Whether it is domestically or externally financed, economic development has always required the mobilization of large amounts of money. Yet the necessity to satisfy basic needs of most vulnerable people and the MDGs' achievement have drastically accentuated financing needs of low-income countries (LICs) over the past decades. Unfortunately this is not about to change. Climate change —already under way— and its dramatic consequences have led the international community to reshape the way we thought about economic development until then, and define new paths towards a more sustainable development.

The 2015 conference on Financing for Development (FfD) in Addis Ababa hence stressed the need for additional financing intended to help developing countries in facing these new challenges. The Sustainable Development Goals (SDGs) agenda, adopted few months later, now call both developed and developing countries to step in and raise massive amounts of resources in order to finance these goals. As stated by World bank's president Jim Yong Kim in Addis Ababa, SDGs will only be achieved by “*substantially increasing funds for the world's poor, moving from billions to trillions of dollars in development spending*”.⁶

The Addis Ababa Action Agenda (AAAA) —derived from this conference— lists several areas where substantial improvements would help reaching such financing objectives. First, focusing on domestic resources, the AAAA put taxation back to the center stage, highlighting the necessity for developing countries to base their development process on fair and performing tax systems. Second, and alongside domestic revenue mobilization, private sector development is expected to take up an active role throughout the coming years, and to be supported with international private capital flows such as foreign direct investment, particularly in key sectors for sustainable development. Third, the AAAA has confirmed international aid and other official flows as crucial factors in helping poor countries to strengthen domestic environment and build essential infrastructures. Last, both domestic and external borrowing are encouraged to significantly increase but without threatening the debt sustainability of poor countries in order to prevent further episodes of debt distress. As a result, the AAAA restated the pivotal role of the international community in assisting developing countries to attain long-term debt sustainability through coordinated policies such as debt relief, restructuring and sound debt management.

These four essays fall within this debate about financing for development and seek to provide understandings about the effectiveness and consequences of two major financing sources for

⁶<http://www.worldbank.org/en/news/speech/2015/07/13/third-international-conference-financing-development>

LICs: debt relief and taxation. While one might think that these two financing instruments are fundamentally different, they are intrinsically related, as chapter 1 and 2 try to show. Chapter 1 investigates the effects of debt relief on beneficiary government's budget. Using time series analysis, we try to identify the impact of debt service savings stemming from debt relief on various budget components such as public investment, current expenditures, and domestic revenues. Chapter 2 builds on chapter 1 findings and takes a close eye to the relationship between debt relief and taxation by focusing on tax effort evolution throughout the debt relief process. The analysis also aims at understanding the role of recipient governments in this connection and how their peculiarities affect outcomes of the debt relief programs. The third chapter reviews challenges and opportunities that beneficiary governments face as regards external financing once they have been granted debt relief. Lastly, after having exposed the importance of debt relief for domestic revenue mobilization, chapter 4 proposes to go one step further by investigating the effect of taxation on economic growth. Adopting a macro-micro approach, this essay intends to revisit the taxation-growth nexus using firm-level observations in developing countries.

This general introduction starts with a brief overview of historical and recent evolutions in development financing. Section 2 builds on these evolutions to narrow the discussion on the Third World debt crisis of the 1980s-90s and the resulting multilateral debt relief initiatives of the early 2000s. After a short discussion about the expected effects of such initiatives, section 3 slightly departs from debt relief to provide some element of context about the taxation-development nexus and the related literature. The last section exposes the motivations of this thesis and its structure.

0.1 Filling up the (double) resource gap

How to finance development? LICs can resort to various strategies which can be differentiated according to their external or domestic feature. Domestically, countries can first seek to increase savings, making funds available to support domestic investment and capital accumulation. However, LICs are often characterized by quite narrow and unbalanced domestic capital markets where most of the financial sector's liquidities are absorbed by the public sector, thus leaving limited opportunities for the financing of small and medium private activities. In addition, the lack of strong value-added processes make it hard to redistribute wealth through the credit channel. Therefore, in spite of the recent development of LICs' financial sector and the mushrooming of banking activities, most of the households and small enterprises still resort to informal financing instruments with limited scope as regards development financing. As a result, domestic savings have been hardly solicited to finance development of poorer economies over the past decades, although recent trends suggest that it is about to change.

Taxation hence appeared as the sole alternative for domestic financing. Historically, taxation has always been advocated as a stepping-stone for economic development ([Burgess and Stern \(1993\)](#), [Besley and Persson \(2007\)](#)). As underlined by [Kaldor \(1962\)](#) in the early 1960s "*The importance of public revenue to the underdeveloped countries can hardly be exaggerated if they are to achieve their hopes of accelerated economic progress*". Fifty years later, the [OECD \(2010\)](#) restated his argument, claiming that "*development success stories go hand in hand with better*

mobilization of a country's own resources and less dependence on foreign finance". Yet taxation hardly took off in developing countries due to many structural constraints such as narrow tax base and weak fiscal capacity that hampered the establishment of efficient and fruitful tax systems. Alongside these issues, bad design of fiscal policies and governments' misuse of public resources prevented to set up a strong "fiscal contract" with taxpayers and to foster tax compliance which consists in one of the main impediments to domestic resource mobilization in developing countries. Despite the efforts deployed by LICs' governments —coupled with those of the IFIs' to improve taxation—, most of these countries painfully managed to levy more than 15 percent of their GDP as fiscal resources, and still experience low tax ratios (Besley and Persson, 2014).

LICs thus logically turned towards external sources. Given their need in foreign currency —necessary to finance imported goods that most of the LICs are unable to produce domestically— trade consisted in a promising solution for developing countries. Regarding LICs openness rates —which are often larger than those observed for high-income countries—, it seems fair to say that LICs, and developing countries to a larger extent, have succeeded in inserting the globalization process. International trade thus partly contributed to fill this foreign currency gap. In addition, imports significantly contributed to increase domestic resource mobilization by facilitating tax collection at the borders, which is however doomed to reduce in a today's context of greater regional and global integration. However, although beneficial for their development, exports were —and for some countries still remain— not enough to help rapidly grow, mostly because of the low diversification of their economic base. Besides trade, foreign direct investment also consisted in an interesting solution for developing countries' financing. Marginal in the late 1980s, foreign capital inflows substantially increased starting from the 1990s, and helped in providing substantial amounts of foreign currency but also technology and skills to recipient countries (Dabla-Norris et al., 2010). Yet despite a recent broadening in FDI destinations —reflecting the growing economic globalization and the proliferation of market-oriented reforms in LICs—, the first waves of foreign capital inflows were more often targeted to countries with large mining and extractive sectors, rather than resource-poor countries. Although the recent trends coupled with the AAAA recommendations let us think that FDI might be of crucial importance for LICs' financing in the coming years, such inflows were historically not sufficient to close the financing gap of these countries, which was potentially compensated —but most often incompletely and for some LICs only— by large inflows of remittances. In overall the lack of foreign currency remained substantial for most of developing countries before the 1990s.

Therefore, from the independences on, LICs facing this double gap had no other solution than turning towards external borrowing. Initiating their take-off, most of the LICs in the late 1960s were however *de facto* excluded from international financial markets. External support thus mainly came from Bretton Woods Institutions and high-income countries' governments, most of which were keeping strong ties with their former colonies. Moreover, having realized the particular needs and borrowing constraints of LICs —and the lending risk associated with it (Humphrey, 2016)—, the international financial institutions (IFIs) created special subsidiaries intended to provide concessional financing for LICs' development. The World bank thus created the International Development Association (IDA) in 1960, which was followed by the Structural Fund Adjustment set up by the IMF in 1986. From the mid-1970s onwards, financial flows from

multilateral and bilateral donors towards LICs rapidly increased, except between 1992 and 2000 which corresponded with the “aid-fatigue” period.

At the end of the 1980s, most of the LICs’ financing was thus supported by IFIs, bilateral donors, and in a lesser extent international commercial banks for countries exposing sufficient guarantees to make banks lend them. Yet, despite all these efforts, many were still stuck in what Sachs labeled a “poverty trap”. All the more detrimental, and without being able to say whether the billions of USD provided as foreign aid had been effective in achieving sustained higher economic growth and lifting people out of the poverty, the public finance situation of recipient countries became genuinely worrisome at the end of the 1980s, thus calling for substantial debt relief.

0.2 Debt relief: the unwanted child

“What Africa needs to do is to grow, to grow out of debt.”

Dr. George Ayittey, President of the Free Africa Foundation.

0.2.1 How did we get there?

Debt issues in low income countries began in the early 1970s and spread over almost three decades. The reasons for the impressive debt accumulation in LICs have been investigated quite extensively by the literature of the 1980s which identifies three main developments over the 1970s and the 1980s that initiated the third world’s debt crisis (Krumm, 1985; Lancaster et al., 1986; Greene, 1989): i) the sharp increase in commodity prices during the 1970s which inflated exports revenue and enabled LICs’ governments to contract loans intended to finance massive domestic projects; ii) the subsequent burst of the commodity bubble which called for additional borrowing in order to sustain development projects started up few years before, and iii) bad decisions from debtor governments as regards the use of external financing and the design of these projects, for the most part ill-conceived. Among the peripheral and exogenous factors that also fueled this crisis, the rise in FED interest rates after the second oil-shock was often put forward, but only concerned the few LICs that had succeeded to borrow from commercial banks during the commodity boom. Simultaneously, the early 1980s severe drought encountered by sub-Saharan African countries yielded most of these countries to increase grain imports financed by external debt (Krumm, 1985; Greene, 1989). Yet, according to Mistry (1991), although debtors failed to profit from these financial inflows, official creditors were also to blame given their irresponsible financing policy during the 1970s that consisted in over-lending to LICs. Underlining the lenders’ impressive passivity, Mistry (1991) argues that their inaction helped arrears to accumulate up to the point where repaying them would have been too costly for debtors, letting thus debt relief as the only conceivable solution.

By the end of the 1980s, the sole debt of sub-Saharan African countries amounted to USD 136 billion while it was only USD 6 billion in 1970, thus consisting in an increase by around 630% (in constant USD) (Greene, 1989). While UNCTAD diagnosed the debt distress of the LICs in the late 1970s, it took ten years for debt relief to be granted. The first moves were purely bilateral and quite disorganized until the Paris Club stepped in to coordinate. Yet, the

initial debt treatments failed to halt the LICs' increasing debt burden. Indeed, debt treatments under the "classic terms", the first wave of treatments granted in the Paris Club, only aimed at rescheduling debts contracted prior a given cut-off date and at non-concessional interest rates, which just postponed payment issues. Consequently, Paris Club treatments became increasingly favorable by providing up to 33% and 50% reduction in bilateral debt service respectively under the Toronto terms in 1988 and the London terms in 1991.

Despite these first two waves of coordinated debt treatments, the average stock of external public debt for the heavily indebted and poor countries (HIPCs) reached frightening levels in the mid-1990s. The Paris Club thus decided to go further and raise the reduction up to 67% under the Naples terms, extending it to the entire stock of bilateral debt claims. This—combined with ad hoc strategies such as fresh-money for LICs allowing them to buy their debt back to private creditors—finally succeeded in reversing the indebtedness dynamics.

0.2.2 The multilateral debt relief initiatives: design and expected effects

However, the various actions of the Paris Club still left multilateral debt weighing on LICs' public finance. Furthermore, alongside these bilateral treatments, multilateral organizations continued to grant concessional loans for development projects (Leo, 2009) and for sums far greater than the canceled debts (Easterly, 2002) such as that HIPCs' net transfers were still positive in 1995 (Thugge and Boote, 1997), hampering thus their deleveraging process (Leo, 2009).

Therefore, in 1996, the G7 decided to expand bilateral debt relief up to 80% under the Lyon terms and most importantly, broke with the principle of untouchable multilateral debts by setting up a debt relief programme known as the Heavily Indebted Poor Countries Initiative (HIPC). Under the first HIPC initiative, launched in 1996, eligibility criteria allowing countries to benefit from debt relief were relatively precluding. Besides being ranked as a LIC by the World bank, and having implemented an macro-stabilizing program (PRGF), countries had to record a debt-to-exports ratio superior to 250% in present value (PV) to be eligible for the debt relief program. Yet this ratio prevented some countries to benefit from the initiative although facing significant difficulties in meeting their heavy debt service payments. The international community therefore decided in 1999 to raise bilateral debt cancellation up to 90% (under the Cologne terms), reduce the debt threshold down to 150% of the exports (250% of domestic revenue for really open economies), speed up debt relief provision, and thus renamed the original HIPC initiative, the "Enhanced" HIPC initiative.

The Enhanced HIPC initiative is designed as a stepwise process. Once eligible, the country reaches the decision point where the government benefits from debt service cancellations and, according to the conditionality attached to the initiative, starts implementing (alongside the PRGF undertaken for being eligibility to the program) a poverty-reduction program (PRSP) entailing specific goals to meet over the medium-run. As long as the country is considered on track in regard to poverty reduction, program's stakeholders continue to grant debt service relief. The resulting debt service savings thus fuel a specific public account entirely (in theory) dedicated to the financing of development projects lined up on the goals defined within the PRSP. Once the country has met these goals, the completion point marks the end of the HIPC

process and grants irrevocable debt stock cancellations on which the debtor government and program's stakeholders previously agreed on.

Yet, although debt relief provided under the Enhanced HIPC initiative was substantial (especially for bilateral donors), multilateral liabilities, though being reduced, were still weighing on governments' budget, slowing down the race toward the MDGs. Consequently, Bretton Woods institutions and the regional development banks (AfDB, IADB) decided in 2005 at the G8 summit of Gleneagles, to cancel the entire remaining multilateral debt stock of HIPCs that have completed the initiative. This ultimate debt relief program known as the Multilateral Debt Relief Initiative (MDRI) therefore involves, since 2005, the full cancellation of outstanding multilateral debt for countries that have reached their completion point under the Enhanced HIPC initiative.

To date, the HIPC and MDRI initiatives have written off a total of nearly USD 76 billion. These cancellations of the external debt of 39 LICs may seem a pittance compared with relief in middle- and high-income countries, but are huge in relative terms. They represent just over all the subsidies granted to all the HIPCs in constant dollars from 2009 to 2011.

0.2.3 What can we expect from debt relief?

What have been the motivations to cancel such amounts of debt? Obviously, these initiatives have not only been implemented for the simple purpose of restoring debt sustainability among LICs and writing off bilateral and multilateral claims that were —for some of them— already forgot by their sharer. The goal of these programs aimed to go beyond the simple cleaning process by providing development opportunities which were until now restrained because of the heavy debt burden. Indeed, from a theoretical standpoint, it is relatively accepted that too much government debt undermines economic growth. This idea, which owes its paternity to the seminal work of [Krugman \(1988\)](#) and [Sachs \(1989\)](#) in the late 1980s, is currently known as the “Debt Overhang” theory (DOT).

In his paper of 1988, [Krugman \(1988\)](#) posits that a debt overhang situation arises when the indebtedness level is such that it becomes beneficial for both the debtor and its creditors to cancel a share of the debt. He underlines that, in the presence of large indebtedness, incentives of the debtor to reimburse might be distorted, resulting in lower capacity to pay, increase in the likelihood of partial default, and thus in reduction of debt market value.

Incentive and liquidity effects

Using a two-period model, [Krugman \(1988\)](#) shows that temporary concessional financing can solve liquidity as well as solvency issues of the debtor, leading creditors to be better off as compared with a full default situation. He argues that such concessional financing would help debtor countries to face their short-term debt payments and undertake substantial investment efforts yielding additional revenue in the next period, and hence making debt easier to service. However, this argument relies on the assumption that the debtor gives away to its creditors all the resources it can generate in order to repay its debt. Yet, as underlined by [Krugman \(1988\)](#) and [Sachs \(1989\)](#), if the debt burden is such that repayments equal the maximum the country can pay with the largest adjustment effort “*there is no reason for the country to make the adjustment*

effort, since the reward goes only to its creditors” (Krugman (1988), pp.14). In such situation, debt relief can solve the problem. Sachs (1989) shows that creditors can partially cancel the claims they have on the debtor down to the level where the resulting debt repayments would be inferior to the stream of revenue stemming from the adjustment effort undertaken by the debtor. It would then allow the debtor to partially benefit from the outcomes of its adjustment efforts, and would secure a non-zero payment for creditors as compared with a situation of full default.

Other detrimental effects stemming from a debt overhang have been emphasized by Borensztein (1990) and Claessens and Diwan (1990) for which large stock of debt can discourage national and foreign investors since it suggests further rise in taxation intended to service the debt, thus pushing future production costs upward. In addition, Borensztein (1990) states that credit rationing induced by unsustainable levels of public debt can also be detrimental for domestic investment. Debt relief should thus be accompanied with extra lending, and thus be additional, in order to maximize the impact on the investment-to-GDP ratio. Therefore, since large debts depress investment by creating negative incentives to undertake pro-growth reforms for public entities and to invest for private agents, debt relief should foster both public and private capital accumulation, yielding *in fine* to larger economic growth rates.

Besides these potential incentive effects, Claessens and Diwan (1990) underline that in LICs, where consumption and investment intended to basic needs can hardly be reduced, large debt burden let the adjustment weighs on debt service repayments which can be only partial. But considering a worst scenario for the debtor, Sachs (1989) argues that debt reschedulings and pressures from donors can force the debtor to service its debt, leading to crowd public funds (initially intended to domestic development projects) out. In this case, debt relief enables debtors to free up sums previously spent on debt service and thus generates “fiscal space” (Heller, 2005), which materializes only if government was repaying its debt (at least partially) prior debt cancellations (Cohen, 2001).

Disincentive effects

Yet while these studies support the idea that debt relief can foster government and private investors to undertake significant investment efforts, some authors support that debt relief could also create disincentives to invest. For instance, Corden (1989) first defines a three-period model where if the debtor cannot pay in period 2 its inherited debt from period 1, concessional financing provided by the creditor in period 2 to service this debt, must be repaid in period 3. Under these settings, he explains that debtor country would deploy significant investment effort in period 1 and 2 to generate revenue in order to pay the difference between debt service and defensive lending in period 2, and to reimburse liabilities contracted in period 2 and due for period 3. In presence of debt relief, Corden (1989) shows that investment effort in period 2 would be lower since there is nothing to service anymore. In addition, although this reduction in investment leads to lower output in period 3, resource transfers abroad fall so much after debt relief that the debtor’s consumption actually raises as compared with the situation where the country would have paid its debt. But as for the illustration of Krugman (1988), this example assumes the debtor’s willingness to pay to be maximal, which remains hardly debatable.

Debt relief and conditionality

Others authors thus argue that debt relief can result in higher growth and repayment equilibrium only if both parties commit themselves to necessary future actions (Claessens and Diwan, 1990). On the one hand, creditors must commit that they will not ask for too much resource transfers from the debtor in the future, which can be achieved by combining concessional loans with debt relief. On the other hand, debtor must ensure to invest revenue stemming from debt cancellations in an efficient way by prioritizing profitable and resource-creating projects. Such actions can be achieved through conditionality and adjustment programs imposed by the IFIs, which in the context of LICs, often represent their creditors.

The authors also state that in a “weak debt overhang” scenario, situation can improve with a simple commitment mechanism ensuring that new loans will be efficiently used and will generate enough revenue to service this new debt. However, if the debtor cannot commit to these adjustment efforts, creditors will have no other choice than resorting to debt relief. Indeed, in a context of “strong debt overhang”, new loans will not be enough to convince the debtor to undertake resource-creating investment for future debt servicing. It will consider adjustment efforts only if creditors agree to partially cancel their claims, since in this case, only a fraction of the gains derived from this effort will go to the creditors.

Sachs (2002) accentuates this idea and suggests debt relief to be always associated with conditionality and new IFIs lending since it yields debtor countries to a better equilibrium (depending on its discount rate), leading them to always comply with conditionality. Lastly, Koeda (2008), supports the idea that highly indebted countries lying below a certain income cutoff (the one that graduates from low-income to lower-middle income country) have strong incentives in favoring short-term consumption over investment to stay below this cutoff and continue borrowing at concessional terms. According to Koeda (2008) debt relief should consist in a one-shot strategy in order to prevent moral hazard in LICs which would be disposed to postpone pro-growth reforms, consume inefficiently and accumulate debt again since they anticipate future debt cancellations on the same eligibility criteria.

*

In overall, theoretical papers addressing the debt-growth nexus seem to converge towards the same idea that high level of debt is detrimental to economic growth, making thus debt relief an efficient development strategy for countries stuck in poverty trap. Yet, while some authors strongly stand in favor of conditional debt relief in order to ensure that incentives and liquidity effects result in sustained higher growth, others also stress the potential moral hazard that such actions could generate. Adopting various empirical approaches, the first three essays of this thesis try to modestly shed some lights on these effects which, among the existing literature, have either not been clearly set yet or even investigated.

0.3 Taxation: the cherished son

“The real spelling of aid is t.a.x.”

Jeffrey Owens, former head of tax at the OECD (2001-2012).

Vice-president of Seychelles Danny Faure stated at the 2015 Addis-Abbaba conference, that given the former developments as regards debt in sub-Saharan Africa and small island countries, *“debt restructuring and cancellations coupled with sound fiscal and monetary policies, is an essential tool for financing for development”*.⁷ Though debt relief is expected to improve taxation through its incentives effects or conditionality, one could however wonder whether the AAAA’s top priority (taxation) does not conflict with other objectives such as private sector development.

0.3.1 Taxation and development

Since the early 60s, taxation has been increasingly accepted as a fundamental pillar of the economic development process (Kaldor and Kaldor, 1965; Tanzi, 1983, 1992; Burgess and Stern, 1993). Most of development actors have acknowledged that although growing financial needs of LICs could not be entirely fulfilled with domestic resources and that foreign financing was strongly needed, taxation was essential to the state building process (Besley and Persson, 2007, 2010, 2013). Consequently, for decades, LICs and international institutions have deployed increasing endeavors to design, set up and foster tax systems across the developing world.

Yet, first theoretical works have shown that taxation could negatively affect the way in which the economy converges towards its long-run equilibrium (Feldstein, 1974; Chamley, 1986; Judd, 1985). In particular, an important theoretical body building on the neoclassical models of investment (Jorgenson, 1963; Tobin, 1969; Hayashi, 1982) shows that taxation influence the global economic activity mainly through its micro effects on firm investment decisions (Hall and Jorgenson, 1967; Summers et al., 1981; Auerbach et al., 1983), identified as detrimental for investment behavior and business incentives.

However, departing from a benchmark situation similar to a high income economy, such conclusions cannot be taken for granted when it comes to developing countries. Indeed, as demonstrated by Barro (1990) in a growth model with a balanced government budget, the contribution of public spending (hence of taxation) to capital accumulation mostly depends on government’s size and the marginal returns of such expenditures. In keeping with Barro’s intuitions, while tax raise reduces economic growth, extra public spending derived from higher tax effort, should help the country to grow faster if its marginal returns are substantial, which is likely to be the case in the context of developing countries where there is a significant lack in infrastructure. Yet, as underlined by (Aghion et al., 2016), such positive effect of taxation are only possible if domestic revenue efficiently translate in efficient public spending such as infrastructures, which also depends on the institutional environment and government’s political accountability in particular.

⁷<http://www.un.org/esa/ffd/ffd3/wp-content/uploads/sites/2/2015/07/seychelles.pdf>

0.3.2 Taxation in the Financing for Development agenda

Historically, the first involvement of the international community into developing countries' tax system occurred with the repeated expert assessments of Edwin Kemmerer in Latin America between 1917 and 1931 who mainly advised reorganization of the financial sector and reforms of public finance (Alacevich and Asso, 2009). This then took another step with the Shoup mission of 1949 which sent seven US economists to the post-World War II Japan in order to get the tax system back on a solid ground. The success of this intervention led for the next two decades the IFIs to send influential economists in developing countries to improve existing tax systems. However, starting from the 1980s, Bretton Woods institutions stopped relying on small groups of leading individuals and started to promote the development of tax systems in recipient countries by tying their disbursements to structural reform programs. As a matter of fact, 1980s' SAF programs mainly targeted public deficit reduction by promoting increases in domestic revenues and wise control over public spending (Ghosh et al. (2005)). These efforts slowed down during the "aid fatigue" period, but started again in the early 2000s with increasing involvements from bilateral donors which also began to develop tax-related official assistance (Fjeldstad, 2013). Nowadays, given the increasing financial needs stemming from the MDGs and now the SDGs, the international community is fully committed to support taxation in developing countries which also contributes to improve the well-functioning of the state (Kaldor (1981)), to reinforce its legitimacy and power (Di John (2009)) and, in a larger extent, fosters institutions quality and democracy (Fjeldstad (2013), Besley and Persson (2013)) when external assistance is provided in the right way.

Yet, and as exposed above, despite all this assistance, tax ratios in developing countries and especially in Sub-Saharan Africa has remained significantly low over the past decades. Causes are numerous and range from the insufficient tax base to the replication of tax systems in countries where the economic environment was not appropriate to make such systems work (Fjeldstad, 2013). Corrupted elites and weak public goods provision also contributed to maintain low tax compliance since citizens cannot touch or even catch sight of benefits derived from tax payments (Fjeldstad and Therkildsen, 2008). Indeed, in many developing countries, public finance mismanagement and rent-seeking behaviors fueled extractive institutions, supporting high reliance on exports taxes, and thus monopolizing domestic resources for elites self-interest which were more often directed to shady foreign bank accounts rather than to the local economy (Boyce and Ndikumana (2011)).

Consequently, since July 2015 and the AAAA, many initiatives have been undertaken in order to efficiently raise tax revenue in developing countries. These have focused on two kinds of actions; expanding the tax base and fighting international tax evasion. As regards the first objective, many efforts are currently deployed on the inclusion of informal activities into the formal sector. In addition, specific strategies are directly addressed to resource-rich countries which are encouraged to invest in value-addition within the processing of natural resource in order to secure a pool of domestic revenue that does not depend upon international price fluctuations. Tax base expansion for developing countries is thus considered as a necessity by the international community, especially in a context of wider regional integration and diminishing custom duties which represent, by far for some countries, a significant share of their domestic revenue. Besides

tax base enlargement, lot of actions have also been undertaken in order to fight capital flights and international tax evasion. International initiatives such as “Tax Inspectors Without Borders”, the “Extractive Industries Transparency Initiative” (for resource-rich countries), the “Stolen Asset Recovery Initiative” as well as supra-national-level committees or forums on tax issues have multiplied in the recent years, underlining the need to address both sides of evasion; evaders and host institutions. This has been set in order to drastically limit capital flights which dry the tax base of developing countries up, keeping most of them aid-dependent and hampering the implementation of enduring and efficient tax systems.

*

The last essay of this thesis falls within this debate about the pivotal role of taxation for economic development. Although stressed as a necessary mean for the attainment of the SDGs by 2030, one may wonder if, in view of the theoretical literature exposed above, significant raise in taxation might conflict with other AAAAA’s recommendations such as the expansion of the private sector. Still, only few studies have tried to observe the impact of taxation on firm performance in the particular context of developing countries ([Easterly and Rebelo, 1993](#); [Djankov et al., 2010](#); [Fisman and Svensson, 2007](#)). The essay thus aims at filling this gap in the literature by empirically investigating this relationship.

0.4 Chapters’ summaries

As highlighted throughout the introduction, the debt overhang theory and the conditionality associated with the multilateral debt relief initiatives suggest that debt cancellations might affect public finance of recipient countries. **Chapter 1**⁸, co-written with Marc Raffinot (University Paris-Dauphine), Danny Cassimon (University of Antwerp, IOB), and Bjorn Van Campenhout (IFPRI), thus focuses on the fiscal effects of debt relief in beneficiary countries. Considering a sample of 24 HIPCs for which the post-debt relief period is long enough, we use time-series analysis and panel VAR specifications to estimate the effects of debt service savings stemming from debt relief on various fiscal outcomes such as public investment, current expenditures, and taxation. Our empirical specification follows a basic government budget representation and then investigates how components react to shock on one specific variable. Moreover, thanks to the temporal depth of our sample, we are able to differentiate debt relief effects according to the initiative under which cancellations have been granted. Results show that debt relief provided under the Enhanced HIPC initiative fosters public investment while additional cancellations under the MDRI increase public current expenditures.

We explain the positive contribution of the Enhanced HIPC initiative by the conditionality attached to debt service relief where proceeds must be used to finance development-oriented expenditures such as infrastructures in social sectors. However, the positive effect of debt relief stemming from the MDRI is more difficult to interpret. On the one hand, such effect can simply translate the increase in running costs of public investment undertaken through the Enhanced

⁸Published in *International Economics* in 2015, vol. 144.

HIPC initiative. On the other hand, this increase could also come out as a return to old policies once full debt relief has been granted, leading beneficiary governments to reallocate public funds toward sectors of political interests, which do not necessitate capital spending. Panel VAR results then also underline a positive effect of debt relief granted under the Enhanced HIPC initiative on domestic revenue mobilization which ties in with the debt overhang theory stating that debtors are more prone to collect taxes once they are freed from their debt burden, since tax effort benefits do not go to the creditors anymore. This transmission channel is considered alongside the potential effect of conditionality under the Enhanced HIPC initiative, which clearly requires improvements as regards domestic revenue mobilization.

The last section of chapter 1 investigates heterogeneity in beneficiary countries' fiscal response by differentiating HIPCs that were paying most of their debt prior the initiatives from those that did not. Following [Cohen \(2001\)](#), one should expect to observe no or less fiscal space for countries that were not fully repaying their debt prior debt relief. Using the ex-ante amounts of debt stock arrears to distinguish bad payers from good payers, we find (in line with [Cohen \(2001\)](#)) that bad payers experience no change in tax-to-GDP ratio but most importantly record a lower fiscal space once they have been granted debt relief.

Chapter 2 builds on these findings to narrow the analysis to the relationship between debt relief and tax effort. First computing tax effort index, which aim at representing the government's performance in collecting its potential taxes, I then investigate how government's tax effort evolve throughout the entire debt relief process (from the decision point to the MDRI). Using a difference-in-differences approach, I start by identifying various groups of countries which, at the macro-level, might represent a satisfactory counterfactual. After having carefully check for the control groups' suitability, I estimate tax effort changes around different stages of the debt relief process and with respect to these various counterfactuals.

Results suggest that HIPCs deploy substantial tax effort beforehand in order to become eligible for the Enhanced HIPC initiative. Such result is expected given the design of this initiative which requires candidate countries to report satisfactory implementation of their macro-stabilizing program before being able to reach the decision point. Findings then show that higher tax effort is sustained throughout the period running from the decision point to the MDRI (which corresponds to the completion point for most of the HIPCs considered in this study). However, tax effort seems to reduce once full and irrevocable debt relief is provided under the MDRI. Given that the completion point marks the end of the HIPC process and therefore of its associated conditionality, HIPCs' governments are then free to shape their fiscal policy the way they want. Under such design, moral hazard is thus likely to materialized.

Regarding this suspicion of moral hazard, the analysis takes one step further and then tries to identify the reasons for such easing off in tax effort after the MDRI. Results suggest that governments are more prone to moral hazard when they highly value the present, here proxied by political instability. Findings also show that inefficient governments as regards public finance and economic policies management are those experiencing a significant drop in tax effort after the MDRI. Lastly, additional results suggest that new financing opportunities stemming from debt relief, such as the expansion of local debt markets, also tend to reduce tax effort for recipient

governments after the MDRI. This second chapter thus emphasizes moral hazard induced by the carrot-and-stick design of these initiatives which leads some beneficiary countries to lose part of the effort they gained throughout the debt relief process. However, despite such behavior, HIPCs still managed to secure levels of tax effort that remain higher as compared with a situation where they would not have benefited from such initiatives.

Chapter 3 then reviews changes in external public financing following debt relief programs. This paper, co-written with Marc Raffinot (University of Paris-Dauphine) and Baptiste Venet (University Paris-Dauphine) adopts a similar empirical approach as the one used for chapter 2, and seeks to estimate the evolution of borrowing conditions to official creditors as well as access to international financial markets around different stages of the debt relief process, still with respect to various control groups. We find that having benefited from debt relief under the Enhanced HIPC initiative leads official creditors to tighten their lending conditions. In particular, we observe that HIPCs experience a significant reduction in the average grace and maturity periods on new official loans, yielding to a substantial fall in the grant element associated with such financing. Simultaneously, results suggest that beneficiary countries managed to contract loans to private creditors such as foreign commercial banks, hence gaining access to international financial markets from which they were historically excluded.⁹

Going further, the last part of this paper investigates under which circumstances HIPCs succeed in accessing financial markets. Findings suggest that HIPCs are more likely to contract this kind of debts once they have received additional and irrevocable debt relief under the MDRI, highlighting the private creditors' appetite for countries without debt. Additional analyses tend to show that private banks and other creditors are more disposed to lend during financial bust in developed economies, hence suggesting as a potential transmission channel the willingness of private investors to seek for higher market returns in developing countries; among which those with a renewed borrowing capacity seem to be favored. Departing from the "push factors", last findings highlight that such resort to external private investors might be motivated by substantial reductions in gross aid transfers from official creditors (in addition to the lending conditions' tightening). This final result suggests that debt relief has not been additional (at least as compared with control group countries), and that given the financing needs of HIPCs, beneficiary countries had no other choice than finding new financing sources, on average more costly, resulting in uncertainty as regards their future debt sustainability.

Lastly, **chapter 4**, co-written with Lisa Chauvet (IRD-DIAL), revisits the taxation-growth nexus using a macro-micro approach. To this end, we match country-level data about taxation from the Government Revenue Dataset (*International Center for Taxation and Development*) which provides reliable information on taxation in developing countries, with firm-level data retrieved from the *World Bank Enterprise Surveys (WBES)*. Using repeated cross-section estimates, our findings support a non-linear relationship between taxation and firm growth, as predicted by the theoretical literature and Barro (1990) in particular. However, although taxation benefit to firms' activity in developing countries, we find that a significant prevalence of corruption leads

⁹Although some of them managed to borrow from private creditors in the early 1980s.

to reduce this positive effect, especially in low-income countries where the economic environment remains unstable and domestic revenue mobilization is low. Lastly, making use of the firms heterogeneity, and adopting an empirical approach similar to [Rajan and Zingales \(1998\)](#), we find fragile evidence that the positive contribution of taxation to firm performance goes through the provision of public goods since enterprises operating in sectors highly dependent on infrastructure, benefit more from taxation.

* * *

The purpose of this thesis is thus to provide new empirical evidences about the effect of two financing strategies —debt relief and taxation— intended to support economic and social development of poorer and most vulnerable countries. The four essays investigate some relationships regarding these financing instruments —seperately or bridging the two— that have not been extensively addressed by the existing literature or that did not led to consensus among the scientific community. Each essay highlights new findings involving clear policy recommendations that line up with the Addis Ababa Action Agenda and call for greater coordination between all stakeholders of the development process.

Chapter 1

Africa: Out of debt, into fiscal space? Dynamic fiscal impact of the debt relief initiatives on African Heavily Indebted Poor Countries (HIPC)

with Danny Cassimon, Marc Raffinot, and Björn Van Campenhout
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1.1 Introduction

Low Income Countries (LICs) have been granted debt relief by bilateral creditors and later by multilateral creditors under the Heavily Indebted Poor Countries (HIPC) Initiative for debt reduction in 1996 and 1999, and from 2005 on under the Multilateral Debt Relief initiative (MDRI). By December 2014, 36 countries have benefited from the HIPC initiative (IMF, 2000).

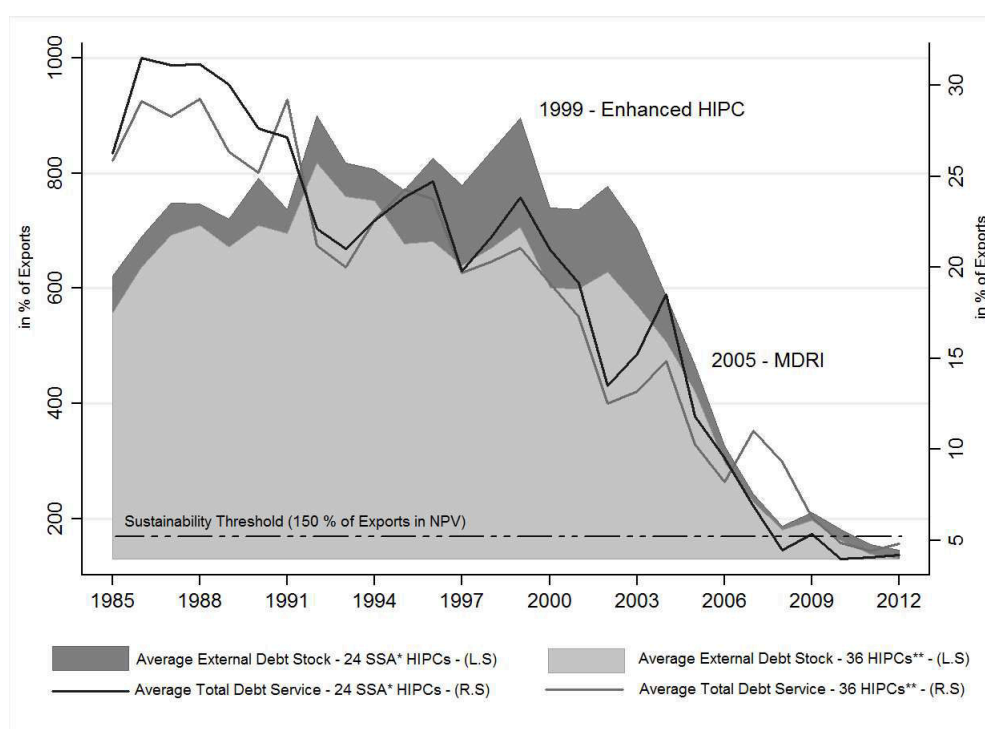
The HIPC initiative's first goal was to cancel debt down to a level that would restore debt sustainability. This was also supposed to eliminate the debt overhang. According to this theory, a high debt burden depresses investment, reform willingness and, hence, future economic growth. Furthermore, debt relief should allow some public resources, otherwise being used for debt service, to be liberated for alternative use, which is the so-called 'fiscal space'; donors were to monitor the use of this money freed in order to make sure that this money was used to increase poverty-reducing public spending. To be more specific, in the late 90s, donors insisted that this money should be invested only in basic health care and primary education. Moreover, conditionality attached to receiving the debt relief (and in particular at the completion point of the HIPC initiative) should strengthen the probability of reaching the desired goals.

The rationale behind the MDRI is different, as it amounts to a full cancellation of the remaining debt after HIPC due to the International Monetary Fund, The World Bank, the African Development Bank and later also the Inter-American Development Bank. Nevertheless, IDA and IMF made it compulsory to reach the HIPC completion point before benefiting from the MDRI. By end-October 2013, 35 countries have benefited from the MDRI (Chad being the only

one that did not yet reach the completion point). For equity reasons, IMF also provided debt relief under MDRI for Cambodia and Tajikistan, which did not previously benefit from HIPC debt relief. These initiatives resulted in a dramatic decrease of the debt ratios of the benefiting countries (cf. Figure 1.1 below). Even if IDA and IMF insist on an ongoing commitment to fight poverty after HIPC completion point and MDRI, their monitoring is much weaker. As the debt relief is irrevocable after this point (and because of the fiscal space thus created), the means of pressure on the benefiting governments are limited.

While the fiscal space effects were of secondary importance in the HIPC Initiative, they became central when donors decided to provide debt relief that went beyond HIPC, as through the MDRI. Here, rather than aiming at restoring debt sustainability, the focus shifted more towards providing recipient countries with additional resources to increase spending targeted at realizing internationally-agreed poverty reduction targets such as the MDGs. However, the resources freed by debt relief are a one-shot intervention. As such, improvements of tax collection are needed in order to make this increase in public expenditure sustainable.

Figure 1.1: Evolution of average indebtedness (in face value) for 24 African HIPCs.



Notes: Data sources: International Debt Statistics (IDS), World Bank, downloaded the 03/06/2014.

Did this combination of debt overhang elimination, fiscal space and conditionality effects led to positive effects on the fiscal situation of the recipient countries, in terms of higher revenue, higher public investment or other public spending? The paper draws on earlier analysis focusing on the ‘fiscal response’ effects of (HIPC) debt relief, and more notably on [Cassimon and Campenhout \(2007\)](#); [Cassimon and Van Campenhout \(2008\)](#), and tries to complement the preliminary findings of these studies by extending the time frame and using alternative estimation

techniques. Moreover, the extended time frame provides an opportunity to complement the earlier studies by explicitly focusing for the very first time on the relative fiscal response effects of the additional debt relief provided through the MDRI.

The remainder of this paper is structured as follows. In Section 2, we describe the channels through which debt relief could affect fiscal variables, both in theory as in practice, referring to the existing literature that links debt relief, economic growth and fiscal variables. The Section 3 deals with the data and the empirical specification we used for this study. Finally, Section 4 presents our empirical results. Section 5 concludes.

1.2 What should we expect from the HIPC and MDRI initiatives?

The main goal of debt relief granted by the donor community through the HIPC initiative was canceling the debt down to a sustainable level, as defined by specific threshold indicators of capacity-to-pay. This sustainable level was usually defined in balance of payments terms (a present value of foreign debt to exports threshold), or in fiscal terms (a present value of debt to fiscal revenue threshold) for very open economies. In order to be eligible (i.e. becoming an HIPC), the country had to be IDA-eligible, and hold an unsustainable external debt. In 1999, the initiative was enhanced by deepening debt relief and lowering the balance of payments and fiscal thresholds to 150% and 250%, respectively. Implementation of the (Enhanced) Initiative followed a two-phased approach: after some initial conditions met (e.g. a track record of successful IMF program implementation), a country reached the so-called decision point, where creditors fixed the amount of debt relief granted to the recipient HIPC ‘in principle’, after which the country entered a second phase in which it had to fulfill a number of other country-specific conditions (the so-called ‘triggers’, including the execution of a poverty reduction strategy), that would ultimately lead to reaching completion point status, when the envisaged debt relief was granted irrevocably. In between decision and completion point, the country already received (so-called ‘intermediary’) debt relief in the form of debt service relief on comparable terms as the debt cancellation to be received at completion point.

1.2.1 The debt overhang predictions

The idea to cancel debt down to the sustainability level was not only to formally acknowledge that these countries were not capable of (fully) servicing their debt and engaged in repeated debt rescheduling that resulted in further stockpiling debt. It was also inspired by the so-called ‘debt overhang theory’ developed by [Krugman \(1988\)](#) and [Sachs \(1989\)](#). This theory states that a high debt burden has a strong negative effect on the debtor country’s creditworthiness, on investment behavior and on the capacity and willingness of these debtor governments to undertake necessary but painful economic and institutional reforms (most of the benefits accruing to external creditors). As such, canceling debt could have positive impacts on investment and potentially on growth. The consequences of the debt overhang theory for debt relief programs and their expected fiscal implications become then quite intuitive: eliminating debt overhang would have a positive effect on public investment and could thus lead to larger fiscal revenue stemming from the higher growth fueled by these additional investment. Moreover, according

to the debt overhang approach, it might also result in an increasing willingness for tax policies implementation as it will directly benefit to the recipient country and no longer to the creditors.

Yet, the debt-growth nexus evidence so far is mixed. From an empirical perspective, many studies (Elbadawi et al., 1997; Pattillo et al., 2011; Clements et al., 2003; Clemens et al., 2012; Chowdhury, 2001; Presbitero, 2009, 2012) tried to test this debt overhang hypothesis and its underlying non-linear relationship between debt, investment and growth.¹ Results widely differ according to the samples, the indicators (e.g. referring to stocks versus flows measures) and the methodology used. Most papers dealing with this issue and finding significant nonlinear relationships conclude that the negative impact of debt on national investment level (private and public) remains negligible. Moreover, most studies rely on panel data mixing LICs and Middle Income countries. However, by making specific assessments, Cordella et al. (2010) showed that no impact of debt relief is to be observed on HIPC.

1.2.2 Fiscal space: potential and real

Next to curing debt overhang, debt relief was supposed to provide debtor governments with fiscal space resulting from money freed by debt relief. According to Heller (2005) definition, there is fiscal space when a government experiences budgetary room which enables it to allocate extra resources to specific purposes without threatening the sustainability of public finances. It is however not straightforward that debt relief allows for direct fiscal space, and it is not easy to measure it. First of all, a decision to cancel a given nominal stock of debt results in cash flow gains distributed over a period of time, depending on the original debt service schedule. Second, if the debt service due would not have been paid in the absence of debt relief, no cash flow savings materialize (Addison, 2008). As in practice debt forgiven often would have been serviced only in part, debt relief is more correctly measured as the gap between the new debt service and the one that would have been serviced in the absence of debt relief (Cohen, 2001). In some cases, the direct cash flow effect on recipient government resources may be close to zero; in others it may be substantial. Third, when granting debt relief, donors may decide to cut back on their other aid interventions, which may lead to no net fiscal space effects for the recipient countries.

For these reasons, we make a distinction in this paper between countries that were repaying a significant part of their debt and countries that were not before debt relief. In the second case, no fiscal space is likely to materialize. However, this distinction is not really easy to implement as most HIPCs were running at least some arrears to some creditors. In particular, some HIPCs were indebted to USSR, China, or even other African countries without being pressed for repayment (a kind of de facto moratorium). In order to build our two sub-samples of "good payers" and "bad payers", we use the ratio of arrears on external debt stock to the long term debt stock (using the World Bank data) in 1995 (one year before debt relief under HIPC initiative was made public - see Table 1.A3 in the Appendix).

¹Following the 'debt overhang' theory, debt positively affects economic growth up to a particular threshold in the debt-to-GDP ratio. After that, if this debt-to-GDP ratio increases further (and debt becomes unsustainable), debt would impact negatively on economic growth as described above. This indebtedness threshold would represent the turning point of a Laffer curve-type relationship between debt and growth (Krugman, 1988).

1.2.3 Fungibility and potential conditionality effects

Moreover, as is well known from the aid fungibility approach (Heller, 2005; Feyzioglu et al., 1998; Van de Sijpe, 2013), benefiting governments could also try to optimally allocate the resources saved, e.g. by cutting down domestic revenues (tax burden), or reducing the fiscal deficit. All this means that it is not always granted that (HIPC) debt relief leads to more resources available, and that they are being spent according to the donors' objectives. It is important to note the difference, at least in principle, between HIPC and MDRI debt relief. HIPC debt relief might be considered partly fictitious, leading to little fiscal space effects. In contrast MDRI debt relief should in principle be considered real resource savings that would otherwise have been fully spent as actual debt service, because the pre-MDRI debt was supposed to be sustainable. This is one specific feature that we want to test in this paper, complementing existing research on this issue.

Moreover, according to the design of these debt relief initiatives, a conditionality effect may be at play. Debt relief comes with some strings attached by donors. Enhanced HIPC debt relief was granted after the successful completion of donor-imposed conditionality, some comparable to an IMF program, others related to the elaboration and implementation of a broadly-owned recipient country development and poverty reduction strategy. On top of this, some country-specific 'triggers' were included on, say, the quality of public management and public service delivery (cf. General introduction). The IMF indeed tried to monitor the relation between actual cash flow savings from debt relief and increases in poverty reduction-targeted as well as in capital spending. Looking at decision point documents produced by the IMF and the IDA, one can indeed clearly see that money freed up thanks to debt relief under the Enhanced HIPC initiative was also planned to be partially spent on capital expenditures. For instance, this document exposes for Cameroon that "*the substantial debt service savings from HIPC Initiative assistance will be used to overcome the severe structural obstacles to social development*" by financing the education sector "[...] *school construction, construction of school catering facilities and health rooms, [...]*", or for the rural development by supporting "[...] *investments in increasing agricultural productivity, [...], construction and maintenance of rural roads, [...]*" (IMF (2000) p.22-23). Similar examples can easily be found for other HIPCs. In addition, we often observe within the governments' financial operations tables that part of future capital spending is directly financed by HIPC proceeds.

However, one might not expect to find such conditionality effect at play under the MDRI since this ultimate debt relief initiative differs from the Enhanced HIPC by its one-off nature.²

1.2.4 Credit constraints and government's impatience rate

Lastly, another interesting approach that could provide some intuitions about the expected fiscal effects of the debt relief initiatives would be to model recipient governments as rational economic agents receiving a future stream of revenue such as the debt service savings from debt

²In fact, for those countries that already reached the HIPC decision or completion point before 2005, additional MDRI relief in 2005/2006 was granted after a slight conditionality check by donors; in the end, all then-eligible countries received the additional MDRI relief. For those countries that only received (completion point) HIPC debt relief after 2005, there was no additional conditionality effect stemming from the MDRI, as both the HIPC and MDRI relief was granted at the same time.

relief and using them parsimoniously in order to maximize their utility, which can be defined as a positive function of present and future government spending. Under this framework, the expected correlation between debt relief flows and public spending would thus depend on governments' choices in terms of consumption path and savings, themselves determined by state's impatience rate and credit constraints.

For instance if we first consider the (presumed unlikely) case of an HIPC's government which is not credit-constrained and indifferent between consuming today or tomorrow, one would not expect to see any correlation between debt relief flows and public spending. Such government, in the prospect of future debt service savings, would indeed initially borrow to finance its current level of public spending using the expected future debt relief flows to finance future public spending and to repay the initially contracted loan. Under such assumptions, the path of government spending would be flat and the correlation with debt relief flows equal to zero. However, if this government is now initially credit constrained, one might expect to find positive and strong correlation between these flows, at least for the first periods following the initial debt reduction. This government, which cannot initially borrow, would indeed spend revenue from debt relief for the first few periods but would then reduce its level of public spending since it prefers a flat path of consumption (given that it equally values present and future consumption).

Considering finally a most likely credit-constrained and impatient government with a high discount rate would lead to observe a large and positive correlation between debt relief flows and public spending since, given its inability to borrow, such a government would be more willing to immediately consume the debt relief proceeds. Under this assumption an even larger discount rate would lead to an almost perfect correlation between debt relief flows and public spending.

Nevertheless, numerous reasons, of a political economy nature for instance, suggest that the relevance of these assumptions of rationality or credit constraints (and therefore this approach) should be considered with caution in the context of Heavily Indebted Poor Countries. Moreover, as we explained above, the conditionality attached to the Enhanced HIPC initiative and the absence of it associated with the MDRI would probably blur these theoretical fiscal impacts of debt relief savings on public expenditures.

1.3 Sample, data and empirical framework

Consecutively to these expected effects of debt relief suggested by the existing literature, our study aims to test the realized impact of debt relief on a small set of fiscal variables, namely taxes and both capital and current expenditures. In order to observe debt relief's impact on the main public budget components of the recipient countries, we based our empirical approach on a theoretical framework of fiscal behavior introduced by Heller (1975), known as a fiscal response model, and widely used within the literature that looks at the fiscal effects of (traditional) foreign aid (Franco-Rodriguez et al., 1998; Franco-Rodriguez, 2000; Mavrotas, 2002; McGillivray and Ouattara, 2005). This model of structural equations allows us to look at the recipient government's response to specific aid flows such as debt relief flows. We therefore used a vector autoregressive approach (VAR) as developed in Osei et al. (2005) and in Cassimon and Van Campenhout (2008), since this approach fully matches the theoretical foundations of the

fiscal response model. Moreover, as in [Cassimon and Van Campenhout \(2008\)](#), we attempt to identify these fiscal responses over a range of African HIPCs. We thus applied the vector autoregressive specification to a panel data set considering 24 African HIPCs observed over 27 years (1986-2012).

1.3.1 HIPCs selection

A necessary condition to correctly observe the debt relief’s impacts on public finances is to consider a sample of HIPCs that received substantial debt relief over the period of study and that experienced a sufficient “post-debt relief period” to benefit from potential fiscal space. To date, over the thirty-nine countries eligible for the HIPC initiative, thirty-five have reached the completion point which grants full and irrevocable debt relief. One country (Chad) has reached the decision point which also allows of benefiting from substantial (‘interim’) debt relief. The three remaining countries (Eritrea, Somalia and Sudan) are still stuck in the pre-decision phase where no debt relief is granted ([IMF, 2013](#)). Therefore, as they did not receive debt relief yet, we definitively cannot include them into our sample. Furthermore, the aim of our study is to identify an average debt relief impact over a set of African HIPCs. By consequence, in order to keep the African dimension we decided to restrict our sample to African HIPCs only. Our final sample thus consists in thirty African countries which have at least reached the decision point.

The vector autoregressive approach identifies the government’s responses to debt relief flows. In order to observe these fiscal responses over the short/medium term (and according to the Akaike and Schwarz criterion), we use a VAR specification with two periods lagged. We then need sufficient temporal step back (the so called “post-debt relief period”) to correctly identify the impact of debt relief granted under the HIPC and MDRI initiatives. We thus chose to not include in the study countries that entered late into the HIPC initiative (see. [Table 1.1](#) below). Therefore we remove from our sample the six latest African HIPCs having reached the decision point, since they do not have long enough post-debt relief period (Togo, Côte d’Ivoire, Comoros, Liberia, Central African Republic and the Republic of Congo³ entered into the HIPC initiative between 2006 and 2010).

Finally, the sample we consider for this analysis contains twenty-four African HIPCs that have at least reached the decision point and that have been granted from HIPC and MDRI soon enough to experience dynamic fiscal impacts from these initiatives (Benin, Burkina Faso, Burundi, Cameroon, Chad, Democratic Republic of Congo, Ethiopia, The Gambia, Ghana, Guinea, Guinea Bissau, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Sao-Tome-and-Principe, Senegal, Sierra Leone, Tanzania, Uganda, and Zambia).

In this way, the panel dimension (24 countries⁴ and a 27 years time span [1986-2012]) solves the principal issues that existing studies about debt relief face. Indeed, some empirical assessments of debt relief’s impacts (and especially of debt relief’s fiscal effects) tried to estimate the effects of debt relief granted on several budgetary outcomes around the early 2000s when just

³Republic of Congo and Central African Republic entered in the HIPC initiative respectively in 2006 and 2007 which is not that late. But for serious data issues about debt relief variables (too low level of debt relief flows for the Republic of Congo and numerous missing values for Central African Republic), we preferred not to include them into our sample.

⁴Of which 23 have reached the completion point.

few countries had fully benefited from the Enhanced HIPC initiative (Chauvin and Kraay, 2005; Johansson, 2010; Presbitero, 2009). The latest observation points of these analyses often refer to 2001-2003 when around twenty countries had passed the decision point but less than ten had reached the completion point and benefited from full and irrevocable debt relief. These previous studies consider therefore too few post-completion point countries, too little debt relief amounts and above all does not have sufficient temporal depth to correctly assess the impact of the debt relief initiatives, and especially those related to the MDRI (Cassimon and Van Campenhout, 2008), on public finance aggregates.

Thanks to our specific panel data sample, we are now able to consider numerous post-completion point countries over a period of study long enough for observing dynamic debt relief effects and implementing the VAR approach (which also needs long time series).

Table 1.1: African HIPCs, decision and completion point's date.

Countries	Decision point reached the :	Completion point reached the :
Benin	July 07th 2000	March 24th 2003
Burkina Faso	July 10th 2000	April 11th 2002
Burundi	July 29th 2005	January 29th 2009
Cameroon	October 11th 2000	April 28th 2006
<i>Central African Republic</i>	<i>September 09th 2007</i>	<i>June 30th 2009</i>
Chad	May 05th 2001	-
<i>Comoros</i>	<i>June 29th 2010</i>	<i>December 20th 2012</i>
<i>Côte d'Ivoire</i>	<i>March 27th 2009</i>	<i>June 26th 2012</i>
Democratic Republic of Congo	July 28th 2003	July 07th 2010
Ethiopia	November 12th 2001	April 20th 2004
Ghana	February 22th 2002	July 13th 2004
Guinea	December 22th 2000	September 26th 2012
Guinea Bissau	December 15th 2000	December 12th 2010
<i>Liberia</i>	<i>March 18th 2008</i>	<i>June 26th 2010</i>
Madagascar	December 21th 2000	October 21th 2004
Mali	September 06th 2000	March 06th 2003
Malawi	December 21th 2000	August 31th 2006
Mauritania	February 02nd 2000	June 06th 2002
Mozambique	June 02nd 1999	September 25th 2001
Niger	December 13th 2000	April 08th 2004
<i>Republic of Congo</i>	<i>March 09th 2006</i>	<i>January 27th 2010</i>
Rwanda	December 22th 2000	April 13th 2005
Sao Tome & Principe	December 20th 2000	March 15th 2003
Senegal	June 20th 2000	April 19th 2004
Sierra Leone	March 19th 2002	December 15th 2006
Tanzania	April 04th 2000	November 27th 2001
The Gambia	December 11th 2000	December 12th 2007
<i>Togo</i>	<i>November 11th 2008</i>	<i>December 14th 2010</i>
Uganda	April 08th 1998	September 09th 2000
Zambia	December 08th 2000	April 04th 2005
included in the sample		
<i>excluded from the sample</i>		

1.3.2 Data

Complete and reliable time series on public finance for low income countries are somewhat rare in existing datasets. Even though the IMF Government Finance Statistics (GFS) dataset tries to gather data from existing country reports and from IMF country offices, GFS time series are rather short for HIPCs, are not sufficiently detailed (e.g. in terms of the accounting for debt relief) and contain many missing values which would prevent a correct assessment of HIPCs fiscal responses. Therefore the principal data sources used for this study are Articles IV and Staff Reports from the International Monetary Fund (IMF, 2013) which provide detailed data on public sector financial operations. Data have been gathered for the whole sample over twenty-seven years (from 1986 to 2012) using for each data point entry the most recent country report (making sure that this entry was stable and consistent with older staff reports). Following the standard fiscal responses model we collected data for both revenue and expenditures in order to constitute a classic public budget framework.

On the revenue side, we gathered data for total revenue, oil related revenue and grants. We then construct our main revenue variable, the total domestic revenue (TTREV) which is net from external grants but includes oil related revenue. Yet, debt relief mostly occurred in the mid-2000s when oil prices experienced continuous increases. In addition, some countries of our sample like Guinea also enjoy significant non-oil natural resources such as minerals. Therefore, in order to properly identify the domestic tax mobilization response to debt relief flows, we also consider a more restricted revenue variable; the domestic revenue net from external grants and oil revenue (REVNFO).

On the expenditure side, we collected data on current primary expenditures (CRPREXP) (net from interest payments) which basically contain wages and salaries of civil servants, public goods and services provision, and public transfers and subsidies. In addition, we also gathered data for government investment (GINVT) defined as capital expenditures within IMF Government Financial Operations tables.

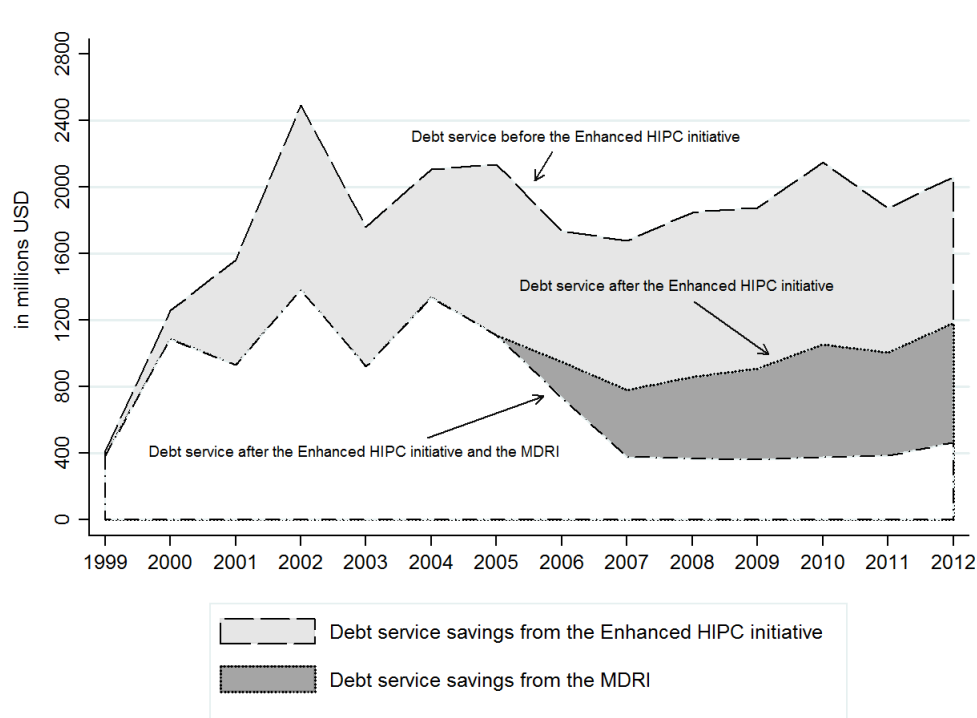
The (budget) financing variables are both external and domestic. For the domestic financing sources, we used the net domestic financing (DFINA) which represents financing from the domestic banking system (central bank and commercial banks) and from other sources such as government bonds issuances. For the external financing sources (also referred as aid variables below), we collected data for total external grants (net from debt relief grants) (TTGRANT) and for total external loans (TTLOAN), both financing development programs as well as budgetary support.

Finally, our variables of interest are the debt service savings from debt relief. These measures have been computed thanks to the annual ‘Status of Implementation’ reports of HIPC/MDRI, provided jointly by the IMF and the IDA. We used the discrepancy between the debt service due without the Enhanced HIPC and the debt service due after the Enhanced HIPC to measure the debt service savings derived from the Enhanced HIPC. In the same vein, we computed the debt service savings stemming from the MDRI by subtracting the debt service due after the Enhanced HIPC and the MDRI to the debt service due only after the Enhanced HIPC (see Figure 1.2 below). The aggregate measure of debt relief (DEBT_RELIEF) is simply the sum of debt service savings from the Enhanced HIPC (HIPC_RELIEF) and from the MDRI (MDRI_RELIEF). We

will use alternately the two disaggregated measures and the aggregate one in order to see which program drives the debt relief effects on fiscal variables.

Yet, our measures of debt relief flows might be seen as misleading because we do not take into account the debt service savings from the first HIPC initiative (1996). However, we believe this does not represent a limit to our analysis because of the low level of debt forgiveness granted under HIPC I and the small number of countries concerned by this initiative between 1996 and 1999.⁵ Moreover, the HIPC I initiative did not require recipient countries to earmark any debt relief savings into increased fiscal spending.⁶ Indeed, most of the HIPCs reached the decision point after 1999 and the launch of the second version of the HIPC initiative, i.e. the Enhanced HIPC initiative (cf. Table 1.1 above).

Figure 1.2: Debt relief flows derived from the Enhanced HIPC initiative and the MDRI.



Notes: Data sources: Decision Point and Completion Point Documents, IMF, IDA

All variables are expressed in percentage of GDP to avoid comparison issues between countries due to exchange rates and inflation problems (see Table 1.A1 in the Appendix, p.28, for descriptive statistics and data sources). In a nutshell, our panel dataset is almost perfectly balanced⁷, covers 24 countries over 27 years (from 1986 to 2012) and contains 10 variables: two domestic revenue variables (TTREV and REVNFO which will be alternately used), two expenditure variables (CRPREXP and GINVT), three financing variables (one domestic; DFINA,

⁵Only seven countries had benefited from the first HIPC version before 1999, but on relatively small amounts: Bolivia, Burkina Faso, Côte d'Ivoire, Guyana, Mali, Mozambique, and Uganda (Bougouin and Raffinot, 2003).

⁶As such, the IMF does not provide sufficient data to compute the debt service savings from HIPC I, as its time series for debt service before and after HIPC only start in 1999. This might reflect our belief about the low level of debt relief granted before 1999.

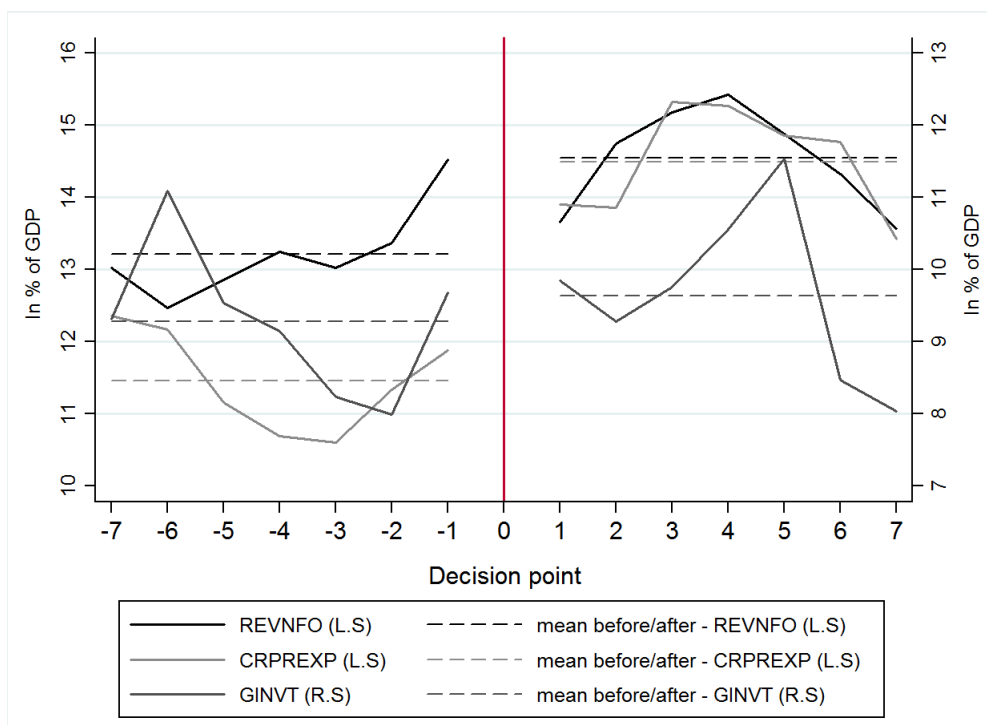
⁷We only have five missing values.

and two external; TTGRANT and TTLOAN), and three debt relief measures (DR_RELIEF, HIPC_RELIEF and MDRI_RELIEF, which will be also considered alternately in the specification).

Before turning to the empirical specification, visual examination of fiscal variables' evolution around the decision point can provide a first insight of the effects stemming from debt relief flows following the entry into the Enhanced HIPC process. Figure 1.3 below presents the average level of domestic revenue net from external grants and from oil revenue (REVNFO), government investment (GINVT) and the current primary expenditures (CRPREXP) over the seven years before and after countries have met their decision point. We observe that having reached the decision point seems to be positively associated with higher level in domestic revenues and current primary expenditures, As regards public investment, we notice a gradual increase after the decision point which nevertheless vanishes five years later. This drop could be due to the attainment of the completion point which marks the end of the interim period and therefore of the conditionality tied to the debt relief savings' use.

Nevertheless, this graph suggests that debt relief granted under the Enhanced HIPC initiative has indeed led to some fiscal space as shown by the acceleration in public spending after the decision point. In addition, a potential positive effect on tax revenues appears to be at play, supporting the debt overhang intuition that debt relief fosters the implementation of fiscal reforms.

Figure 1.3: Evolution of fiscal variables around the HIPCs' decision point.



Notes: Data sources: IMF Article IV and Country Staff Reports. Data have been averaged for our sample of 24 African HIPCs as regards their respective debt relief calendar. For instance, observation in year -1 pools data for HIPCs in 1999 (for those having reached their decision point in 2000), for other HIPCs in 2001 (for HIPCs having reached their decision point in 2002), and so on. Authors' calculations.

1.3.3 Empirical framework: dealing with heterogeneity

As argued above, we consider the vector autoregressive approach (VAR) as the most suited specification to observe how budgetary variables react to debt relief provision. Indeed, [Heller \(1975\)](#) built his fiscal response model as a set of structural equations within which budgetary variables are successively the dependent and the explanatory variable. Therefore, in keeping with the theoretical fiscal response model of [Heller \(1975\)](#), the VAR specification represents an appropriate method for investigating empirically of the nature of the interactions between budgetary components.

Once the reduced form of the VAR specification is set, the VAR estimator basically applies the classic OLS estimator on each equation of the system. However our VAR specification, has to consider the panel dimension of our dataset. As we now work with several HIPC countries, the OLS estimator cannot be used anymore. If used, OLS estimators will be definitively biased because of potential correlation between explanatory variables and the error term, since estimate residuals will surely contain omitted but potentially important country-specific factors. Therefore we decide to pool observations and include country and time fixed effects in our VAR specification (now called “panel VAR”) in order to account for the sample heterogeneity and for potential common trends that might occur on such long period of study. The use of the panel VAR approach is also motivated by the possibility of observing an average effect of the debt relief initiatives within our sample. However, it would be misleading to claim that HIPCs are perfectly identical to justify the use of such methodology, but we reasonably think that these countries present enough similar features to use a common specification.

As alternative methodology —necessitating longer time series— [Juselius et al. \(2014\)](#) test the impact of aid on long term growth using one VAR/VECM model for each country of their sample. Such method allows to get individual coefficients and to observe the effect of aid on GDP growth for the considered country. However, two things lead us to believe that the panel VAR approach is more suited to our research question.

First, [Juselius et al. \(2014\)](#) are able to run individual VAR models thanks to long time series on aid data and GDP growth (more than 40 years). We do not have such temporal depth which therefore prevents us to apply similar models. Second, their motivations for estimating individual specifications is also justified by the heterogeneity of their sample which contains thirty-six sub-Saharan African countries exposing really different income level (Botswana, Gabon, DRC and Somalia) and contrasting access to external financing. However, in our case, we argue that our sample of 24 African HIPCs is much more homogenous since HIPCs were all classified as low-income country (LIC) by the World Bank and were all IDA eligible (only, not blend⁸) prior the Enhanced HIPC initiative.

Lastly, and as explained in [Lof et al. \(2015\)](#), another argument in favor of the panel VAR methodology is that pooled panel VAR allows to significantly increase the number of observations since instead of estimating individual VAR with country-level observations (for one country), we are now able to run one VAR with many observations (over several countries). Our empirical specification therefore takes the following form:

⁸The ‘blend’ label refers to countries which can either borrow from the IDA or the IBRD.

$$\begin{bmatrix} r_{i,t} \\ v_{i,t} \\ h_{i,t} \\ X_{i,t} \end{bmatrix} = \begin{bmatrix} c_r^0 \\ c_v^0 \\ c_h^0 \\ c_X^0 \end{bmatrix} + \sum_{j=1}^2 \begin{bmatrix} \alpha_{r,j}^r & \alpha_{r,j}^v & \alpha_{r,j}^h & A_{r,j}^X \\ \alpha_{v,j}^r & \alpha_{v,j}^v & \alpha_{v,j}^h & A_{v,j}^X \\ \alpha_{h,j}^r & \alpha_{h,j}^v & \alpha_{h,j}^h & A_{h,j}^X \\ \alpha_{X,j}^r & \alpha_{X,j}^v & \alpha_{X,j}^h & A_{X,j}^X \end{bmatrix} \times \begin{bmatrix} r_{i,t-j} \\ v_{i,t-j} \\ h_{i,t-j} \\ X_{i,t-j} \end{bmatrix} + \tau_t + \delta_i + \begin{bmatrix} \epsilon_{i,t}^r \\ \epsilon_{i,t}^v \\ \epsilon_{i,t}^h \\ \epsilon_{i,t}^X \end{bmatrix} \quad (1.1)$$

where $r_{i,t}$ denotes the total domestic revenue for country i in year t , $v_{i,t}$ the government investment for country i in year t , and $h_{i,t}$ the current primary expenditures for country i in year t . $X_{i,t}$ is vector that collects financing and debt relief variables. More specifically, we have $X'_{i,t} = [f_{i,t}; l_{i,t}; g_{i,t}; d_{i,t}]$, where $f_{i,t}$ is domestic financing for country i in year t , $l_{i,t}$ represents loans for country i in year t , $g_{i,t}$ denotes grants (net from debt relief grants) for country i in year t , and lastly $d_{i,t}$ is our variable of interest which corresponds to debt service savings derived from debt relief for country i in year t , but can be a vector of two variables when disaggregated ($d'_{i,t} = [hipc_{i,t}; mdri_{i,t}]$). The number of lags in our VAR system is represented by j and is equal to 2 (according to Akaike and Schwarz criterion). α_j are all VAR parameters to be estimated for each equation of our system (A_j being the vector of VAR parameters for the rest of variables). c^0 is a constant for each equation (c_X^0 being the constant vector for the remaining variables of the system). δ_i represents N-1 country fixed effects in each equation and τ_t represents T-1 time fixed effects in each equation of the system. $\epsilon_{i,t}^r$, $\epsilon_{i,t}^v$ and $\epsilon_{i,t}^h$ are classic error terms and $\epsilon_{i,t}^X$ a vector of the error terms of our set of financing and debt relief variables.

From our panel VAR estimates, we will only report results for three equations out of seven (or eight when debt relief variable is disaggregated). These are the ones that show the effect of debt relief on total domestic revenue (and alternately on revenue net from oil receipts), on government investment and on current primary expenditures. More in particular, we report results for the three following equations:

$$\begin{aligned} r_{i,t} &= c_r^0 + \delta_i + \tau_t + \sum_{j=1}^2 \alpha_{r,j}^r r_{i,t-j} + \sum_{j=1}^2 \alpha_{r,j}^v v_{i,t-j} + \sum_{j=1}^2 \alpha_{r,j}^h h_{i,t-j} + \sum_{j=1}^2 A_{r,j}^{X-1} X_{-1,i,t-j} + \sum_{j=1}^2 \alpha_{r,j}^d d_{i,t-j} + \epsilon_{i,t}^r \\ v_{i,t} &= c_v^0 + \delta_i + \tau_t + \sum_{j=1}^2 \alpha_{v,j}^r r_{i,t-j} + \sum_{j=1}^2 \alpha_{v,j}^v v_{i,t-j} + \sum_{j=1}^2 \alpha_{v,j}^h h_{i,t-j} + \sum_{j=1}^2 A_{v,j}^{X-1} X_{-1,i,t-j} + \sum_{j=1}^2 \alpha_{v,j}^d d_{i,t-j} + \epsilon_{i,t}^v \\ h_{i,t} &= c_h^0 + \delta_i + \tau_t + \sum_{j=1}^2 \alpha_{h,j}^r r_{i,t-j} + \sum_{j=1}^2 \alpha_{h,j}^v v_{i,t-j} + \sum_{j=1}^2 \alpha_{h,j}^h h_{i,t-j} + \sum_{j=1}^2 A_{h,j}^{X-1} X_{-1,i,t-j} + \sum_{j=1}^2 \alpha_{h,j}^d d_{i,t-j} + \epsilon_{i,t}^h \end{aligned}$$

Another interesting feature of our empirical specification (related to the VAR approach) is the ability to compute impulse response functions (IRFs) using the Sims' approach popularized in 1980 and which requires Cholesky decomposition to orthogonalize the shocks. IRFs represent graphically how a budgetary variable reacts (holding everything else constant) over the short- and the medium-term to a shock on an explanatory variable (such as debt relief flows for instance). The use of IRFs thus provides additional information on the fiscal response' length to debt relief as well as information about the validity of our model since convergence in IRFs attests the

stability of the VAR model. Lastly, when using disaggregated measures of debt relief, the risk that the model becomes over-parametrized increases, which is why, as a robustness check, we also estimate our panel VAR with an aggregated measure of aid (loans and grants considered as a sole aid flow).

1.4 Results, discussion and further analysis

In this section, we present the results of our panel vector autoregressive model. We only report results for three equations out of the system of seven (eight in the case of disaggregated debt relief) in the interest of space. We first focus on government investment since it is often thought to be a particular sign of structural investment in social services, as favored by donors. This type of government expenditure is also assumed to have a positive impact on future growth as compared with current primary expenditures (that we also review). We then investigate the effect of debt relief on future tax collection. This is because, as debt relief is not sustainable in itself, the fiscal space created by debt relief can only be preserved in the future if debt relief also leads to improve domestic revenue mobilization. Lastly, following the fiscal space predictions, we try to go further by differentiating the debt relief impact over two sub-samples, the HIPCs defined as “bad payers” and those considered as “good payers”.

1.4.1 Dynamic fiscal effects of debt relief on government investment and current primary expenditures

Table 1.2 below shows results derived from the public investment and current primary expenditures equations as estimated by the panel VAR model. Columns I and III report results for aggregate debt relief effects on government investment using alternately total domestic revenue and revenue net from oil. Columns II and IV present results for disaggregated debt relief impacts on public investment using also the two measures of domestic revenue. Government investment seems to be persistent, with an increase in the past period being associated with an increase in the future. For the aid variables, as we might expect, past increases in loans seem to have important effect. Indeed, government investment in developing countries and especially in sub-Saharan African countries is mostly externally financed. This financing mainly occurs through concessional borrowing from international financial institutions since these countries are excluded from international financial markets. For total grants, the results suggest a strong positive effect in the following year, although this effect seems to be slightly offset the year after.

As regards our variables of interest, we find a statistically significant effect of aggregate debt relief on public investment. According to our results, the debt relief impact occurs after one year and is around 0.35 suggesting that an increase in debt service savings from debt relief initiative by 10% in T is associated with a 3.5% increase in public investment in $T+1$. More interesting, when differentiating debt relief between the two initiatives, it appears that the bulk of this effect is due to the Enhanced HIPC initiative. In particular, an increase in debt service savings of 10% under the Enhanced HIPC initiative in the previous year is associated with an increase of around 4.6% in public investment as a share of GDP the year after. The effect is

similar and even higher in magnitude than those of total grants and total loans.⁹ The absence of result for debt service savings from the MDRI however suggests that the fiscal space created by MDRI does not result in investment increase. This may be explained by the fact that, unlike HIPC debt reduction, MDRI is much less able to let the conditionality effect work due to its one-off nature. The Enhanced HIPC initiative was indeed accompanied by a close follow-up of expenditures financed by money freed by debt relief (which had to be transferred to a special banking account), that aimed at promoting public investment, mostly in social sectors, over the short- and medium-term as its impulse response attests in Figure 1.A1 in the Appendix (p.26).¹⁰ Achieving the completion point of the HIPC initiative was indeed subject to a precise set of conditions. Conversely, after the completion point, debt relief under HIPC becomes irrevocable and MDRI is granted without further conditions.

The debt relief impacts on current primary expenditures seem to support this explanation. Indeed, although columns V and VII from Table 1.2 expose an absence of effect from debt relief granted as a whole, results with disaggregated debt relief expose a strong and positive effect of debt service savings from the MDRI on current primary expenditures. These results provide therefore empirical support to what we argue in introduction and in the Section 1.2.3. Debt relief under MDRI seems to significantly free-up resources that would have been otherwise spent on debt service payments (since the post-Enhanced HIPC initiative debt should have been sustainable). Moreover, looking at coefficients magnitude, results could suggest that HIPC's governments are close to the most extreme picture we depict in Section 1.2.4 where they are considered as both credit-constrained and highly impatient (which is, according to us, the most likely case out of the four presented). In addition, the MDRI savings allocation toward current primary expenditures rather than capital spending also appears quite intuitive if one look at the design of the debt relief initiatives. Since, under the HIPC initiative, government was biased to target money freed up by debt relief predominantly to public investment, positive impacts of debt relief flows from the MDRI could simply reflect the combination of fiscal space with the absence of conditionality which leads beneficiary governments to go back to old policies where current expenditures were preferred to structural ones.

However, we could also imagine a more positive picture where the increase in current primary expenditures stemming from the MDRI will aim at financing running costs associated with the initial investment undertaken thanks to debt relief granted under the Enhanced HIPC initiative. The increase in current primary expenditures would therefore suggest that investment stemming from debt relief are not doomed to transform in “white elephants”, but are intended to be perennial. Note that replacing loans and grants by the aggregate measure of aid flows (AID) does not alter the results (see Table 1.A2 in the Appendix, p.29).

⁹Moreover, we do not find significant crowding-out effects of the debt relief initiatives on other aid flows (total grants and loans) which confirms the realization of a net fiscal space induced by these initiatives.

¹⁰Note that convergence in the IRFs attests the absence of unit root in our panel VAR (stable necessary condition). IRF are only interpreted for significant results.

Table 1.2: Debt relief impacts on public spending.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Dep. var.:	GINVT				CRPREXP			
TTREV t-1	0.069 (0.067)	0.068 (0.067)			0.294*** (0.043)	0.298*** (0.043)		
TTREV t-2	0.068 (0.069)	0.064 (0.069)			-0.040 (0.044)	-0.037 (0.044)		
REVNFO t-1			-0.050 (0.081)	-0.049 (0.081)			0.357*** (0.053)	0.368*** (0.053)
REVNFO t-2			0.113 (0.081)	0.105 (0.081)			-0.214*** (0.053)	-0.215*** (0.052)
CRPREXP t-1	0.012 (0.066)	0.013 (0.066)	0.069 (0.065)	0.070 (0.065)	0.403*** (0.042)	0.394*** (0.042)	0.449*** (0.042)	0.439*** (0.042)
CRPREXP t-2	-0.027 (0.063)	-0.024 (0.063)	-0.030 (0.063)	-0.027 (0.063)	0.045 (0.041)	0.047 (0.040)	0.116*** (0.041)	0.120*** (0.041)
GINVT t-1	0.174*** (0.044)	0.171*** (0.044)	0.193*** (0.043)	0.190*** (0.043)	-0.076*** (0.028)	-0.075*** (0.028)	-0.045 (0.028)	-0.044 (0.028)
GINVT t-2	0.061 (0.043)	0.065 (0.044)	0.075* (0.042)	0.079* (0.042)	0.030 (0.028)	0.030 (0.028)	0.056** (0.028)	0.057** (0.027)
DFINA t-1	0.009 (0.018)	0.009 (0.018)	0.006 (0.018)	0.006 (0.018)	0.016 (0.012)	0.016 (0.011)	0.007 (0.012)	0.007 (0.012)
DFINA t-2	-0.025 (0.018)	-0.025 (0.018)	-0.029 (0.018)	-0.029 (0.018)	-0.008 (0.011)	-0.008 (0.011)	-0.008 (0.012)	-0.008 (0.011)
TTGRANT t-1	0.226*** (0.072)	0.218*** (0.072)	0.215*** (0.072)	0.208*** (0.072)	0.011 (0.046)	0.013 (0.046)	-0.047 (0.047)	-0.048 (0.046)
TTGRANT t-2	-0.134* (0.071)	-0.138* (0.071)	-0.154** (0.070)	-0.158** (0.070)	0.082* (0.046)	0.092** (0.045)	0.058 (0.046)	0.067 (0.045)
TTLOAN t-1	0.142** (0.061)	0.145** (0.061)	0.142** (0.061)	0.146** (0.061)	0.104*** (0.039)	0.100** (0.039)	0.106*** (0.040)	0.103*** (0.040)
TTLOAN t-2	0.182*** (0.060)	0.186*** (0.060)	0.179*** (0.060)	0.183*** (0.060)	-0.048 (0.039)	-0.052 (0.039)	-0.049 (0.039)	-0.053 (0.039)
DEBT RELIEF t-1	0.353** (0.180)		0.351* (0.180)		-0.095 (0.116)		-0.112 (0.117)	
DEBT RELIEF t-2	0.022 (0.176)		0.003 (0.176)		0.160 (0.113)		0.147 (0.114)	
HIPC_RELIEF t-1		0.469** (0.199)		0.466** (0.200)		-0.086 (0.128)		-0.077 (0.129)
HIPC_RELIEF t-2		0.003 (0.197)		-0.004 (0.198)		0.018 (0.126)		-0.011 (0.128)
MDRI_RELIEF t-1		-0.357 (0.572)		-0.341 (0.574)		-0.225 (0.367)		-0.414 (0.371)
MDRI_RELIEF t-2		0.324 (0.559)		0.257 (0.562)		0.875** (0.359)		0.979*** (0.363)
Constant	-0.677 (1.684)	-0.186 (1.731)	-0.084 (1.800)	0.457 (1.848)	0.920 (1.085)	0.335 (1.109)	1.144 (1.168)	0.574 (1.194)
Country/time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.665	0.666	0.664	0.665	0.673	0.677	0.667	0.671
χ^2 test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	637	637	637	637	637	637	637	637

Notes: The table reports VAR equations only for government investment and current primary expenditures. Coefficients are exposed with, in brackets, their associated standard errors. t-1 and t-2 reflects variables with respectively one and two period lags. Country and time fixed effects (FE) are included as exogenous block. ***, ** and * denote significance at 10%, 5% and 1%.

1.4.2 Dynamic fiscal effects of debt relief on tax mobilization

Table 1.3 presents the results from the equations of our panel VAR that model the effect of different fiscal variables on total domestic revenue. We expose results for our two revenue variables (total domestic revenue and revenue net from natural resources receipts) and using alternately aggregate and disaggregated debt relief variables. As for public investment and current primary expenditures equations, domestic revenue seem to be persistent over time, with an increase in the past period also being associated with a current increase.

Columns I—IV expose results for our broader measure of domestic revenue. Column I and II show a positive debt relief impact on the total domestic revenue. When we differentiate between HIPC and MDRI, we find that this positive impact seems to be essentially due to debt relief granted under the MDRI.

Nevertheless, as explained in the previous section, there is a risk that positive correlation between debt relief and total domestic revenue might be due to the spike in oil prices that occurred in the mid-2000s. Some countries of our sample rely significantly on oil-related revenue (Chad, Cameroon) and received debt relief around the same period. In order to identify the debt relief effects on genuine domestic effort in terms of tax collection, it would be therefore preferable to look at the effects on revenue net from oil and other natural resources receipts.

Columns V-VI in Table 1.3 thus report estimates where revenue net from natural resources receipts is the dependent variable. Once again, tax revenue are positively associated with their past values. Moreover, debt service savings from debt relief taken as a whole is still positively and significantly associated with tax revenue. However, conversely to results in column (II), it now seems more difficult to identify the initiative responsible for such effect.

Lastly, since resource rich countries have a larger share of their revenue derived from natural resources related activities which can impact both revenue and the GDP, we also run panel VAR models excluding three countries of our sample that have (on average and over the period considered) at least 25% of their domestic revenue stemming from the natural resources sector. This leads us to remove from the sample Cameroon (with 32% of its domestic revenue derived from the oil sector), Chad (with 25% of total domestic revenue as oil revenue) and Guinea (with 36% of revenue related to the mining sector). Columns (III), (IV), (VII) and (VIII) expose the results. Excluding these resource-rich countries does not distort the results. Debt service savings from debt relief are significant at the 5% level with the aggregate measure of domestic revenue and significant at almost 5% (the associated p-value is equal to 0.051) with the revenue net from natural resources receipts. Using this last measure, we also notice that as before, the effect from the overall debt relief seems to be driven by the MDRI. As a result, and although not obvious in the impulse response function (see Figure 1.A1 in the Appendix, p.26), it is likely that debt relief under the MDRI is the key driver of the positive reaction of domestic revenues to debt relief. So to conclude, if we consider debt relief as a whole (which is more intuitive when looking at the impact on domestic revenue), results suggest that an increase in debt service savings of 10% in the previous year is associated with an increase between 1.5 and 1.9% in domestic revenue (net from natural resources receipts and grants) as a share of GDP two years after.

Table 1.3: Debt relief impacts on total domestic revenues (gross and net from oil).

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Dep. var.:	TTREV				REV_NFO			
TTREV t-1	0.663*** (0.043)	0.664*** (0.043)	0.516*** (0.045)	0.516*** (0.045)				
TTREV t-2	0.007 (0.044)	0.006 (0.044)	-0.024 (0.043)	-0.022 (0.043)				
REVNFO t-1					0.588*** (0.042)	0.590*** (0.042)	0.578*** (0.045)	0.579*** (0.045)
REVNFO t-2					-0.043 (0.042)	-0.048 (0.042)	-0.019 (0.046)	-0.020 (0.046)
CRPREXP t-1	-0.017 (0.042)	-0.021 (0.042)	-0.009 (0.038)	-0.012 (0.038)	-0.029 (0.034)	-0.030 (0.034)	-0.037 (0.037)	-0.039 (0.037)
CRPREXP t-2	0.007 (0.040)	0.010 (0.040)	0.016 (0.036)	0.015 (0.036)	0.026 (0.033)	0.028 (0.033)	0.024 (0.036)	0.025 (0.036)
GINVT t-1	-0.018 (0.028)	-0.019 (0.028)	-0.021 (0.025)	-0.021 (0.025)	-0.004 (0.022)	-0.005 (0.022)	-0.009 (0.024)	-0.010 (0.024)
GINVT t-2	0.004 (0.028)	0.007 (0.028)	-0.004 (0.025)	-0.004 (0.025)	-0.000 (0.022)	0.002 (0.022)	-0.006 (0.024)	-0.005 (0.024)
DFINA t-1	-0.004 (0.011)	-0.004 (0.011)	-0.010 (0.010)	-0.010 (0.010)	-0.020** (0.009)	-0.019** (0.009)	-0.018* (0.010)	-0.018* (0.010)
DFINA t-2	-0.008 (0.011)	-0.008 (0.011)	-0.012 (0.010)	-0.012 (0.010)	-0.006 (0.009)	-0.006 (0.009)	-0.004 (0.010)	-0.004 (0.010)
TTGRANT t-1	0.002 (0.046)	-0.003 (0.046)	0.060 (0.049)	0.062 (0.049)	0.044 (0.037)	0.040 (0.037)	0.066 (0.048)	0.063 (0.049)
TTGRANT t-2	0.021 (0.045)	0.023 (0.045)	0.015 (0.048)	0.019 (0.048)	0.020 (0.037)	0.019 (0.037)	0.012 (0.047)	0.014 (0.047)
TTLOAN t-1	0.052 (0.039)	0.053 (0.039)	0.047 (0.035)	0.047 (0.035)	0.038 (0.032)	0.039 (0.032)	0.040 (0.035)	0.041 (0.035)
TTLOAN t-2	-0.015 (0.038)	-0.014 (0.038)	-0.004 (0.035)	-0.007 (0.035)	-0.017 (0.031)	-0.015 (0.031)	-0.021 (0.034)	-0.021 (0.034)
DEBT RELIEF t-1	-0.064 (0.115)		0.039 (0.102)		-0.033 (0.094)		-0.001 (0.100)	
DEBT RELIEF t-2	0.187* (0.113)		0.215** (0.100)		0.152* (0.092)		0.192* (0.098)	
HIPC_RELIEF t-1		0.013 (0.127)		0.046 (0.111)		0.032 (0.104)		0.046 (0.109)
HIPC_RELIEF t-2		0.106 (0.126)		0.160 (0.110)		0.123 (0.103)		0.139 (0.108)
MDRI_RELIEF t-1		-0.571 (0.366)		-0.055 (0.333)		-0.436 (0.299)		-0.357 (0.328)
MDRI_RELIEF t-2		0.724** (0.358)		0.535 (0.328)		0.414 (0.293)		0.594* (0.323)
Constant	2.375** (1.077)	2.397** (1.107)	5.324*** (1.015)	5.126*** (1.032)	5.372*** (0.938)	5.561*** (0.963)	5.964*** (0.994)	5.939*** (1.018)
Country/time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Resource-rich countries	Yes	Yes	No	No	Yes	Yes	No	No
R-Squared	0.740	0.741	0.765	0.765	0.795	0.795	0.773	0.774
χ^2 test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	637	637	588	588	637	637	558	558

Notes: The table reports VAR equations only for total domestic revenue and total domestic revenue net from oil. Coefficients are exposed with, in brackets, their associated standard errors. t-1 and t-2 reflects variables with respectively one and two period lags. Country and time fixed effects (FE) are included as exogenous block. ***, ** and * denote significance at 10%, 5% and 1%.

1.4.3 Bad payers versus good payers: does being a good payer increase relative impact?

As exposed above, our measure of debt relief might be subject to the criticism that, in the absence of debt relief, debt would not have been serviced (at least fully). In such a case, cash flow gains from debt relief would be closed to zero. In order to consider that debt relief's benefits are not as high for bad payers as for good payers, we then split our sample in two sub-samples; the bad and good payers. This distinction is based on the share of long-term debt arrears of HIPC countries the year before the HIPC initiative was made public, so in 1995. We decided to focus on 1995 because once the initiative made public (in 1996), some HIPC countries would have been tempted to not reimburse their debt and accumulate arrears in order to breach the insolvency threshold and get debt relief from international financial institutions. This differentiation leads the bad payers' sub-sample to include eleven countries for which the share of long-term debt arrears over the external debt was higher than 10% in 1995. The good payers' sub-sample contains the remaining thirteen countries for which this share was below 10% the same year.

However this proxy for the government's willingness to pay should be taken cautiously since Table 1.A3 (p.30 in the Appendix) exposes level of arrears that are relatively low as compared with what one would have expected. Explanations for such low stock of arrears can be found in the ever greening practice from international financial institutions which, over the 1990s, continued to provide loans (Geginat and Kraay, 2012) (and even grants¹¹) to these countries in order to make them able to repay the old ones. Therefore, since the stock of arrears does not take this potential defensive lending into account, one could consider that our proxy reflects more potential disagreements between governments and IFIs in debt repaying procedures rather than the exact measure of willingness to pay. That said, to our knowledge, building a proxy for the state's willingness to pay that accounts for defensive lending would require a loan-by-loan approach which, as regards sub-Saharan African HIPC countries, seems quite unrealistic given the data availability and the blurred boundary between what could be considered as defensive lending and what cannot. That is why we finally decided to keep the stock of arrears as our proxy for the government's willingness to pay, although we acknowledge this proxy has some limits.

Table 1.4 shows the results on public spending for bad payers only. The impact of debt relief on capital expenditures is positive and significant at the 10% level though we do not know which program (HIPC or MDRI) fuels this effect. But the magnitude of the debt relief coefficient now ranges between 0.30 and 0.26 which is less than when we considered the entire sample. This seems consistent with the fiscal space prediction suggesting that fiscal space created by the Enhanced HIPC initiative should be less important for countries which were not fully servicing their debt prior cancellations. Conversely, the impact of debt relief on public investment for countries that did honor their debt service is quite interesting. Table 1.5 indeed exposes a positive and significant (though only at the 10% level) impact for HIPC debt relief that is almost three times larger than the one found for bad payers and for the whole sample, although maybe less perennial according to the IRFs.¹² This also supports the fiscal space intuition arguing that, conversely to the situation for bad payers, countries which were previously repaying their

¹¹Cf. Marchesi and Missale (2013).

¹²See Figure 1.A2 (p.27) and 1.A3 (p.27) the Appendix. Convergence in IRFs for the two sub-samples also verifies the stable condition of the corresponding panel VAR.

debt should have benefited from a significant fiscal space when international creditors decided to cancel their debt down to sustainable levels. Broadly speaking, it basically means that debt relief has been more effective in terms of public investment for countries which were meeting their liabilities prior to the HIPC initiative (and that maybe also had better institutions).

Furthermore, columns (V) and (VII) show that this larger fiscal space perceived by good payers also helped to increase current primary expenditures two years after the debt relief provision (and according to column (VI) after debt relief provided under the Enhanced HIPC initiative). This is quite consistent with Table 1.2 (p.16) findings, where increase in current primary expenditures due to debt relief was probably intended to finance running costs associated with investment initially undertaken thanks to the first wave of resources freed up by the Enhanced HIPC initiative (in the case of good payers).

Lastly, looking at Table 1.6 which presents results for good and bad payers on domestic revenue, we find that debt relief provided under the Enhanced HIPC initiative has had a positive and significant impact on revenue net from natural resources for good payers.

Following the debt overhang theory developed by Krugman (1988), such fiscal reaction might be motivated by the fact that, before benefiting from debt relief, external creditors were putting substantial pressure on highly indebted countries' governments as regards debt repayments. Therefore, the additional tax receipts that indebted countries might have collected would have been immediately grabbed by creditors. Then, it would have been more interesting for those indebted countries not to engage in such tax collection effort, not reimburse debt service and to await debt relief before implementing such policy which could then favor directly the domestic public administration and not be "expropriated" by external creditors.

In addition other conditionality effects might be at play since eligible criteria prior to the Enhanced HIPC initiative also required to implement macroeconomic reforms such as tax base improvements and better tax collection. The reason for larger impacts on domestic revenue for good payers could be thus explained by the fact that good payers probably have better institutions and therefore strongly stuck to IMF and IDA recommendations in order to get debt relief, which *in fine* might have helped to improve domestic revenue mobilization. In contrast with the domestic revenue response for bad payers, we see that the magnitude of the debt relief effect on domestic revenue is less important and less robust for good payers, which does not go in favor of this conditionality argument, even though one can be dubious about the real impact of debt relief on taxation for bad payers since the coefficient becomes not statistically significant when we use our preferred measure of domestic revenue (column (VII)).

Table 1.4: Debt relief impacts on public spending - Bad payers only.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Dep. var.:	GINVT				CRPREXP			
TTREV t-1	-0.106 (0.082)	-0.107 (0.082)			0.490*** (0.080)	0.492*** (0.079)		
TTREV t-2	0.061 (0.078)	0.067 (0.079)			-0.229*** (0.076)	-0.197*** (0.076)		
REVNFO t-1			-0.107 (0.081)	-0.102 (0.081)			0.539*** (0.078)	0.555*** (0.077)
REVNFO t-2			0.146* (0.083)	0.145* (0.084)			-0.292*** (0.080)	-0.282*** (0.079)
CRPREXP t-1	0.099 (0.066)	0.095 (0.067)	0.076 (0.066)	0.072 (0.067)	0.387*** (0.064)	0.361*** (0.064)	0.379*** (0.064)	0.350*** (0.063)
CRPREXP t-2	-0.072 (0.064)	-0.072 (0.064)	-0.098 (0.064)	-0.096 (0.064)	0.110* (0.062)	0.100 (0.061)	0.134** (0.061)	0.134** (0.060)
GINVT t-1	0.344*** (0.083)	0.344*** (0.083)	0.334*** (0.080)	0.333*** (0.080)	-0.381*** (0.081)	-0.364*** (0.080)	-0.314*** (0.077)	-0.299*** (0.076)
GINVT t-2	-0.037 (0.082)	-0.039 (0.082)	-0.040 (0.075)	-0.040 (0.075)	0.242*** (0.080)	0.227*** (0.079)	0.224*** (0.072)	0.222*** (0.071)
DFINA t-1	-0.012 (0.017)	-0.012 (0.017)	-0.009 (0.017)	-0.009 (0.017)	0.024 (0.017)	0.024 (0.016)	0.019 (0.016)	0.019 (0.016)
DFINA t-2	-0.051*** (0.017)	-0.051*** (0.017)	-0.051*** (0.017)	-0.051*** (0.017)	-0.022 (0.017)	-0.021 (0.016)	-0.012 (0.016)	-0.012 (0.016)
TTGRANT t-1	0.158 (0.099)	0.160 (0.099)	0.176* (0.099)	0.176* (0.099)	0.066 (0.097)	0.065 (0.095)	0.024 (0.095)	0.022 (0.093)
TTGRANT t-2	-0.203** (0.096)	-0.204** (0.095)	-0.207** (0.095)	-0.209** (0.095)	0.063 (0.093)	0.061 (0.092)	0.077 (0.091)	0.068 (0.089)
TTLOAN t-1	0.041 (0.096)	0.036 (0.097)	0.032 (0.095)	0.029 (0.096)	0.248*** (0.093)	0.215** (0.093)	0.257*** (0.092)	0.224** (0.091)
TTLOAN t-2	0.443*** (0.096)	0.448*** (0.096)	0.458*** (0.094)	0.461*** (0.094)	-0.024 (0.094)	-0.027 (0.093)	-0.046 (0.090)	-0.051 (0.089)
DEBT RELIEF t-1	0.187 (0.162)		0.192 (0.162)		-0.025 (0.158)		-0.098 (0.156)	
DEBT RELIEF t-2	0.302* (0.158)		0.265* (0.159)		-0.002 (0.154)		0.051 (0.153)	
HIPC_RELIEF t-1		0.226 (0.177)		0.218 (0.176)		-0.096 (0.170)		-0.122 (0.167)
HIPC_RELIEF t-2		0.259 (0.174)		0.230 (0.176)		-0.119 (0.168)		-0.125 (0.166)
MDRI_RELIEF t-1		-0.120 (0.597)		-0.015 (0.599)		0.607 (0.575)		0.168 (0.566)
MDRI_RELIEF t-2		0.647 (0.581)		0.528 (0.575)		0.702 (0.559)		1.136** (0.543)
Constant	1.565 (1.691)	1.496 (1.799)	1.255 (1.557)	1.188 (1.642)	1.214 (1.649)	-0.484 (1.731)	2.687* (1.498)	1.196 (1.552)
Country/time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.875	0.875	0.876	0.876	0.658	0.668	0.669	0.681
χ^2 test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	265	265	265	265	265	265	265	265

Notes: The table reports VAR equations only for government investment and current primary expenditures. Coefficients are exposed with, in brackets, their associated standard errors. t-1 and t-2 reflects variables with respectively one and two period lags. Country and time fixed effects (FE) are included as exogenous block. ***, ** and * denote significance at 10%, 5% and 1%.

Table 1.5: Debt relief impacts on public spending - Good payers only.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Dep. var.:	GINVT				CRPREXP			
TTREV t-1	0.129 (0.100)	0.137 (0.100)			0.193*** (0.044)	0.200*** (0.044)		
TTREV t-2	0.091 (0.108)	0.089 (0.109)			0.057 (0.048)	0.048 (0.048)		
REVNFO t-1			0.040 (0.146)	0.045 (0.146)			0.076 (0.068)	0.081 (0.067)
REVNFO t-2			-0.004 (0.142)	-0.015 (0.142)			-0.063 (0.065)	-0.075 (0.065)
CRPREXP t-1	-0.013 (0.125)	-0.030 (0.124)	0.100 (0.118)	0.087 (0.118)	0.457*** (0.055)	0.447*** (0.055)	0.592*** (0.054)	0.585*** (0.054)
CRPREXP t-2	-0.005 (0.120)	-0.012 (0.119)	0.068 (0.118)	0.064 (0.117)	-0.016 (0.053)	-0.019 (0.052)	0.069 (0.054)	0.066 (0.054)
GINVT t-1	0.039 (0.053)	0.031 (0.053)	0.059 (0.053)	0.052 (0.053)	-0.027 (0.024)	-0.032 (0.023)	-0.003 (0.024)	-0.007 (0.024)
GINVT t-2	0.018 (0.053)	0.021 (0.053)	0.034 (0.052)	0.039 (0.053)	-0.005 (0.023)	-0.000 (0.023)	0.014 (0.024)	0.019 (0.024)
DFINA t-1	0.015 (0.037)	0.017 (0.037)	0.002 (0.037)	0.004 (0.037)	0.022 (0.016)	0.023 (0.016)	0.006 (0.017)	0.007 (0.017)
DFINA t-2	-0.021 (0.037)	-0.017 (0.037)	-0.028 (0.037)	-0.025 (0.036)	0.018 (0.016)	0.019 (0.016)	0.010 (0.017)	0.012 (0.017)
TTGRANT t-1	0.266*** (0.099)	0.243** (0.100)	0.206** (0.097)	0.181* (0.097)	0.089** (0.044)	0.069 (0.044)	0.015 (0.045)	-0.006 (0.045)
TTGRANT t-2	-0.020 (0.099)	-0.046 (0.100)	-0.074 (0.096)	-0.097 (0.098)	0.029 (0.044)	0.015 (0.044)	-0.029 (0.044)	-0.038 (0.045)
TTLOAN t-1	0.030 (0.080)	0.053 (0.081)	0.028 (0.081)	0.050 (0.081)	0.098*** (0.036)	0.114*** (0.035)	0.096** (0.037)	0.110*** (0.037)
TTLOAN t-2	-0.053 (0.080)	-0.026 (0.082)	-0.041 (0.081)	-0.017 (0.082)	-0.082** (0.036)	-0.066* (0.036)	-0.066* (0.037)	-0.053 (0.038)
DEBT RELIEF t-1	0.357 (0.434)		0.311 (0.440)		-0.216 (0.192)		-0.263 (0.203)	
DEBT RELIEF t-2	-0.301 (0.421)		-0.362 (0.429)		0.486*** (0.186)		0.400** (0.198)	
HIPC_RELIEF t-1		0.886* (0.532)		0.843 (0.539)		0.210 (0.234)		0.164 (0.247)
HIPC_RELIEF t-2		-0.215 (0.501)		-0.337 (0.507)		0.429* (0.220)		0.284 (0.232)
MDRI_RELIEF t-1		-0.733 (0.924)		-0.844 (0.929)		-1.227*** (0.406)		-1.330*** (0.425)
MDRI_RELIEF t-2		0.001 (0.911)		0.077 (0.915)		1.040*** (0.400)		1.090*** (0.419)
Constant	0.515 (2.369)	1.256 (2.392)	1.347 (2.863)	2.141 (2.886)	-0.654 (1.050)	-0.147 (1.051)	0.646 (1.321)	1.193 (1.322)
Country/time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.321	0.327	0.311	0.312	0.781	0.786	0.759	0.765
χ^2 test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	372	372	372	372	372	372	372	372

Notes: The table reports VAR equations only for government investment and current primary expenditures. Coefficients are exposed with, in brackets, their associated standard errors. t-1 and t-2 reflects variables with respectively one and two period lags. Country and time fixed effects (FE) are included as exogenous block. ***, ** and * denote significance at 10%, 5% and 1%.

Table 1.6: Debt relief impacts on domestic revenue - Good vs. Bad payers.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
	Good Payers only				Bad Payers only			
Dep. var.:	TTREV		REVNFO		TTREV		REVNFO	
TTREV T-1	0.709*** (0.056)	0.724*** (0.055)			0.496*** (0.068)	0.498*** (0.067)		
TTREV T-2	0.048 (0.061)	0.020 (0.060)			-0.056 (0.064)	-0.047 (0.065)		
REVNFO T-1			0.576*** (0.053)	0.582*** (0.052)			0.577*** (0.068)	0.575*** (0.068)
REVNFO T-2			-0.050 (0.052)	-0.066 (0.051)			-0.038 (0.070)	-0.039 (0.070)
CRPREXP T-1	0.144** (0.070)	0.140** (0.069)	0.081* (0.043)	0.075* (0.042)	-0.010 (0.055)	-0.017 (0.055)	-0.058 (0.055)	-0.055 (0.056)
CRPREXP T-2	-0.102 (0.067)	-0.101 (0.066)	-0.070 (0.043)	-0.072* (0.042)	0.063 (0.053)	0.058 (0.053)	0.064 (0.053)	0.063 (0.053)
GINVT T-1	0.021 (0.030)	0.018 (0.029)	0.016 (0.019)	0.013 (0.019)	-0.111 (0.069)	-0.103 (0.069)	-0.044 (0.067)	-0.045 (0.067)
GINVT T-2	0.007 (0.029)	0.020 (0.029)	0.007 (0.019)	0.015 (0.019)	0.052 (0.068)	0.047 (0.067)	0.041 (0.063)	0.041 (0.063)
DFINA T-1	0.037* (0.021)	0.038* (0.020)	0.023* (0.013)	0.024* (0.013)	-0.019 (0.014)	-0.019 (0.014)	-0.035** (0.014)	-0.035** (0.014)
DFINA T-2	0.025 (0.020)	0.025 (0.020)	0.023* (0.013)	0.024* (0.013)	-0.026* (0.014)	-0.025* (0.014)	-0.015 (0.014)	-0.015 (0.014)
TTGRANT T-1	-0.013 (0.055)	-0.046 (0.055)	0.054 (0.035)	0.032 (0.035)	0.083 (0.082)	0.081 (0.082)	0.060 (0.083)	0.060 (0.083)
TTGRANT T-2	-0.007 (0.055)	-0.010 (0.055)	-0.009 (0.035)	-0.011 (0.035)	0.025 (0.079)	0.024 (0.079)	0.026 (0.079)	0.027 (0.079)
TTLOAN T-1	0.102** (0.045)	0.119*** (0.044)	0.070** (0.029)	0.083*** (0.029)	0.068 (0.079)	0.058 (0.080)	0.047 (0.080)	0.050 (0.080)
TTLOAN T-2	-0.020 (0.045)	-0.013 (0.045)	0.005 (0.029)	0.013 (0.029)	-0.025 (0.080)	-0.032 (0.079)	-0.046 (0.078)	-0.046 (0.079)
DEBT RELIEF T-1	-0.193 (0.243)		0.014 (0.160)		0.076 (0.135)		0.017 (0.136)	
DEBT RELIEF T-2	0.081 (0.235)		0.058 (0.156)		0.243* (0.131)		0.145 (0.133)	
HIPC_RELIEF T-1		0.411 (0.293)		0.441** (0.193)		0.005 (0.146)		0.013 (0.148)
HIPC_RELIEF T-2		-0.313 (0.276)		-0.170 (0.182)		0.234 (0.144)		0.166 (0.147)
MDRI_RELIEF T-1		-1.960*** (0.509)		-1.174*** (0.333)		0.678 (0.494)		0.043 (0.501)
MDRI_RELIEF T-2		1.643*** (0.502)		1.028*** (0.328)		0.211 (0.480)		0.000 (0.481)
Constant	0.398 (1.327)	0.894 (1.318)	4.857*** (1.043)	5.331*** (1.034)	3.900*** (1.402)	3.198** (1.486)	2.142* (1.302)	2.274* (1.373)
Country/time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.791	0.800	0.859	0.865	0.732	0.735	0.763	0.764
χ^2 test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	372	372	372	372	265	265	265	265

Notes: The table reports VAR equations only for total domestic revenue and total domestic revenue net from oil. Coefficients are exposed with, in brackets, their associated standard errors. t-1 and t-2 reflects variables with respectively one and two period lags. Country and time fixed effects (FE) are included as exogenous block. ***, ** and * denote significance at 10%, 5% and 1%.

Conclusion

Over the last 20 years, debt relief has been added to the tools of development interventions used by bilateral donors at the macro level as well as multilateral development organizations as the World Bank, the International Monetary Fund, African Development Bank, and the Inter-American Development Bank. As with other development interventions such as (concessional) loans and grants, there is a substantial body of literature describing how, in theory, debt relief could lead to growth and poverty reduction. Now that over USD 76 billion worth of debt relief (in present value terms) has been given through HIPC and MDRI, the question emerges if these benefits can also be established empirically.

In this paper, we use a standard Vector Auto Regressive fiscal response model. Unlike the standard "aid-growth" literature, these models explicitly acknowledge that aid is given primarily to the government, and that any impact of aid on the economy will hence depend on government behavior, in particular how fiscal decisions on taxation and expenditure are affected by aid revenues (Franco-Rodriguez et al., 1998; Franco-Rodriguez, 2000). Throughout this study, we focus on the fiscal response effects of debt relief as an alternative instrument of aid delivery on three important fiscal variables. We make a distinction between HIPC and MDRI, as the logic behind these two debt relief initiatives is quite different. In addition we also differentiate the fiscal response of debt relief according to the credit history of beneficiary countries.

Using appropriate panel vector autoregressive models, we do find positive and substantial effects for aggregate debt relief on public investment. Moreover, when we differentiate debt relief between HIPC and MDRI, we observe that debt relief under HIPC fosters capital expenditures with a stronger effect for countries that were repaying their debt, providing empirical support to the fiscal space predictions. According to our result, debt relief under the MDRI also favors fiscal space creation which seems more targeted to current primary expenditures than capital spending. We feel this may be because HIPC came with a close follow-up of public spending financed by debt relief and strong conditionality at completion point. Threats of not meeting donors' expectations leading to less debt reduction in the future were credible. Debt relief after completion point and MDRI is different, as it consists in irrevocable debt relief granted to HIPC's governments. Nevertheless, MDRI impacts on current primary expenses can be either considered as a "back to normal" behavior from government or an increasing financial support (operating costs) for public investment achieved through the HIPC initiative.

Lastly, although this study shows that debt relief generates fiscal space, one might wonder whether this fiscal space is expected to be perennial and serve economic growth in the short- and medium-run. Hence, for fiscal space created by debt relief to be sustainable and effective, other types of fiscal revenue should respond positively as well (Addison, 2008). We find that aggregate debt relief has this sort of crowding in effect on domestic revenue mobilization, although we do not know exactly through which initiative this effect might be fueled. Furthermore, the response of tax revenue following the decomposition between good and bad payers brings additional support to the debt overhang theory and also emphasizes potential conditionality effects related to eligible criteria which would deserve to be investigated in depth.

In overall, it seems that the Enhanced HIPC initiative had led to significant fiscal space that fostered public investment in the benefiting countries. However, the lack of conditionality attached to MDRI did not result in similar increase in capital expenditures, although positive effects on current primary expenditures might be seen as supplementary financing for running costs associated with investment undertaken under the Enhanced HIPC. Moreover, a robust positive effect of MDRI on domestic revenue mobilization is lacking, casting doubt about the sustainability of the fiscal space created by these debt relief initiatives.

Appendix

Figure 1.A1: Impulse response function to debt relief flows.

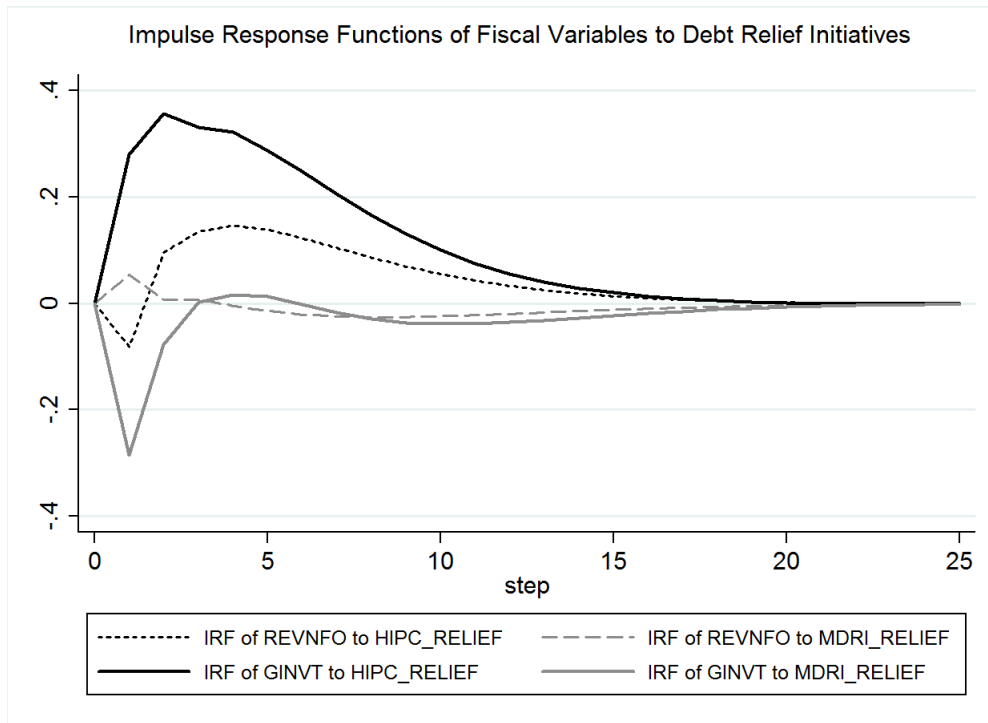


Figure 1.A2: Impulse response function to debt relief flows.

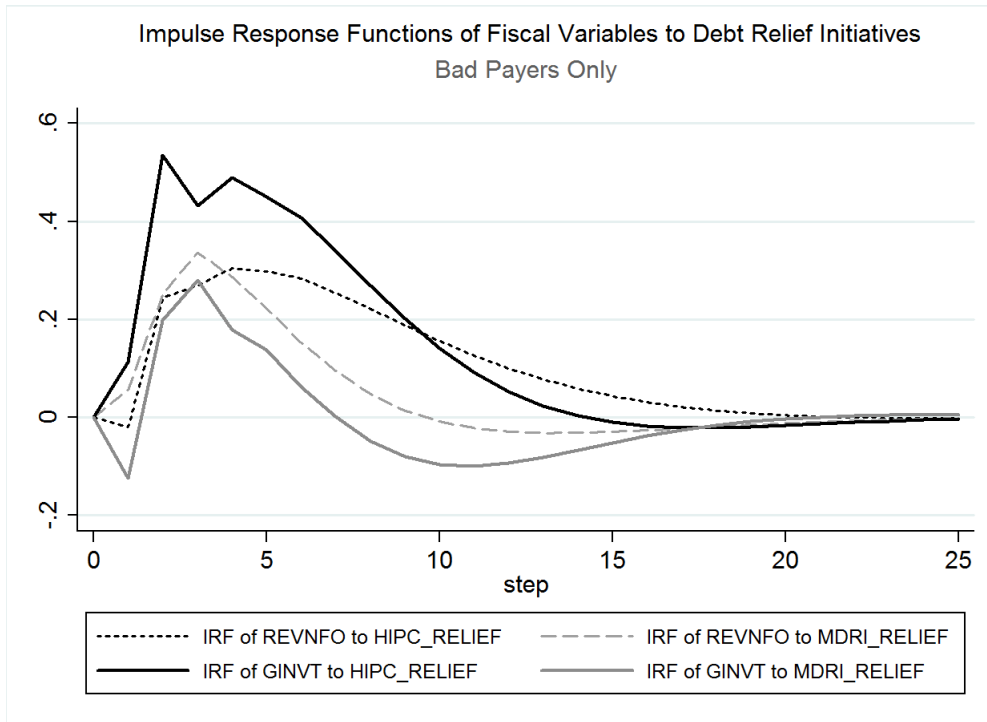


Figure 1.A3: Impulse response function to debt relief flows.

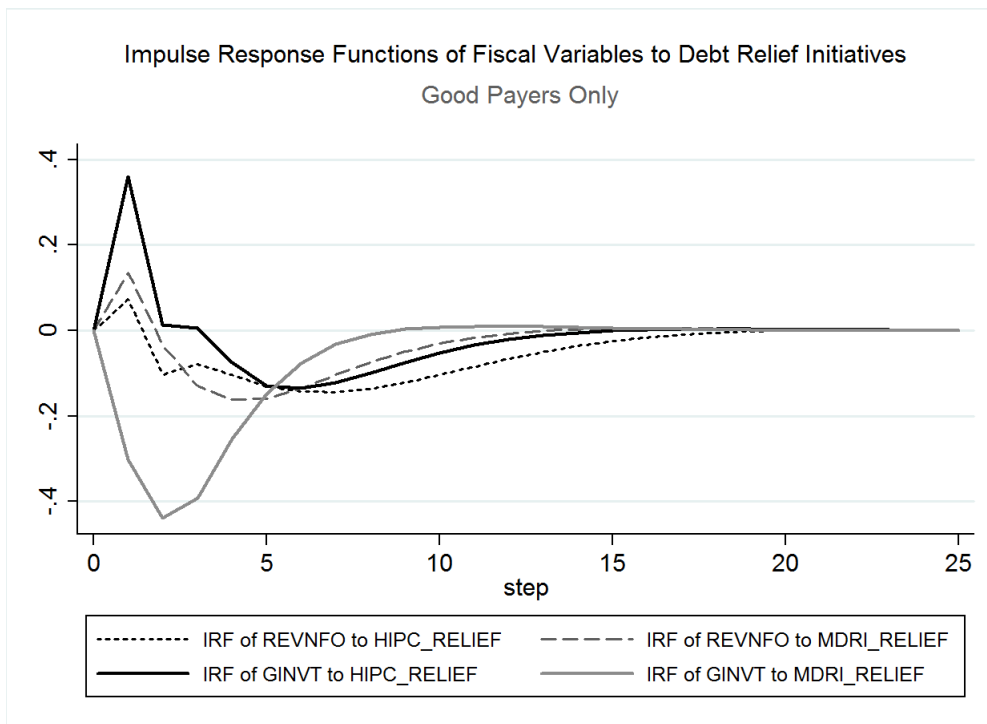


Table 1.A1: Variables description, observation and descriptive statistics.

Variables	Description and <i>Sources</i>	Observations	Mean	Std. Dev.
TTREV	Total domestic revenue (tax and non-tax revenue, including oil revenue) net of external grants (in percentage of GDP). <i>Article IV and Staff Report (IMF documents)</i>	643	15.332	5.601
REVNFO	Total domestic revenue (tax and non-tax revenue, excluding oil revenue) net of external grants (in percentage of GDP). <i>Article IV and Staff Report (IMF documents)</i>	643	14.026	5.145
CRPREXP	Current primary government expenditures, net of interest payments (in percentage of GDP). <i>Article IV and Staff Report (IMF documents)</i>	643	13.504	5.024
GINVT	Government investment, as defined by capital expenditures in IMF documents (in percentage of GDP). <i>Article IV and Staff Report (IMF documents)</i>	643	9.647	7.804
DFINA	Domestic financing, from the central and other commercial banks (in percentage of GDP). <i>Article IV and Staff Report (IMF documents)</i>	643	1.623	10.769
TTGRANT	Total grants received by the country, excluding debt relief grants (in percentage of GDP). <i>Article IV and Staff Report (IMF documents)</i>	643	5.432	5.292
TTLOAN	Total loans received by the country (in percentage of GDP). <i>Article IV and Staff Report (IMF documents)</i>	643	4.133	4.957
DEBT_RELIEF	Debt service savings (aggregate): debt service savings from HIPC + debt service savings from MDRI. (in percentage of GDP). <i>Status of Implementation (IMF Documents)</i>	648	1.045	2.129
HIPC_RELIEF	Debt service savings from HIPC; authors' computation (in percentage of GDP). <i>Status of Implementation (IMF Documents)</i>	648	0.804	1.739
MDRI_RELIEF	Debt service savings from MDRI; authors' computation (in percentage of GDP). <i>Status of Implementation (IMF Documents)</i>	648	0.241	0.667

Table 1.A2: Debt relief impacts on public spending - with aggregate aid variables.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Dep. var.:	GINVT				CRPREXP			
TTREV t-1	0.072 (0.067)	0.072 (0.067)			0.296*** (0.043)	0.299*** (0.043)		
TTREV t-2	0.092 (0.069)	0.091 (0.069)			-0.046 (0.044)	-0.045 (0.044)		
REVNFO t-1			-0.060 (0.082)	-0.058 (0.082)			0.354*** (0.053)	0.365*** (0.053)
REVNFO t-2			0.119 (0.082)	0.113 (0.082)			-0.206*** (0.053)	-0.207*** (0.053)
CRPREXP t-1	0.010 (0.066)	0.009 (0.066)	0.081 (0.065)	0.080 (0.066)	0.401*** (0.042)	0.393*** (0.042)	0.446*** (0.042)	0.436*** (0.042)
CRPREXP t-2	-0.050 (0.063)	-0.049 (0.063)	-0.048 (0.064)	-0.046 (0.064)	0.050 (0.040)	0.053 (0.040)	0.111*** (0.041)	0.116*** (0.041)
GINVT t-1	0.179*** (0.044)	0.177*** (0.044)	0.201*** (0.043)	0.199*** (0.043)	-0.081*** (0.028)	-0.080*** (0.028)	-0.052* (0.028)	-0.051* (0.028)
GINVT t-2	0.039 (0.043)	0.042 (0.043)	0.057 (0.043)	0.060 (0.043)	0.038 (0.028)	0.038 (0.028)	0.060** (0.027)	0.062** (0.027)
DFINA t-1	0.017 (0.018)	0.017 (0.018)	0.014 (0.018)	0.014 (0.018)	0.014 (0.011)	0.013 (0.011)	0.008 (0.012)	0.007 (0.011)
DFINA t-2	-0.018 (0.018)	-0.017 (0.018)	-0.023 (0.018)	-0.022 (0.018)	-0.010 (0.011)	-0.011 (0.011)	-0.010 (0.012)	-0.010 (0.011)
AID t-1	0.180*** (0.045)	0.178*** (0.045)	0.173*** (0.045)	0.172*** (0.045)	0.064** (0.029)	0.062** (0.029)	0.041 (0.029)	0.038 (0.029)
AID t-2	0.042 (0.044)	0.042 (0.044)	0.028 (0.044)	0.028 (0.044)		0.009 (0.028)	-0.009 (0.028)	-0.007 (0.028)
DEBT RELIEF t-1	0.361** (0.181)		0.361** (0.182)		0.006 (0.028)		-0.117 (0.117)	
DEBT RELIEF t-2	0.019 (0.178)		-0.002 (0.178)		-0.099 (0.116)		0.153 (0.115)	
HIPC_RELIEF t-1		0.458** (0.201)		0.455** (0.202)	0.164 (0.114)	-0.088 (0.128)		-0.089 (0.129)
HIPC_RELIEF t-2		-0.019 (0.199)		-0.030 (0.200)		0.029 (0.127)		-0.001 (0.128)
MDRI_RELIEF t-1		-0.247 (0.575)		-0.214 (0.578)		-0.241 (0.367)		-0.377 (0.371)
MDRI_RELIEF t-2		0.386 (0.565)		0.310 (0.568)		0.847** (0.360)		0.953*** (0.364)
Constant	-0.972 (1.698)	-0.669 (1.742)	-0.115 (1.818)	0.227 (1.869)	1.026 (1.087)	0.501 (1.110)	1.225 (1.173)	0.640 (1.199)
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.659	0.660	0.656	0.657	0.671	0.674	0.664	0.668
Chi2 Test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	637	637	637	637	637	637	637	637

Notes: The table reports VAR equations only for government investment and current primary expenditures. Coefficients are exposed with, in brackets, their associated standard errors. t-1 and t-2 reflects variables with respectively one and two period lags. Country and time fixed effects (FE) are included as exogenous block. ***, ** and * denote significance at 10%, 5% and 1%.

Table 1.A3: Sample decomposition - Bad payers vs. Good payers.

Arrears (interest and capital on LDOD*) on external debt stock (DOD) in 1995 (%)			
Bad Payer		Good Payer	
Democratic Republic of Congo	56.69	Benin	4.87
Ethiopia	39.44	Burkina Faso	3.86
Guinea	13.98	Burundi	0.43
Guinea Bissau	37.92	Cameroon	7.74
Madagascar	39.05	Chad	5.23
Mali	12.50	Ghana	2.04
Mauritania	10.58	Malawi	0.39
Mozambique	17.91	Niger	8.09
Sao Tome & Principe	13.52	Rwanda	6.00
Tanzania	32.50	Senegal	1.56
Zambia	13.64	Sierra Leone	9.16
		The Gambia	0.67
		Uganda	8.17

Notes: Considered as bad payer when the ratio of interest and capital arrears on external debt stock is above 10%.

*LDOD: Long-term Debt Outstanding and Disbursed

Chapter 2

The Carrot and Stick Approach to Debt Relief: Overcoming Moral Hazard

2.1 Introduction

By the end of 2014, debt relief under the Enhanced Heavily Indebted Poor Countries (HIPC) initiative and the Multilateral Debt Relief Initiative (MDRI) was standing at a high of some USD76 billion (in net present value (NPV)) granted to 36 countries, including 30 in Sub-Saharan Africa.

These initiatives, which broke with international financial institutions (IFIs) doctrine in a first ever move to write off multilateral debt, were tied to strong public finance management conditionality such as tax system improvements. In addition, the debt overhang theory posits that governments granted debt relief are more willing to conduct tax reforms, since they can reap all the benefits of the reform outcomes (which no longer accrue to external creditors in the form of debt repayments). This theory combined with the HIPC program's conditionality suggests that debt relief may have positive effects on governments' tax effort, which is defined in this paper as the government's willingness to tax (or to collect taxes). However, the relationship is not that straightforward. Debt relief expectations could encourage eligible countries to deploy substantial tax efforts to satisfy IFIs' recommendations in order to become eligible for the program. Yet, once debt relief has been granted, governments may also cut their tax effort since there is no debt relief to acquire anymore. This paper therefore explores how debt relief provided under the Enhanced HIPC initiative and the MDRI impacts recipient governments' tax efforts and seeks to identify potential moral hazard effects at play in this relationship.

Since July 2015 and the third International Conference on Financing for Development in Addis Ababa, taxation has been restated as a cornerstone of economic development. Low-income countries (LICs) have been urged to raise more domestic revenues which, combined with traditional external financing flows, should help finance the ambitious Sustainable Development Goals (SDGs) by 2030. Yet tax systems in developing countries cannot be redesigned and improved overnight. It takes time and money. Historically, the improvement of tax systems supported by foreign aid has been mixed. Therefore, other forms of international intervention,

such as debt relief, could help beneficiary countries embrace a virtuous path in terms of raising domestic revenues and hence increase the fiscal capacity of governments in LICs.

To my knowledge, the impact of debt relief on a government's willingness or ability to tax has not yet been investigated. However, some studies have examined the relationship between public debt and taxation, and more recent papers have even tested the impact of debt relief on the tax ratio and institutional quality, but without really focusing on the government's tax effort (as defined in this paper). They nevertheless provide some insight into the potential impact of debt relief on tax effort. A number of papers on taxation determinants where the stock of debt is taken as an explaining factor for taxation observe that public debt tends to negatively impact tax ratios in developing countries. This ties in with debt overhang theory's premise that more indebted countries gradually ease their tax policies since collected revenues go directly to creditors (Teera and Hudson, 2004; Gupta, 2007; Mkandawire, 2010). Furthermore, Clist and Morrissey (2011), using a sample of 82 developing countries, find a non-linear effect between external debt flows and taxation (external debt playing negatively above a certain level), which is also in line with the debt overhang theory.

In a more straightforward manner, some studies seek to directly assess the impact of debt relief on fiscal variables such as tax ratio and government capacity. Presbitero (2009) investigates the impact of debt relief on the Country Policy and Institutional Assessment (CPIA) index, but turns up no significant results, which might be explained by the strong inertia of this index. However, his study and these by Freytag and Pehnelt (2009) and Chauvin and Kraay (2007) suggest that debt relief is granted to countries that post improvements in the quality of their institutions (as measured by the CPIA). These results could therefore support the idea that countries - when anticipating their potential eligibility for future debt cancellations - raise up their efforts to conduct structural reforms that will ultimately improve their institutional quality. Turning to the impact of debt relief on taxation itself, Chauvin and Kraay (2005) estimate the impact of debt relief on the tax-to-GDP ratio and find positive, but not (or marginally) significant effects.

The reasons why debt relief has no effect on taxation or other fiscal variables in all these studies could be largely attributed to the sample and study period considered since Presbitero (2009), Chauvin and Kraay (2005), and Johansson (2010) estimate the impact of debt relief on macroeconomic outcomes through to 2003, largely before the full process was completed. Therefore, the time span of these studies i) rules out consideration of the impact of total debt relief granted over the entire Enhanced HIPC process; and ii) excludes debt relief provided under the MDRI, in 2005 and afterwards. Two other studies by Cassimon and Van Campenhout (2008) and Cassimon et al. (2015) address these shortcomings using longer time series and considering more HIPCs that have received substantial amounts of debt relief. They observe that debt relief flows are positively associated with higher public investment, current expenditures, and tax-to-GDP ratio. Nevertheless, as explained by the authors, these studies of a sample made up solely of Heavily Indebted Poor Countries (HIPCs) do not provide any external validity for these fiscal effects of debt relief.

Building on these studies, this paper takes longer time series to provide enough temporal depth as regards debt relief provision; uses relevant control groups to provide external validity

for the findings; and thus sets out to accurately assess the effect of debt relief. I use structural tax equation residuals to build a tax effort index for 113 developing countries and for each year over the period 1990-2012 in order to estimate the effects of debt relief on government tax effort. Tax effort is hence measured as the ratio of actual taxes over predicted taxes stemming from this zero-stage estimate where taxes are explained by the country's structural determinants. This method allows identifying the government's actual endeavors to collect taxes, as compared to what might be collected given the country's structural factors.

I then use a difference-in-differences (DID) framework to first test the effects of debt relief on tax effort at different stages of the debt relief process. To do so, the study period is split up in four phases over which debt relief could theoretically affect tax effort in different ways. Such temporal decomposition is partly motivated by the conditionality associated with the HIPC process which would suggest to observe some anticipatory effects. I distinguish these effects from those suggested by the debt overhang theory, where tax effort becomes more interesting for HIPCs once debt service starts being canceled. Lastly, I also define a post-MDRI period which intends to capture tax effort evolution over the medium/long run once HIPCs received ultimate debt cancellations.

The DID approach runs a difference-in-mean analysis before and after debt relief (here provided sequentially over the different phases) compared with control group countries supposed to be similar enough with HIPCs to represent a relevant counterfactual. However, finding such a counterfactual at the country-level is not an easy task since countries did not randomly benefit from debt forgiveness. Yet, given that eligibility for the HIPC initiative (1996) and its enhanced version (1999) is conditional on certain macroeconomic criteria (presented in the next section), it is possible to identify some countries that might have been eligible (or close to eligible) for the Enhanced HIPC initiative, but that never benefited from it. I thus start by identifying a control group made up of countries similar to the HIPCs (to a certain extent). I then define two other control groups which control for potential global and regional trends. The reliability of these control groups is challenged with robustness checks where selection issue is addressed using propensity score matching (PSM) in order to refine the composition of the control group. I also test for alternative measures of tax effort, either derived from another zero-stage estimate or from a newly released dataset.

Lastly, I investigate potential heterogeneity in the relationship between debt relief and tax effort after the MDRI and as regards various governments' characteristics. Results of this study suggest that debt relief under the Enhanced HIPC initiative gives rise to a greater tax effort. Yet they also show that HIPCs deploy most of their tax effort before the decision point in order to become eligible for the initiative before subsequently easing off on their effort once they have been granted full debt relief under the MDRI. This finding points up the moral hazard feature of these initiatives, whereby improvements required by international financial institutions serve as positive fiscal incentives that fade away once the countries have been granted debt forgiveness. However, further tests find that the post-MDRI diminution in tax effort is mainly due to HIPCs with relatively high government's preference for present and weak institutions, which are more likely to adopt such behavior. Additional findings also suggest that new financing opportunities such as the expansion of local debt markets play a central role in securing initial tax effort

deployed around the decision point.

The rest of the paper is organized as follows. Section 2 introduces the debt relief initiatives and the channels through which they could potentially affect domestic revenue mobilization. Section 3 describes the empirical strategy used to estimate the effects of debt relief on government's willingness to tax, explains the concept of tax effort, and discusses the control groups' suitability. Section 4 presents the effects of debt relief on country tax effort, and details several robustness checks. Section 5 then investigates the heterogeneity in reactions to debt relief provided under the MDRI. Lastly, section 6 concludes.

2.2 International debt relief and tax effort

2.2.1 The debt relief initiatives

Fifty years of studies ranging from [Kaldor \(1962\)](#) to the [OECD \(2010\)](#) generally agree that raising domestic revenue is one of the keystones of LICs development. Yet although these countries and international institutions scaled up their efforts to design, set up and foster tax systems throughout the developing world over this period, tax ratios hardly took off. Meanwhile, the rigid nascent tax systems drove up the LICs' external public debt to what became unsustainable levels by the early 1980s. The situation called for significant debt write-offs.

Initial policy responses to what would later be called “the third-world debt crisis” consisted merely of debt rescheduling, which did not stop debt from stockpiling as [Figure 2.1](#) underlines. The first move to reduce bilateral debt for poor countries (by around one-third) came with the Toronto terms in 1988. This was extended under the London terms in 1991 (50% debt cancellation), and the Naples terms in 1994 (67% debt cancellation) ([Thugge and Boote, 1997](#); [Daseking and Powell, 1999](#)). Yet debt ratios were still high at the end of the 1990s. Although the Paris Club canceled a huge amount of debt, it only dealt with bilateral debt while a significant share of the LICs' debt was owed to multilateral financial institutions such as the World Bank, the IMF, and the regional development banks. The G7 thus decided to launch the Heavily Indebted Poor Countries Initiative in 1996, granting debt relief on multilateral liabilities for the very first time, and enlarging debt cancellation on bilateral claims with the Lyon terms (80% debt cancellation).

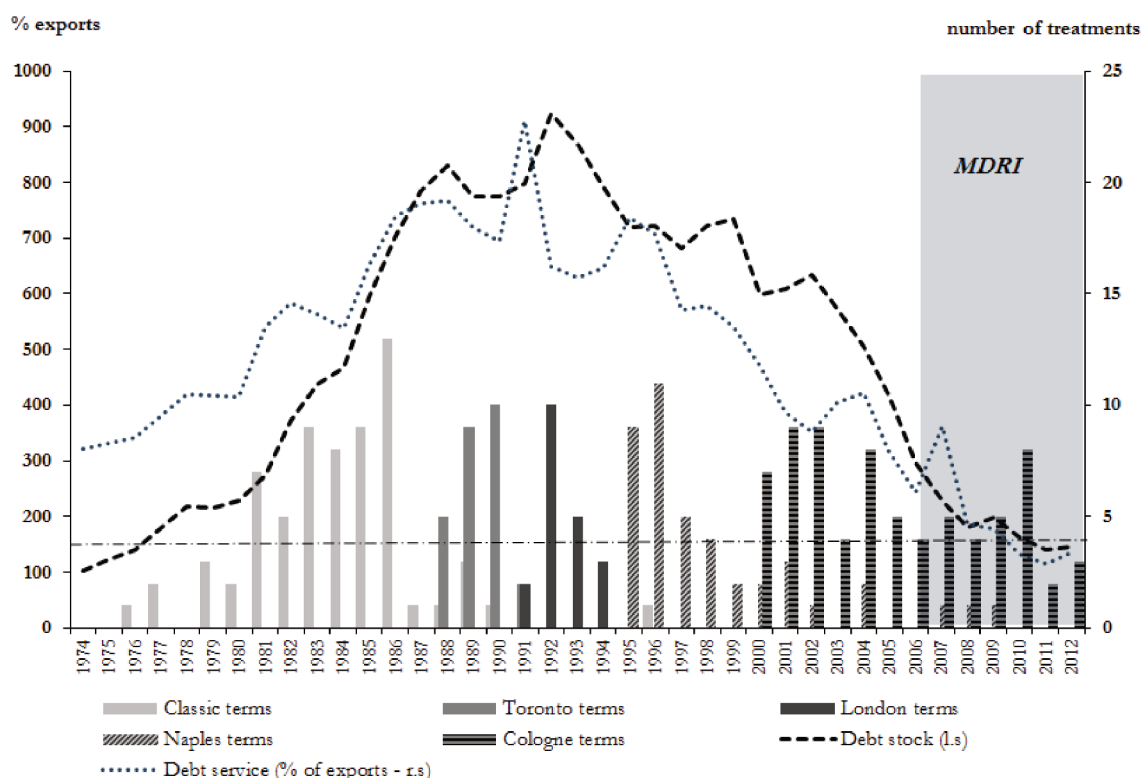
The HIPC initiative was designed as a process in which debt relief is granted subject to meeting criteria and targets that qualify for the different stages such as the “decision point” for entry into the initiative, and the “completion point” for exit. At the decision point, a country is eligible for debt relief under the HIPC initiative only if it fulfills the following four criteria; **(i)** being a low income country as defined by the World Bank classification; **(ii)** being IDA-eligible only (not blend)¹; **(iii)** having successfully implemented reforms under IMF-PRGF programs²; and **(iv)** having an unsustainable external public debt, defined as a ratio of external public debt to exports (in net present value (NPV)) of more than 250% ([IMF, 2014](#)).

¹The International Development Association (IDA) is a World Bank's special subsidiary which main activity is to provide concessional financing to LICs. *Blend* refers to countries that can borrow from both the IDA and the IBRD.

²The Poverty Reduction and Growth Facility program, labeled ESAF (Enhanced Structural Adjustment Facility) prior to 1999.

Yet few LICs qualified for the HIPC initiative between 1996 and 1999³, because the eligibility criteria were too selective and ruled out countries stuck in a debt trap with a debt ratio below the required threshold. Consequently, the required debt-to-exports ratio was lowered to 150% (still in NPV) in 1999.⁴ In addition, the process of debt relief delivery was stepped up to relieve LICs of their debt burden as fast as possible, and cancellations of commercial debts adjusted up to 90% with the Cologne terms (Daseking and Powell, 1999).

Figure 2.1: Debt treatments and debt stockpiling in 39 HIPCs.



Notes: Data on public debt service and debt stock (PPG) have been retrieved from the *International Debt Statistics (IDS)* website. Both variables are expressed in percentage of exports. Figures for the public debt stock are reported on the left axis, while debt service figures can be observed on the right axis (the same as for the debt treatments). Number of debt treatments at the Paris Club under the different terms (Classic, Toronto (30% debt reduction), London (50% debt reduction), Naples (67% debt reduction), Cologne (90% debt reduction)) have been directly collected on the Paris Club’s website. Shaded area corresponds to the period of MDRI implementation (from 2005 onwards).

Under this 1999 framework, the government, once eligible, reaches the decision point and can start receiving debt service relief. Further debt relief is then granted during the post-decision point phase called the “interim period” subject to the implementation of a Poverty Reduction Strategy Paper (PRSP). Once the government meets the targets defined by the PRSP, it reaches

³Only seven countries had benefited from the original version of the HIPC initiative by 1999, but on relatively small amounts of debt: Boliva, Burkina Faso, Côte d’Ivoire, Guyana, Mali, Mozambique, and Uganda (Bougouin and Raffinot, 2003)

⁴Or over 250 percent of their domestic revenues for open economies.

the completion point where the IFIs cancel a previously agreed proportion of its multilateral debt stock, with the possibility of topping-up. This new, improved HIPC initiative was thus aptly renamed the Enhanced HIPC initiative.

Lastly, in a move to achieve the Millennium Development Goals (MDGs), the G8 drove the process forward in 2005 with the Multilateral Debt Relief Initiative (MDRI) to cancel the entire remaining multilateral debt stock of HIPCs that had already reached their completion point.

2.2.2 Reform incentives and design of the debt relief initiatives

As mentioned above, one of the eligibility criteria for the Enhanced HIPC initiative is to have implemented an IMF PRGF program. Yet most of the PRGF reforms for LICs are strongly focused on fiscal deficit reduction and therefore on taxation improvements (Ghosh et al., 2005).⁵ Details of a number of HIPCs' *Decision Point Documents under the Enhanced HIPC Initiative* reveal that the IDA and the IMF strongly recommend significant reforms to improve domestic revenue mobilization. For instance, the *Decision Point Document under the Enhanced HIPC Initiative* prepared by the IDA and the IMF for Benin (IMF, 2005) highlights that, "Benin satisfies the eligibility criteria for assistance under the Enhanced HIPC initiative. [...]. Performance under the adjustment programs has been satisfactory, [...]. These achievements reflect mostly an improvement in government revenue and better controls over the government spending". The *Decision Point Document* for Mali (IMF, 2005) also states that, "Mali's current three-year ESAF arrangement, approved on April 10, 1996, supports a program of policy reforms covering the period 1996-1999 [...] In support of his request, the Malian authorities significantly strengthened macroeconomic policies and deepened structural reforms, [...], with regards public finances, [...] revenue enhancement (including a sharp reduction of exemptions, unification of the value-added tax at a single rate of 18 percent, and improving the efficiency of tax-collection agencies". Many more examples are to be found in these Decision Point documents.

Debt relief granted under the Enhanced HIPC initiative could therefore represent a sufficient reward to drive potentially eligible countries to conduct much-needed and recommended structural tax reforms to improve the efficiency of the tax system.

2.2.3 Theoretical considerations

Economic theory also provides insights into how tax effort might respond to debt relief. Following the debt crisis of the early 1980s, Krugman (1988), Sachs (1989), and Cohen (1990) studied the macroeconomic effects of high levels of public debt. They found that a debtor country has a debt overhang when it becomes beneficial for both the debtor and its creditors to partially cancel its stock of debt. Unsustainable levels of public debt can indeed negatively impact economic growth, which will ultimately lower the debtor's capacity to pay and hence the value of the creditors' assets.

There are three channels through which unsustainable public indebtedness hinders economic growth. First, a high level of public debt implies significant debt service payments, which could take up the bulk of the government's resources and crowd out public development expenditure.

⁵Though the IMF was more focused on spending cuts in the 1980s since reduction in expenditures had the advantage of speeding up fiscal adjustments.

Second, domestic and foreign investors may see a large stock of public debt as an implicit future tax burden and postpone their investment for fear of subsequent tax hikes. These two effects simultaneously curtail the capital accumulation process (private and public) which hampers economic growth.

The third effect concerns the negative incentives induced by a high level of public debt, which is the focus of this study. [Krugman \(1988\)](#), [Sachs \(1989\)](#), and [Corden \(1989\)](#) expose that substantial public debt can create disincentives for the debtor to invest and seek to raise more revenues since any benefits would directly accrue to creditors as debt repayments.

Taking up the illustrative example of [Sachs \(1989\)](#), it is quite easy to show why a significant debt burden hinders government's adjustment effort, in particular as regards fiscal capacity. Let's first assume that a country owes USD150 million to its creditors, but can raise just USD100 in domestic revenues, which represents its capacity to pay. We also suppose that the debtor country honors its debt to the best of its ability and defaults on the remaining debt service payments. Let's then assume that the debtor country spends USD10 million today to improve the efficiency of its tax system, which will then collect more taxes and build the country's capacity to pay up to USD120 million in the following period. This adjustment effort would be beneficial for the creditors, but totally irrational for the debtor country, which would prefer to default. The debtor country would be spending USD10 million in current consumption to get nothing in the future, since all additional revenue would accrue to its creditors. Yet the situation changes when the creditors are given the possibility to cancel the debtor's liabilities. Let's assume that the creditors agree to provide debt relief of USD45 million (30% debt forgiveness) and continue to require total repayment of the remaining stock of debt (USD105 million). If the debtor country were to spend USD10 million now to improve tax collection, its earnings would still build its capacity to pay up to USD120 million, which is now enough to repay its debt and have USD15 million left over for consumption. In this scenario, debt relief improves the government's future utility by just over USD1.5 million if the government's discount rate is assumed to be 0.3. Consequently, a government would be expected to scale up its tax effort once it had been granted debt relief, since it could then reap the benefits of its efforts.

However, the "post-debt relief" situation also needs to be considered in this debt cancellation scenario. Countries expecting to be granted debt relief in this scenario should rationally make more of an effort than before to raise domestic revenue. But there is no guarantee that the pre-debt relief conditionality of the HIPC initiative will not prevent moral hazard triggering subsequent misconduct by recipient governments. There is indeed a risk that potentially eligible countries make substantial adjustment efforts to get debt relief, but then ease off their tax policies and worse engage in new, uncontrolled borrowing once debt relief has been granted. [Easterly \(2002\)](#) underlines this potential risk of moral hazard stemming from the debt relief initiatives and explains that "*countries could even engage in zigzag behavior, getting debt relief as they improve policies and then backsliding to the old level of policies*", especially for countries having governments with high preference for present ([Easterly \(2002\)](#) - pp. 1681). Empirically, [Dijkstra \(2013\)](#) studies the impacts of debt relief in Nigeria. She shows that although the country is a non-HIPC, it conducted significant fiscal reforms in order to sign debt relief agreements with its bilateral creditors in the Paris Club. The study hence shows that these sorts of incentive effects

could well be at play, but it does not mention any loosening of fiscal policies in the post-debt relief period, hence supporting the debt overhang mechanism explained above.

2.3 Empirical approach and data

2.3.1 Identification strategy

In this paper, I use DID methods to estimate the effect of debt relief on changes in government tax effort. Given the particular design of the Enhanced HIPC initiative which involves strong ex-ante and ex-post (throughout the interim period) conditionality, the approach compares changes in tax effort of HIPCs' government around different stages of the initiative and with respect to a control group of non-HIPCs.

As underlined by the theoretical works mentioned above, debt relief is likely to foster tax effort in recipient countries since they can fully reap the benefits of their effort when there is no more debt to serve. One could thus legitimately expect an increase in tax effort right after the decision point, when benefiting countries start being granted debt cancellations. Yet, given the strong conditionality associated with the decision point attainment, changes in tax effort are also likely to materialize ex-ante. Indeed, having shown a 3 to 4-year track record of "good performance" under the IMF-PRG program (which often focuses on improvements of the tax system) represents one of the requirements to enter the HIPC process (cf. Section 2.2.2). Consequently, it is plausible that the prospect of debt relief at the decision point also encourages future HIPCs to outperform in terms of tax effort.

To differentiate between this anticipatory effect, the reaction of tax effort to debt relief provision, and its evolution after the debt relief initiatives, I use an empirical approach where, following [Papaioannou and Siourounis \(2008\)](#), the entire period is split up into different sub-periods in order to account for such timing effects of debt relief. Only HIPCs having reached their decision point no later than 2003 are first considered for the study since one need to have enough years in the post-decision point duration to observe these different sub-periods. The first sub-period represents the baseline period and runs from 1990 to the fourth year before the country attains its decision point. For most of the HIPCs of this restricted sample, the baseline period corresponds to 1990-1996, thus before the HIPC initiative was announced. The pre-decision point period (the second sub-period) used to observe potential anticipatory effects therefore runs from the fourth year before the decision point to the year right before the decision point is reached, and can vary by countries (Cf. Table 2.1 below).

This period is the timeline covered by the PRGF. Moreover these years also cover the period in which certain signal effects induced by the launch of the 1996 HIPC initiative might had prompted HIPCs to improve their fiscal position to be able to subsequently join the program. Then, the third sub-period defined as the post-decision point period runs over the entire extended interim period, until the country receives ultimate debt relief under the MDRI, and is also country-specific (since the duration of this period depends on the years the decision and completion point were reached). This period allows to observe whether the first debt cancellations foster governments to increase their tax effort as compared with the baseline and the anticipatory phase. Lastly, the fourth period (the post-MDRI phase) runs from the year right after ultimate

debt relief has been granted under the MDRI to 2012 and thus denotes the level of tax effort from the end of the process onwards.

Table 2.1: Heavily Indebted Poor Countries and "Debt relief stages".

Countries	Decision point	Completion point	Interim Period
Uganda	2000	2000	2000-2000
Mozambique	2000	2001	2000-2001
Bolivia	2000	2001	2000-2001
Mauritania	2000	2002	2000-2002
Tanzania	2000	2001	2000-2001
Honduras	2000	2005	2000-2005
Senegal	2000	2004	2000-2004
Benin	2000	2003	2000-2003
Burkina Faso	2000	2002	2000-2002
Mali	2000	2003	2000-2003
Cameroon	2000	2006	2000-2006
Guyana	2000	2003	2000-2003
Nicaragua	2000	2004	2000-2004
Niger	2000	2004	2000-2004
Madagascar	2000	2004	2000-2004
Rwanda	2000	2005	2000-2005
Zambia	2000	2005	2000-2005
Malawi	2000	2006	2000-2006
Ethiopia	2001	2004	2001-2004
Ghana	2002	2004	2002-2004
Sierra Leone	2002	2006	2002-2006
Sao Tome & Principe	2000	2003	2000-2003
The Gambia	2000	2007	2000-2007
Guinea Bissau	2000	2010	2000-2010
Guinea	2000	2012	2000-2012
Chad	2001	-	-
Democratic Republic of Congo	2003	2010	2003-2010
Burundi	2005	2009	2005-2009
Republic of Congo	2006	2010	2006-2010
<i>Haiti</i>	<i>2006</i>	<i>2009</i>	<i>2006-2009</i>
<i>Afghanistan</i>	<i>2007</i>	<i>2010</i>	<i>2007-2010</i>
<i>Central African Republic</i>	<i>2007</i>	<i>2009</i>	<i>2007-2009</i>
<i>Liberia</i>	<i>2008</i>	<i>2010</i>	<i>2008-2010</i>
<i>Togo</i>	<i>2008</i>	<i>2010</i>	<i>2008-2010</i>
<i>Cote d'Ivoire</i>	<i>2009</i>	<i>2012</i>	<i>2009-2012</i>
<i>Comoros</i>	<i>2010</i>	<i>2012</i>	<i>2010-2012</i>

Notes: HIPC and MDRI Status of Implementation - International Monetary Fund

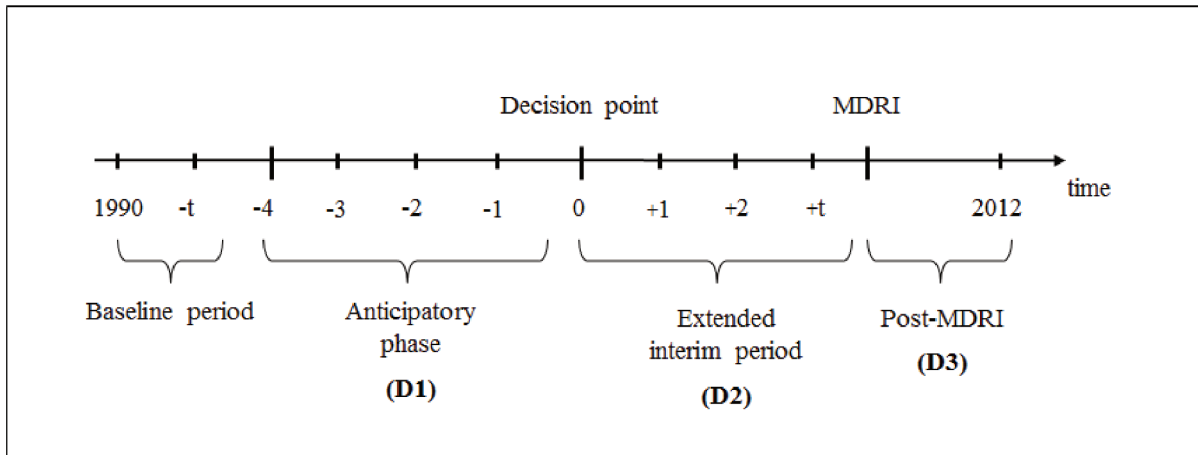
This "timing" specification with several sub-periods can thus be written as follows:

$$TE_{i,t} = \alpha_i + \nu_t + \beta_1 HIPC_i * D1_{i,t} + \beta_2 HIPC_i * D2_{i,t} + \beta_3 HIPC_i * D3_{i,t} + \epsilon_{i,t} \quad (2.1)$$

where $D1_{i,t}$ is a dummy variable taking 1 for all the years from 4 years before the decision point up to the year right before the decision point's attainment (so from year -4 up to year -1 as regards the decision point); $D2_{i,t}$ is a dummy variable that takes 1 in the decision-point year and all the following years up to the MDRI (so all along the interim phase plus the remaining

years until the MDRI for HIPCs having completed the HIPC initiative before 2005); and $D3_{i,t}$ is a dummy variable that takes 1 in all years from the year after debt treatment under MDRI onwards (Cf. Figure 2.2 below).

Figure 2.2: Timing in Debt Relief - subperiods' description.



Notes: Our study period runs from 1990 to 2012. The first sample of HIPCs we consider in the analysis includes 26 HIPCs having reached their decision point no later than 2003, of which 21 have reached this stage in 2000. Therefore, associated anticipatory phase for 2000s' HIPCs runs from 1996 to 1999 (4 years) and their extended interim period from 2000 up to the date at which they were granted ultimate debt relief under the MDRI which corresponds to 2005 for these 26 HIPCs, since all of them have reached their completion point before 2005. However, for other HIPCs, the length of this period depends on their completion point's date, since debt relief under MDRI started to be granted after 2005 and providing the completion point's attainment).

Note that $D1_{i,t}$, $D2_{i,t}$, and $D3_{i,t}$ can only be defined for HIPCs, since only HIPCs have reached the decision and completion points. In order to mark these variables as HIPC-specific, I thus interact these dummy variables with a time-invariant dummy variable, $HIPC_i$, which is equal to 1 for HIPCs (or “treated countries”) considered in this scenario (26) and 0 otherwise. Therefore, under this setting, β_1 denotes the anticipatory effect of the decision point, β_2 represents the response of HIPCs' tax effort during the time of debt relief provision, and β_3 represents the long-term effect of debt relief on tax effort once full debt relief under the Enhanced HIPC and the MDRI has been granted. All these coefficients thus capture changes in tax effort (at different moments of the process) with respect to the baseline period.

However, it might be misleading to assume that β_2 and β_3 measure the effect of debt relief *per se*. Indeed, particular attention needs to be paid to the risk of endogeneity stemming from the design of the HIPC initiative. DID estimators, widely used in experimental microeconomics, remain the gold standard of evaluation strategies when the treatment under evaluation is randomly assigned. Yet in the present case, our treatment—the provision of debt relief under the HIPC initiative and the MDRI—is obviously not random. Moreover, and as underlined in section 2.2.2, debt relief can even be determined by tax effort performance for countries having specific fiscal targets in their PRGF, which partly explains the presence of $D1_{i,t}$ in our empirical specification. Consequently, the endogeneity concerns that our methodology raises need to be

carefully identified.

Selection issue

First, given that debt relief is not randomly assigned, selection into the treatment can potentially weaken the identification strategy. As explained above, the IFIs defined eligibility criteria to flag countries supposed to be the “best candidates” for these debt cancellations. A relevant control group should thus be made up of countries that satisfied these eligibility criteria, but were ultimately not granted debt relief under the HIPC initiatives. Consequently, I first define a “narrow control group” including countries that might have been eligible or close to eligible for the debt relief process, but which ultimately did not benefit from the HIPC initiatives. The selection criteria are: 1) having an average debt-to-exports ratio of over 170% (in face value)⁶ over the four years before 1996 (the HIPC’s announcement year), and 2) having been ranked as a low income country by the World Bank for at least three years between 1992 and 1996. Table 2.B1 (p.68) in the Appendix B displays the countries that satisfy these selection criteria and hence form the narrow control group. We observe that almost all the countries were ranked LICs before 1996, and thus benefited from an IMF economic program where a strong emphasis was also put on domestic revenue mobilization. However, one can notice that the average debt-to-exports ratio before 1996 was significantly lower than it is for the HIPCs. This might explain in why these countries never benefited from the multilateral debt relief initiatives and remained “untreated”.

In addition, I also define two additional control groups: the “extended control group” and the “African control group”. The first one includes all non-HIPC developing countries (ranked at least once as LICs over the four years before 1996) and hence controls for a potential trend in tax effort within the “developing world”. Yet given that out of 39 HIPCs, 33 are African countries (22 out of 26 in our sample), I also consider an “African control group”. This group contains all non-HIPC African developing countries, and thus controls for a potential trend in tax performance within the continent. Sample composition of the extended and African control groups is provided in Table 2.B2 (p.69) in the Appendix B.

Yet, most of the countries that satisfied the eligibility criteria benefited from the Enhanced HIPC initiative. Every eligible country indeed received a proposal from the IFIs to join the debt relief process. Some countries such as Laos refused to participate in the initiative because of the debt forgiveness conditionality terms set by the IMF and the World Bank.⁷ So there is no perfect counter-factual such as a country that would have been eligible for the initiative, was willing to participate, and ultimately did not benefit from it. In this case, endogeneity issues would result from the fact that treated countries have both observable and unobservable characteristics that drove them being granted debt relief under the Enhanced HIPC initiative. In order to reduce this risk of selection bias, I suggest alternative methods such as considering as control countries the HIPCs that entered late the initiative. This leads to adopt a “pipeline approach” where

⁶It would have been better to use the threshold in NPV, but long time series on such data are not available and computing them would have exposed this criterion to questionable assumptions regarding the discount rate. The rate of 170% for the debt-to-exports ratio thus intentionally overshoots the required threshold of 150% in NPV to partly account for the grant element in the nominal debt.

⁷So did Ghana initially, before agreeing to debt relief in 2002. However, the Ghana’s refusal was mostly motivated by fears associated with an increase in interest rates after debt relief.

control units are the ones which have not been treated in the first place, but which will benefit from the treatment later on. Lastly, I also resort to propensity score methods to identify control group countries with similar (on average) ex-ante likelihood of being granted debt relief.

Omitted variables bias

The second channel through which endogeneity could mar the identification strategy is the omitted variable bias. It is indeed likely that a third factor (observable or not) simultaneously explains participation (or non-participation) in the debt relief program and the variation in governments' tax effort. To reduce the omitted variable bias as much as possible, I control for numerous variables in the zero-stage estimate where tax effort index are obtained. This zero-stage estimate provides a measure of the government's willingness to tax, which is filtered using various macroeconomic indicators such as GDP per capita, openness rate, sectoral composition of the economy, rate of inflation and so on, which could be correlated with both treatment and the government's tax effort. Tax effort estimates also include country and time fixed effects that capture the contributions of unobserved (time-invariant) country-specific features and changes due to time trends or common shocks.

In addition, although the classic DID specification usually includes a dummy variable for HIPCs only—in order to account for the initial discrepancy in tax effort between the “treated” and the “untreated”—, I favor DID estimates with country-fixed effects to better address any country-specific (time-invariant) unobservables that might influence the relationship between debt relief provision and tax effort. These estimates thus provide the average within-country variation in tax effort for HIPCs, around different debt relief stages, and as compared with the average tax effort evolution in control-group countries.⁸

Reverse causality

Lastly, a major endogeneity concern usually takes the form of potential simultaneity whereby the outcome variable also affects the treatment, making the identification of a causal effect impossible if it is not controlled for. I acknowledge that given the design of the HIPC process, and the required eligibility criteria, tax effort performances potentially affect the attainment of the decision point. Such conditionality effect should thus be captured by β_1 in equation 2.1. If true, then a positive coefficient associated with β_2 should be carefully interpreted since such increase could be attributed either to a debt overhang effect or to a legacy stemming from the tax improvements made ex-ante. However, I assume tax effort changes following debt relief under MDRI (so β_3) are less exposed to reverse causality since the 2005 decision of canceling the whole remaining multilateral debt stock was mainly politically driven in view of reaching the MDGs by 2015. Therefore, although some observables (and unobservables) might still explain why some HIPCs have completed their interim period earlier, and thus benefited from debt relief under the MDRI earlier than other HIPCs (which has more to do with the selection issue exposed above), we think simultaneity between tax effort performance and ultimate debt forgiveness under the MDRI is less plausible than in the case of the decision point attainment.

I thus start by simply looking at the tax effort evolution around the different stages of the

⁸I also ran all estimates with an HIPC dummy variable in order to observe the differential effects on tax effort of the different stages of the HIPC process between HIPC and non-HIPC countries. Estimates support our results without the HIPC dummy and are available upon request to the author.

debt relief process using equation 2.1, and then, as explained above, consider alternative control groups and specifications to control as much as possible for selection into the debt relief initiative and to investigate the effect of the overall debt relief initiatives (and of the MDRI in particular) on tax effort.

2.3.2 What is tax effort and how can we measure it?

How can we define the government's willingness to tax? Many studies have attempted to measure it using proxies and zero-stage estimate procedures. In keeping with the definition provided by Gupta (2007), I consider for this study the classic tax effort measure computed as the ratio of actual to potential tax revenues. This measure of tax effort can be considered as the effort made by a government to collect what its economy potentially supplies. The extent of a country's tax base depends on its economic, social, demographic and even historical characteristics which therefore determine potential tax revenues, or, in other words, the country's "tax capacity" (Fenochietto and Pessino, 2013). So if a gap is found between what the government can levy (taxes predicted by economic and social outcomes) and what it actually collects (actual tax revenues), this shortfall in domestic revenues could be said to be due to the government's inadequate tax collection efforts and could therefore be associated with a weak will to raise domestic resources. Consequently, any tax effort ratio (actual taxes over predicted taxes) inferior to one means that the government falls short of its "tax capacity" and can be interpreted as a weak willingness to tax.

Although this tax effort ratio might be subject to measurement errors (Baskaran and Bigsten, 2013), it represents an interesting proxy for the government's willingness to tax since it denotes the deviation from current tax level, which is exogenous to structural tax determinants. I therefore keep it as the preferred measure and build tax effort index using predicted taxes stemming from an estimation (zero-stage estimate) where the tax-to-GDP ratio is explained by per capita GDP, the openness rate, the share of agriculture and natural resources in the economy, and some demographic factors such as the population density, the age dependency ratio and the urbanization rate. Data used for the calculation of tax effort come from both IMF documents and the *World Development Indicators* (WDI) database (see Appendix A, p.64, for details on the methodology).

However, other proxies might also be considered. In their paper on the impact of government fiscal capacity on institutional quality in Sub-Saharan Africa, Baskaran and Bigsten (2013) use several measures for government fiscal capacity besides this classic tax effort measure. They first argue that fiscal capacity can be proxied by total tax revenues given that domestic resources in these countries rely to a large extent on non-tax revenues such as natural resources revenues (Burgess and Stern, 1993). Yet, total taxes do not appear to be the more suitable proxy since economic fluctuations such as unexpected increase in imports with no changes in GDP would increase the amount of tax collected (through taxes on international trade) and therefore the tax-to-GDP ratio without reflecting a genuine change in the government's willingness to tax. Considering the low rate of tax compliance in developing countries (Fjeldstad and Therkildsen, 2008), Baskaran and Bigsten (2013) then suggest taking income taxes, as it could be interpreted as a real government effort if it were to increase. But the state of disaggregated tax data

availability in developing countries makes it hard to collect long, full time series on direct and indirect taxes for our entire sample (HIPCs and control group countries), which prevents from using it as the benchmark proxy for the government’s tax effort. Nevertheless, this paper looks at a newly released dataset on disaggregated taxes and reviews this alternative measure in section 4. It finds similar results to those obtained with the estimated tax effort measure.

2.3.3 Visual examination

Figures 2.3 and 2.4 below represent the change in tax revenues (% of GDP) and tax effort around the decision point and can provide preliminary insight into the impacts of debt relief.⁹ The solid black line in Figure 2.3 denotes the average tax-to-GDP ratio for HIPCs that reached their decision point no later than 2003.¹⁰ The difference in tax share between the baseline period, the anticipatory phase and the post-decision point period seems to be clearly positive for HIPCs, which confirms the findings of Cassimon et al. (2015). However, looking at changes in average tax share for control groups, one can see that this increase could be due to a trend among LICs since a increasing evolution in tax-to-GDP ratio is also observed for the different control groups over the years following the decision point. Taking a closer look at these graphs, an acceleration in the tax-to-GDP ratio for HIPC countries can nonetheless be found in the years of the anticipatory phase (which for most of the sample, coincide with the years following the HIPC announcement date). Yet, this is not really observed for other control groups and might reflect an increase in tax effort motivated by the conditionality attached to the initiative (which calls for tax raising improvements to be made to enter the debt relief program and secure future debt cancellations). This ex-ante evolution seems to be also supported by Figures 2.4 where tax-to-GDP ratios are replaced by tax effort index.

2.3.4 Control groups suitability

Looking quickly at the macro-covariates for control groups before 1996, the HIPCs appear to remain quite different in terms of GDP per capita, breakdown of economic activity, and demographic features (cf. Table 2.B3 in the Appendix B, p.70). However, the data suggest that the narrow control group displays economic features closest to the HIPCs, which comforts the decision of considering this control group as the preferred counterfactual. Focusing then on Figures 2.4 below and 2.B1 in the Appendix B (p.71), HIPCs and control group countries seem to experience similar tax effort trends throughout the anticipatory phase. The parallel trend hypothesis over the years preceding the “treatment effects” (which can be both ex-ante and ex-post in our context) is necessary for the reliability of DID estimates.

Consequently, in addition to this visual examination, I run placebo tests to check for ex-ante parallel trends between control and treatment groups. I thus estimate a model where the change in tax effort between years -8 and -5 as regards the decision point is compared with the period prior year -9, and with respect to tax effort evolution in the different control groups. I also define an alternative placebo test, where the baseline period is split up in half for HIPCs, as if a placebo treatment was granted halfway this period, and for HIPCs only. The specifications used

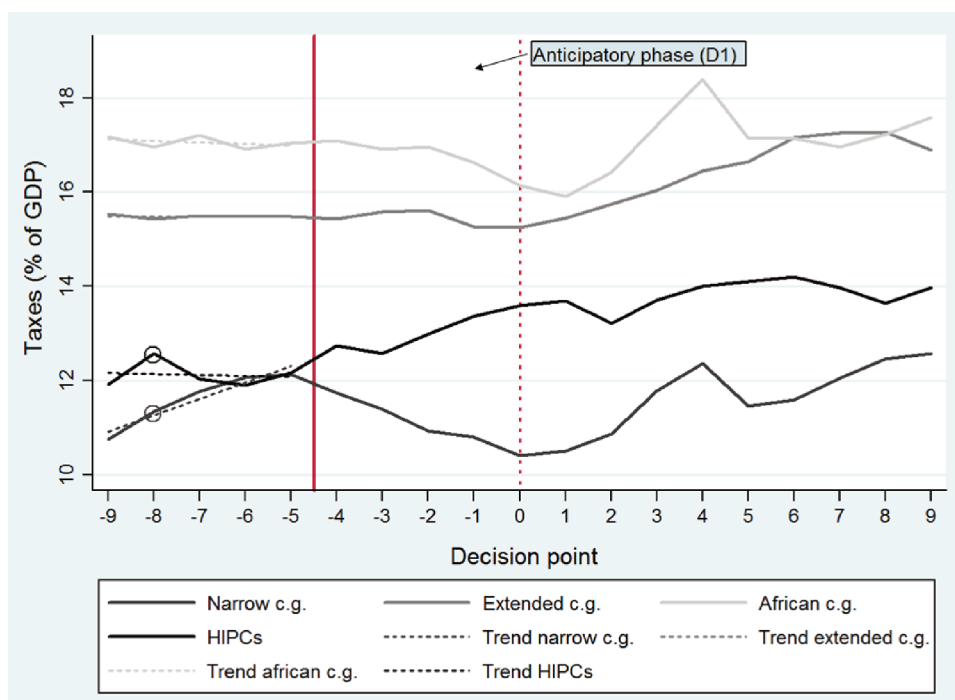
⁹The methodology used to build those graphs is detailed in the Appendix E, p.86.

¹⁰Note that considering all HIPCs in the sample (regardless their decision point’s date) leads to similar graphs.

for these placebo tests are detailed at length in the Appendix B (p.72).

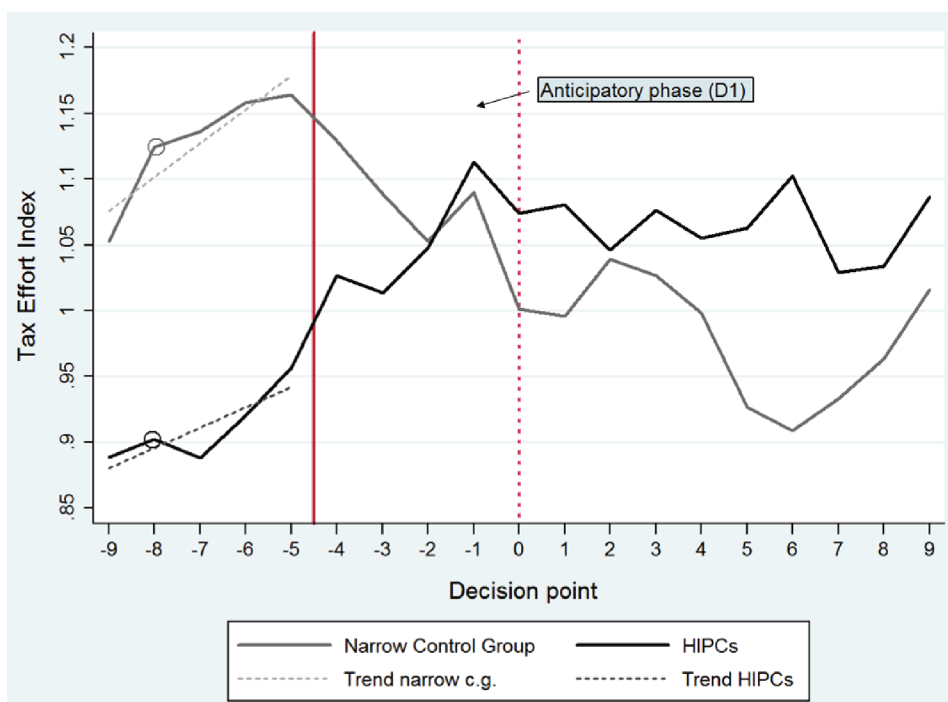
Results (Table 2.B4 in the Appendix B, p.73) suggest that there is no significant diverging path in tax effort between HIPCs and the control group countries (on average) over the baseline period, making these three control groups suitable for a DID analysis.

Figure 2.3: Average evolution of tax-to-GDP ratios around debt relief.



Notes: The graph illustrates the evolution of tax-to-GDP ratios (where tax revenue exclude natural resources revenue) around the decision point of the Enhanced HIPC initiative for the three different control groups and the sample of 26 HIPCs having reached their decision point before 2003 (among which 21 have reached their decision point in 2000, 2 in 2001, 2 in 2002, and 1 in 2003). Period running from -4 to -1 is the anticipatory phase (see Figure 2.2, p.40). As it is explained in the Appendix E (p.86), the **solid black line** represents the evolution of the weighted average of tax-to-GDP ratios for 26 HIPCs as regards their decision point calendar. For instance, the **black circle** represents the weighted average tax-to-GDP ratio (calculated over 26 HIPCs) in the eighth year before these 26 HIPCs reach their decision point. The **gray circle** then represent the weighted average tax-to-GDP ratio for countries included into the narrow control group (clarifications about the method of calculation can be found in the Appendix E, p.86). **Dotted lines over the period [-9; -5] denote average trends in tax-to-GDP ratios for HIPCs and the three control groups.** One can notice that, although trends for HIPCs, the extended and African control groups are all rather flat, the one associated with the narrow control group is increasing. However, including one more year in the baseline period (so considering year -4 in the baseline period) leads to observe nearly similar trends between HIPCs and narrow control group countries.

Figure 2.4: Average evolution of tax effort around debt relief.



(a) Comparison with the narrow control group

Notes: The graph illustrates the evolution of tax effort around the decision point of the Enhanced HIPC initiative for the narrow control group and the sample of 26 HIPCs having reached their decision point before 2003. Period running from -4 to -1 is the anticipatory phase (see Figure 2.2). As it is explained in the Appendix E (p.86), the **solid black line** represents the evolution of the (weighted) average tax effort for 26 HIPCs as regards their decision point. For instance, the **black circle** represents the weighted average tax effort in the eighth year before HIPCs reach their decision point. One can observe that HIPCs' average tax effort in the baseline period is significantly lower than for narrow control group countries (represented by the **gray circle** for the eighth year before HIPCs reached their decision point). **The dark dotted line denotes the average trend of HIPCs' tax effort in the baseline period. The gray dotted line represents the average tax effort trend in narrow control group countries over the same period.** We observe that, although there is large difference in level of tax effort, both groups experienced (on average) a quite similar trend during the baseline period (before anticipatory and signal effects be at play). Indeed, the one associated with the narrow control group is increasing and follows (to some extent) the one of HIPCs.

2.4 Impacts of debt relief on government tax effort

2.4.1 Main results

Table 2.2 presents the results of equation 2.1, where standard-errors have been bootstrapped. The bootstrapping method is based on intensive re-sampling for reliable estimates given the feature of our dependent variable. Indeed, since tax effort stems from a zero-stage estimate, there is a possible risk of measurement error and inflated standard-errors. This risk can thus be reduced using such re-sampling procedure. Tax effort estimates used as dependent variable for DID estimates reported in Table 2.2 are obtained from our preferred zero-stage model; specification of column (1) in Table 2.A2 (see Appendix A, p.64).¹¹ Results are exposed with

¹¹Estimated with Panel Corrected Standard Error (PCSE) estimators, and time and country fixed effects.

respect to the three different control groups and for two HIPC samples. The HIPC sample 1 is the one considering 26 HIPCs having reached their decision point not later than 2003. This restriction is motivated by the need for a long-enough post-decision point period, necessary to observe how tax effort varies throughout the extended interim period and after the MDRI. Yet this restriction implicitly results in selection into “the highest performance HIPCs” treatment group which managed to rapidly implement a PRGF to secure debt relief in the early 2000s.¹² I thus also present results when considering all HIPCs in the sample, regardless of their date of entry into the HIPC process (i.e. 34 HIPCs¹³).

Table 2.2: Main results.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index					
	HIPC sample 1			HIPC sample 2		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
HIPC*D1: (Anticipatory effect)	0.194*** (4.085)	0.145*** (4.837)	0.137*** (4.669)	0.143*** (4.935)	0.108*** (3.935)	0.099*** (3.571)
HIPC*D2: (DP-MDRI period)	0.353*** (7.536)	0.220*** (7.516)	0.239*** (5.887)	0.267*** (7.409)	0.187*** (7.554)	0.190*** (6.027)
HIPC*D3: (post-MDRI period)	0.183*** (4.152)	0.109*** (5.132)	0.092** (2.298)	0.161*** (4.201)	0.097*** (3.653)	0.085** (2.431)
Constant	0.811*** (14.721)	0.943*** (18.905)	0.885*** (12.002)	0.623*** (8.272)	0.657*** (5.957)	0.612*** (6.098)
Observations	854	2,135	916	1,008	2,289	1,070
No. of HIPCs	26	26	26	34	34	34
No. of control countries	14	78	17	14	78	17
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.166	0.086	0.129	0.138	0.083	0.114
Test: D2 - D1 = 0 (p-val.)	0.000	0.003	0.007	0.000	0.000	0.002
Test: D1 - D3 = 0 (p-val.)	0.790	0.143	0.208	0.320	0.588	0.702
Test: D2 - D3 = 0 (p-val.)	0.000	0.000	0.002	0.031	0.000	0.001

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. Columns (I), (II), and (III) report estimate results of equation 2.1 where the sample considered includes 26 HIPCs having reached their decision point no later than 2003. Columns (IV), (V), and (VI) expose estimate results of equation 2.1 when the HIPCs sample is not restricted and includes all HIPCs, regardless their decision point’s date. Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2). Tax effort estimates using specification of column (1) in Table 2.A2 are quite large for Niger, leading thus to inflated results. We therefore removed Niger from our main estimates and provide estimate results including Niger figures in the Appendix E (Cf. Table 2.E1, p.86). We next do not provide results with Niger since they follow those reported throughout the study (but are just larger in magnitude). However, remaining Tables with Niger are available upon request to the author. **The last three rows expose tests for difference in coefficients.** The first one reports the significance (p-value) of the difference between D2 and D1 coefficients. The second row compares D1 and D3 coefficients, while the last one exposes the significance of the difference between D2 and D3 coefficients. Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

¹²However, one could also think that political motives lie behind the early provision of debt relief under the Enhanced HIPC initiative.

¹³34 HIPCs having at least reached their decision point. Haïti is excluded because of the 2010 earthquake which clearly changes the country’s economic structure and makes it impossible to observe a clear-cut relationship between tax effort and debt relief.

Results suggest that HIPCs start improving their tax effort before the decision point (throughout the anticipatory phase), sustain this effort during their extended interim period (from the decision point to the MDRI) and even after receiving ultimate debt relief under the MDRI. Within HIPCs, tax effort increases by between 9 to 18 additional percentage points after the MDRI as compared with the level recorded over the baseline period. This pattern is robust when comparing tax effort changes within HIPCs, with the ones in narrow, extended or African control groups' countries. In addition, the right part of the Table shows that results obtained for the benchmark HIPCs sample (column (I) to (III)) are similar to those when all HIPCs are considered (columns (IV) to (VI)).¹⁴

However, one can notice that the level of tax effort in the extended interim period is greater than the one recorded for the anticipatory phase. Indeed, looking at the tests performed at the bottom of Table 2.2, we observe that coefficients associated with D2 are significantly larger (in all regressions) than those for the anticipatory phase. This could mean that while HIPCs deploy significant tax effort to become eligible for the Enhanced HIPC initiative, the provision of debt relief fosters them in reaching higher levels of tax effort throughout the extended interim period. Yet one could conversely argue that the larger tax effort observed over this period simply results from tax reforms undertaken under the anticipatory phase which come to finally benefit to HIPCs' governments few years after (thus during the extended interim period).

Interestingly, the other tests on coefficients suggest that HIPCs, on average, ease off their tax policies once they received full and irrevocable debt relief. Indeed, coefficients associated with the post-MDRI period (D3) are significantly lower than those for the extended interim period (D2). Such an effect could be expected in HIPCs, since the completion point marks the end of the Enhanced HIPC process and therefore the end of the conditionality linked to debt relief provision. Now that the government has secured debt forgiveness and is not under IMF and World Bank "supervision" anymore, it can basically decide to go back to old policies, slacken off on domestic resource mobilization and look for new domestic or foreign financing opportunities, reinforcing moral hazard. Such behavior might have also been made possible by the attitude of the IMF regarding fiscal policies in Sub-Saharan African countries which seems to have somewhat relaxed at the end of the 2000s according to some economists.¹⁵ At first glance, these results thus seem to support evidence of zigzag behaviors by HIPCs, as suggested by Easterly (2002).

Nevertheless, although the drop in tax effort observed after the MDRI produces an average tax effort inferior to the one recorded in the extended interim period, the second row from the bottom of Table 2.2 shows that there is no significant difference in tax effort between the anticipatory phase and the post-MDRI period. Indeed, it seems that the combination of anticipatory effects with larger tax effort in the extended interim period offsets the negative impact of having been granted debt relief under the MDRI. Strictly speaking, this means that, within HIPCs, the tax effort in the post-MDRI years is significantly larger than the level recorded in the years preceding the anticipatory phase (so over the baseline period).

¹⁴Note that removing the seven countries which benefited from the original HIPC initiative from the HIPCs sample 1 and 2, does not change the results. Results are not reported in order to save space but are available upon request.

¹⁵See the Rodrik's letter addressed to Andrew Berg on this topic: http://rodrik.typepad.com/dani_rodriks_weblog/2009/05/the-kinder-gentler-imf-on-african-fiscal-policy.html

The findings therefore suggest that greater tax efforts after the completion point are a *de facto* legacy of efforts in the years preceding the decision point and during the extended interim period. Under these circumstances, conditionality makes beneficiary country significantly improve their fiscal outcomes. The results hence argue in favor of conditionality when granting debt relief to LICs, which contradicts the findings of existing literature on the effectiveness of the IMF's programs (Przeworski and Vreeland, 2000; Bird and Rowlands, 2001; Easterly, 2005; Dreher, 2006).¹⁶ Moreover, conditionality is more likely to succeed under the HIPC initiatives' settings since the outcome for compliant countries is more attractive than in classic IMF programs. Indeed, while conditionality under IMF programs leads to new concessional loans, i.e. new debts, conditionality under debt relief programs gives rise to debt cancellations. Therefore, HIPCs would be more disposed to efficiently conduct reforms when they expect future debt relief, which *in fine* produces significant results on the targeted outcomes.

2.4.2 Validity of control groups and selection issues

Alternative control groups

Up to this point, the comparison with the extended and African control groups shows that tax effort changes around the debt relief process are not driven by an increasing trend in developing or African countries. However, there could be some doubts about the level of the cutoffs considered to identify narrow control group countries. I thus test the robustness of the first results to these selection criteria, using different cutoffs in terms of debt ratio and income classification.

As presented in Section 2, the IFIs also defined indebtedness threshold in fiscal terms for really open countries that did not satisfy the 150% debt-to-exports ratio, even though their external public debt was burdensome.¹⁷ The required debt ratio for this particular type of country was set to 250% of their domestic revenues (in NPV). Consequently, I first define a new control group called "PANEL A" comprising countries with an average debt-to-revenue ratio superior to 250% over the six years preceding 1996, and which the World Bank classified as LIC for at least four years out of these six. I then define as "PANEL B", countries classified as IDA eligible-only for at least four years between 1990 and 1996, regardless their indebtedness level. Using the indebtedness historical classification provided by the World Bank, I also determine two control groups ("PANEL C" and "PANEL D") where countries classified for at least four years between 1990 and 1996 as *Moderately* or *Severely Indebted* (excluding HIPCs of course) are included in "PANEL C". "PANEL D" only considers those defined as *Severely Indebted*. The composition of these four control groups, as well as the definition of *Severely* and *Moderately Indebted* countries, is provided at the beginning of the Appendix C (p.74).

However, although these countries posted similar economic characteristics in the years preceding 1996 (in terms of income classification and indebtedness ratio), comparisons with these additional control groups do not completely clear all doubts about the similarities between HIPCs and control group countries. Indeed, the simple fact that they did not benefit from

¹⁶Note, however, that these papers focus mainly on the effects of IMF conditionality on economic growth and not fiscal outcomes.

¹⁷Countries like Senegal or Cameroon for instance (Bougouin and Raffinot, 2003).

the initiative makes them different from the HIPCs. Therefore, another attempt to control for potential selection bias would be to define a control group made up solely of “future HIPCs”, i.e. countries that entered the Enhanced HIPC process late and that, although eligible for the initiative in the early 2000s, only benefited from it later on.¹⁸ Using this control group would call for a sort of “pipeline approach” commonly used in experimental economics whereby the control group is made up of individuals eligible for the treatment, but not randomly chosen to benefit from the treatment in the first stage, and who will benefit from it later on (although the random feature is largely debatable in the present case). Consequently, “Panel E” comprises all the HIPCs, and results for this sample simply consist in estimates of equation 2.1 where we only consider HIPCs in the study sample (since HIPCs reached their decision point and benefit from the MDRI at different dates).¹⁹ However, the small number of “untreated” units in this control group is reducing over time (since more and more HIPCs reach their decision point and then benefit from the MDRI as we get close to the end of the period) which means that the result need to be viewed with caution, even though they can provide further insights into the effect of the debt relief initiatives on recipient countries’ tax effort.

Table 2.3 presents results with the different control groups. Results significantly support the previous findings for our main control groups. However, we note that coefficients associated with the post-MDRI period become not significant when comparing HIPCs with heavily indebted non-HIPCs, and when we adopt the “pipeline approach”, which supports the evidence of a stronger moral hazard and average zigzag behavior once countries leave the HIPC process and are granted massive and irrevocable debt relief under the MDRI.

PSM-based control groups

Although these multiple comparisons with different control groups may suggest that debt relief granted under the HIPC initiatives has indeed affected tax effort in recipient countries, question marks could still hang over the effect of this debt relief program since, as described in Section 2.3.4, the narrow control group, although the closest from HIPCs (in average) in terms of economic characteristics, remains significantly different from the “treatment” group as regards the observables considered and observed before 1996.

A final attempt to reduce the bias stemming from the selection into the debt relief initiative, consists in identifying a control group of countries with high probability of receiving debt relief under the HIPC initiatives. I thus estimate a Probit model where the probability of being an HIPC (and so having been granted debt relief under these initiatives) is explained by ex-ante covariates, averaged before 1996. That way, the propensity score of being “treated” is only determined by economic (and political) characteristics observed before the debt relief initiative’s announcement and allows to find control units with similar macroeconomic features during the pre-1996 period. I consider economic characteristics (averaged over 1990-1996) which could explain both the probability of receiving debt relief and the initial tax effort performance. Regarding the determinants of being an HIPCs, I first choose the debt level as well as the level

¹⁸Although the random feature of such stepwise treatment cannot be applied in the present case.

¹⁹Cf. Table 2.1 (p.39). Haiti is excluded for the reasons previously exposed. However, while we include Eritrea and Sudan that are defined as HIPCs in pre-decision point phase, we do not include Somalia which has the same status, because of lack of data.

Table 2.3: Alternative control groups.

	(I)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index				
	HIPCs sample 1				
Control group:	<i>Panel A</i>	<i>Panel B</i>	<i>Panel C</i>	<i>Panel D</i>	<i>Panel E</i>
HIPC*D1: (Anticipatory effect)	0.206*** (5.556)	0.185*** (5.701)	0.135*** (3.523)	0.103*** (2.632)	-
HIPC*D2: (DP-MDRI period)	0.402*** (8.652)	0.257*** (7.794)	0.252*** (6.178)	0.228*** (5.464)	-
HIPC*D3: (post-MDRI period)	0.202*** (4.084)	0.131*** (3.979)	0.148*** (4.113)	0.068 (1.451)	-
Constant	0.817*** (14.878)	0.959*** (13.972)	0.931*** (15.827)	0.850*** (16.960)	-
Observations	764	1,333	969	750	-
No. of HIPCs	26	26	26	26	-
No. of control countries	10	37	21	11	-
Test: D2 - D1 = 0 (p-val.)	0.000	0.023	0.003	0.003	-
Test: D1 - D3 = 0 (p-val.)	0.913	0.119	0.714	0.448	-
Test: D2 - D3 = 0 (p-val.)	0.000	0.000	0.006	0.000	-
	HIPCs sample 2				
Control group:	<i>Panel A</i>	<i>Panel B</i>	<i>Panel C</i>	<i>Panel D</i>	<i>Panel E</i>
HIPC*D1: (Anticipatory effect)	0.151*** (5.339)	0.133*** (4.770)	0.109*** (4.182)	0.084*** (2.799)	0.080** (2.224)
HIPC*D2: (DP-MDRI period)	0.287*** (10.111)	0.211*** (7.466)	0.214*** (6.496)	0.182*** (5.190)	0.164*** (3.517)
HIPC*D3: (post-MDRI period)	0.173*** (3.991)	0.115*** (3.560)	0.140*** (3.804)	0.079* (1.743)	0.003 (0.043)
Constant	0.635*** (7.613)	0.656*** (7.456)	0.657*** (7.586)	0.645*** (7.099)	0.620*** (7.402)
Observations	918	1,487	1,123	904	739
No. of HIPCs	34	34	34	34	37
No. of control countries	10	37	21	11	-
Test: D2 - D1 = 0 (p-val.)	0.000	0.010	0.001	0.000	0.003
Test: D1 - D3 = 0 (p-val.)	0.543	0.515	0.341	0.906	0.092
Test: D2 - D3 = 0 (p-val.)	0.001	0.000	0.016	0.005	0.000

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. We also expose results for the two HIPCs' samples. HIPCs sample 1 only considers HIPCs having reached their decision point no later than 2003. HIPCs sample 2 includes all HIPCs regardless their decision point's date. **Panel A (average debt-to-revenue ratio \geq 250%, and LIC classification at least 4 years between 1990-1996), Panel B (IDA-eligible only before 1996), Panel C (Moderately or Severely Indebted before 1996), Panel D (Severely Indebted before 1996), Panel E (All HIPCs).** Tax effort index come from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

of GNI per capita. Indicators of the country's economic structure such as the share of the agricultural sector, the exports, imports, or natural resources into the GDP are also included into the model. I then add the density of the population (in log) as well as aid grants (net from debt relief grants and expressed in percentage of GDP). Lastly, I augment the Probit model with the level of tax effort before 1996 and a measure of institutional quality (Polity IV index) since it has been shown as determining the access to these initiatives (Freytag and Pehnelt, 2009; Presbitero, 2009). I then derive propensity scores from Probit estimates, and restrain the control group to non-HIPCs with a propensity score superior or equal to 0.2 (with the control group's composition varying according to the specification considered). More details about the model specification is provided in the Appendix C (p.74). Table 2.C2 in the Appendix C (p.77) shows that considering non-HIPCs with a propensity score above 0.2 leads to a control group with average ex-ante economic characteristics quite similar to those of HIPCs. However, the average ex-ante level of tax effort and propensity score for HIPCs remain both significantly different from those of control group countries (on average) across the different Probit specifications. Consequently, I define another control group where are only included non-HIPCs with a propensity score superior to 0.5 and for which economic features are even closer from those of HIPCs. Nevertheless, reducing the control group sample to countries with higher propensity score leads to consider much less control countries (7 - 10) which is why Table 2.4 reports results as compared with the two propensity score-based control groups.

Looking at Table 2.4 above, results of the DID equation with propensity score-based control groups²⁰ support previous findings, i.e. an increase in tax effort during the anticipatory and extended interim periods (which here, are similar in magnitude). Moreover, results also confirm findings stemming from the previous robustness check; i.e. HIPCs loosen their tax effort once they have benefited from debt relief under the MDRI, which here, leads them to a tax effort level which is not statistically significant from the one recorded over the baseline period.

²⁰Where propensity scores have been obtained from different specification in order to test the robustness of the effects to the composition of the PSM-based control group.

Table 2.4: Propensity score- based control groups.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index					
CG selection based on:	Propensity score ≥ 0.2			Propensity score ≥ 0.5		
Probit model:	(1)	(2)	(3)	(1)	(2)	(3)
HIPC*D1: (Anticipatory effect)	0.144*** (3.337)	0.155*** (4.551)	0.174*** (4.862)	0.106** (2.323)	0.117** (2.402)	0.130*** (2.899)
HIPC*D2: (DP-MDRI period)	0.202*** (4.591)	0.204*** (6.580)	0.263*** (6.982)	0.128** (2.371)	0.164*** (2.999)	0.215*** (4.253)
HIPC*D3: (post-MDRI period)	0.037 (0.884)	-0.002 (-0.046)	0.077** (2.354)	-0.116** (-2.257)	-0.075 (-1.430)	-0.014 (-0.303)
Constant	0.819*** (15.318)	0.843*** (11.535)	0.834*** (18.551)	0.813*** (12.198)	0.821*** (14.940)	0.838*** (15.196)
Observations	1,043	900	802	726	764	690
No. of HIPCs	26	26	26	26	26	26
No. of control countries	23	16	12	8	10	8
Test: D2 - D1 = 0 (p-val.)	0.127	0.108	0.013	0.647	0.202	0.039
Test: D1 - D3 = 0 (p-val.)	0.005	0.000	0.014	0.000	0.000	0.001
Test: D2 - D3 = 0 (p-val.)	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. We expose results for the HIPCs sample 1 where we only considers HIPCs having reached their decision point no later than 2003. Results with HIPCs sample 2 are similar and available upon request to the author. Columns (I) to (III) shows DID coefficients when the control groups includes non-HIPCs with a propensity score superior to 0.2. Columns (IV) to (V) reports DID coefficients when considering non-HIPCs with a propensity score above 0.5 as control units. The different Probit models refers to the various set of control variables alternately used to estimate propensity scores (cf. Appendix C, p.74). Tax effort index come from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

2.4.3 Validity of the tax effort's measure

Testing for different tax effort estimates

I then test the results using alternative dependent variable. As explained in Section 2.4, the preferred tax effort measure is drawn from column (1) specification in Table 2.A2 (p.67) and the PCSE estimators, which both take into account heteroskedasticity and serial autocorrelation issues (cf. Appendix A, p.64). Given that being granted debt relief has a positive ex-ante and ex-post impacts on HIPC governments' tax efforts when it is determined by this estimate of tax effort, it would be interesting to know whether these effects hold when replacing tax effort index based on the PCSE estimators by tax effort index obtained using alternative zero-stage specification and estimators.

Equation 2.1 is then re-estimated, but now with different measures of tax effort derived from the structural tax specification (3) (using alternately PCSE and LSDV estimators) in

Table 2.A2. As with the benchmark specification, average tax effort appears to increase over the anticipatory phase, improve even further during the extended interim period, and then lowers after the MDRI.²¹ Results remain robust to the different control groups considered all along this study and also hold when switching for the propensity score-based control groups.²²

Non-estimated tax effort proxies

So far, I have used a zero-stage estimated tax effort variable to represent the government's willingness to tax. However, as already explained, this variable is subject to measurement errors that may still fuel doubts over these findings. I therefore use disaggregated tax variables retrieved from the Government Revenue Dataset (GRD, ICTD) (Prichard et al., 2014), which contains disaggregated tax data for a large number of developing countries. This dataset basically builds on the same sources as the one used for the benchmark tax effort measure, but has the disadvantage of still having a sizable number of missing values.²³ Regarding disaggregated tax data, over a fifth of the information is missing, especially for HIPCs. This rules out the use of this dataset for main estimates. Nevertheless, consideration of the impact of the debt relief process on disaggregated tax variables can make for interesting additional robustness checks.

I focus on two types of disaggregated taxes that may reflect the government's willingness to tax: indirect and direct taxes (both excluding natural resource revenues). Among the indirect taxes, taxes on goods and services can be considered as a good proxy for government willingness to tax since increases in VAT and sales tax are partly associated with economic performance, but also largely depend on the quality and efficiency of the tax administration in supervising self-assessed tax returns. With respect to direct taxes, the aggregated variable appears to also be a good proxy for the government's willingness to tax since collecting taxes on incomes and profits in developing countries necessitates close tax administration oversight.

I therefore run DID models taking these disaggregated taxes as dependent variables. Yet in keeping with Mahdavi (2008), disaggregated taxes such as direct and indirect taxes have been shown to be affected by the economic environment. I therefore run equation 2.1, adding the same control variables as in the structural tax specification (specification of column (1) in Table 2.A2).

Table 2.5 shows the results for indirect taxes; and for its component on goods and services since there is no effect on direct taxes nor on international trade-related taxes. Results suggest that foreseeing debt relief and having been granted it over the extended interim period leads to an increase in indirect taxes by around 1 to 2 additional GDP percentage points. The effect of debt relief on indirect taxes also seems to go through taxes on goods and services (since no effect is observed for international trade-related taxes) which is in line with the advices of the Decision-Point documents. This means that the positive effect on indirect taxes could also stem from the conditionality attached to the HIPC initiative.

²¹Table 2.C5 in the Appendix C (p.79) reports the results. Note that DID results with tax effort index obtained from other specifications ((2), and (4)) and with both estimators (LSDV and PSCE) are not reported to save space, but are similar to those reported in Table 2.C5, and are available upon request.

²²Results are not reported in order to save space but are available upon request to the author.

²³See Table 2.C4 in the Appendix C, p.78. Note that the pairwise correlation between the variable of tax revenues excluding natural resources revenues (obtained from IMF Staff Report) and the one from the ICTD dataset is equal to 76.3% supporting hence the reliability of our own dataset.

Table 2.5: Alternative tax effort measures - Using disaggregated taxes.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Indirect tax-to-GDP ratio					
	HIPC sample 1			HIPC sample 2		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
HIPC*D1: (Anticipatory effect)	1.247*** (2.976)	1.106*** (3.106)	1.409*** (3.533)	0.620** (2.172)	0.689** (2.151)	0.736** (2.218)
HIPC*D2: (DP-MDRI period)	1.883*** (3.166)	1.771*** (3.282)	2.064*** (3.163)	1.320** (2.502)	1.433*** (2.911)	1.359** (2.270)
HIPC*D3: (post-MDRI period)	1.170 (1.399)	1.887** (2.574)	1.396 (1.379)	0.844 (1.078)	1.530** (2.325)	0.861 (0.939)
Constant	21.571 (0.886)	21.331*** (3.044)	9.641 (0.750)	0.694 (0.049)	17.521** (2.177)	-6.148 (-0.501)
Observations	700	1,822	775	834	1,956	909
No. of HIPCs	26	26	26	34	34	34
No. of control countries	12	75	16	12	75	16
R-squared	0.870	0.883	0.885	0.906	0.880	0.879
Dep. variable:	G&S tax-to-GDP ratio					
	HIPC sample 1			HIPC sample 2		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
HIPC*D1: (Anticipatory effect)	0.726** (2.473)	0.372 (1.126)	0.844** (2.324)	0.345 (1.177)	0.080 (0.255)	0.364 (1.084)
HIPC*D2: (DP-MDRI period)	1.101** (2.608)	0.456 (0.867)	1.180** (2.376)	0.647 (1.485)	0.225 (0.472)	0.639 (1.416)
HIPC*D3: (post-MDRI period)	1.303** (2.282)	0.336 (0.484)	1.238** (2.157)	0.835 (1.545)	0.120 (0.188)	0.690 (1.247)
Constant	-31.051** (-2.169)	3.880 (0.566)	-2.462 (-0.443)	-22.713*** (-3.070)	-2.199 (-0.305)	-12.431* (-1.699)
Observations	724	1,829	775	855	1,960	906
No. of HIPCs	27	27	27	35	35	35
No. of control countries	14	77	17	14	77	17
R-squared	0.917	0.850	0.852	0.863	0.853	0.850
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes	Yes	Yes

Notes: F-statistics are not reported here but are all significant at the 5% level. We expose results for both HIPCs samples. Dependent variables come from the ICTD dataset (Prichard et al., 2014). We include in all regressions macro-covariates such as the per capita GDP (in constant USD, log), the openness rate, the agriculture share in GDP, the natural resource rent (in % of GDP), the age dependency ratio, population density, and the share of urban population in total population. Data for Niger can be included since the dependent variable is not obtained from a zero-stage estimate. Robust t-statistics (based on standard-errors clustered at the country-level) are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

However, this effect must be considered with caution since the statistical significance

for results on goods and services tax revenue fall drastically when considering all the HIPCs in sample 2.

These results are thus consistent with an increase in tax effort before debt relief provision, a subsequent improvement throughout the extended interim period, and then a loosening in tax policy after the MDRI.²⁴

2.5 What drives moral hazard after the MDRI?

Main results and robustness checks suggest that tax effort reduces after the MDRI and can even be inferior to the levels observed over the anticipatory and extended interim periods. As discussed in section 3, the more exogenous nature of the MDRI (regarding tax effort) allows to better capture the effect of ultimate debt relief (and end of conditionality) on tax effort evolution. Yet, one might wonder whether the moral hazard observed after the MDRI is an average effect stemming from the design of these debt relief initiatives or is fostered by governments' peculiarities which lead some HIPCs to be more prone to such behavior.

2.5.1 Preference for present

In theory, HIPCs' governments can respond to debt relief in many ways, most of them, according to [Easterly \(2002\)](#), being counter-productive and leading recipient countries to accumulate new debts until they reach prior levels of indebtedness. [Easterly \(2002\)](#) argues that government's preference for present determines borrowing decisions but can also affect the willingness to tax the economy since ruling elites, which are more interested in consuming today rather than tomorrow, seek to capture as much resources as possible over the short-run. Government's preference for present is expected to be larger in LICs, and in HIPCs in particular, than in industrialized countries, since these countries remain (on average) more exposed to political instability. However, although it is hard to deny that government's preference for present shapes public policies in LICs, strategic behaviors exposed by [Easterly \(2002\)](#) are less likely to materialize throughout the HIPC process given the strong conditionality associated with debt relief. Nevertheless, once complete debt relief has been provided, such as after the MDRI, there could be potential room for such politically-driven discretionary decisions. So, in keeping with Easterly's intuitions, one should expect political instability positively contributes to tax effort after the MDRI.

Yet increase in tax effort necessitates (to some extent) investments in fiscal infrastructure such as hiring and training competent tax auditors, or computerizing the tax system. But, since such investments do not generate immediate payoffs, one might think that governments with high preference for present would be more disposed to reduce investment in fiscal capacity and favor short-run consumption. This idea is also supported by [Besley and Persson \(2010\)](#) which show that investment in fiscal capacity decrease with the level of political instability. For instance, in the context of internal conflicts, they explain that the ruling regime would have less incentives in improving the ability to tax by fear that resulting proceeds be captured by (or

²⁴Note that the results are robust regardless the different control groups considered throughout the study (with different selection criteria, or propensity score-based). Results are not reported to save space but are available upon request to the author.

redistributed to) opponent groups.

In order to test these theoretical predictions I alternately include different measures of political instability coming from several sources (*Worldwide Governance Indicators (WGI)* (Kaufmann et al., 2011), *Polity IV dataset*, or the *Dataset on Political Institutions (DPI)* (Beck et al., 2001)) to see how it affects changes in tax effort. However, regarding the data availability of these data for HIPCs (see Table 2.D1 in the Appendix D, p.80, for descriptive statistics and definitions), I decide to run equation 2.1 but dropping the baseline period (so the period before the anticipatory phase) and thus only keep dummy variables for the extended interim period and the post-MDRI period. That way, the reference period to which tax effort levels are compared with, becomes the anticipatory phase. Results show that political instability reduces tax effort (slightly), without altering the raise in tax effort over the extended interim period, and the subsequent diminution following debt relief granted under the MDRI. ²⁵

Taking this one step further, I then investigate the contribution of political instability to tax effort changes after the MDRI. I thus add to the previous specification an interaction term between the dummy variable capturing the post-MDRI period and the measure of political instability. Table 2.6 below exposes the results. One can notice that an increase in political instability (as expressed by the WGI measure of instability, or the regime durability) reduces (although the effect is marginal) the level of tax effort for HIPCs that have exited the HIPC initiative and received ultimate debt relief under the MDRI. These findings echo theoretical predictions of Besley and Persson (2010) about the relationship between political instability and fiscal capacity²⁶, and most importantly support the idea, initially suggested by Easterly (2002), of political instability (and indirectly government's strong preference for present) being a potential factor that encourages moral hazard after debt relief.

²⁵Cf. Table 2.D2 in the Appendix D, p.81.

²⁶Note that, following Besley and Persson (2010), the contribution of conflicts (both external and internal) to tax effort changes is also investigated. Yet, results do not emphasize any robust relationship between fiscal capacity and armed conflicts (see Table 2.D3 in the Appendix D, p.82).

Table 2.6: Government's preference for present and sustained tax effort after the MDRI.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
Dep. var.:	Tax effort index											
Control Group:	<i>Narrow</i>				<i>Extended</i>				<i>African</i>			
HIPCs sample 1												
HIPC*D2: (DP-MDRI period)	0.172*** (3.439)	0.158*** (4.309)	0.176*** (4.737)	0.115*** (3.488)	0.088** (2.476)	0.075*** (3.198)	0.084*** (3.010)	0.035* (1.720)	0.127*** (2.857)	0.111*** (2.637)	0.115*** (3.255)	0.041 (1.051)
HIPC*D3: (post-MDRI period)	0.057 (1.041)	0.035 (0.937)	-0.089** (-1.978)	0.035 (0.769)	0.011 (0.340)	-0.004 (-0.176)	-0.114*** (-2.630)	-0.044* (-1.721)	0.041 (0.821)	0.013 (0.437)	-0.101** (-1.997)	-0.029 (-0.530)
Political Instability	-0.044 (-1.638)				-0.029* (-1.809)				-0.033 (-1.194)			
Political Instability II		-0.052** (-2.349)				-0.037*** (-2.929)				-0.051* (-1.794)		
Inverted regime durability			0.001 (1.394)				-0.001 (-1.000)				-0.001 (-0.847)	
Years left in current term				0.008* (1.832)				0.006** (1.973)				0.009 (1.571)
HIPC*D3*Instability	-0.044 (-0.969)	-0.052* (-1.803)	-0.010*** (-4.117)	0.004 (0.371)	-0.042 (-1.409)	-0.053** (-2.187)	-0.009*** (-3.654)	0.003 (0.368)	-0.048 (-1.189)	-0.053+ (-1.563)	-0.008*** (-2.992)	0.003 (0.281)
Constant	1.008*** (15.813)	1.027*** (17.933)	0.962*** (8.549)	1.066*** (8.826)	0.937*** (11.154)	0.957*** (12.580)	0.956*** (11.501)	0.914*** (11.466)	0.973*** (9.893)	1.004*** (10.086)	0.835*** (9.462)	0.892*** (8.353)
Observations	507	621	694	616	1,315	1,608	1,813	1,675	542	665	755	622
R-squared	0.286	0.256	0.229	0.327	0.267	0.238	0.098	0.150	0.238	0.212	0.178	0.237

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. The Table exposes results for HIPCs sample 1 since it includes HIPCs with the longer post-MDRI period (7 years for all of them). Note that running estimates with HIPCs sample 2 gives the same results (available upon request to the author). The study period has been shortened by dropping observations before 1996 which corresponds to the baseline of most HIPCs of this sample. **The reference period** for HIPCs to which coefficients HIPC*D2 and HIPC*D3 must be compared with is **the anticipatory phase. Absence of statistical significance for HIPC*D2 or HIPC*D3 thus suggests no different level of tax effort in the (extended-) interim and post-MDRI periods as regards the level recorded during the anticipatory period.** Tax effort index measured at the country-year level are obtained from tax structural equation 2.2 (column (1) in Table 2.A2, p.67). Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

2.5.2 Government effectiveness

The analysis is then narrowed to the post-MDRI drop and intentionally omit years before 2000 to only focus on changes in tax effort between the extended interim and post-MDRI periods (still as compared with tax effort trend in our respective control groups). I then decompose the HIPC sample into two sub-samples: relatively "weak institutions" HIPCs and relatively "strong institutions" HIPCs. The purpose of such differentiation is to see whether relatively weak institutions HIPCs are more prone to adopt moral hazard behavior and relax their tax effort once they have been granted full and irrevocable debt relief. Although related to some extent to the concept of preference for present, such decomposition remains relevant since a government which significantly values the future can still face institutional constraints such as low administration quality, or ineffective organization that can make difficult to sustain tax effort. Moreover, even if this distinction between weak and strong government quality might be seen tautological since tax effort already reflects public sector effectiveness (to some extent), one can fairly consider that a government of weak quality could easily show-off in terms of tax effort in order to get debt relief at the decision point and then relax this effort while keeping its institutional quality fundamentally unchanged.

I collect several measures of government quality such as the *WGI-KKZ* government effectiveness and regulatory quality index, since they both focus on the government's ability to reform its tax system (Kaufmann et al., 2011). I also consider the *ICRG* measure of government quality, and the classic *CPIA* index of the World Bank.²⁷ The distinction between relatively weak and strong institutions countries is based on the average value of these variables between 2004 and 2005 (so right before the MDRI for most of the HIPCs sample 1). HIPCs with an average government quality below the HIPCs' median are thus considered as relatively weak institutions countries (and conversely for relatively strong institutions countries). In contrast with the previous section, I favor a static approach and do not control for changes in institution quality over the entire post-MDRI period since such changes in these variables would potentially reflect changes in government tax effort and could partly capture the relationship between debt relief and government's willingness to tax.

I test heterogeneity in tax effort evolution after the MDRI (and conditional to institutions quality) by running equation 2.1 (thus without D1 and D2) on these two HIPCs sub-samples (the relatively weak- and strong-institutions sub-samples). Table 2.7 presents the results for the two sub-samples of which country-composition slightly varies with respect to the measure of institutional quality considered. Results suggest that the downturn found after the MDRI is driven mainly by weak institution countries. The coefficients for the relatively strong institution countries are not significant. In terms of policy implications, these results point up the need for continuous monitoring of weak institution countries, even after the completion point, to sustain the tax effort made around the decision point and secure it over the long run.²⁸

²⁷I use several definitions of institution quality to be sure that results are not driven by one particular measure. Yet, these variables are strongly correlated between each other as shown in Table 2.D4 in the Appendix D, p.83.

²⁸Note that although weak institutions HIPCs experience a drop in tax effort after the MDRI, their level of tax effort remains larger than the one recorded over the baseline period. Results not reported in order to save space but available upon request to the author.

Table 2.7: Weak versus Strong institution quality - Moral hazard around the MDRI.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Dep. var.:	Tax effort index							
	Relatively weak inst. HIPCs				Relatively strong inst. HIPCs			
Governance quality measure:	GOV.EF	REG.Q	GOV.Q	CPIA	GOV.EF	REG.Q	GOV.Q	CPIA
<i>Narrow control group</i>								
HIPC*D3: (post-MDRI period)	-0.144*** (-3.234)	-0.087*** (-3.223)	-0.081* (-1.941)	-0.166*** (-4.207)	0.007 (0.222)	-0.032 (-0.823)	-0.031 (-0.766)	0.018 (0.492)
Observations	318	316	285	311	329	331	305	336
R-squared	0.299	0.336	0.284	0.320	0.342	0.292	0.308	0.330
<i>Extended control group</i>								
HIPC*D3: (post-MDRI period)	-0.107*** (-3.200)	-0.049** (-2.162)	-0.084*** (-2.589)	-0.122*** (-4.656)	-0.024 (-1.065)	-0.064*** (-2.729)	-0.035 (-0.958)	-0.020 (-0.903)
Observations	1,075	1,073	1,042	1,068	1,086	1,088	1,062	1,093
R-squared	0.350	0.363	0.350	0.356	0.376	0.360	0.364	0.370
<i>African control group</i>								
HIPC*D3: (post-MDRI period)	-0.123*** (-3.156)	-0.066 (-1.328)	-0.065* (-1.683)	-0.145*** (-3.793)	0.018 (0.417)	-0.021 (-0.496)	-0.015 (-0.353)	0.029 (0.691)
Observations	350	348	317	343	361	363	337	368
R-squared	0.256	0.289	0.257	0.276	0.306	0.265	0.269	0.293

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. The Table exposes results for HIPCs sample 1 since it includes HIPCs with the longer post-MDRI period (7 years for all of them). The study period has been shortened by dropping observations before 2000 which corresponds to the baseline and the anticipatory period of most HIPCs of this sample. **The reference period for HIPCs to which coefficients HIPC*D3 must be compared with is thus the extended interim period (from the decision point to the MDRI). Absence of statistical significance for HIPC*D3 thus suggests similar level of tax effort in the post-MDRI and the extended interim periods.** GOV.EF and REG.QUAL denote respectively the **WGI-KKZ** government effectiveness and regulatory quality measures. GOV.Q reflects the government quality as measured by the **ICRG**. Lastly, CPIA is the overall **CPIA** index from the World Bank. Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). I ran estimates for weak institution HIPCs and dropped alternately each "weak institution" HIPC from the sample in order to check that post-MDRI reduction in tax effort was not driven by outliers. Results support the average moral hazard effect and are available upon request to the author. Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

2.5.3 New financing opportunities

Lastly, an alternative explanation for easing off on tax effort after the MDRI can also be found in the new potential sources of financing available to HIPC governments. These countries historically excluded from the international markets because of their structural imbalances, political risks, and heavy debt burden in the late 1980s, could now have access to broader, more diversified financing sources. Some studies show that, now HIPCs' debt has been drastically reduced, these countries experience a significant widening of new financing opportunities such as borrowing on the international and domestic markets (Dömeland and Kharas, 2009; Presbitero, 2009; Ferry et al., 2016) and would need to use these opportunities to finance their development process and reach the MDGs (Addison et al., 2005) or now the SDGs.

I investigate such possibilities by running the same model as for political instability contribution but replacing instability measures by domestic debt, public debt commitments to external private creditors, or commitments to official creditors (retrieved from the International Debt Statistics (IDS) database). Table 2.8 reports below results when considering domestic debt since according to Presbitero (2009), debt relief might have contributed to deepen financial local markets in benefiting countries, making possible for HIPCs' governments to domestically finance their deficit. Results suggest that while domestic debt does not directly affect tax effort changes after the decision point, HIPCs slacken off on their effort as domestic debt accumulates over the post-MDRI period.²⁹ This underlines another potential explanatory factor for moral hazard behavior after MDRI. Indeed, for HIPCs' governments seeking new funds, borrowing on domestic market appears as a "quick-fix" solution as compared with developing and maintaining an efficient tax system. Such reaction seems mainly concentrated on domestic borrowing, since no effect is observed for commitments to official and private external creditors.³⁰

Yet, governments that use these new financial possibilities should not overlook the fact that newly contracted debts on the domestic (or international) market, often go hand in hand with higher interest rates and shorter maturity periods than these granted by the IFIs, and will have to be paid back. Consequently, countries will have to efficiently raise domestic resources if they do not want to reproduce the same scenario that got them into the debt overhang situation in the first place, and this will be achieved only if governments scale up their work on the design of their tax system and the collection of inclusive, well-defined taxes.

²⁹Data on domestic debt stocks come from Presbitero et al. (2012). Their dataset contains data for 41 low income countries observed over 1970-2010. Given the data availability and the composition of our control groups, we end with few observations for the African and narrow control groups. Results thus need to be interpreted with caution.

³⁰See Table 2.D5 and 2.D6 in the Appendix D, p.84-85.

Table 2.8: Contribution of domestic debt to moral hazard.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index					
	HIPC sample 1			HIPC sample 2		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
HIPC*D2: (DP-MDRI period)	0.152*** (5.056)	0.138*** (3.374)	0.156*** (3.430)	0.107*** (3.071)	0.107*** (4.413)	0.089** (2.102)
HIPC*D3: (post-MDRI period)	0.056 (1.068)	0.079 (1.565)	0.026 (0.446)	0.042 (0.714)	0.066 (1.113)	0.002 (0.031)
Domestic Debt (% GDP)	0.000 (0.543)	0.001 (1.288)	0.001 (1.276)	-0.001 (-0.662)	-0.000 (-0.532)	-0.001 (-0.688)
HIPC*D3*Domestic Debt	-0.008*** (-3.374)	-0.008*** (-3.180)	-0.008*** (-3.772)	-0.008*** (-3.059)	-0.008** (-2.525)	-0.008*** (-3.428)
Constant	0.994*** (24.565)	0.989*** (13.186)	1.073*** (9.937)	1.037*** (20.004)	0.999*** (10.799)	1.088*** (7.775)
Observations	396	464	316	427	495	347
R-squared	0.410	0.370	0.422	0.398	0.364	0.398
No. of HIPCs	20	20	20	25	25	25
No. of control countries	7	12	3	7	12	3

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. Columns (I), (II), and (III) report estimate results of equation 2.1 where the sample considered include HIPCs having reached their decision point no later than 2003. Columns (IV), (V), and (VI) expose estimate results of equation 2.1 when the HIPCs sample is not restricted and includes all HIPCs, regardless their decision point's date. Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). Data on domestic debt stock come from [Presbitero et al. \(2012\)](#) and are available over 1970-2010 for 41 low-income countries, which explains the small number of countries included into the narrow and African control groups. Robust z-statistics are exposed in parentheses***, ** and * denote significance at 10%, 5% and 1%.

2.6 Conclusion

This study takes different measures of government willingness to tax to show that the expectation of debt relief under the Enhanced HIPC initiative prompted HIPC governments to make substantial taxation efforts. Findings suggest that they saw future debt relief as attractive enough to launch significant reforms to collect a relatively larger share of their “tax capacity”. This upturn in effort, which appears to have started around 1996 when the IFIs first announced multilateral debt write-offs, drove HIPCs to a higher average level of tax effort after the decision point compared with the level recorded before the anticipatory effects took place. A recent disaggregated tax dataset on developing countries shows that this tax effort focused mainly on improving indirect tax collection such as taxes on goods and services.

Yet the study also finds that as soon as HIPCs qualify for debt relief at the completion point and receive additional cancellations under the MDRI, they ease off on their tax effort as compared with the level sustained throughout the period between the decision point and the MDRI. This might have happened because, given that the completion point marks the end of the HIPC process and hence of conditional debt relief, HIPCs no longer need to make significant efforts to satisfy IFIs’ expectations. In other words, there is no other fiscal incentive for HIPCs’ governments to behave well than the prospect of having an efficient, inclusive tax system. The final section of this paper suggests that government’s preference for present, weak institutional quality and access to new financing sources partly explain why some HIPCs are more prone to reduce tax effort once relieved from the IMF monitoring. Therefore, in a first, this study identifies moral hazard effects derived from the design of the debt relief initiative, which unfortunately cancel out part of the benefits gained (in terms of tax effort) throughout the process.

However, one should bear in mind that although the drop in tax effort around the MDRI produces an average tax effort in the post-MDRI period inferior to the one recorded in the extended interim period, the combination of the anticipatory effect with sustained tax effort in this extended interim period helps to secure higher levels of tax effort than those recorded prior to the anticipatory period (so over the baseline).

This study thus shows that HIPCs make substantial, valuable fiscal improvements when they are compelled to do so. Future cooperation between HIPCs (pre-completion countries in particular³¹) and IFIs should therefore continue to focus on tax effort improvements to create efficient, long-lasting, and hardly reversible tax systems that will provide substantial domestic resources, and will thus help HIPCs in financing their development, but also in breaking free from IFI financial assistance and ultimately reinforce their sovereignty.

³¹Eritrea, Somalia, Sudan.

Complementary results

Appendix A. Taxation determinants and zero-stage estimates.

I design the structural tax model drawing on most of the contributions in the tax effort literature. However, since the objective is to observe the reaction of the residuals derived from this zero-stage estimate to debt relief provision, **I do not consider as structural tax determinants factors theoretically at play in this relation such as the stock of debt** (Teera and Hudson, 2004; Gupta, 2007; Mkandawire, 2010; Clist and Morrissey, 2011) **and institutional quality** (Kaldor, 1962; Tanzi and Davoodi, 1998; Ghura, 1998; Teera and Hudson, 2004; Gupta, 2007; Mahdavi, 2008; Bird et al., 2008; Bornhorst et al., 2009; Thomas and Treviño, 2013). I deliberately exclude institutional quality measures from the tax effort model since estimate residuals should embrace the contribution of this variable to domestic resource mobilization. Indeed, one can fairly think that the relationship between taxes and institutional quality directly refers to the willingness of the government to tax and must therefore be captured by the residuals of the tax effort equation. Therefore, the final tax effort model for the entire sample of 113 developing countries, including HIPCs and countries of the three control groups, can be represented as follows:

$$Tax_{i,t} = \alpha + \mu_i + \gamma_t + \beta X_{i,t} + \phi Z_{i,t} + \epsilon_{i,t} \quad (2.2)$$

where $Tax_{i,t}$ is the government's tax revenues as a percentage of GDP, net of natural resource revenues, grants and other non-tax revenues for country i in time period t ; $X_{i,t}$ is a vector of structural economic determinants of taxation for country i in period t , which includes the logarithm of per capita GDP in 2005 constant USD (in line with studies by Lotz and Mors (1967); Heller (1975); Bahl (1971); Chelliah et al. (1975); Tait et al. (1979); Leuthold (1991)), the economy's trade openness as a percentage of GDP (Burgess and Stern, 1993; Khattry and Rao, 2002; Agbeyegbe et al., 2006; Baunsgaard and Keen, 2010), the breakdown of value-added by sector as a percentage of GDP (Gupta, 2007; Bornhorst et al., 2009; Thomas and Treviño, 2013; Crivelli and Gupta, 2014), and can also include in some specifications the inflation rate (Tanzi and Davoodi, 1998), and ODA (Official Development Assistance) grants net of debt relief grants (Clist and Morrissey, 2011).³² In keeping with a number of studies (Bolnick, 1978; Khattry and Rao, 2002; Mahdavi, 2008; Mkandawire, 2010; Thomas and Treviño, 2013), $Z_{i,t}$ denotes a vector of demographic variables comprising population density (logarithm), the age dependency ratio and the urbanization rate (as a percentage of the total population) also for country i in time period t . Lastly, α_i and γ_t represent respectively n-1 country and t-1 time fixed effects, and $\epsilon_{i,t}$ denotes the classic error term. Basic descriptive statistics and data sources for these variables are presented in Table 2.A1 below.

Most of the studies estimate tax effort using classic Least Squares Dummy Variable (LSDV) estimators. However, as pointed out by Gupta (2007) and Mkandawire (2010), tax revenues are subject to heteroskedasticity and serial auto-correlation issues, as confirmed by the Wooldridge

³²We do not include ODA loans since their evolution would be too close to the HIPC process given that debt cancellations mostly bore on multilateral ODA loans.

tests performed for this study.³³ This persistence in tax revenues³⁴ is not unexpected since the volatility of domestic revenue in developing countries is often associated with fluctuations in natural resource revenue which are mostly driven by exogenous shocks on international commodity prices. Yet, given that we take our tax variable net of natural resource revenues, we logically suspect the tax revenue variable to be serially auto-correlated. Therefore, as in [Gupta \(2007\)](#) and [Mkandawire \(2010\)](#), we estimate equation 2.2 using the Panel Corrected Standard Error (PCSE) estimators, which account for both serial auto-correlation and heteroskedasticity.

Generalized method of moments (GMM) estimators ([Arellano and Bond, 1991](#); [Arellano and Bover, 1995](#)) could also be used to account for this continuity and the potential reverse causality between structural economic determinants and tax revenues. Yet, since reverse causality between tax revenues and structural economic determinants depends upon the government’s willingness to raise its domestic revenues, removing it would “wash” the residuals from the factor driving this endogeneity, which, in this case, is the government’s willingness to tax. Moreover, dynamic models are not suitable for structural tax estimates since the lagged dependent variable explains most of the contemporaneous dependent variable (hence revealing the serial correlation features of taxes) and prevent identification of the role played by the country’s tax base. Nevertheless, models using alternative estimators such as LSDV estimators, or soft controls for common unexpected events such as PCSE and LSDV models with lagged values of endogenous variables have also been used to estimate alternative tax effort index in order to test the robustness of the debt relief impacts on tax effort.

Table 2.A2 below presents the equation 2.2 estimates for the panel of 113 developing countries observed over 1990-2012, using PCSE estimators with panel-specific correlation coefficients and country and time fixed effects. Findings are in line with the literature, with per capita GDP and the rate of openness positively associated with the tax ratio. The share of the different sectors also has the expected sign, even for the natural resource share, while the demographic variables do not seem to really make a difference for domestic revenue mobilization. Of these four estimates, column (1) represents the benchmark estimate since it includes the most standard explanatory variables used in the literature and which approximates the most the tax base for developing country.³⁵

Taking the predicted value of the tax-to-GDP ratio from column (1) specification in Table 2.A2, we then compute the tax effort ratio for each country and each year since our panel is almost perfectly balanced and has few missing values:

$$TE_{i,t} = \frac{Tax_{i,t}}{\hat{Tax}_{i,t}} = 1 + \frac{\epsilon_{i,t}}{\hat{\alpha} + \hat{\mu}_i + \hat{\gamma}_t + \hat{\beta}X_{i,t} + \hat{\phi}Z_{i,t}}$$

³³Not reported to save space, but available upon request to the author.

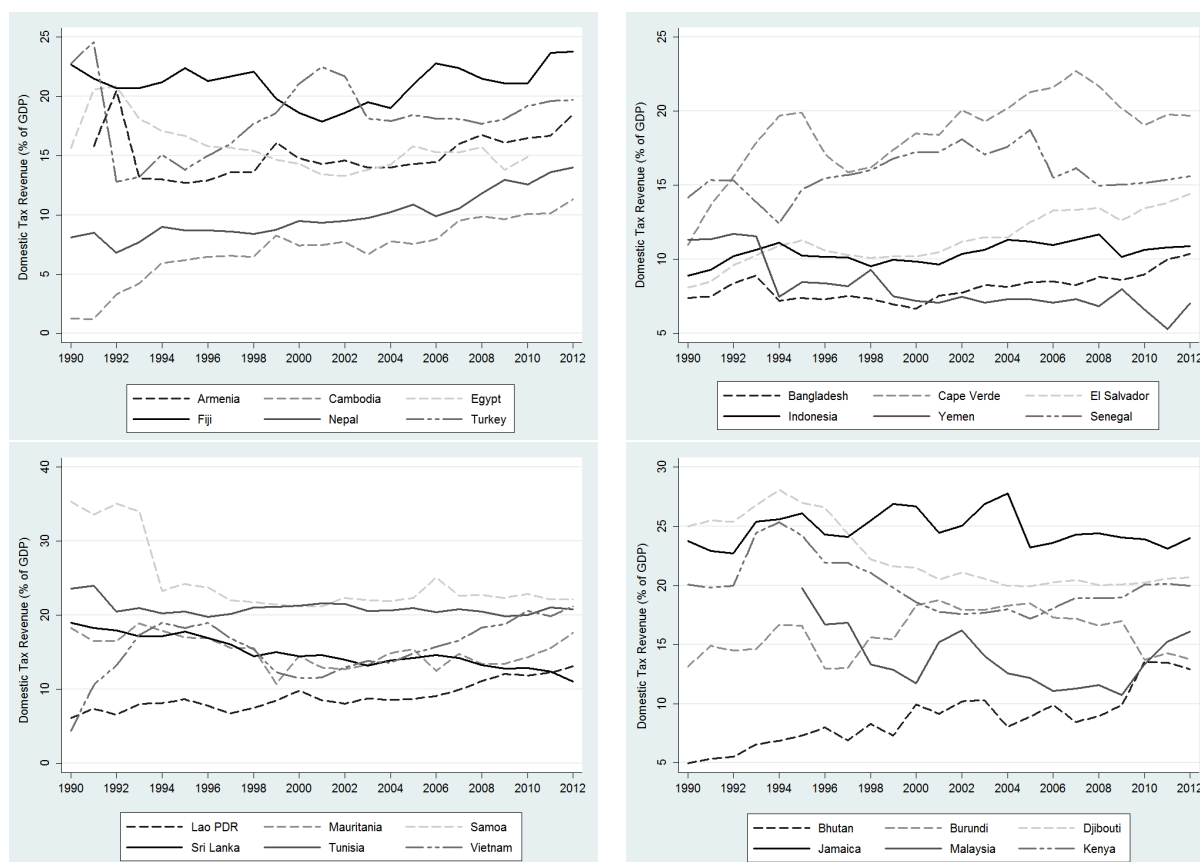
³⁴Cf. Figure 2.A1 below.

³⁵In section 2.4.3, we use tax effort index obtained from other specifications to test the robustness of the relationship between debt relief and tax effort. But the pairwise correlation matrix (see Table 2.C3 in the Appendix C, p.78) shows that the tax effort estimates are fairly similar irrespective to the specification used.

Table 2.A1: Data source and coverage - 113 Developing countries [1990-2012]

Variables	Source	Mean	Std. Dev.	Obs.	% missings
Domestic tax revenues	<i>IMF Article IV and Staff Report</i>	15,16	6,43	2525	4.53
Log GDP pc	<i>World Development Indicator (2014)</i>	7.02	1.02	2547	3.70
Agriculture share	<i>World Development Indicator (2014)</i>	22.32	14.41	2479	6.27
Industry share	<i>World Development Indicator (2014)</i>	28.30	11.43	2473	6.50
Service share	<i>World Development Indicator (2014)</i>	49.37	13.14	2473	6.50
Resources share	<i>World Development Indicator (2014)</i>	10.28	13.56	2578	2.53
Openness rate	<i>World Development Indicator (2014)</i>	39.37	19.23	2530	4.34
Inflation rate	<i>World Development Indicator (2014)</i>	58.91	762.78	2295	13.23
ODA grants	<i>OECD-DAC donors database (2014)</i>	5.85	8.19	2578	2.53
Log pop. density	<i>World Development Indicator (2014)</i>	3.98	1.22	2645	0.00
Age dependency	<i>World Development Indicator (2014)</i>	73.98	18.44	2622	0.87
Urban population	<i>World Development Indicator (2014)</i>	42.98	19.06	2645	0.00
Tax/Rev Natural Res.	<i>IMF Article IV and Staff Report</i>	2.29	6.86	2645	0.00

Figure 2.A1: Tax revenue persistence.



Notes: These four graphs illustrate the evolution of tax revenues (excluding revenues from natural resources) in developing countries (both HIPCs and non-HIPCs). As one can notice, there is a quite important persistence in tax-to-GDP ratio which supports the resort to the Panel Corrected Standard Errors estimators.

Table 2.A2: Tax effort model for 113 Developing countries.

Model:	(1)	(2)	(3)	(4)
Dep. var.:	TAX REVENUES			
Estimators:	PCSE			
Log GDP pc	2.501*** (3.709)	2.154*** (3.037)	2.382*** (10.343)	1.873*** (5.696)
Openness rate	0.024*** (2.626)	0.020** (2.158)	0.056*** (5.084)	0.051*** (4.913)
Agriculture share	-0.115*** (-6.951)		-0.006 (-0.370)	
Resources share	0.000 (0.031)		-0.042*** (-2.913)	
Industry share		0.115*** (5.889)		0.025 (1.252)
Service share		0.084*** (4.469)		0.067*** (3.390)
Log Pop. density	-0.038 (-0.033)	-2.128* (-1.826)	0.192* (1.652)	0.072 (0.663)
Age dependency	-0.032 (-1.553)	-0.036 (-1.634)	-0.024* (-1.829)	-0.045** (-2.510)
Urban population	0.071 (1.342)	0.079 (1.417)	-0.038** (-2.376)	0.010 (0.538)
Inflation			0.000 (1.116)	0.000 (1.430)
ODA (Grants)			0.039** (2.072)	0.042** (2.309)
SSA				0.990 (1.360)
LATAM				-4.078*** (-4.996)
Country FE	Yes	Yes	Yes	No
Time FE	Yes	Yes	Yes	Yes
Observations	2,312	2,308	2,038	2,036
No. of countries	2,312	2,308	2,038	2,036
R-squared	0.927	0.925	0.801	0.818
Number of country	113	113	108	108
F-Statistic (p-value)	0.000	0.000	0.000	0.000

Notes: All regressions are estimated using PCSE estimators with panel specific correlation coefficients. Their related robust z-statistics are exposed in parentheses. Estimates with LSDV estimators expose positive and statistically significant coefficients for the population density (in log) and the LATAM dummy. Estimates with lagged values of GDP per capita and openness rate (with both PCSE and LSDV estimators) also lead to similar results but with larger coefficients for lagged explanatory variables. Results are not reported here to save space but are available upon request to the author. F-statistics are all statistically significant at the 1% level. ***, ** and * denote significance at 10%, 5% and 1%.

Appendix B. Control groups: composition and suitability.

Composition and static comparisons

Table 2.B1: Narrow control group - Country-composition.

Period (length)	1990-1996 (7 years)		
Country name	debt-to-exports ratio (%)	years as LIC	IMF Program
Bangladesh	476.16	7	Yes
Cambodia	708.00	7	Yes
Egypt	249.74	7	Yes
India	273.81	7	Yes
Kenya	216.95	7	Yes
Lao PDR	913.73	7	Yes
Lesotho	327.29	7	Yes
Nepal	302.66	7	Yes
Nigeria	349.38	7	Yes
Pakistan	239.52	7	Yes
Sri Lanka	178.64	7	Yes
Sudan	1925.17	7	Yes
Vietnam	538.54	7	Yes
Yemen	716.72	4	Yes
<i>Average</i>	529.74	6.8	Yes
<i>Average HIPCs sample 1</i>	712.99	6.2	Yes
<i>Average HIPCs sample 2</i>	668.59	6	Yes

Notes: Author's computation. Data on debt stocks have been retrieved from *International Debt Statistics*, LICs' classification from the *World Development Indicators*, and the IMF program's participation from the *IMF Archives Catalogue*. Figures for Average HIPCs sample 1 have been obtained from the sample of **26 HIPCs** having reached their decision point no later than 2003. Average HIPCs sample 2 report figures for the unrestricted sample of HIPCs (**34 HIPCs** which have at least reached their decision point - Haiti being excluded for the reason exposed in the core text).

Table 2.B2: Extended control group countries.

Albania	Dominican Republic	Libya	South Africa
Algeria	Ecuador	Macedonia	Sri Lanka
Angola	Egypt	Malaysia	St. Lucia
Argentina	El Salvador	Maldives	St. Vincent
Armenia	Equatorial Guinea	Mauritius	Sudan
Azerbaijan	Eritrea	Moldova	Swaziland
Bangladesh	Fiji	Mongolia	Syria
Belarus	Georgia	Morocco	Tajikistan
Belize	Grenada	Myanmar	Thailand
Bhutan	Guatemala	Nepal	Tonga
Bosnia and Herzegovina	India	Nicaragua	Tunisia
Botswana	Indonesia	Nigeria	Turkey
Brazil	Iran. Islamic Rep.	Pakistan	Turkmenistan
Bulgaria	Jamaica	Panama	Ukraine
Cambodia	Jordan	Papua New Guinea	Uzbekistan
Cape Verde	Kazakhstan	Paraguay	Vanuatu
China	Kenya	Peru	Venezuela
Colombia	Kyrgyz Republic	Philippines	Vietnam
Costa Rica	Lao PDR	Romania	Yemen
Djibouti	Lebanon	Samoa	Zimbabwe
Dominica	Lesotho	Serbia	

African control group countries
 Libya and Equatorial Guinea are excluded from the sample because of lack of data.

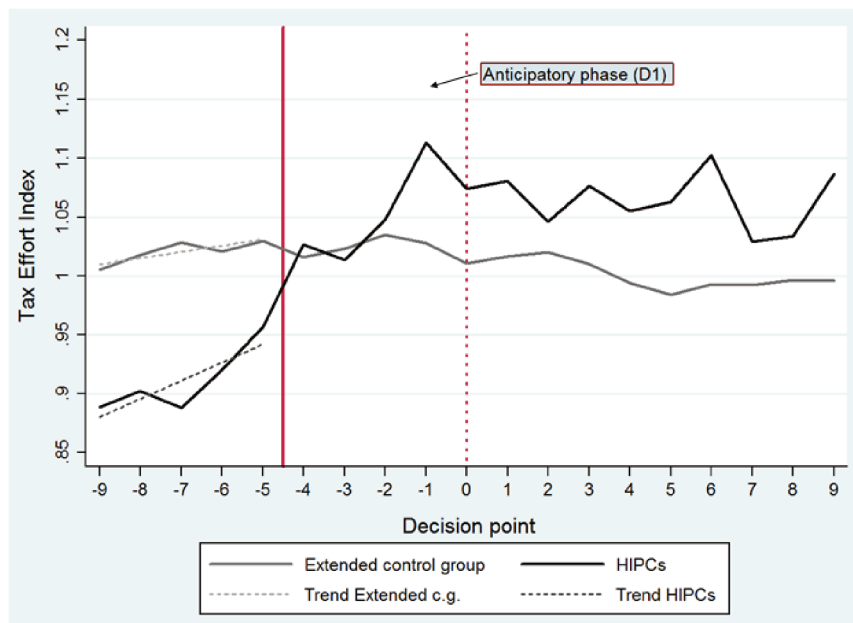
Notes: All countries considered for the extended and African control groups are countries which have been ranked as a LIC at least once between 1990 and 1996.

Table 2.B3: Control groups and macro-covariates (average 1990-1996).

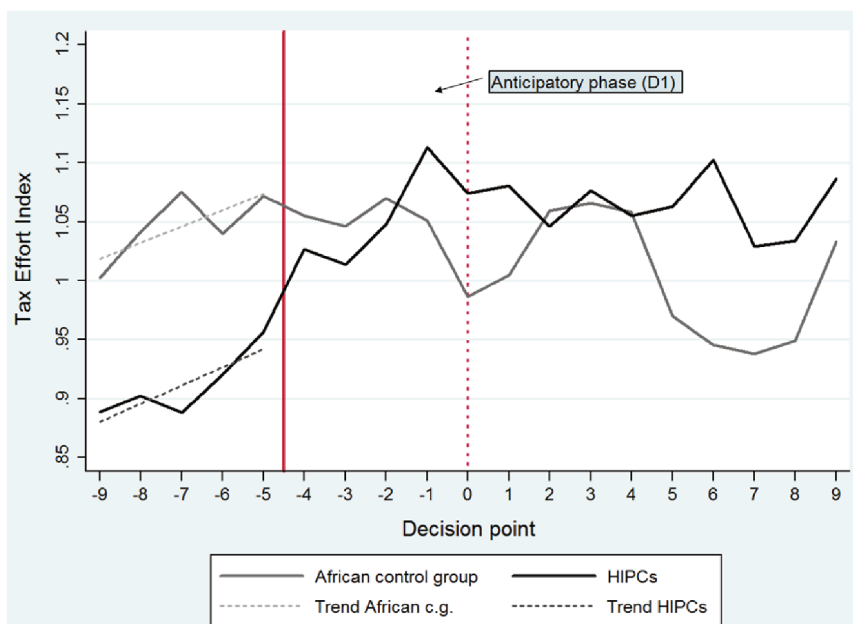
Variables	(I)	(II)	(III)	(IV)	Difference before 1996		
	HIPC	Control groups			(I)-(II)	(I)-(III)	(I)-(IV)
		Narrow	Extended	African			
Debt-to-exports	712.99	529.74	198.29	286.58	183.25***	509.64***	424.21***
LIC Statuts	0.88	0.96	0.26	0.35	-0.08***	0.61***	0.53***
Log GDP pc	5.98	6.14	7.26	7.07	-0.15***	-1.27***	-1.09***
Openness rate	29.55	27.87	39.29	40.72	1.74	-9.69***	-11.14***
Agriculture share	36.14	29.56	21.58	17.23	6.61***	14.55***	18.90***
Resources share	10.88	10.98	8.19	9.33	-0.08	2.69***	1.55***
Log pop. Density	3.32	4.49	4.03	3.60	-1.17***	-0.71***	-0.28***
Age dependency	94.08	86.17	75.16	85.85	7.91***	18.91***	8.22***
Urban population	30.15	23.37	44.29	40.38	6.78***	-14.13***	-10.22***

Notes: In this table we observe macro-covariates average values for each group under review and over 1990-1996 (which nearly coincides with the baseline period of HIPC's considered in sample 1). The HIPC group contains all HIPC's that have reached their decision point no later than 2003. Paired t-test are performed in order to observe the difference in macro-covariates between HIPC's and countries included in the different control groups (the narrow, extended, or African control group). We note, that although most of the differences are statistically significant, differences with HIPC's are minimized (on average) when comparisons are performed with respect to narrow control group countries. ***, ** and * denote significance at 10%, 5% and 1%.

Figure 2.B1: Average evolution of tax effort around debt relief (continued).



(a) Comparison with the extended control group



(b) Comparison with the African control group

Notes: The graph (a) illustrates the evolution of tax effort around the decision point of the Enhanced HIPC initiative for the extended control group and the sample of 26 HIPCs having reached their decision point before 2003. The graph (b) does the same considering the African control group instead of the extended one. **Dotted line denotes average trends in tax effort for HIPCs and control groups over the baseline period.** Similarly to Figure 2.4 (p.46) we observe that the parallel trend hypothesis seems to be verified when comparing HIPCs' tax effort evolution with respect to the one of the extended and African control groups. However, as explained in section 2.3.1, these groups of countries are just intended to control for global and regional trends in tax effort and are not intended to represent the main counterfactual.

Parallel trend - Econometric analysis

The identification of treatment effects under the DID methodology is based on the hypothesis of ex-ante parallel trends in the outcome variable between control and treated units. Consequently, I run placebo tests to check for parallel trends in tax effort between HIPCs and the different control groups before debt relief was granted. However, taking into account the potential anticipatory effect over the years preceding the attainment of the decision point (captured by β_1 in equation 2.1), I investigate the parallel trend hypothesis before such anticipation takes place, i.e. over the baseline period. Note that for 21 out of 26 HIPCs of our sample, the baseline period corresponds to the years prior 1996, so before the HIPC initiative was officially disclosed.

In order to empirically observe the difference in tax effort evolution between HIPCs and control group countries over the baseline, I run the following specification:

$$TE_{i,t} = \alpha + \delta_t + \nu HIPC_i + \beta HIPC_i * Placebo_{i,t} + \epsilon_{i,t} \quad (2.3)$$

where only observations over the baseline period for the HIPCs are considered, thus restricting the time series for control group countries to 1999 (since for HIPCs having reached their decision point in 2003, the baseline period ends in 1999). I then define $Placebo_{i,t}$ as a dummy variable equal to 1 for the most recent half of the HIPCs' respective baseline period. Note that the length of the baseline period is HIPC-specific and depends on the date the HIPC reached its decision point (date which varies between HIPCs). For instance, a country like Burkina Faso that reached its decision point in 2000 will have its baseline period defined between 1990 and 1995 (with the period running from 1996 to 1999 being the anticipatory phase). Therefore, the $Placebo_{i,t}$ dummy is equal to 1 for years from 1993 to 1995 and 0 otherwise. For country having reached their decision point in 2002 like Ghana, the baseline period runs from 1990 up to 1997 (with the anticipatory phase over 1998-2001). In this case $Placebo_{i,t}$ is equal to 1 for the sub-period 1994-1997. In addition to this placebo treatment I include time-fixed effects as well as an HIPC dummy to account for initial differences in tax effort with respect to the different control groups.

Alternately, I also consider a second specification to investigate the parallel trend hypothesis:

$$TE_{i,t} = \alpha + \delta_t + \nu HIPC_i + \sum_{p=-8}^{-5} \beta_p HIPC_i * DP(-p)_{i,t} + \epsilon_{i,t} \quad (2.4)$$

where instead of splitting the baseline period in two, I observe the gradual evolution of tax effort throughout this period and with respect to the first years of the baseline period (years prior the year -8 as regards the decision point). The variable $DP(-p)_{i,t}$ is a dummy variable equal to 1 in the year t corresponding to the year $-p$ as regards the decision point of the HIPC i . We thus have four dummy variables that capture the level of tax effort in HIPCs in -5, -6, -7, and -8, and as compared with tax effort in older years. Any robust significance in these dummy variable suggests a different trend in tax effort evolution between HIPCs and the control groups.

Results for both equation 2.3 and 2.4 are reported in Table 2.B4. Results denote an absence of robust diverging path in tax effort between HIPCs and countries in the different control groups. The Placebo coefficient is never significantly different from zero which therefore supports the parallel trend hypothesis. The parallel trend hypothesis is also supported by even columns,

where dummy variables for the last four years of the HIPCs' baseline period are not statistically significant (except with respect to the extended control group, although the significance remains marginal - at the 10% level).

Table 2.B4: Parallel trend analysis.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index					
Control group:	<i>Narrow</i>	<i>Extended</i>		<i>African</i>		
Placebo (ex-ante)	-0.039 (-0.664)		0.035 (0.848)		-0.028 (-0.512)	
Placebo (year -5)		0.014 (0.130)		0.088* (1.700)		0.019 (0.255)
Placebo (year -6)		-0.004 (-0.049)		0.069* (1.658)		0.021 (0.317)
Placebo (year -7)		-0.053 (-0.799)		0.020 (0.400)		-0.043 (-0.615)
Placebo (year -8)		-0.010 (-0.163)		0.051 (0.745)		0.014 (0.163)
HIPC Dummy	-0.194*** (-3.403)	-0.208*** (-3.644)	-0.147*** (-5.081)	-0.165*** (-4.491)	-0.120*** (-2.746)	-0.138*** (-2.638)
Observations	289	289	813	813	319	319
R-squared	0.641	0.643	0.428	0.429	0.608	0.610
Wald-Stat (p-value)	0.000	0.000	0.567	0.000	0.000	0.000
No. of HIPCs	25	25	25	25	25	25
No. of control countries	14	14	78	78	17	17

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. Columns (I), (III), and (V) report estimate results of equation 2.3, while columns (II), (IV), and (VI) expose estimate results of equation 2.4. Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). Tax effort estimates using specification 1 are quite large for Niger and can thus rise doubts about the reliability of our results. We therefore removed Niger from our benchmark estimates. Nevertheless, results with Niger do not change the conclusions and are available upon request to the author. Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%. **Results do not suggest an average significant divergence in tax effort evolution over the baseline period between HIPCs and the various control groups, thus making them suitable for the difference-in-differences analysis.**

Appendix C. Robustness checks.

PANEL A - Debt-to-revenue ratio - (10 countries): Bangladesh, Cambodia, Kenya, Lao PDR, Nepal, Nigeria, Sri Lanka, Sudan, Vietnam, Yemen.

PANEL B - IDA eligible - (37 countries): Albania, Angola, Armenia, Azerbaijan, Bangladesh, Bhutan, Cape Verde, China, Djibouti, Egypt, Georgia, India, Indonesia, Kazakstan, Kenya, Krygyz Republic, Lao PDR, Lesotho, Moldova, Mongolia, Morocco, Nepal, Nigeria, Pakistan, Papua New Guinea, Philippines, Samoa, Sri Lanka, Sudan, Syria, Tajikistan, Turkmenistan, Uzbekistan, Vanuatu, Vietnam, Yemen, Zimbabwe.

PANEL C - SIN and MIN - (21 countries): Argentina, Bangladesh, Brazil, Bulgaria, Colombia, Dominican Republic, Ecuador, Guatemala, India, Indonesia, Kenya, Morocco, Myanmar, Nigeria, Pakistan, Peru, Philippines, Sudan, Syria, Turkey, Zimbabwe.

PANEL D - SIN only - (11 countries): Argentina, Brazil, Bulgaria, Ecuador, Kenya, Morocco, Myanmar, Nigeria, Peru, Sudan, Syria.

Note that countries are defined as severely indebted (SIN) and moderately indebted (MIN) following the World bank's definition: "*Severely indebted means either: PV of debt service to GNI exceeds 80 percent or PV of debt service to exports exceeds 220 percent. Moderately indebted means either of the two key ratios exceeds 60 percent of, but does not reach, the critical levels. For economies that do not report detailed debt statistics to the World Bank Debtor Reporting System (DRS), PV calculation is not possible. Instead, the following methodology is used to classify the non-DRS economies. Severely indebted means three of four key ratios (averaged over three years) are above critical levels: debt to GNI (50 percent); debt to exports (275 percent); debt service to exports (30 percent); and interest to exports (20 percent). Moderately indebted means three of the four key ratios exceed 60 percent of, but do not reach, the critical levels. All other classified low income and middle-income economies are listed as less indebted*".

PSM-based control groups

As explained in the core text, I specify a Probit model where the probability of being HIPC under the Enhanced HIPC initiative (regardless the date of debt relief provision) is determined by covariates averaged over 1990-1996. This model can thus be written as follows:

$$Pr(HIPC_i) = \Phi(DEBT_{i,90-96}, GNI_PC_{i,90-96}, EXPORTS_{i,90-96}, IMPORTS_{i,90-96}, \\ AGRI_{i,90-96}, NAT_RES_{i,90-96}, POP_DENS_{i,90-96}, ODA_{i,90-96}, \\ POLITY_IV_{i,90-96}, TAX_EFFORT_{i,90-96})$$

where $HIPC_i$ is a dummy variable equal to 1 if the country i has been granted debt relief under the Enhanced HIPC over our entire period of study (so between 1990 and 2012). Then, the covariates that could potentially explain why some countries have benefited from this initiative (out of the 113 countries of our sample) are averaged over 1990-1996, so before the first HIPC initiative was disclosed. $DEBT_{i,90-96}$ is the average debt-to-exports ratio over 1990-1996, $GNI_PC_{i,90-96}$ the average GNI per capita (using World Bank Atlas methodology on which IDA eligibility is based), $EXPORTS_{i,90-96}$ and $IMPORTS_{i,90-96}$ then denote exports and imports'

average shares into the GDP over 1990-1996, $AGRI_{i,90-96}$ is the average share of GDP accruing to the agricultural sector, $NAT_RES_{i,90-96}$ is the average natural resource rents (also expressed in GDP percentage), $POP_DENS_{i,90-96}$ is the average log of population density (averaged over 1990-1996). Then, $ODA_{i,90-96}$ denotes as before the average ODA grants received between 1990 and 1996 (net of debt relief grants) and expressed in percentage of GDP. $POLITY_IV_{i,90-96}$ defines the institutional quality and ranks countries from autocracy to democracy. Lastly, $TAX_EFFORT_{i,90-96}$ is the average level of tax effort over 1990-1996 (derived from column (1) specification of Table 2.A2, p.67) which captures most of the baseline period for HIPCs that have reached their decision point in the early 2000s.

Table 2.C1 below exposes results of Probit estimates. Results of the different Probit model show that, in keeping with the design of the Enhanced HIPC initiative and the eligibility criteria, more indebted and poorer countries (between 1990 and 1996) are more likely to benefit from this initiative. One can also note that exporting countries expose higher probability of being selected into the program, and that countries which are more imports-oriented are less likely to join the initiative. In addition, results suggest that non-resource rich countries and those receiving more ODA are more likely to benefit from these debt relief initiatives. Lastly, the average level of tax effort before 1996 is also found as being an important determinant of the HIPC status. Countries with lower average level of tax effort, indeed report a greater probability of being selected as an HIPC. Interestingly, and in keeping with [Presbitero \(2009\)](#) and [Freytag and Pehnelt \(2009\)](#), we note that institutional quality (here proxied by the Polity IV autocracy/democracy index) plays a positive role in the participation of these debt relief programs.

From Table 2.C1, I derive three propensity scores, each stemming from a particular Probit specification. Some countries have their propensity score computed in each Probit specification, but some other do not, due to missing values on ex-ante economic covariates. Therefore, the number of countries included in the control group can vary according to the specification I used to derived propensity scores, and the propensity score threshold above which countries have to satisfied for being considered as a counterfactual. Countries reported below are countries with a propensity score above 0.2 in Panel F, and with propensity score above 0.5 in Panel G. Countries in **bold** font have their propensity score calculated for each specification and above the required threshold in each situation (so regardless the Probit specification). Countries in *italic* font have propensity scores above the threshold for only two Probit specifications. Lastly, countries in normal font breach the propensity score threshold when their propensity score have been calculated with only one Probit specification.

Propensity score \geq 0.2: **Angola**, Armenia, Azerbaijan, Bangladesh, Bhutan, Cape Verde, Djibouti, China, Eritrea, Georgia, India, **Kenya**, **Kyrgyz Republic**, **Lao PDR**, Lesotho, Moldova, **Nepal**, Nigeria, Pakistan, Papua New Guinea, Samoa, **Sudan**, **Tajikistan**, **Turkmenistan**, Vietnam, Yemen.

Propensity score \geq 0.5: **Angola**, Bangladesh, Bhutan, Djibouti, Georgia, Kenya, Kyrgyz Republic, **Lao PDR**, Lesotho, **Nepal**, Samoa, **Sudan**, Tajikistan, Turkmenistan, Vietnam.

Table 2.C1: Propensity score estimates.

Probit specification:	(1)	(2)	(3)
Dep. var.:	HIPC _{<i>i</i>}		
	(1 if HIPC - 0 otherwise)		
av. DEBT _{<i>i</i>,90-96}	0.001** (2.304)	0.001** (2.501)	0.001 (0.955)
av. GNI_PC _{<i>i</i>,90-96}	-0.002*** (-2.775)	-0.002** (-2.490)	-0.003** (-2.129)
av. EXPORTS _{<i>i</i>,90-96}		0.034* (1.677)	0.212*** (3.030)
av. IMPORTS _{<i>i</i>,90-96}		-0.023 (-1.503)	-0.196*** (-3.091)
av. AGRI _{<i>i</i>,90-96}		-0.002 (-0.092)	0.030 (1.186)
av. NAT_RES _{<i>i</i>,90-96}		-0.022 (-1.227)	-0.082*** (-2.629)
av. POP_DENS _{<i>i</i>,90-96}			-0.237 (-0.941)
av. ODA _{<i>i</i>,90-96}			0.317*** (3.373)
av. POLITY_IV _{<i>i</i>,90-96}			0.139** (2.232)
av. TAX_EFFORT _{<i>i</i>,90-96}	-2.364** (-2.449)	-2.812*** (-2.648)	-2.950* (-1.888)
Constant	2.601*** (2.658)	3.290** (2.136)	3.453 (1.449)
Observations	103	103	96
Prob ≥ Chi2	0.000	0.000	0.000
Pseudo R2	0.432	0.464	0.671

Notes: Probit estimates mobilize observations at the country-level (one observation per country). The dependent variable (HIPC_{*i*}) is equal to 1 for countries defined as HIPC, 0 otherwise. The explanatory variables are average values of macro-covariates over 1990-1996. We lose 7 countries for column (3) estimate because of missing values in the *POLITY_IV* variable. ***, ** and * denote significance at 10%, 5% and 1%.

Table 2.C2: Differences in ex-ante covariates - HIPCs vs propensity score-based control groups.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
	Propensity score ≥ 0.2				Propensity score ≥ 0.5		
	HIPCs	C1	C1 - HIPC		C2	C2 - HIPC	
	Mean	Mean	Diff.	p.val	Mean	Diff	p.val
Probit specification 1							
av. DEBT _{<i>i,90-96</i>}	712.99	318.13	-444.58	0.005***	601.34	-111.64	0.693
av. GNI_PC _{<i>i,90-96</i>}	361.18	419.44	58.26	0.259	378.57	17.39	0.820
av. TAX_EFFORT _{<i>i,90-96</i>}	0.91	0.99	0.07	0.177	0.90	-0.01	0.852
Propensity score _{<i>i</i>}	0.65	0.45	-0.20	0.002***	0.66	0.01	0.896
Observations	26	23	-	-	8	-	-
Probit specification 2							
av. DEBT _{<i>i,90-96</i>}	712.99	343.57	-369.42	0.078*	463.02	-249.97	0.336
av. GNI_PC _{<i>i,90-96</i>}	361.18	404.19	43.01	0.447	369.82	8.64	0.900
av. EXPORTS _{<i>i,90-96</i>}	23.99	30.25	6.26	0.298	32.49	8.49	0.248
av. IMPORTS _{<i>i,90-96</i>}	35.10	35.42	0.32	0.956	39.23	4.12	0.563
av. AGRI _{<i>i,90-96</i>}	36.02	33.03	-2.98	0.426	35.62	-0.39	0.932
av. NAT_RES _{<i>i,90-96</i>}	10.88	10.97	0.09	0.976	12.31	1.43	0.697
av. TAX_EFFORT _{<i>i,90-96</i>}	0.91	0.96	0.05	0.367	0.92	0.01	0.921
Propensity score _{<i>i</i>}	0.67	0.54	-0.13	0.049**	0.65	-0.02	0.741
Observations	26	16	-	-	10	-	-
Probit specification 3							
av. DEBT _{<i>i,90-96</i>}	712.99	394.31	-318.68	0.182	422.79	-290.19	0.345
av. GNI_PC _{<i>i,90-96</i>}	361.18	440.88	79.69	0.267	506.93	145.75	0.111
av. EXPORTS _{<i>i,90-96</i>}	23.99	29.93	5.93	0.363	34.45	10.45	0.200
av. IMPORTS _{<i>i,90-96</i>}	35.10	35.72	0.61	0.926	39.68	4.57	0.579
av. AGRI _{<i>i,90-96</i>}	36.02	31.42	-4.59	0.306	27.85	-8.16	0.139
av. NAT_RES _{<i>i,90-96</i>}	10.88	12.44	1.56	0.652	18.50	7.62	0.069*
av. POP_DENS _{<i>i,90-96</i>}	3.32	3.79	0.47	0.288	3.07	-0.25	0.608
av. ODA _{<i>i,90-96</i>}	13.02	7.38	-5.63	0.053*	10.47	-2.54	0.477
av. POLITY_IV _{<i>i,90-96</i>}	-0.42	-1.33	-0.91	0.620	-3.24	-2.82	0.180
av. TAX_EFFORT _{<i>i,90-96</i>}	0.91	1.03	0.11	0.039**	0.99	0.08	0.275
Propensity score _{<i>i</i>}	0.81	0.48	-0.33	0.000***	0.63	-0.18	0.059*
Observations	26	12	-	-	7	-	-

Notes: The HIPCs sample is made up of 26 countries having reached their decision point no later than 2003. C1 (control group 1) considers non-HIPCs with a propensity score above 0.2, while C2 limits the group to non-HIPCs with a propensity score superior to 0.5. The Table also reports the difference (as well as the statistical significance of this difference) in covariates' mean value before 1996, and between HIPCs and the two control groups. ***, ** and * denote significance at 10%, 5% and 1%.

Alternative dependent variables

Table 2.C3: Tax effort index - Pairwise correlation matrix.

Models:	(1)	(2)	(3)	(4)
(1)	1.000			
(2)	0.915	1.000		
(3)	0.826	0.834	1.000	
(4)	0.381	0.430	0.456	1.000

Notes: Pairwise correlations are all statistically significant at the 1% level. Models (1), (2), (3), (4) correspond to estimate results from columns (1), (2), (3), and (4) respectively (cf. Table 2.A2 in the Appendix A, p.67).

Table 2.C4: ICTD Disaggregated taxes & data coverage - 113 Developing Countries [1990-2012]

Variables (in % of GDP)	Mean	Std. Dev.	Obs.	% missing
Total non-resource taxes	14.13	6.55	2407	8.99
Indirect taxes	9.77	4.89	2115	20.03
<i>of which</i> Taxes on goods and services	6.02	3.59	2113	20.11
<i>of which</i> Taxes on international trade	3.41	3.74	2096	20.75
Direct taxes	4.46	2.95	2148	18.79
<i>of which</i> Taxes on income	1.85	1.75	1565	40.83
<i>of which</i> Taxes on profits gains	2.32	1.92	1535	41.96

Notes: Data come from the GRD (ICTD) (Prichard et al., 2014). December 2015 database available on the UNU-WIDER website

Table 2.C5: Alternative measures of tax effort.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index (specification (3))					
HIPCs sample 1						
Control group:	<i>Narrow</i>		<i>Extended</i>		<i>African</i>	
Estimators	PCSE	LSDV	PCSE	LSDV	PCSE	LSDV
HIPC*D1: (Anticipatory effect)	0.141*** (3.286)	0.164*** (4.453)	0.135*** (3.434)	0.133*** (4.137)	0.094*** (2.741)	0.085* (1.835)
HIPC*D2: (DP-MDRI period)	0.303*** (5.882)	0.307*** (6.701)	0.203*** (7.699)	0.170*** (7.418)	0.207*** (3.987)	0.163*** (3.499)
HIPC*D3: (post-MDRI period)	0.186*** (4.103)	0.186*** (4.475)	0.107*** (4.007)	0.075*** (2.829)	0.095** (2.368)	0.048 (0.958)
Constant	0.871*** (15.820)	0.966*** (19.033)	2.069*** (25.125)	3.149*** (25.516)	2.039*** (18.890)	3.104*** (22.419)
Observations	792	792	1,897	1,897	829	829
No. of HIPCs	26	26	26	26	26	26
No. of control countries	14	14	74	74	16	16
P-value test (D2 - D1 = 0)	0.000	0.000	0.013	0.112	0.010	0.022
P-value test (D1 - D3 = 0)	0.126	0.581	0.379	0.024	0.987	0.332
P-value test (D2 - D3 = 0)	0.000	0.002	0.000	0.000	0.008	0.007
HIPCs sample 2						
Control group:	<i>Narrow</i>		<i>Extended</i>		<i>African</i>	
Estimators	PCSE	LSDV	PCSE	LSDV	PCSE	LSDV
HIPC*D1: (Anticipatory effect)	0.106*** (4.957)	0.113*** (3.810)	0.092*** (4.719)	0.085*** (3.133)	0.067*** (2.903)	0.050* (1.937)
HIPC*D2: (DP-MDRI period)	0.233*** (6.611)	0.225*** (6.547)	0.163*** (5.646)	0.130*** (4.285)	0.163*** (5.383)	0.120*** (3.753)
HIPC*D3: (post-MDRI period)	0.172*** (4.707)	0.166*** (3.965)	0.090*** (3.027)	0.059* (1.917)	0.093** (2.259)	0.048 (1.275)
Constant	0.857*** (10.111)	1.015*** (11.850)	0.858*** (10.179)	1.006*** (11.638)	0.854*** (11.358)	0.993*** (10.955)
Observations	928	928	2,033	2,033	965	965
No. of HIPCs	34	34	34	34	34	34
No. of control countries	14	14	74	74	16	16
P-value test (D2 - D1 = 0)	0.000	0.000	0.013	0.014	0.000	0.009
P-value test (D1 - D3 = 0)	0.026	0.148	0.937	0.136	0.455	0.938
P-value test (D2 - D3 = 0)	0.071	0.144	0.015	0.007	0.036	0.044

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. The Table expose results for both HIPCs samples. The measure of tax effort stems from estimates of specification in column (3), Table 2.A2. As exposed at the top of the table, tax effort measure are either obtained from estimates with PCSE or LSDV estimators. Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Appendix D. Moral hazard around the MDRI - additional results.

Table 2.D1: Descriptive statistics on political instability.

	Over the entire period				
	Mean	Sd	Min	Max	% missing
For HIPCs sample 1					
Political Instability	0.49	0.74	-1.04	2.98	39%
Political Instability II	0.50	0.76	-1.04	2.98	26%
Inverted regime durability	-9.71	9.14	-42	0	4%
Years Left in current term	2.25	1.58	0	6	17%
For non-HIPCs					
Political Instability	0.40	0.85	-1.41	2.80	39%
Political Instability II	0.40	0.85	-1.41	2.80	26%
Inverted regime durability	-17.11	18.59	-97	0	13%
Years Left in current term	2.05	1.46	0	6	20%
Post-baseline (after 1996 for CG countries)					
	Mean	Sd	Min	Max	% missing
For HIPCs sample 1					
Political Instability	0.47	0.72	-1.04	2.58	17%
Political Instability II	0.47	0.73	-1.04	2.78	0%
Inverted regime durability	-9.42	8.05	-42	0	4%
Years Left in current term	2.19	1.56	0	6	12%
For non-HIPCs					
Political Instability	0.40	0.85	-1.41	2.80	18%
Political Instability II	0.40	0.85	-1.41	2.80	1%
Inverted regime durability	-18.14	18.69	-97	0	13%
Years Left in current term	2.02	1.45	0	6	18%

Notes: *Political Instability* is the **WGI (KKZ)** measure of political stability and absence of violence which has been multiplied by -1. *Political Instability II* is the same variable where missing values for 1997, 1999, and 2001 have been filled up using Taylor-Young linear approximation. *Inverted regime durability* comes from the **Polity IV** dataset and multiplies by -1 the number of years since the last policy regime change. Therefore increase in this variable denotes shorter period since the last regime change. Lastly, *Years left in current term* come from the **Dataset on Political Insitutions (DPI)**.

Table 2.D2: Debt relief and tax effort - control for government's preference for present.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
Dep. var.:	Tax effort index											
<i>Control Group</i>	<i>Narrow</i>				<i>Extended</i>				<i>African</i>			
HIPCs sample 1												
HIPC*D2: (DP-MDRI period)	0.168** (2.447)	0.155*** (3.830)	0.169*** (4.677)	0.115*** (3.318)	0.087** (2.279)	0.074** (2.516)	0.082** (2.524)	0.035 (1.254)	0.125** (2.086)	0.110*** (2.736)	0.110*** (2.662)	0.041 (0.963)
HIPC*D3: (post-MDRI period)	0.040 (0.694)	0.016 (0.379)	0.033 (0.982)	0.044 (1.051)	-0.001 (-0.038)	-0.020 (-0.767)	-0.003 (-0.114)	-0.037 (-1.492)	0.026 (0.468)	-0.003 (-0.078)	-0.001 (-0.037)	-0.022 (-0.501)
Political Instability	-0.053** (-2.316)				-0.033** (-2.155)				-0.043 (-1.563)			
Political Instability II		-0.062*** (-2.670)				-0.041*** (-2.920)				-0.060** (-2.530)		
Inverted regime durability			0.000 (0.119)				-0.001** (-2.001)				-0.002* (-1.715)	
Years left in current term				0.009** (2.067)				0.006** (2.466)				0.009* (1.695)
Constant	1.024*** (13.095)	1.041*** (20.855)	0.946*** (11.142)	1.066*** (12.151)	0.940*** (8.489)	0.960*** (10.417)	0.955*** (9.638)	0.914*** (13.735)	0.980*** (8.530)	1.011*** (8.778)	0.828*** (8.023)	0.890*** (9.075)
Observations	507	621	694	616	1,315	1,608	1,813	1,675	542	665	755	622
R-squared	0.284	0.253	0.216	0.327	0.266	0.237	0.094	0.150	0.236	0.210	0.170	0.237

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. The Table exposes results for HIPCs sample 1 since it includes HIPCs with the longer post-MDRI period (7 years for all of them). Note that running estimates with HIPCs sample 2 gives the same results (available upon request to the author). The study period has been shortened by dropping observations before 1996 which corresponds to the baseline of most HIPCs of this sample. Therefore, **the reference period** for HIPCs to which coefficients *HIPC * D2* and *HIPC * D3* must be compared with **is the anticipatory phase. Absence of statistical significance for *HIPC * D2* and *HIPC * D3* suggests no different level of tax effort in the extended interim and post-MDRI periods as regards the level recorded during the anticipatory period.** Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2, P.67). Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Table 2.D3: Do conflicts explain changes in tax effort around debt relief?

Dep. var.:	Tax effort index												
	<i>Control Group:</i>	HIPC's sample 1						HIPC's sample 2					
		<i>Narrow</i>		<i>Extended</i>		<i>African</i>		<i>Narrow</i>		<i>Extended</i>		<i>African</i>	
HIPC*D1: (Anticipatory effect)	0.193*** (5.213)	0.194*** (4.752)	0.146*** (5.371)	0.146*** (4.587)	0.137*** (3.760)	0.138*** (3.090)	0.144*** (5.959)	0.144*** (4.535)	0.108*** (5.130)	0.108*** (3.781)	0.100*** (4.276)	0.101*** (3.805)	
HIPC*D2: (DP-MDRI period)	0.353*** (7.574)	0.353*** (7.502)	0.221*** (8.706)	0.221*** (7.712)	0.239*** (6.278)	0.240*** (5.778)	0.268*** (8.395)	0.269*** (6.204)	0.187*** (8.196)	0.188*** (6.849)	0.192*** (6.642)	0.193*** (5.652)	
HIPC*D3: (post-MDRI period)	0.183*** (3.847)	0.181*** (4.114)	0.110*** (3.816)	0.110*** (3.607)	0.092** (2.291)	0.093** (2.154)	0.161*** (3.957)	0.161*** (4.164)	0.097*** (4.236)	0.096*** (3.356)	0.086*** (2.634)	0.086** (2.523)	
Conflicts	-0.002 (-0.140)		-0.017 (-1.365)		0.004 (0.137)		0.013 (0.812)		-0.007 (-0.449)		0.024 (1.082)		
Interstate conflicts		0.063 (1.311)		0.047 (1.364)		0.007 (0.176)		0.034 (0.833)		0.039 (1.022)		0.001 (0.017)	
Internal conflicts		-0.009 (-0.544)		-0.022 (-1.581)		0.002 (0.056)		0.010 (0.485)		-0.012 (-0.989)		0.023 (0.910)	
Internationalized conflicts		-0.003 (-0.049)		-0.017 (-0.361)		0.012 (0.180)		0.022 (0.397)		0.002 (0.040)		0.031 (0.762)	
Constant	0.811*** (13.360)	0.811*** (15.135)	0.945*** (19.014)	0.944*** (11.591)	0.885*** (9.968)	0.886*** (11.278)	0.608*** (6.559)	0.598*** (5.867)	0.665*** (8.319)	0.656*** (8.047)	0.587*** (6.963)	0.580*** (5.566)	
Observations	854	854	2,135	2,135	916	916	1,008	1,008	2,289	2,289	1,070	1,070	
R-squared	0.166	0.167	0.087	0.088	0.129	0.129	0.139	0.139	0.083	0.084	0.115	0.115	
P-value test (D2 - D1 = 0)	0.000	0.000	0.008	0.001	0.002	0.000	0.000	0.000	0.012	0.000	0.000	0.000	
P-value test (D1 - D3 = 0)	0.814	0.748	0.150	0.222	0.219	0.210	0.592	0.621	0.701	0.606	0.631	0.616	
P-value test (D2 - D3 = 0)	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.002	0.000	0.003	0.000	

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. The Table exposes results for HIPC's samples 1 and 2. Data on conflicts come from the latest version of the **UCDP/PRIO Armed Conflict Dataset** (Gleditsch et al., 2002; Harbom and Wallensteen, 2010). Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Table 2.D4: Pairwise correlation between measures of government quality.

	GOV.EF	REG.Q	GOV.Q	CPIA
(WGI) GOV.EF	1.000 (.)			
(WGI) REG.Q	0.877 (0.000)	1.000 (.)		
(ICRG) GOV.Q	0.592 (0.000)	0.524 (0.000)	1.000 (.)	
(IRAI) CPIA	0.782 (0.000)	0.805 (0.000)	0.453 (0.000)	1.000 (.)

Notes: This table reports the pairwise correlation between our different measures (averaged over 2004-2005) of institutional quality for the entire sample. GOV.EF denotes government effectiveness as measured by the WGI-KKZ methodology. REG.Q represents regulatory quality and also comes from the WGI dataset. GOV.Q is the government quality measured by the ICRG. Lastly, CPIA is the classic indicator provided by the World Bank and used by the IDA for its resource allocation criteria. P-values of the pairwise correlation between the different indicators are reported in brackets below correlation coefficients.

Table 2.D5: Moral hazard: contribution of new commitments on external official debt.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index					
	HIPC sample 1			HIPC sample 2		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
HIPC*D2: (DP-MDRI period)	0.164*** (4.541)	0.073** (2.442)	0.107*** (3.164)	0.101*** (2.770)	0.053* (1.833)	0.068*** (2.733)
HIPC*D3: (post-MDRI period)	0.042 (1.131)	0.001 (0.027)	0.005 (0.142)	0.020 (0.504)	-0.010 (-0.272)	-0.006 (-0.188)
Official debt commit.	-0.001* (-1.778)	-0.000* (-1.743)	-0.001* (-1.854)	-0.000 (-0.610)	-0.000 (-0.851)	-0.000 (-1.444)
HIPC*D3*Official debt commit.	-0.001 (-0.668)	-0.001 (-1.343)	-0.001 (-0.591)	-0.001 (-0.776)	-0.001 (-0.942)	-0.001 (-0.641)
Constant	0.985*** (8.951)	0.901*** (13.450)	0.857*** (8.815)	0.802*** (6.345)	0.828*** (9.916)	0.777*** (7.727)
Observations	702	1,891	758	766	1,955	822
R-squared	0.220	0.120	0.173	0.218	0.127	0.179
No. of HIPCs	26	26	26	34	34	34
No. of control countries	14	75	17	14	75	17

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. Columns (I), (II), and (III) report estimate results of equation 2.1 where the sample considered include 26 HIPCs having reached their decision point no later than 2003. Columns (IV), (V), and (VI) expose estimate results when the HIPCs is not restricted and includes all HIPCs, regardless their decision point's date. **Official debt commit.** denote external public debt (PPG) **commitments to official creditors** expressed in percentage of the exports. Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). Robust z-statistics are exposed in parentheses***, ** and * denote significance at 10%, 5% and 1%.

Table 2.D6: Moral hazard: contribution of new commitments to external private creditors.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index					
	HIPC sample 1			HIPC sample 2		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
HIPC*D2: (DP-MDRI period)	0.176*** (4.105)	0.053** (2.283)	0.073** (2.022)	0.109*** (3.731)	0.053*** (2.597)	0.073** (2.512)
HIPC*D3: (post-MDRI period)	0.048 (1.441)	-0.021 (-0.864)	-0.008 (-0.190)	0.017 (0.471)	-0.021 (-1.074)	-0.008 (-0.200)
Debt commit. to priv.	-0.007*** (-2.848)	0.001 (1.271)	0.000 (0.042)	-0.007*** (-2.903)	0.001 (1.327)	0.000 (0.049)
HIPC*D3*Debt commit. to priv.	0.003 (0.364)	-0.005 (-0.967)	-0.004 (-0.706)	0.003 (0.427)	-0.005 (-0.837)	-0.004 (-0.764)
Constant	0.962*** (10.585)	0.826*** (8.977)	0.767*** (6.247)	0.807*** (7.105)	0.826*** (11.077)	0.767*** (7.620)
Observations	702	1,955	822	766	1,955	822
R-squared	0.233	0.129	0.179	0.234	0.129	0.179
No. of HIPCs	26	26	26	34	34	34
No. of control countries	14	75	17	14	75	17

Notes: Estimates have been obtained using the option *vce(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. Columns (I), (II), and (III) report estimate results of equation 2.1 where the sample considered include 26 HIPCs having reached their decision point no later than 2003. Columns (IV), (V), and (VI) expose estimate results of equation 2.1 when the HIPCs is not restricted and includes all HIPCs, regardless their decision point's date. **Debt commit. to priv.** denote external public debt (PPG) **commitments to private creditors** expressed in percentage of the exports. Tax effort index measured at the country-year level are obtained from structural tax equation (1) (column (1) in Table 2.A2, p.67). Robust z-statistics are exposed in parentheses***, ** and * denote significance at 10%, 5% and 1%.

Appendix E. Miscellaneous.

Benchmark results including Niger

Table 2.E1: Benchmark results - including Niger.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	Tax effort index					
	HIPC sample 1			HIPC sample 2		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
HIPC*D1: (Anticipatory effect)	0.195*** (4.601)	0.150*** (4.659)	0.139*** (3.439)	0.144*** (5.364)	0.112*** (3.716)	0.101*** (3.416)
HIPC*D2: (DP-MDRI period)	0.367*** (7.574)	0.236*** (6.964)	0.253*** (6.500)	0.276*** (7.088)	0.200*** (7.312)	0.200*** (7.071)
HIPC*D3: (post-MDRI period)	0.250*** (4.978)	0.177*** (5.215)	0.159*** (3.173)	0.218*** (4.848)	0.156*** (5.665)	0.143*** (3.287)
Constant	0.786*** (13.224)	0.942*** (13.065)	0.884*** (10.378)	0.602*** (6.637)	0.636*** (5.993)	0.591*** (5.979)
Observations	877	2,158	939	1,031	2,312	1,093
No. of HIPCs	27	27	27	35	35	35
No. of control countries	14	78	17	14	78	17
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.276	0.164	0.248	0.245	0.157	0.227
Test: D2 - D1 = 0 (p-val.)	0.000	0.000	0.000	0.000	0.000	0.000
Test: D1 - D3 = 0 (p-val.)	0.231	0.246	0.645	0.058	0.152	0.310
Test: D2 - D3 = 0 (p-val.)	0.023	0.022	0.021	0.215	0.105	0.121

Notes: Estimates have been obtained using the option *vc(bootstrap)* under STATA 13. F-statistics are not reported here but are all significant at the 5% level. Columns (I), (II), and (III) report estimate results of equation 2.1 where the sample considered include 26 HIPCs having reached their decision point no later than 2003. Columns (IV), (V), and (VI) expose estimate results of equation 2.1 when the HIPCs sample is not restricted and includes all HIPCs, regardless their decision point's date. Tax effort index measured at the country-year level are obtained from structural tax equation 2.2 (column (1) in Table 2.A2, p.67). Robust z-statistics are exposed in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Parallel trend - Graphical analysis

Average evolution of tax-to-GDP ratios and tax effort index for HIPCs and control groups around the decision point have been obtained as follows:

For the sample of HIPCs that have reached their decision point no later than 2003, figures for each year regarding the year of the decision point's attainment (-9, -8, ..., 0, 1, ..., 9) represent the average tax effort performance of HIPCs in that given year. For instance, for the year "0" (the year where decision point has been reached) we calculate the average tax effort (*A_TAX_E*) in 2000 (over 21 HIPCs having reached the decision point in 2000), the *A_TAX_E* in 2001 (over 2 HIPCs having reached their decision point in 2001), the *A_TAX_E* in 2002 (over 2 HIPCs having reached their decision point in 2002), and the *A_TAX_E* in 2003 (which consists in the 2003 tax effort of Democratic Republic of Congo (DRC), since only DRC reached its decision point

in that year). We multiply each of these average figures by the number of HIPCs that have been used to compute the mean, then sum these weighted average figures, and lastly divide this sum by 26 (the number of HIPCs having reached their decision point no later than 2003). This allows to give more weight to the A_TAX_E calculated for 2000 since it has been obtained over 21 HIPCs. Replicating this for every year in the range [-9; +9] as regards the decision point, we thus get a unique series of weighted average tax effort for our sample of 26 HIPCs (the **solid black line** in the graphs).

The calculation of the A_TAX_E for the different control groups follows the same philosophy. But, instead of computing average tax effort in 2000 over HIPCs, we just compute average tax effort in 2000 over countries included in the narrow control group (or extend/African control groups for the two other series). Once the average values computed for the four different “decision-point regimes” (2000, 2001, 2002, 2003), we again multiply by the number of HIPCs in the relative decision-point regime, sum these values and divide the sum by 26. As for the HIPC series, replicating this for every year in the range [-9; +9] as regards the decision point provides a unique series of weighted average tax effort for the different control groups (the **solid gray lines** in the graphs).

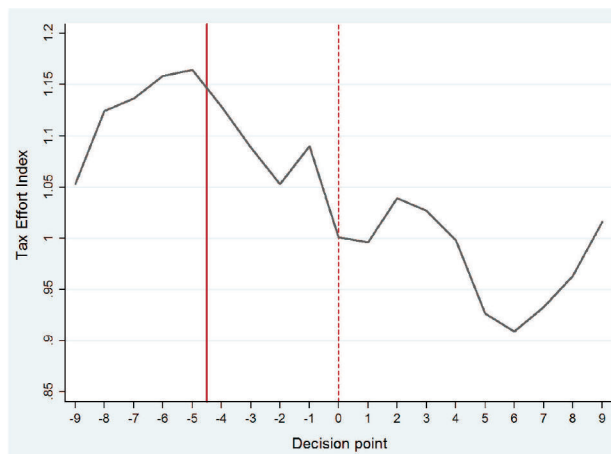
Table 2.E2 below provides an example of a simple hand calculation for the narrow control group’s series of tax effort. The resulting weighted average tax effort for this control group is then plotted in the Figure 2.E1. One can easily notice that it is the same series as the one observed in Figure 2.4 (the solid gray line, p.46).

Table 2.E2: Computation method for the counterfactual (graph) - Application to tax effort series of the narrow control group.

DP regime	No. of HIPCs	Average tax effort of narrow control group for each year of each decision point (DP) regime																		
		Decision point (DP) calendar [-9; +9]																		
		-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9
2000	21	1.03	1.12	1.13	1.16	1.18	1.14	1.09	1.06	1.11	1.00	0.99	1.05	1.04	1.02	0.93	0.90	0.92	0.95	1.03
2001	2	1.12	1.13	1.16	1.18	1.14	1.09	1.06	1.11	1.00	0.99	1.05	1.04	1.02	0.93	0.90	0.92	0.95	1.03	0.98
2002	2	1.13	1.16	1.18	1.14	1.09	1.06	1.11	1.00	0.99	1.05	1.04	1.02	0.93	0.90	0.92	0.95	1.03	0.98	0.98
2003	1	1.16	1.18	1.14	1.09	1.06	1.11	1.00	0.99	1.05	1.04	1.02	0.93	0.90	0.92	0.95	1.03	0.98	0.98	0.95
Total	26																			
Weighted average:		1.05	1.12	1.14	1.16	1.16	1.13	1.09	1.05	1.09	1.00	1.00	1.04	1.03	1.00	0.93	0.91	0.93	0.96	1.02

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Figure 2.E1: Graphical representation.



Chapter 3

Low Income Countries and External Public Financing: Does Debt Relief Change Anything?

with Marc Raffinot and Baptiste Venet

3.1 Introduction

Many low income countries (LICs) have been granted debt relief by bilateral creditors and international financial institutions under the HIPC (Heavily Indebted Poor Countries) initiatives since 1996, and the MDRI (Multilateral Debt Relief Initiative) since 2005. How have these debt relief initiatives impacted on HIPC financing? Have they led creditors to change their lending policies, deterring them from continuing to lend to LICs or prompting them to change their conditions? This paper sets out to answer these questions with an empirical assessment of the impact of debt relief on the financing conditions attached to official lending. We also investigate whether these initiatives have helped beneficiary countries access new financing sources such as international financial markets, and try to identify the circumstances under which this might have happened.

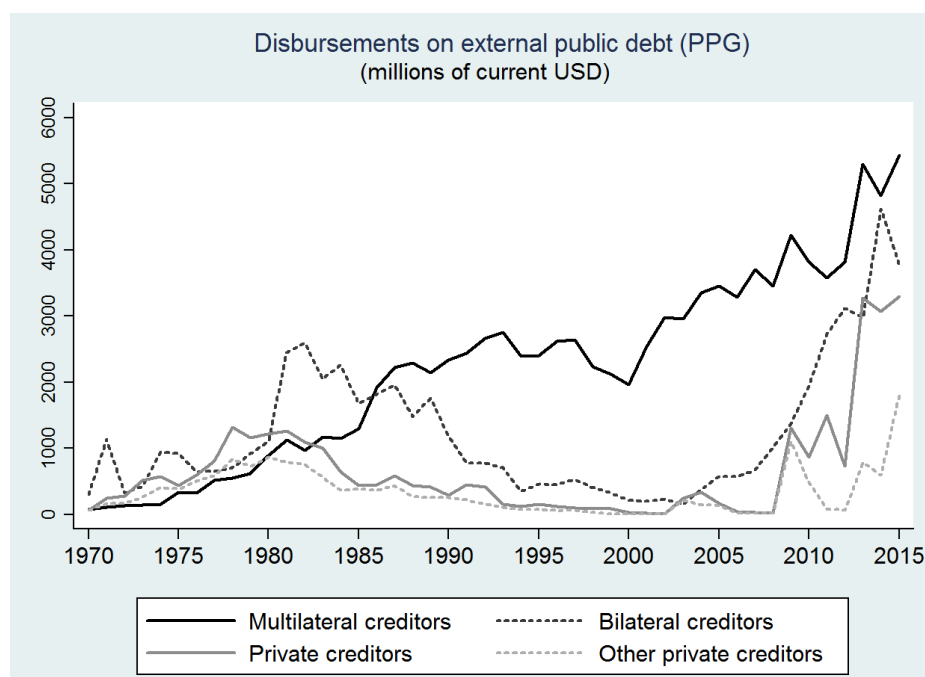
Historically, Rawling's Ghana refused HIPC debt relief in the first place, because of fears of subsequent increases in interest rates (although it was the only HIPC country to do so). The same concern lay behind the refusal of Sri Lanka, Indonesia and India to have their debt rescheduled following the tsunamis. Yet can the increase in risk premium and the narrowing of financing opportunities be deemed rational following a debt cancellation? In actual fact, debt relief probably sends a mixed signal. On the one hand, debt relief would not be expected to build confidence because countries unable to repay their debt in the past could be seen as risky borrowers. On the other hand, debt relief improves debt sustainability by creating fiscal space. The surge in bond issues by African countries on the international financial markets appears to provide the answer: investors like countries without debt. In addition, the global economic turmoil of recent years has prompted investors to search for assets with higher returns, such as African bonds. In 2011, Graham Stock, Director of JP Morgan's Research Department on

Emerging Countries, explained that the increase in commodity prices, high Chinese demand, and the growing quality of institutions on the continent was improving the appeal of African bonds to investors seeking portfolio diversification with attractive returns.¹ He went on to say that the debt relief initiatives had really improved debt sustainability in those countries as they had reassured investors about the debtor’s capacity to pay in the short and medium term.²

However, the story is not that straightforward since some bond-issuing countries were not LICs or HIPCs (Kenya and Gabon). The surge might then be due to the “irrational exuberance of the markets” in a situation of historically low interest rates in OECD countries. This increase could also be explained by Africa’s improving economic prospects attracting new financing from emerging countries, in particular China, India and Brazil. Yet some other countries that were HIPCs, such as Ghana and Senegal, appear to have problems borrowing regularly and steadily. In addition, the high interest rates charged by private lenders have raised concerns that loans to Africa might be no other than a new wave of “subprime loans” (Stiglitz and Rashid, 2013).

Bear in mind, however, that even after debt relief, the majority of LIC and HIPC financing remains official (public) financing. As shown by Figure 3.1 below, bilateral and multilateral loans account for nearly all external public debt disbursements in LICs. And although public financing institutions switched, at least partly, from loans to grants after the 1982 debt crisis, this trend has been reversing since 2006 due to commitments to increase Official Development Aid (ODA) in a situation of public finance crisis in the donor countries.

Figure 3.1: Evolution of external public debt in LICs.



Sources: International Debt Statistics Database - World Databank, downloaded on the 12/21/2016.

¹With spreads on African bonds 400 to 600 basis points higher than on European bonds.

²Les Afriques, No. 167, 23 to 29 June, 2011.

So it is likely that bilateral creditors, who already agreed to cancel a significant part of the claims they had on HIPC, are now looking for higher (than before) returns on new loans and are tightening their financing conditions by lowering the level of concessionality. However, such a shift would be less expected from multilateral donors given the rigidity of their lending policy, which remains mostly defined by economic and institutional features of recipient countries.

We use a difference-in-differences (DID) methodology to first investigate whether debt relief provided under the Enhanced HIPC initiative and the MDRI has led official donors to change the lending terms they offer to beneficiary countries. We also look at changes in access to international financial markets, proxied by public debt contracted from private external banks and other private lenders, which could also be affected by the provision of debt forgiveness. We thus build a control group of countries as similar as possible from among the HIPCs in order to overcome the usual selection issue with the DID approach. The conditionality of debt relief on certain criteria defined in terms of per capita GDP and public indebtedness is then taken to identify those countries that might have been eligible (or close to eligible) for the initiative, but did not ultimately benefit from it. We also define two other control groups, which control to a certain extent for potential trends in developing countries, or Africa, since most of the HIPCs are sub-Saharan African countries. Lastly, the DID estimates include an important set of macroeconomic covariates in addition to country and time fixed effects to help minimize the risk of omitted variable bias.

Comparisons with the different control groups hence provides external validity to the DID estimates, and show that debt relief leads official donors to tighten their lending policy. The results also suggest that debt relief helps beneficiary governments access international financial markets and borrow from private creditors, as public debt contracted from foreign private banks significantly increases after the MDRI. Lastly, going further on the renewed access to private financing, we show that, throughout the post-debt relief period, the widening of financing opportunities has been associated with fewer aid flows from official donors such as bilateral gross transfers and multilateral loans. This final result suggests that private financing has substituted, to some extent, to official financing flows for HIPCs. In other words, it seems that debt relief has not been additional for recipient countries, and that private banks, motivated by attractive capital returns in HIPCs and the sluggish economic environment in industrialized countries, have compensated the shortfall in official assistance to satisfy the financing needs of HIPCs. We provide a series of robustness checks designed to rigorously control for the selection issue, sample dependence, and the omitted variable bias. They all support our benchmark results.

The rest of this paper is organized as follows. Section 2 presents a brief background on LIC financing and the potential effects of debt relief on concessionality and external financing to foreign creditors. Section 3 details the data and the HIPC samples used for this study. Section 4 describes our empirical methodology. Section 5 presents the main results and robustness checks. Lastly, section 6 investigates the circumstances under which the HIPCs' market access has been made possible.

3.2 LIC financing and the impact of debt relief

Middle income countries (MICs) have the option of borrowing on international financial markets, but not in their own currency, and borrowing on their own financial domestic market, but only short term. This peculiarity among the emerging economies has been coined “original sin” by [Eichengreen et al. \(2002\)](#), because it cannot be explained by these economies’ “fundamentals”. This constraint has been somewhat relaxed since 2003, as some emerging countries have been able to borrow from international investors in their own currency and from their own domestic market for longer periods.

LICs are different. We propose describing their (non-)access to the international financial market as “double original sin”, because they cannot usually borrow from international sources even in hard currency at market conditions. This situation abounded in the 1990s, but double original sin was far from prevalent in the 1970s prior to the 1982 debt crisis. In the early 1980s, LICs started to turn to public institutions like the development banks to provide them with concessional loans. The development bank set-up had been put in place following the independence of the African States in the early 1960s with for instance, its special subsidiary the International Development Association (IDA) in 1960 providing concessional loans to LICs.³ Concessional lending means loans that are “significantly” below the market rate which, according to the OECD-DAC, defines a situation where the present value of a loan⁴ is less than 75 percent of its face value (so when the grant element is at least equal to 25 percent of this face value). The rationale behind this institutional set-up is somewhat puzzling, however, because economic theory assumes that returns on investment tend to be much higher in LICs, and so private capital should transit from rich to poor countries (“Lucas paradox”). The wording “double original sin” is thus relevant because, as in the case of “original sin” for emerging countries, there is no rationality behind this financial market behavior. Even when LICs are well managed, they still cannot access the market.

Yet, although unable to borrow from the international financial markets, and benefiting from soft lending conditions, LICs’ governments have accumulated large amounts of external debt to official creditors through the 1980s and 1990s. Inefficient project loans and poor public management contributed to debt stockpiling in LICs, especially sub-Saharan African countries ([Krumm, 1985](#); [Greene, 1989](#)). Note that, although defensive lending is also often claimed as having contributed to this cumulating process, no consensus has been clearly set yet. While some studies find evidence of such behavior from IFIs and the IMF in particular ([Easterly, 2002](#); [Cordella et al., 2010](#); [Geginat and Kraay, 2012](#)), others show that these institutions actually reacted with more grants to the increasing level of debt in LICs ([Marchesi and Missale, 2013](#)).

As a result, given the unsustainable debt ratios of numerous LICs at the end of the 1980s, debt relief started with small bilateral decisions, before becoming systematic for bilateral lenders in the Paris Club under the Toronto Treatment (1988) and being extended to 90% of claims (and more if necessary) under the Cologne treatment (1999) ([Daseking and Powell, 1999](#)). Multilateral debt was not concerned pre-1996, since it was considered senior and could therefore never be canceled or even rescheduled. However, under the 1996 Heavily Indebted Poor Countries

³Defined as countries with a per capita GNI of less than \$1,215 (in IDA’s fiscal year 2015)

⁴Discounted at 10 percent.

(HIPC) Initiative and the 2005 Multilateral Debt Relief Initiative (MDRI), virtually all the multilateral debt stock held by HIPC countries has been canceled by the multilateral creditors (IMF, World Bank, African Development Bank and Inter-American Development Bank). Under the HIPC initiative (and especially the Enhanced HIPC initiative launched in 1999), debt relief is conditional on fulfilling each of the following steps in the process. First, a country has to fulfill income rank, debt level, and macrostability program implementation criteria to be eligible for the initiative. Once eligible, the country reaches the decision point and is granted cancellations on its debt service. Then, conditionally to the implementation of a Poverty Reduction Strategy Paper (PSRP), the HIPC reaches the completion point that marks the end of the process and is granted debt relief on a set amount of external public debt stock. The MDRI then cancels the remaining debt stock for LICs that have already reached the HIPC initiative's "completion point".

From the standpoint of international private investors, debt relief may be seen either as a negative signal (incapacity to repay the former debt) or as a positive signal (recovered capacity to pay). Which side they come down on will first depend on the investors' characteristics, mainly their memory of past defaults and losses, but also their ability to assess the risks in a context that always looks different from the past; the "this time is different" syndrome analyzed by [Reinhart and Rogoff \(2009\)](#). Among the existing literature about the cost of sovereign default, a consensus arises that having benefited from debt restructuring or cancellations leads to temporary exclusion from international financial markets ([Aguar and Gopinath, 2006](#); [Richmond and Dias, 2008](#)). Yet, many studies suggest that the "this time is different" syndrome often materializes since, even though temporarily excluded, defaulters regain access to international credit markets quite quickly (within one or two years after default), and with no sizable borrowing penalty ([Borensztein and Panizza, 2009](#)). This has also recently been underlined by [Bencúr and Ilut \(2015\)](#) which show that although recent defaults significantly affects current spreads level, more distant default tends to have no impact on borrowing costs. However, [Cruces and Trebesch \(2013\)](#) have recently exposed that private lenders wait longer before lending again to defaulters whom haircuts on prior restructuring were substantial. Consequently, since HIPC's defaults on external debt to private creditors go back to the debt crisis of 1982, and following [Bencúr and Ilut \(2015\)](#), one could expect private lenders to be tempted to lend to HIPC's once they got full debt relief and regained substantial capacity to borrow.

In addition, a large body of the economic literature has pointed up that high levels of debt could result in a debt overhang situation where partial default would benefit to both the debtor and its creditors ([Krugman, 1988](#); [Sachs, 1989](#)). This results from the particular case where the market value of the debt becomes inferior to its face value and happens when the debt is so large that it negatively weights on economic activity, lowers investment, growth (see a survey in [Obstfeld et al. \(1996\)](#)), and thus the debtor capacity to pay ([Krugman, 1988](#); [Corden, 1989](#)). Although, and to our knowledge, there is no convincing empirical evidence of the existence of a debt overhang for LICs ([Cordella et al., 2010](#); [Idlemouden and Raffinot, 2005](#)), this view (often termed the debt Laffer curve) holds that debt relief should boost investment and growth. This was the rationale behind the HIPC initiative, but not behind the MDRI where all the debt stock is canceled, not just that considered to be overindebtedness. The potential increase in capital

accumulation induced by debt relief could hence also boost beneficiary countries' attractiveness and explains, along with other factors, why HIPCs currently contract more debt from private creditors. Therefore, the regained access to financial markets for HIPCs might differ within HIPCs, conditionally to their economic activity and, in a lesser extent and in keeping with [Cruces and Trebesch \(2013\)](#) and [Trebesch and Zabel \(2017\)](#), to their prior credit history with private creditors.

As regards official creditors, they would consider it logical to stop lending to LICs after the debt relief initiatives and to provide them with grants only, thus easing their external financing further. The Bush administration indeed insisted that IDA provides only grants. The outcome is mixed: IDA still provides concessional lending (as does the IMF), but also grants. Yet public lenders and multilateral donors do not have the same objectives and constraints as private investors. They are supposed to meet various objectives at the same time: providing resources for development (disbursing their budget), being profitable or at least financially sustainable (development banks), and promoting economic liberalization.⁵ They also face different constraints: they borrow on the international financial market (so they have to protect their rating), but they rely heavily on subsidies for LIC financing. These particularities may explain why public lenders react differently. For instance, countries like Burkina Faso and Mali have been repaying all their debt since 1994, but have also been granted debt relief by multilateral institutions, which sounds surprising.

A further issue that needs to be taken into account is the problem of free rider behavior. If a specific lender or specific group of lenders (such as Paris Club Members) provides debt relief, this may open the door for non-cooperative lenders to enter the scene. China and, to a lesser extent, Brazil, India and other emerging economies may be seen behaving in this way. For instance, the IMF postponed debt relief to the Democratic Republic of Congo (DRC) because the government was considering borrowing large amounts from China, with special arrangements for in-kind repayments. In order to avoid such non-cooperative strategies, Bretton Woods Institutions require that their borrowers refrain from borrowing at non-concessional terms at the time debt relief is granted, thus making difficult to accumulate debt to private creditors during the HIPC process. Lastly, and in addition to the free riding problem, potential adverse effects have been pointed out such as the possibility that debt relief can result in moral hazard, casting doubt on future repayments' capacity ([Ferry, 2015](#)).

So the impact of debt relief on financing flows is hard to predict. Some concerns have been raised that debt relief may make it impossible to resume borrowing. If that were true, debt relief would then be a mixed blessing as it seems impossible for a country to develop (not to mention emerge) with foreign financing made up of just grants. Surprisingly, as of 2007 (so right after the MDRI), some HIPCs have been able to borrow not just from public institutions and emerging countries, but also from the private international financial market. Apathetic economic growth in high income countries and associated low interest rates have turned LICs as interesting potential borrowers in the eyes of private international investors.⁶ Kenya, Tanzania and Zambia have been considering issuing bonds on the international financial market. Ghana

⁵See [Mosley et al. \(1995\)](#) for an analysis of the World Bank on this point.

⁶See the Economist n24, International Sovereign Bond Hunters On Safari in Africa, 24/12/07

did it in 2007, issuing USD 750 million in Eurobonds.⁷ M. Baah-Wiredu, Ghana’s Minister of Finance at that time, stated that this bond issue: “... *came as the next logical step after the completion of the HIPC Program and the Poverty Reduction Growth Facility Program with the IMF which classified Ghana as a matured stabilizer.*”⁸

Yet, given the mixed past records of those countries, the question might arise as to whether the improvement in their growth prospects is enough to legitimate this renewed access to international private markets and make this debt sustainable. [Stiglitz and Rashid \(2013\)](#) do not believe it and call this surge a new kind of subprime movement. However, the bulk of the LICs’ borrowing remains historically with concessional sources that have switched from loans to grants to a certain extent. This therefore raises another question about the effect of debt relief on the financing conditions attached to official lending and its effects on traditional official flows.

3.3 HIPCs samples and Data

3.3.1 Temporal depth and HIPCs sample

Before turning to the identification strategy, we define the sample of HIPCs considered for the study. One important feature of this paper is that, given the multilateral debt relief initiatives that occurred in the early and mid-2000s, we now have enough temporal depth to observe the potential effects of these programs in beneficiary countries. However, although the Enhanced HIPC initiative was launched in 1999, some countries only benefited from it later on because they did not meet the required eligibility criteria at the time. So to properly observe the impacts of debt relief in recipient countries, our sample needs to exclude countries that entered the HIPC initiative late. This prevents us from considering Afghanistan, Liberia, Togo, Côte d’Ivoire, and Comoros for this study. Haïti is also excluded because of the 2010 earthquake that prompted huge amounts of foreign aid (both public and private), which could be wrongly attributed to the debt relief initiatives.

Given that our study period runs from 1992 to 2015, we decide to keep HIPCs for which data are available for a long enough period after a given debt relief stage. As mentioned in section 3.2, the HIPC initiative is a stepwise process: decision point, completion point, and interim period (the period between the decision and the completion point). We therefore focus on two debt relief stages in this paper: the decision point, which represents the entry into the HIPC process, and the interim period, which reflects the entire period during which HIPCs receive debt cancellations. The restriction on the years available after the debt relief event means that we consider different HIPC samples depending on the HIPC’s stage we are focusing on. As regards the effect of having reached the decision point, we first consider a sample of 29 HIPCs that reached their decision point no later than 2007 and for which an eight years window is available after this stage (see [Table 3.1](#) below).

However, when considering the entire HIPC process (so the interim period —from entry to exit—), we only consider 24 HIPCs that reached their completion point no later than 2009 and for which records are thus available at least six years after the end of the debt relief process.

⁷With ten-year maturity and a B+ Fitch rating at 8.5 percent.

⁸Accra Mail, 12/01/2007

Table 3.1: Heavily Indebted Poor Countries and sample restrictions.

Countries	Decision Point	Completion Point	MDRI
	Entry	Exit	
Decision Point reached no later than 2007 and Completion Point before 2010			
Uganda	2000	2000	2005
Mozambique	2000	2001	2005
Bolivia	2000	2001	2005
Tanzania	2000	2001	2005
Burkina Faso	2000	2002	2005
Mauritania	2000	2002	2005
Benin	2000	2003	2005
Mali	2000	2003	2005
Guyana	2000	2003	2005
<i>Sao Tome & Principe</i>	<i>2000</i>	<i>2003</i>	<i>2005</i>
Senegal	2000	2004	2005
Nicaragua	2000	2004	2005
Niger	2000	2004	2005
Madagascar	2000	2004	2005
Honduras	2000	2005	2005
Rwanda	2000	2005	2005
Zambia	2000	2005	2005
Cameroon	2000	2006	2006
Malawi	2000	2006	2006
Ethiopia	2001	2004	2005
Ghana	2002	2004	2005
Sierra Leone	2002	2006	2006
The Gambia	2000	2007	2007
Burundi	2005	2009	2009
Central African Republic	2007	2009	2009
Decision Point reached no later than 2007			
Guinea Bissau	2000	2010	2010
Guinea	2000	2012	2012
Chad	2001	-	-
Democratic Republic of Congo	2003	2010	2010
Republic of Congo	2006	2010	2010
<i>Haiti</i>	<i>2006</i>	<i>2009</i>	<i>2009</i>
Decision Point reached after 2007			
<i>Afghanistan</i>	<i>2007</i>	<i>2010</i>	<i>2010</i>
<i>Liberia</i>	<i>2008</i>	<i>2010</i>	<i>2010</i>
<i>Togo</i>	<i>2008</i>	<i>2010</i>	<i>2010</i>
<i>Côte d'Ivoire</i>	<i>2009</i>	<i>2012</i>	<i>2012</i>
<i>Comoros</i>	<i>2010</i>	<i>2012</i>	<i>2012</i>

Notes: Sources: HIPC and MDRI Status of Implementation - International Monetary Fund. *HIPCs in italic font are excluded from the sample. Only HIPCs in bold font are considered for the impact of the whole HIPC process.* Sao Tome & Principe and Afghanistan are excluded from the analysis because of too many missing values on control variables.

Note that, while we reduced the number of years available in the post-interim period (in order to include more HIPCs in the study), keeping only HIPCs that have completed the process no later than 2007 leads to the same results.

3.3.2 Outcomes of interest and their determinants

Financing conditions on official lending and market access

A look at official borrowing conditions reveals whether multilateral and bilateral creditors, which provide the bulk of the LICs' financial resources, change their lending policy in response to the debt relief initiatives. An analysis of borrowing from private creditors, on the other hand, observes whether debt relief is a positive or negative signal for international private investors and changes the likelihood of beneficiary countries to contract this kind of loan.

As regards official borrowing conditions, we collect data from the *International Debt Statistics* (IDS) database and look at changes in average grace period (AGP), average maturity period (AMP), and average grant element (AGE) on new external official debt commitments. However, since the AGE measure in the IDS database considers the grant element on new loans only, we suggest an additional measure to AGE called AGE_MO, where we include the level of grants (net of debt forgiveness grants), and which represents the degree of concessionality on new (global) official financing. We then use this measure as a dependent variable in our estimates alongside the IDS indicator. This modified measure of the official average grant element is thus computed as follows:

$$AGE_MO_{i,t} = \frac{Grants_{i,t} + [AGE_{i,t} \times PPG_OFF_{i,t}]}{PPG_OFF_{i,t} + Grants_{i,t}} \quad (3.1)$$

where $Grants_{i,t}$ are grants net of debt forgiveness grants and technical cooperation for country i in period t , $AGE_{i,t}$ is the IDS measure of the official grant element as described above, and $PPG_OFF_{i,t}$ are official disbursements on public and publicly guaranteed (PPG) debt for country i in period t . In addition, we compute the grant element on total new external debt disbursements (AGE_MT) across all types of debtor (government and private entities) for all debt contracted from either official or private creditors. This modified grant element on new external debt takes the following form, and marks the average grant element on global new external financing:

$$AGE_MT_{i,t} = \frac{Grants_{i,t} + [AGE_TOTAL_{i,t} \times DIS_EXT_{i,t}]}{DIS_EXT_{i,t} + Grants_{i,t}} \quad (3.2)$$

with $AGE_TOTAL_{i,t}$ being the average grant element on total external debt for country i in period t , and $DIS_EXT_{i,t}$, the disbursements on external long-term debt (maturity over one year) contracted by country i in period t .

With respect to access to international financial markets which can be proxied by new private debt flows, we choose the public and publicly guaranteed (PPG) debt disbursements from private commercial banks (PRIV_BANK), and overall private creditors (PRIV_CREDIT) as our variables of interest, both measured as a percentage of the country's exports. We also consider PPG external debt commitments to private creditors (PRIV_CO) as it also reflects the attractiveness of the debtor, even though funds may not be disbursed yet.

We then consider a number of control variables in order to observe the debt relief effects conditional to changes on other macro-covariates that might directly affect our dependent variables.

Official borrowing conditions and amounts of public debt contracted to private creditors are influenced by both supply and demand factors. Although it is not easy to differentiate between these two types of covariates since some economic and political factors are liable to reflect both the creditors' motives for lending and the debtors' financing needs, we build on different strands of the existing literature to select the main determinants of official financing conditions and borrowing to external private creditors.

Determinants of official lending

Building on the aid allocation literature, we first consider as demand-side variables, economic factors that represent the debtor country's level of development. In keeping with most of these studies, we select the income of recipient country, here measured as the per capita GDP (in log and constant USD (GDP_PC)). It is indeed widely accepted that donors tend to give more to poorer countries (Alesina and Dollar, 2000; Neumayer, 2003), and that this behavior is common to both bilateral and multilateral donors (Dollar and Levin, 2006; Harrigan et al., 2006; Knight and Santaella, 1997; Neumayer, 2003). Moreover, Claessens et al. (2009) underline that bilateral donors have granted increasing attention to the level of development when allocating aid over the past decades (and especially in the early 2000s which coincides with the launch of the MDGs). Therefore, even though we are only looking at changes in financing conditions to official creditors and not flows *per se* yet, we consider per capita GDP as a good proxy for the recipients needs, and expect this variable to be negatively associated with an easing in official financing conditions. We then also control for the size of the population since studies about aid allocation have underlined that small countries tend to get more aid per capita (Snyder, 1993; Alesina and Dollar, 2000; Berthélemy and Tichit, 2004; Berthélemy, 2006), although this small country-bias tends to reduce over time (Claessens et al., 2009).

Then, given that data from the *International Debt Statistics* database do not allow differentiating between conditions granted by bilateral and multilateral donors, one also needs to control for covariates that have been shown to be specifically related to multilateral lending. Following the literature on the economic determinants of IMF lending, we thus add the GDP growth rate (GDP_GROWTH), and the level of gross fixed capital formation (GFCF) which are both expected to be negatively associated with more assistance from the IFIs and a potential easing in financing conditions (Bird and Rowlands, 2001; Dreher et al., 2009b,a). Indeed, countries experiencing temporary or structural difficulties in their development process should benefit from more concessional financing. Then, according to Knight and Santaella (1997), Bird and Rowlands (2001), and Harrigan et al. (2006), we also include balance of payments variables such as the current account (CAB, defined in percentage of GDP and net of external grants), and the international reserves (TOT_RESV, expressed in months of imports), which are both expected to negatively affect IMF lending, and, to some extent, the grant element associated with it. We indeed expect countries with balance of payments difficulties to benefit from financial assistance from the IMF (and even from bilateral donors) with soft financing conditions. Note that we do not consider public finances variables since changes in these aggregates have been shown to be directly affected by debt relief (Cassimon and Van Campenhout, 2008; Cassimon et al., 2015; Ferry, 2015) and would thus explain most of the variation in our debt relief variable.

Alongside these economic factors which can be thought as demand-side determinants of

official financing conditions, we then consider various institutional and political factors as supply-side controls. Among institutional factors, it has been underlined that official donors have gradually rewarded performing countries in terms of civil liberties, political rights, policies and institutions quality, especially over the past decade (Alesina and Dollar, 2000; Bird and Rowlands, 2001; Berthélemy and Tichit, 2004; Harrigan et al., 2006; Dollar and Levin, 2006; Claessens et al., 2009; Marchesi and Missale, 2013). Consequently, we add to our pool of explanatory variables the Polity IV index of democracy (POLIT_IV), a measure of government’s durability (DURABLE) which is a proxy for government stability, an index of Civil Liberties (CIVIL_L) from the *Freedom House* database, and the inflation rate (INF) that reflects (to a certain extent) the macroeconomic stability of recipient countries and the quality of policy management. We will also consider the classic CPIA index, although data are less complete for this measure in our sample. Lastly, an important strand of the literature identifies political interests of donors as major determinants of bilateral financing (Alesina and Dollar, 2000; Hoeffler and Outram, 2011). Such political interests can be captured by vote alignment at the UN security council, general assembly, or by a new executive seat at the board of international financial institutions. Using these measures of political interests, studies have emphasized that “UN friends” tend to get more aid from their bilateral partners, but also from international financial institutions such as the World Bank and the IMF (Dreher et al., 2009b,a). Consequently, we also include as explanatory variable the vote alignment with the G7 at the UN General Assembly (UN_VOTE).⁹ Table 3.A2 in the Appendix A (p.123) summarizes the expected effects of the different control variables and provides a non-exhaustive list of papers where these variables have been considered as determinants for aid allocation.

Determinants of external debt to private creditors

Then, regarding private debt disbursements, we build on two specific literatures; the determinants of market access for developing countries, and the reputation cost of sovereign default. Following Cantor and Packer (1996), we consider variables that have been identified as determinants of sovereign credit ratings, and which could affect the decision of private investors to lend or not. We first include the same measure of per capita GDP as for the official financing conditions (GDP_PC) since it reflects, to some extent, the potential country’s tax base, its level of economic development and so its ability to raise taxes and service its debt (Eichengreen et al., 2002; Afonso, 2003; Afonso et al., 2007; Gelos et al., 2011). In the same vein, we add the economic growth of the country (GDP_GROWTH) to our list of determinants (Edwards, 1984; Baldacci et al., 2008). The ability to repay foreign debt is then also captured by external reserves (TOT_RESV) (Benczúr and Ilut, 2015) as well as the current account balance (CAB, net of external grants) which partly reflects structural strengths and weaknesses of debtor countries (Edwards, 1984; Baldacci et al., 2008). We then consider the inflation rate (INF) since high inflation also points to structural imbalances and weak economic management which can both lead to economic and political instability and discourage foreign investors (Cuadra and Sapriza, 2008; Eichengreen et al., 2002). Inflation is thus expected to play negatively on disbursements

⁹UN votes are weighted by the share of ODA (net of debt relief) for each G7 member in the total amount of aid received. Note that data on UN votes alignment come from Dreher and Sturm (2012) and are only available up to 2008.

from private creditors. In order to include a more straightforward measure of political and economic risk, we consider the government’s durability (DURABLE) and the economic freedom index from the *Heritage Foundation* (ECO_FREE) as in [Baldacci et al. \(2008\)](#). We control for the degree of general openness of debtor countries using the overall globalization index (KOF_INDEX) developed by [Dreher \(2006\)](#), and also add an export diversification index from the IMF (EXP_DIVERS). We expect these four indicators being positively associated with debt contracted to private creditors. Similarly, institutions and policies quality is expected to reassure external investors and will be controlled for with the CPIA index ([Gelos et al., 2011](#)). Lastly, we add the resource rent as a share of GDP (RES_RENT) in order to control for private debt targeting solely resource-rich countries. Yet, dependency on natural resources can also divert external investors since such dependency is often associated with volatile exports revenues which can weaken the debtor capacity to pay. This leads natural resources to have an ambiguous effect on borrowing to external private creditors.

As pointed in section 3.2, we next also refer to papers that study the reputation effects of having defaulted on sovereign loans. Most of those papers use as controls the variables exposed above. However, although a large majority of these studies agree that sovereign default leads to temporary and brief exclusion from international financial markets, the time span before re-access can be determined by the debtor credit history, such as the size of prior haircuts on debt to private creditors ([Cruces and Trebesch, 2013](#)). Therefore, it would be interesting to test for the role played by previous rescheduling on debt to private creditors in the HIPC’s regained access to financial markets. However, capturing the contribution of past haircuts on current market access is not feasible under our DiD specification since it would consist in differentiating HIPC’s as regards the average haircut received on prior loans, which would be a time-invariant measure, therefore captured by country-fixed effects. Nevertheless, using data provided by [Cruces and Trebesch \(2013\)](#) we empirically investigate this contribution by simply interacting such measure with our treatment variable (thus defining a continuous treatment, and assuming a linear effect of prior haircuts). As for the conditions attached to official lending, [Table 3.A3](#) in the Appendix A (p.124) summarizes the expected effects of selected explanatory variables.

3.4 Empirical Strategy

3.4.1 Reasons for the Difference-in-Differences approach

Our empirical assessment of the impacts of debt relief on borrowing conditions and private debt commitments in beneficiary countries builds on a difference-in-differences (DID) approach which, with respect to the HIPC initiative, should take the following form:

$$Y_{i,t} = \alpha + \delta HIPC_i + \phi Post_t + \beta HIPC_i \times Post_t + \gamma Z_{i,t} + \epsilon_{i,t}$$

where $Y_{i,t}$ is the dependent variable for country i in year t , $Z_{i,t}$ is a set of control variables for country i in year t , $HIPC_i$ is a dummy variable that takes 1 if the country i is an HIPC and 0 otherwise, $Post_t$ is a dummy variable that takes 1 for the year t the HIPC’s reach their debt relief stage and for all the subsequent years (the dummy is thus equal to 0 in all years prior the

debt relief stage), and $HIPC_i \times Post_t$ is an interaction term that takes 1 for the HIPC i that is in its post-debt relief event period in t . However, this specification cannot be estimated since it is impossible to define a $Post$ period for control group countries since HIPCs reached their debt relief stage at different dates. Therefore, we take another commonly-used DID specification where we replace the HIPC dummy with country fixed effects ν_i , and the $Post$ variable with time fixed effects δ_t . Moreover, we think the inclusion of country fixed effects rather than a dummy for the HIPCs addresses the countries' unobservable and time-invariant heterogeneity better. Considering a dummy for HIPCs only indeed implicitly assumes that the "treatment group is homogeneous, whereas HIPCs can be significantly different from each other. The model therefore takes the following form:

$$Y_{i,t} = \alpha + \nu_i + \delta_t + \beta HIPC_i \times Post_t + \gamma Z_{i,t} + \epsilon_{i,t} \quad (3.3)$$

So when taking the decision point as debt relief stage, the interaction dummy $HIPC_i \times Post_t$ is equal to 0 in the years prior to the decision point and 1 in the years after it, and for HIPCs only. However, taking the interim period as the debt relief stage means setting this interaction dummy to 0 for the years prior to the decision point and 1 for the years after the completion point (after the exit from the HIPC process). Observations between the decision and the completion point are thus intentionally omitted (replaced with missing values). We can hence compare the change in the outcome variables before and after the HIPC process, regardless of what happens during the interim period, to see whether changes in lending policy last or even accentuate after full and irrevocable debt relief has been granted.

There are a number of reasons for using the DID strategy. First, such specification reviews the effect of debt relief on treatment countries as compared with control group countries, which are supposed to be similar enough to the treatment group to be deemed good counterfactuals. This approach hence leads to interpret the DID coefficient as the effect of having benefited from the HIPC initiative on outcome variable, compared with the situation where these countries would have not been granted debt relief.

Second, the DID specification includes time fixed effects which control for trends in dependent and explanatory variables that could be shared by both treatment and control group countries. Since we are focusing on developments in borrowing conditions and private debt flows, these time-fixed effects thus capture global macroeconomic trends (common to both treated and control countries) that could influence changes in these variables such as the low interest rates in OECD economies, the emerging countries' slowdown, and even fluctuations in international commodity prices. All these "push factors" influencing private investors' decision to redirect capital flows towards developing countries are therefore controlled for with time fixed effects, which reduces the risk of omitted variables bias.

3.4.2 Searching for relevant counterfactuals

Though increasingly used in applied macroeconomics, resort to DID estimators is often justified by the existence of a natural counterfactual which, at macro-level, is rare not to say non-existent. Nevertheless, since benefiting from the HIPC initiative is determined by eligibility

criteria, some countries can be found that met these conditions, but ultimately did not benefit from this initiative. Yet if these countries were eligible in the early 2000s, they probably had an offer to join the HIPC initiative alongside current HIPCs. Therefore, given the inability to enforce a country to benefit from this program, the simple fact that they refused the HIPC initiative makes them different from the treatment group. Therefore, although we put it that the counterfactual selection process alleviates the issue of selection into the treatment without completely ruling it out, results must be interpreted with caution.

As in section 3.2, a country is eligible for the HIPC initiative if: (i) it is ranked as a low-income country (LIC) by the World Bank classification; (ii) it is IDA-eligible only, meaning that the country's government can only borrow from the concessional window of the World Bank (the International Development Association); (iii) the government has agreed on a macro-stability program defined by the World Bank and the IMF; and (iv) the IFIs consider the external public debt (in net present value) as unsustainable at over 150% of the country's exports. A relevant control group should thus comprise countries that met these criteria (more or less strictly), but which did not benefit from these debt relief initiatives.

Consequently, we define our main control group as the "narrow" control group including those countries which, in the five years before the decision point for each HIPC cohort, had a World Bank ranking as an LIC for at least three years and posted an average external public debt in face value of over 170% of their exports. Although we do not specifically look at the application of the macro-stability program and the World Bank borrowing arrangements for our benchmark control group countries, we know that LICs are constrained to borrow from the IDA window and that such borrowing is frequently accompanied by the application of a macro-stability program.

In addition, in keeping with the paper by [Chen et al. \(2008\)](#) that uses an event-study methodology to identify the effects of civil wars on several macroeconomic outcomes, we also consider an "extended" control group including countries classified as an LIC at least once in the five years preceding the decision point for each HIPC. This controls for a potential trend among developing countries (both LICs and LMICs). Lastly, since 33 out of the 39 HIPCs are African countries, we also define a control group of non-HIPC African countries classified as LIC at least one year in the five years prior to the decision point of a given HIPC. This controls for a potential trend within the continent. Table 3.B1 in the Appendix B (p.126) presents the composition of the different control groups.

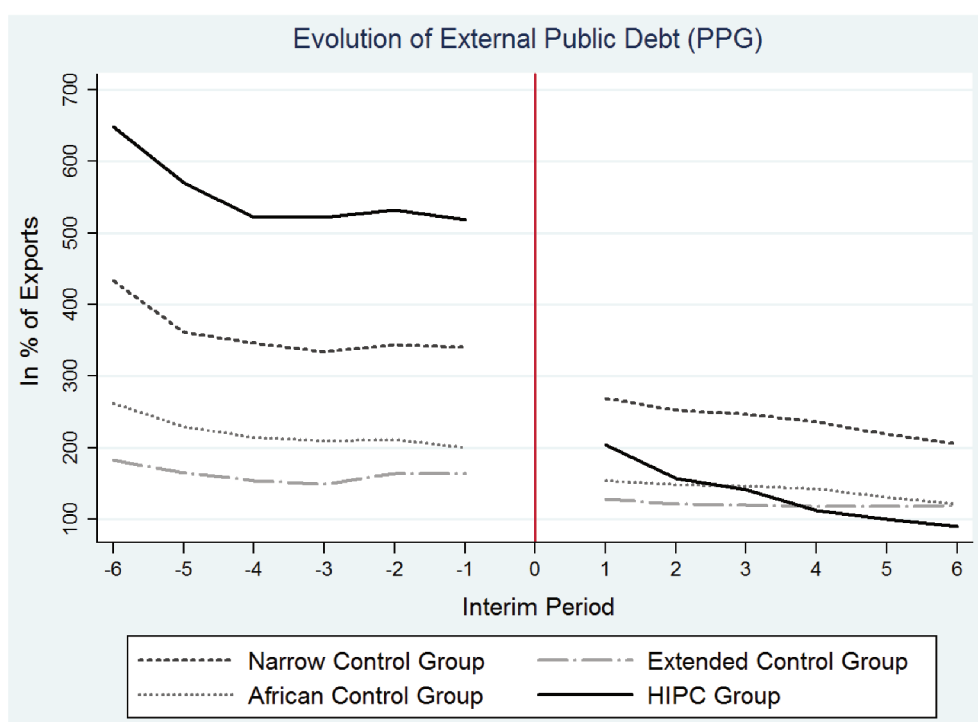
3.4.3 Counterfactual suitability

Figure 3.2 below shows the evolution of external public debt for HIPCs, the narrow control group and the two other control groups based on the HIPC initiative occurrence year. It is clear that the impact of debt relief on HIPCs (i.e. the treatment on the treated) has been efficient since it significantly helped to reduce the debt-to-exports ratio. We also notice that the narrow control group is the control group with the highest average indebtedness level of all our, although it remains significantly lower than the HIPCs. Table 3.B2 in the Appendix B (p.127) indeed shows that, although the narrow control group returns the figures closest to the HIPCs in terms of eligibility criteria for the Enhanced HIPC initiative (in the years preceding the decision point),

there is a significant ex-ante difference when it comes to the other economic features (which we however use as controls in the DID estimates).

Nevertheless, on several covariates, the narrow control group remains relatively similar to the HIPC group compared with the extended and African control groups. Indeed, the average income classification for countries in the narrow control group mirrors the one for HIPCs. These countries also seem to be not different from HIPCs prior debt relief (on average) as regards institutions quality (CPIA), and overall openness (KOF). In addition, HIPCs and narrow control group countries appear to contend (on average) with the same structural issues in terms of their external position (international reserves) and controlling inflation.

Figure 3.2: Looking for a valid control group.



Sources: *International Debt Statistics Database - World Databank*

Notes: Control group line pools the average debt ratios of control groups relative to each HIPCs' cohort. For instance, observation point in -1 for the narrow control group is the mean value of the average debt ratio computed in -1 over each control group associated with its HIPC cohort (the control group associated with the 2000's cohort, the one associated with the 2001's cohort, and so on up to the control group associated with the 2009's cohort). We weight the share of each control group in the total average according to the number of HIPCs in each cohort. Since most of the HIPCs entered the HIPC initiative in 2000 (and so belong to the 2000's cohort), the average debt ratio of the control group relative to the 2000's cohort has the biggest weight in the total debt ratio average.

Descriptive statistics in Table 3.B3 in the Appendix B (p.128) then show that there is also an ex-ante (i.e. before debt relief) significant difference in our variables of interest between our treatment and control groups. Although we expected to find such disparities with the extended and the African control group, differences compared with the narrow control group need to be small enough to consider this pool of countries as a relevant counterfactual. Yet, perfect similarity between two groups of countries is quite unlikely at macro-level. It can nevertheless be

observed that the narrow control group again displays figures that are the closest (on average) to the HIPC group. The average grace period before debt relief is just ten months longer for HIPCs than for this control group, while the level of commitments to external private creditors is on average lower by just 0.65 percentage point. Ex-ante differences in the average grant element (modified or not) and the maturity period are, however, more significant, although figures for the benchmark control group are the closest to those of the HIPCs.

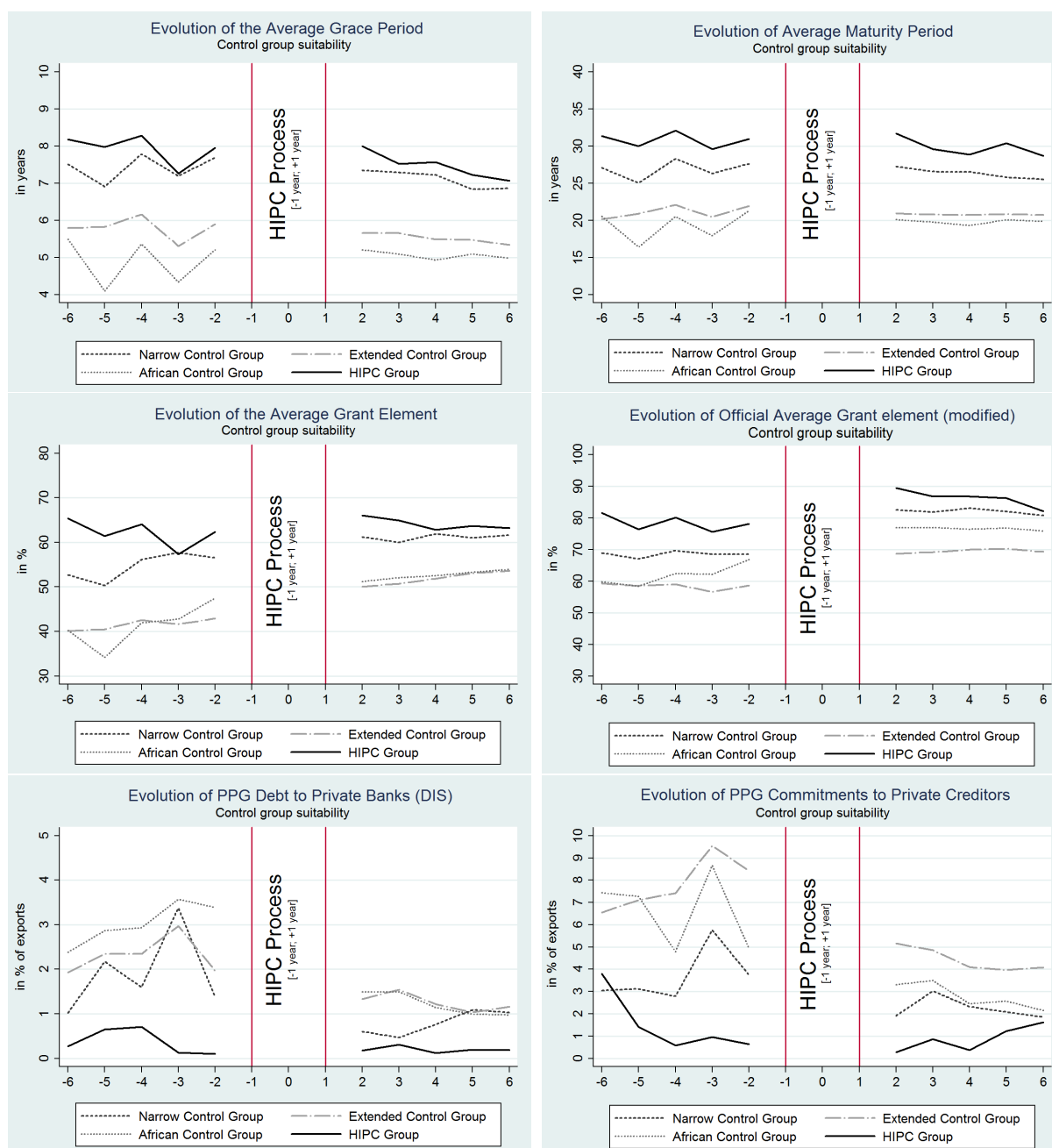
However, these differences between “treated” and “control” countries are of no concern to us when it comes to identifying the effects of debt relief, since unobserved factors that could explain these structural (and so time-invariant) differences between two groups are supposed to be captured by country fixed effects in the DID specification. What is important in the DID setting is the hypothesis of common trends in the years preceding the treatment. Indeed, as underlined by Angrist and Pischke (2008), counterfactuals need to display a trend in the outcome variable similar to the one observed for the treated countries in order to provide a reliable prediction of how the dependent variable would have evolved in absence of the treatment. To test this common trend hypothesis, we first look at the evolution of our variables of interest over the years before the HIPC process. Figure 3.3 below shows that, although HIPCs benefited (on average) from longer grace and maturity periods in the years before the HIPC process, the trend in these variables is similar to the one observed for the three other control groups. The common trend hypothesis also appears to hold for our other variables of interest (except maybe for the average grant element as defined by the World bank).

Another approach to check for the existence of a parallel trend between control and treated units is the placebo test. To do so, we propose running an event-study model over the pre-decision point period (considering six years before the entry into the initiative). We match one control group with each HIPC cohort, since HIPCs entered the initiative at different dates. Control countries are selected based on the selection criteria we previously defined (for the narrow, extended, and African control groups). We then create a placebo treatment with the variable $Post_Placebo_s$ which is equal to 1 for the three years preceding the decision point [-3; -1], and equal to 0 for the three years before this period [-6; -4]. The model takes the following form and is estimated for the period [-6; -1], with respect to each HIPC cohort’s decision point:

$$Y_{i,s} - \bar{Y}_{i,s} = \alpha + \beta Post_Placebo_s + \nu_i + \epsilon_{i,s} \quad (3.4)$$

where $Y_{i,s} - \bar{Y}_{i,s}$ represents the difference in the dependent variable between HIPC i (Y_i) and the average of its associated control group (\bar{Y}_i) in year s (with $s \in [-6; -1]$). The variable $Post_s$ is a dummy variable that takes 1 for years over or equal to -3, and 0 otherwise, and thus captures the average ex-ante difference in outcome variable trends between HIPCs and their associated control group. Table 3.B4 in the Appendix B (p.129) reports the results. We observe that, although the static ex-ante differences are significant, there is no evidence of robust divergence in our variables of interest between treatment and control groups. Moreover, the coefficient for the average maturity period with respect to the African control group, and the one associated with the average grant element on external financing with respect to the narrow and extended control groups are statistically significant with a positive sign. This means that if our DID estimates point to a negative, significant coefficient for the average maturity period, the debt relief impact

Figure 3.3: Parallel trend - Visual examination before the HIPC process.



Notes: We use the same methodology as for Figure 3.2. Control group's dotted or dashed line pools the average outcome variable of control groups relative to each HIPC's cohort. We do not report graph for modified measure of the average grant element on new external debt since it is really similar to the one for the modified average grant element on new official debt.

is probably underestimated since HIPC benefited from softening borrowing conditions as regards the maturity period, before the HIPC initiative. The same argument can be made for the variables denoting access to international financial markets. Nevertheless, one can notice that the average grant element on official borrowing and total financing was already decreasing for HIPC prior to the decision point and as compared with the African control group. Therefore, according to the value of the coefficient we obtain in our DID estimates, the impact of having

been granted debt relief should be lowered by the magnitude of this ex-ante decrease.

3.5 Results and Robustness Checks

3.5.1 Main Findings

Table 3.2 and 3.3 presents the estimates of equation 3.3 with respect to the three control groups and for our various dependent variables. Looking first at Table 3.2, where the debt relief stage is the decision point (i.e. the entry into the HIPC process), a significant tightening in official borrowing conditions can be observed for countries that entered the HIPC initiative as compared to countries that did not. Having reached the decision point (and benefited from debt relief afterwards) seems to shorten grace and maturity periods by over 1 and 6 years, respectively, and as compared with the narrow control group. We also note that this shortening of the grace period's length after the decision point is not due to a downward trend within developing or African countries. This also appears to hold true for the evolution of the average grant element (modified or not), although the African dimension is more questionable when considering the average grant element on new official financing. This suggests that non-HIPC African countries probably also faced tightened borrowing conditions on external official financing around the decision point years and that this change in lending policy from official creditors is possibly not entirely due to entry into the debt relief initiative. In contrast, coefficients associated with disbursements from external private banks (and commitments to private creditors in a lesser extent) are highly significant compared to the three control groups, reflecting relative broader access to this type of loan for HIPC countries in the years following the decision point.

Focusing then on Table 3.3 and the impact of having fully benefited from the HIPC initiative, we observe that the results obtained for the decision point are still significant and that the magnitude of the coefficients is even greater. The results in columns (I) and (II) suggest that having fully benefited from the HIPC initiative leads official creditors to shorten the average grace and maturity periods on new loans by just 1.5 and 8.5 years respectively (and with respect to the narrow control group). The average grant element on new official loans also falls from more than 13 percentage points as compared with the main control group (16.5 percentage points if we consider the AGE measure for the overall official financing, and more than 14 if we look at the average grant element on the entire external debt).

All these effects are robust to the two other control groups, showing that these developments are not driven by potential trends among developing or African countries.¹⁰ These findings thus rule out the doubts we had about the contribution of global and regional trends to estimates around the decision point.¹¹

¹⁰Except maybe for the AGE_MO measure and with respect to the African control group.

¹¹Although we need to correct the debt relief effect on AGE_MT from the ex-ante reduction observed with respect to the African control group in Table 3.B4, p.129.

Table 3.2: Difference-in-Differences estimates - Main results around the decision point.

Study period: 1992-2015	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Debt relief stage:	Decision Point [with at least +8 years after]							
Dep. var.:	AGP	AMP	AGE	AGE_MO	AGE_MT	PRIV_BK	PRIV_CR	PRIV_CO
<i>Narrow CG</i>								
Post-Decision Point	-1.111* (-1.790)	-6.309*** (-3.109)	-9.046** (-2.642)	-11.632** (-2.534)	-10.599** (-2.350)	0.809*** (3.101)	0.704 (1.249)	1.345* (1.723)
Observations	816	816	787	787	813	744	744	744
R-squared (within)	0.168	0.125	0.127	0.344	0.268	0.114	0.117	0.093
No. of country	44	44	44	44	44	43	43	43
<i>Extended CG</i>								
Post-Decision Point	-0.780* (-1.663)	-3.031* (-1.912)	-11.079*** (-3.963)	-9.973*** (-2.944)	-5.967** (-2.183)	0.977*** (3.982)	1.681** (2.419)	1.803** (2.247)
Observations	1,769	1,769	1,668	1,667	1,764	1,584	1,584	1,584
R-squared (within)	0.072	0.058	0.197	0.229	0.147	0.080	0.053	0.049
No. of country	88	88	88	88	88	92	92	92
<i>African CG</i>								
Post-Decision Point	-1.510** (-2.180)	-5.349** (-2.228)	-10.047** (-2.213)	-9.581 (-1.326)	-7.785 (-1.555)	0.983** (2.583)	1.807** (2.470)	1.729** (2.048)
Observations	799	799	742	741	799	736	736	736
R-squared (within)	0.135	0.135	0.145	0.267	0.267	0.105	0.119	0.094
No. of country	43	43	43	43	43	42	42	42

Notes: Table exposes results for a sample of 28 HIPCs that have reached their decision point no later than 2007. **AGP**, **AMP**, **AGE**, denote respectively the average grace period, maturity period, and grant element on new official loans. **AGE_MO**, and **AGE_MT** represent our corrected measures for the average grant element on new financing (official and total, respectively). **PRIV_BK**, and **PRIV_CR** are respectively disbursements on new loans from private foreign banks, and overall private creditors. **PRIV_CO** are private commitments on new PPG external debt. These last three variables are expressed in percentage of the exports. The set of control variables is the same for columns (I) to (V) and includes **GDP_PC**, **POP**, **GDP_GROWTH**, **GFCF**, **CAB**, **INF**, **TOT_RESV**, **DURABLE**, and **CIVIL_L**. Control variables for columns (VI) to (VII) are **GDP_PC**, **GDP_GROWTH**, **CAB**, **DURABLE**, **ECO_FREE**, **KOF**, and **RES_RENT**. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.3: Difference-in-Differences estimates - Main results around the interim period.

Study period: 1992-2015	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Debt relief stage:	Interim Period [with at least +6 years after]							
Dep. var.:	AGP	AMP	AGE	AGE_MO	AGE_MT	PRIV_BK	PRIV_CR	PRIV_CO
<i>Narrow CG</i>								
Post-Interim Period	-1.703** (-2.586)	-8.754*** (-3.979)	-13.497*** (-3.464)	-16.557*** (-3.325)	-14.225*** (-2.949)	0.983*** (3.223)	1.111 (1.655)	1.888* (1.853)
Observations	692	692	675	675	689	593	593	593
R-squared (within)	0.200	0.121	0.160	0.381	0.291	0.124	0.122	0.096
No. of country	39	39	39	39	39	39	39	39
<i>Extended CG</i>								
Post-Interim Period	-1.287** (-2.493)	-4.864*** (-2.818)	-16.784*** (-5.347)	-13.806*** (-3.563)	-10.907*** (-3.883)	1.250*** (4.049)	2.854*** (2.798)	3.100*** (2.818)
Observations	1,645	1,645	1,556	1,555	1,640	1,433	1,433	1,433
R-squared (within)	0.079	0.060	0.227	0.243	0.159	0.094	0.067	0.062
No. of country	83	83	83	83	83	88	88	88
<i>African CG</i>								
Post-Interim Period	-1.413 (-1.662)	-6.167** (-2.183)	-13.702** (-2.543)	-11.886 (-1.427)	-11.929** (-2.411)	1.497*** (2.758)	2.643*** (3.222)	2.567** (2.368)
Observations	675	675	630	629	675	585	585	585
R-squared (within)	0.132	0.127	0.164	0.277	0.298	0.149	0.153	0.106
No. of country	38	38	38	38	38	38	38	38

Notes: Table exposes results for a sample of 24 HIPCs that have reached their completion point no later than 2009. The set of control variables is the same for columns (I) to (V) and includes **GDP_PC**, **POP**, **GDP_GROWTH**, **GFCF**, **CAB**, **INF**, **TOT_RESV**, **DURABLE**, and **CIVIL_L**. Control variables for columns (V) to (VII) are **GDP_PC**, **GDP_GROWTH**, **CAB**, **DURABLE**, **ECO_FREE**, **KOF**, and **RES_RENT**. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Looking at Tables 3.C5 and 3.C6 in the Appendix C (pp.134-135), one can also notice that these results are robust to the inclusion of a different set of control variables and that considered covariates have, in overall, the expected sign.

The reduction in financing concessionality after debt relief (and with respect to control groups) can be explained by several factors. First, lenders may decide to alter the composition of their financing by providing more loans than grants, which can reduce the grant element of total financing. Second, lenders may also reduce the grant element on new external debt by increasing the interest rate on their loans. However, such developments in financing composition and interest rate on new loans do not pop up in our data.¹² Yet a reduction in the grant element can also come from the observed changes in maturity and grace periods for HIPC, which automatically increases the present value of the claims owed to official creditors and thus reduces the grant element on external public debt. Although we do not expect to observe a significant switch in lending policy across the multilateral creditors, since the Bank and the Fund's lending conditions are quite rigid and mostly vary according to the income classification of the debtor and its CPIA index, an adjustment by bilateral creditors is likely to happen. Indeed, most of the bilateral creditors which already complied to cancel significant amounts of debt through the HIPC initiative could now ask for higher returns on investment by reducing the grant element on new loans to HIPC (especially given the public finance crisis in donor countries). Unfortunately, the IDS does not provide the necessary data to calculate the grant element for bilateral and multilateral creditors separately. Yet, since our indicators are for official debt (i.e. both multilateral and bilateral debt), we assume the change in lending policy to be driven mainly by bilateral rather than multilateral creditors.

Lastly, this first set of results also suggests that having benefited from the HIPC initiative fosters access to new financing sources, since debt disbursements (and commitments) to external private banks and other private creditors increase (on average) after the HIPC process.

3.5.2 Sensitivity to selection criteria

Given these results, we first test whether our main results are robust to the criteria we use to define the narrow control group. One of the features of the Enhanced HIPC initiative compared to the original HIPC initiative is the reduction of the indebtedness threshold from 250% of exports to 150%. In addition, under the Enhanced HIPC initiative, the debt threshold required for eligibility can be expressed in fiscal terms for highly indebted countries with a large openness rate, and which therefore do not meet the threshold defined in balance of payments' terms.

Countries with an external debt of over 250% of their domestic revenues thus became also eligible for the Enhanced HIPC initiative (subject to the other eligibility criteria such as income ranking, etc.). Consequently, we define another control group (Panel A) including countries with an average external public debt of over 250% of their domestic revenues in the five years before each HIPC cohort's decision point. Panel A includes solely those countries ranked as LICs at least three years in this five-year window. We also define two other control groups (Panel B and C). Panel B comprises countries with a debt-to-exports ratio of over 170% in the five years before the decision point for each HIPC cohort, regardless of their income ranking. This control

¹²Not reported in order to save space.

group therefore includes only highly indebted countries. Panel C, however, includes countries constantly ranked as LICs in the five years preceding the decision point for each HIPC cohort, regardless of their indebtedness level, and hence only considers poor countries. Table 3.C1 in the Appendix C (p.130) presents these alternative samples.

Table 3.C2 in the Appendix C (p.131) expose the results with these alternative control groups. We observe that having reached the decision point leads official creditors to shorten the average maturity period associated to new loans. In addition, results also suggest that the achievement of the decision point (and the entire HIPC process) is followed by a reduction in the average grant element on new official loans and overall financing (with respect to these new control groups).

The increase in disbursements from private banks creditors (and commitments to a lesser extent) is also supported by these robustness checks since coefficients remain positive and significant across all control groups. As regards the impact of the overall initiative, we note that, here again, prior results are robust to changes in control groups' composition. Benefiting from the entire HIPC process (Table 3.C3 in the Appendix C, p.132) appears to shorten the average grace period by 1.5 years, the average maturity period by 5 to 8 years, and the average grant element on official financing by at least 15 percentage points. In addition, the post-debt relief period also features a significant acceleration in debt disbursements and commitments to private banks and other creditors with a significant increase of between 1.4 and 4.3 additional percentage points (of exports) for commitments.

3.5.3 Falsification tests

We next run falsification tests where “treated” countries (HIPCs) have been randomly drawn from our pool of developing countries. The purpose of this additional test is to see whether our results capture some sort of spurious correlation between a given group of countries and the several dependent variables we consider, or whether the effects we observe are really HIPC-specific, which would strengthen the reliability of our results.

We thus randomly draw samples of countries that we now consider as if they were HIPCs. We keep the sample size identical to that observed for each HIPC cohort. For instance, and for the 2000 HIPC cohort, we randomly select 22 countries and then consider these countries as if they had benefited from debt relief under the Enhanced HIPC initiative from 2000 on. We then randomly select two countries and define their treatment period from 2001 on, and so on for the other HIPC cohorts. We finally obtain a sample of 28 “random HIPCs”, which have been randomly chosen from our pool of 112 developing countries. Note that, since we randomly draw countries for our entire pool of developing countries (including HIPCs), some countries randomly selected as “treated” may be “true” HIPCs. We then run the classic DID specification, as presented in equation 3.3, on this new “treatment” group. We replicate the random draw and DID estimate 500 times, and then compute the average value (and standard error) of the coefficient of interest, i.e. the interaction term between the HIPC dummy and the Post variable. We expect to observe non-significant results (on average over the 500 replications), which would indicate that the effect of debt relief that we observed so far on the different outcome variables is genuinely HIPCs-specific.

We adopt this approach to both check for the effect of having reached the decision point and having benefited from the entire interim period. Table 3.C4 in the Appendix C (p.133) reports the results for both effects. One can notice that, when the “treatment” group is randomly selected, having reached the decision point or having fully benefiting from the interim period produces no change in the different outcome variables. For instance, only 2.67% of the 500 estimates report a statistically significant effect (at least at the 10% level) of having fully benefited from the HIPC initiative on the average grant element for official financing (column (IV), bottom part of Table 3.C4, p.133) for the interaction term between the *HIPC* dummy and the *Post* variable.

These tests thus reinforce the reliability of our benchmark findings by showing that, when the “treatment” group does not consider “true” HIPCs, neither “debt relief” nor the period associated with it has any effect on financing conditions.

3.5.4 Sensitivity to sample composition and outliers

Although currently increasing, debt commitments to private creditors remain quite low in developing countries, especially since the debt crisis of the early 1980s. Moreover, public debt contracted from private creditors tends to be short- to medium-term debt and is thus frequently regarded as opportunistic behavior from creditors. These capital inflows may be driven by the existence of natural resources that, in developing countries, remain largely controlled by the government and that on the whole prompt medium-/long-term investment from abroad. Yet, they can also be fueled by short-run economic dynamics that create incentives for external private investors to settle in the country, temporarily or not. More in particular, such increase might be due to outstanding developments in one particular HIPC. Consequently, in order to avoid wrongly attribute the increase in these commitments to debt relief, we run the DID specification excluding each HIPC from the sample one by one. This enables us to see whether the positive impact of debt relief on public debt contracted from private creditors is a “true” average effect genuinely due to debt relief or whether this surge is merely induced by one HIPC’s economic situation leading its government to contract large amounts of debt to private creditors.

The results in Table 3.C7 in the Appendix C (p.136) show that the positive effect of debt relief on private foreign banks’ disbursements is not driven by an outlier that may have contracted unusual amounts of these debts. The magnitude of the coefficients is similar to that obtained from the main estimates, showing that the HIPC program, on average, increases access to private capital for beneficiary governments.

3.6 What determine market access after the completion point?

3.6.1 Ultimate debt relief under the MDRI

The above results show that debt cancellations lead recipient countries to contract more debt from private banks compared to if they had not been granted debt relief. This now raises the question as to which step of the debt relief process sends the signal that prompts international investors to lend to HIPC governments. Being eligible for the HIPC initiative could be interpreted by private creditors as future debt cancellations and could thus decide to lend more to HIPCs even before the debt relief process ends. Yet given the low creditworthiness of HIPCs, private

creditors could possibly also wait until the end of the debt relief process, i.e. the completion point, before lending to HIPC governments. However, given that HIPC debt is reduced, but still significant following the HIPC process, some may even postpone their first loans after the MDRI in order to have a debtor with a cleaned slate, hence ensuring future repayment of their claims. Therefore, in keeping with [Papaioannou and Siourounis \(2008\)](#) and [Ferry \(2015\)](#), we decide to estimate the following equation to see which step of the HIPC process fosters lending by private investors:

$$Y_{i,t} = \alpha + \nu_i + \delta_t + \beta_1 HIPC_i * D1_{i,t} + \beta_2 HIPC_i * D2_{i,t} + \beta_3 HIPC_i * D3_{i,t} + \gamma Z_{i,t} + \epsilon_{i,t} \quad (3.5)$$

where $D1$ is a dummy taking 1 for the 4 years preceding the decision point, and 0 otherwise. β_1 approximates the announcement effect of the HIPC initiative launched in 1996, i.e. four years before the first HIPC entered the enhanced initiative. The $D2$ variable is a dummy equal to 1 for the years from the decision point to the completion point (i.e. for the interim period years). Lastly, $D3$ is a dummy that takes 1 for the years after the completion point. We alternately estimate this model using a dummy $D2$ that covers all years from the decision point to the MDRI (i.e. including the years between the completion point and the MDRI), and a dummy $D3$ equal to 1 for all years in the post-MDRI period. Comparisons between these two specifications reveal whether private creditors react immediately after the HIPC initiative completion point or whether they prefer to await subsequent debt cancellations under the MDRI before lending to HIPC governments

We schematize these two potential cases in figures 4 and 5 below. Figure 4 presents the situation where private creditors start to lend to HIPC governments as soon as the countries complete the HIPC process. In this scenario, coefficient β_2 of equation 3.5 should not be statistically significant if we consider period $D2$ as the interim period. However, if $D2$ is defined as the period running from the decision point through to the MDRI (period drawn in light gray below the arrow denoting time), coefficient β_2 should be significantly different from the baseline period. In the second case (Figure 5), where private investors wait until the MDRI before lending, β_2 should not be significantly different from the baseline period when the $D2$ period runs either to the completion point or to the MDRI. Note that if an increase in debt commitments is temporary instead of long lasting as schematized in Figures 4 and 5, the results should be the same except for the β_3 coefficient if the temporary increase occurs after the completion point and if $D2$ represents the period between the decision point and the MDRI. Under this scenario, β_2 would still be significantly different from the baseline period, but β_3 would not.

The upper half of Table 3.4 report β_1 , β_2 , and β_3 when $D2$ covers the interim period. The results show that debt disbursements from private banks robustly increase during period $D3$, i.e. after the completion point. This is robust across the different control groups we have used so far as well as the choice of control variables. However, looking at the bottom part of this Table, results when $D3$ denotes the post-MDRI period are similar to those above. This means that the increase in financing from private banks occurs, on average, at the end of the period of study and therefore after the MDRI. International investors thus seem to wait until the HIPCs benefit from the entire debt relief package (cancellations under the HIPC initiative plus those granted by the MDRI) and display a cleaned slate before lending to their respective governments.

Figure 3.4: Debt to private creditors - Scenario 1.

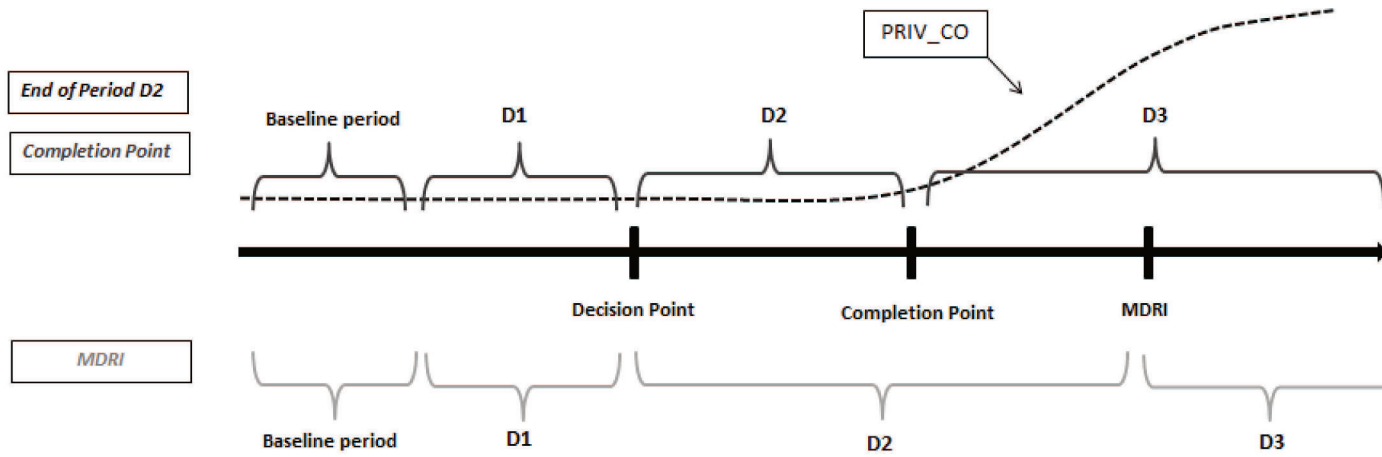


Figure 3.5: Debt to private creditors - Scenario 2

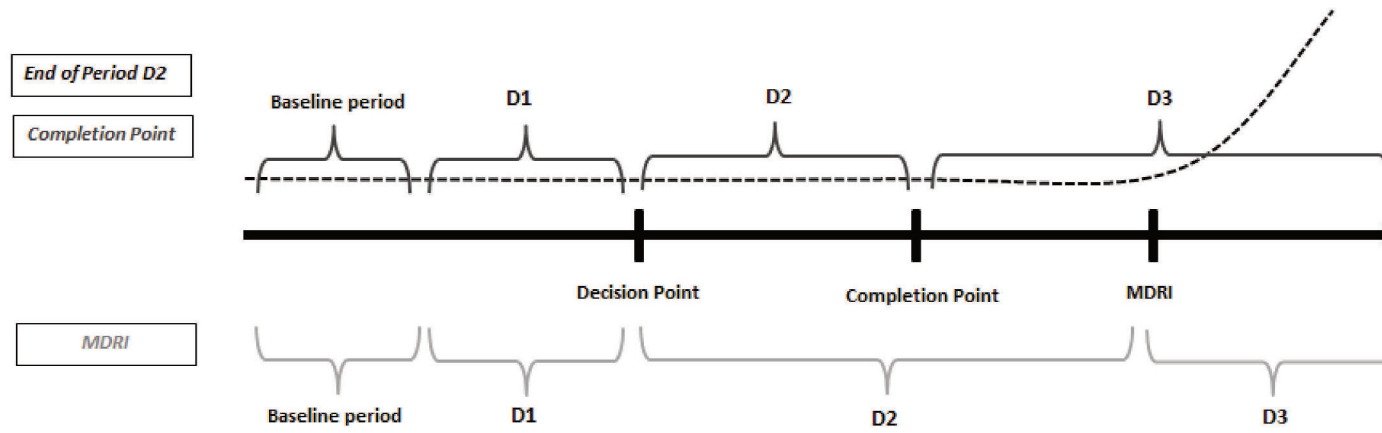


Table 3.4: Difference-in-Differences estimates - Gradual effect of debt relief.

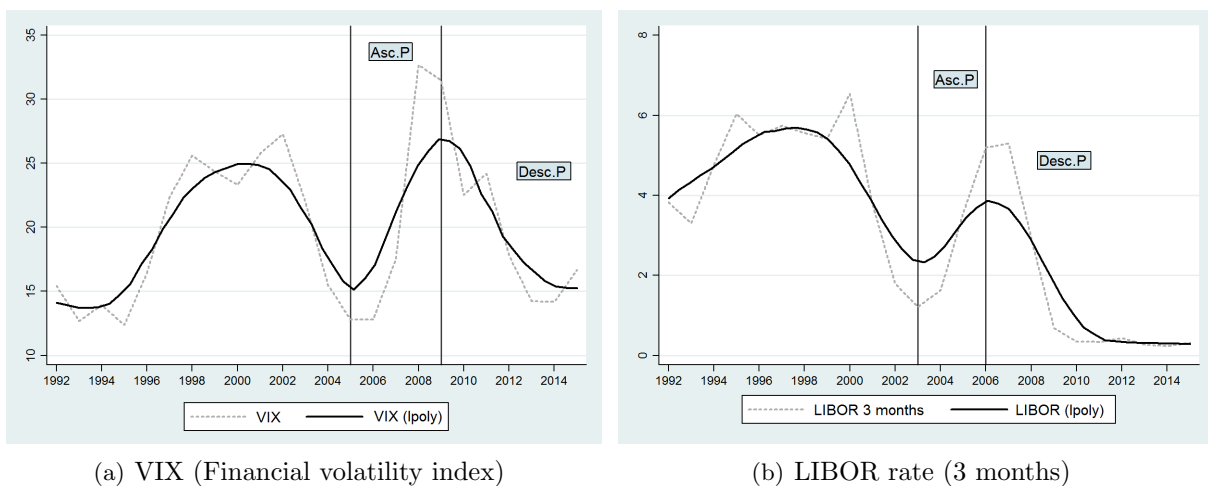
Study period: 1992-2015	(I)	(II)	(III)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Dep. var.:	PRIV_BK			PRIV_CR			PRIV_CO		
Control group:	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>	<i>Narrow</i>	<i>Extended</i>	<i>African</i>
D2=DP-CP period									
HIPC*D1:	0.445 (1.454)	-0.304 (-1.001)	-0.369 (-0.574)	-0.079 (-0.158)	-1.582* (-1.884)	-0.021 (-0.021)	-2.955 (-1.286)	-3.673** (-2.354)	-3.108 (-1.440)
HIPC*D2:	1.090** (2.653)	0.381 (1.156)	0.405 (0.817)	0.240 (0.278)	-1.597 (-1.636)	0.919 (0.812)	-1.816 (-0.890)	-3.679** (-2.404)	-1.844 (-0.995)
HIPC*D3:	1.383*** (2.968)	1.012*** (2.753)	1.070** (2.669)	0.900 (0.950)	1.445 (1.255)	2.457** (2.075)	-0.499 (-0.231)	0.082 (0.048)	0.114 (0.056)
Observations	677	1,517	669	677	1,517	669	677	1,517	669
R-Squared (within)	0.131	0.094	0.140	0.126	0.066	0.148	0.115	0.066	0.122
No. of country	39	88	38	39	88	38	39	88	38
D2=DP-MDRI period									
HIPC*D1:	0.431 (1.410)	-0.325 (-1.075)	-0.401 (-0.616)	-0.111 (-0.221)	-1.680** (-2.044)	-0.095 (-0.097)	-3.015 (-1.314)	-3.795** (-2.414)	-3.201 (-1.484)
HIPC*D2:	1.078** (2.628)	0.417 (1.315)	0.358 (0.734)	0.212 (0.246)	-1.571 (-1.650)	0.802 (0.716)	-1.908 (-0.952)	-3.626** (-2.402)	-2.031 (-1.132)
HIPC*D3:	1.433*** (2.976)	1.068*** (2.794)	1.187*** (2.970)	1.013 (1.028)	1.845 (1.526)	2.736** (2.267)	-0.230 (-0.103)	0.558 (0.309)	0.507 (0.240)
Observations	677	1,517	669	677	1,517	669	677	1,517	669
R-Squared (within)	0.132	0.095	0.144	0.128	0.069	0.155	0.117	0.070	0.128
No. of country	39	88	38	39	88	38	39	88	38

Notes: In order to estimate equation 3.5, one needs sufficient observations over D1, D2, D3, and the baseline period. We therefore consider the sample made up of 24 HIPCs having reached their completion point no later than 2009. Control variables are the same as in Table 3.3. Note that results with respect to Panel A, B, and C have not been reported to save space but are similar to those reported here. All F-statistics are statistically significant at the 0.01% level. Robust t-statistics in parentheses (clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

3.6.2 Financial environment in high-income countries

Another explanation for such private capital inflows could also be found in the recent financial turmoils experienced by advanced economies. As regards the recent developments and especially the two financial crises that severely hit high-income countries (HICs) in 2008 and 2012, one might legitimately think that precautionary behaviors and low returns in high-income countries have motivated private investors to seek for financial investment with higher returns and thus to turn toward HICs. Such “push factors” were so far captured by time-fixed effects, included in every regression. However, in this section, we try to go further by identifying whether HICs which, according to our findings have accessed financial markets starting from 2005 on (the MDRI launching date), have contracted debts to private creditors mostly during financial busts in advanced economies. To do so, we collect annualized data on the VIX index and the LIBOR rate (3 months) for our entire period ¹³ and look at the evolution of those indicators after 2005. Figure 3.6 below shows that both the VIX and the LIBOR have experienced an ascending phase prior to the global financial crisis and the sovereign debt issues of European countries before this trend reversed in 2010 for the VIX and 2007 for the LIBOR. We believe these indicators can be used as a proxy for the relative attractiveness of low-income countries, since low levels of VIX and LIBOR denote low market returns in advanced economies (financial volatility —as regards VIX index— being often associated with bubbles and inflated market returns, which can also be feared by private investors when they feel the bubble is about to deflate).

Figure 3.6: Financial volatility and market returns in high-income countries.



Notes: Both graphs show the raw evolution (dotted line) of the financial index as well as its smoothed evolution (solid line) derived from weighted local polynomial estimates which have been calculated with the kernel function. **Asc.P** denotes the ascending phase of the index while **Desc.P** represents its descending one.

In order to identify the role played by the development of financial markets in high-income economies (HICs), we interact our variable capturing years in the post-interim period with a dummy variable capturing years in the descending period as regards these financial indicators, and alternately a dummy variable identifying years in the ascending period (the *CYCLE* variable).

¹³Data have been retrieved from the FRED Economic Data website.

This allows us to observe whether HIPCs' borrowing to private creditors occurred mostly during the expansion or contraction of financial markets. Results are exposed in Table 3.5. One can observe that HIPCs borrow from private creditors mostly when both the VIX and LIBOR follow a downward trend. Indeed, after 2005, many HIPCs of our sample have benefited from both the HIPC initiative and the MDRI, getting back a substantial borrowing capacity. Yet the few years following the MDRI were characterized by increasing returns and financial volatility in advanced economies which did not lead private investors to search for higher returns and immediately lend to developing countries, and HIPCs in particular. However, when situation started to depreciate in high-income countries, fall in financial returns have probably motivated private investors to seek higher returns in developing countries and consider HIPCs as a priority destination given their renewed debt sustainability.

Moreover, it seems that the decision of private creditors to lend to HIPCs has not been driven by particular economic or institutional developments in those countries. Indeed, interacting the post-interim period dummy with indicators such as economic growth, per capita GDP, natural resource rents, institutional quality, and even the average haircuts on prior defaults to private creditors (using data from Cruces and Trebesch (2013)) does not lead to observe heterogeneity in market access among HIPCs (see Table 3.C10 in the Appendix C, p.139). We however notice that private creditors tend to head toward more stable governments with a significant longevity in power. Note also that we do not find any negative effect derived from the size of prior haircuts on sovereign debt owed to private creditors, which emphasizes the absence of lenders' recall and, to a certain extent, the "this time is different" syndrome as defined in Reinhart and Rogoff (2009).

Table 3.5: Did financial environment in HICs trigger private capital flows to HICs?

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
Debt relief stage:	Interim Period [with at least +6 years after]											
	VIX						LIBOR 3 months					
CYCLE	Ascending Phase			Descending Phase			Ascending Phase			Descending Phase		
Dep. var.:	PRIV_BK	PRIV_CR	PRIV_CO	PRIV_BK	PRIV_CR	PRIV_CO	PRIV_BK	PRIV_CR	PRIV_CO	PRIV_BK	PRIV_CR	PRIV_CO
<i>Narrow CG</i>												
Post-IP	1.163*** (3.158)	1.527** (2.149)	2.491** (2.185)	0.687*** (2.772)	0.428 (0.661)	0.890 (0.922)	1.020*** (3.129)	1.256* (1.758)	2.061* (1.898)	0.725*** (3.016)	0.516 (0.801)	1.004 (1.046)
CYCLE	-0.217 (-0.608)	-0.733 (-0.973)	-1.038 (-0.822)	-1.667*** (-3.699)	-4.058*** (-3.383)	-5.853** (-2.608)	-1.155*** (-2.747)	-2.497*** (-3.204)	-3.100*** (-3.023)	-1.541*** (-3.983)	-3.746*** (-3.889)	-4.609** (-2.617)
Post-IP*CYCLE	-0.478 (-1.507)	-1.100** (-2.452)	-1.595* (-2.017)	0.752* (1.812)	1.735** (2.621)	2.535** (2.073)	-0.204 (-1.007)	-0.786* (-1.706)	-0.936 (-1.253)	0.333 (1.347)	0.771 (1.376)	1.146 (1.400)
Observations	593	593	593	593	593	593	593	593	593	593	593	593
<i>Extended CG</i>												
Post-IP	1.467*** (3.866)	3.145*** (2.847)	3.491*** (2.830)	0.866*** (3.537)	1.704** (2.020)	1.725* (1.874)	1.304*** (4.043)	3.200*** (2.993)	3.482*** (2.982)	0.874*** (2.994)	0.446 (0.555)	0.370 (0.411)
CYCLE	0.143 (0.556)	-1.219 (-1.401)	-0.852 (-0.867)	-1.991*** (-3.821)	-6.410*** (-2.970)	-6.592*** (-2.965)	0.930** (2.251)	2.866* (1.697)	3.110* (1.785)	-0.674** (-2.464)	-3.835*** (-2.881)	-3.376** (-2.457)
Post-IP*CYCLE	-0.571** (-2.085)	-0.768 (-1.415)	-1.029 (-1.371)	0.858** (2.307)	2.570*** (2.931)	3.074** (2.604)	-0.372 (-1.498)	-2.361*** (-3.559)	-2.609*** (-3.076)	0.454* (1.749)	2.913*** (2.968)	3.302*** (2.916)
Observations	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433
<i>African CG</i>												
Post-IP	1.743** (2.686)	2.986*** (3.335)	3.159*** (2.808)	0.988** (2.301)	1.680** (2.268)	1.245 (1.150)	1.599*** (2.865)	2.899*** (3.443)	2.823** (2.477)	0.957* (1.997)	1.258* (1.698)	1.023 (1.075)
CYCLE	-0.907 (-1.514)	-1.857* (-1.775)	-2.110** (-2.078)	-1.258 (-1.525)	-2.628* (-1.922)	-4.131** (-2.095)	0.421 (1.075)	0.311 (0.422)	0.189 (0.322)	-1.068* (-1.783)	-2.699** (-2.362)	-2.472 (-1.495)
Post-IP*CYCLE	-0.667* (-1.742)	-0.928* (-1.718)	-1.602 (-1.675)	1.221** (2.428)	2.311*** (3.216)	3.173** (2.644)	-0.596** (-2.055)	-1.490*** (-3.308)	-1.494* (-1.829)	0.686** (2.253)	1.761*** (3.098)	1.963** (2.135)
Observations	585	585	585	585	585	585	585	585	585	585	585	585

Notes: Study period runs from 1992 to 2015. Columns (I) to (VI) expose effect of debt relief conditional on the VIX index's financial cycle (ascending vs. descending phase) while Columns (VII) to (XII) do the same with respect to the LIBOR (3 months) rate. We study changes in disbursements and commitments to private creditors (banks and others) around the interim period. Post-IP is the abbreviation for Post-Interim Period. Note that we control for the same set of explanatory variables used so far. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

3.6.3 Flows substitutability

Lastly, one could ultimately wonder whether the increasing resort to external private financing translates a gradual withdrawal of official creditors in HIPCs. Indeed, given the large amounts of debt canceled through the HIPC initiative for bilateral lenders, and via the MDRI for the multilateral donors, official creditors could redirect financing flows towards LICs which did not benefit from these programs, especially in a context of public finance crisis for most of the traditional bilateral donors. Debt relief would be thus not additional and HIPCs, which still lack of sufficient domestic financial resources and need external financing to achieve their development, would thus have no other choice than seeking for new financing sources such as private creditors, now reachable given their renewed debt sustainability.

We test this hypothesis by running equation 3.3 but considering as dependent variables gross financing flows from official donors. Using data from the OECD-DAC, we focus on the effect of debt relief on changes in grants, gross loans, and gross aid transfers. Following Roodman (2006), we correct our dependent variables for debt relief flows. We thus remove debt forgiveness grants from official grants, and rescheduled debt from ODA loans. The gross aid transfers (GAT) as defined in Roodman (2006) therefore sum corrected measures of grants and ODA loans. All these variables are expressed in percentage of GDP. In addition, the OECD-DAC database provides data by type of donors, which conversely to the financing conditions, allows us to differentiate between bilateral and multilateral creditors in their response to debt relief. Table 3.A4 in the Appendix A (p.125) provides descriptive statistics for these variables. Note that we add the same controls as for the financing conditions and test the specification to the inclusion of different explanatory variables. Table 3.6 below exposes the DID effect of debt relief on changes in official financing flows. One can notice that in addition of tightening their lending conditions, official creditors seem to reduce aid flows towards HIPCs (with respect to the various control groups) by around 4 percentage points of GDP.¹⁴ Looking at Table 3.7, it seems that the fall in official flows materializes by less loans from both multilateral and bilateral donors. We also observe a diminution in bilateral grants after the decision point and the interim period which is however not shared by multilateral donors. Results are robust to the set of explanatory variables as exposed in Table 3.C8 and 3.C9 in the Appendix C (pp.137-138). Note that most of the explanatory variables are associated with their expected sign when statistically significant.

Conversely to Powell and Bird (2010), these findings suggest that debt relief under these initiatives has not been additive for HIPCs. This could partly explain the fact that some HIPCs turned to private creditors and thus tried to access international financial markets at the time where investors were searching for high-return investment. Therefore, one might think that borrowing to private creditors has not only been determined by private lenders, but also by HIPCs themselves in search for necessary financing.

¹⁴Note that we ran the same estimates with other official flows (OOF) as dependent variable but did not find any significant effect. Specification using dependent variables expressed in percentage of exports have been also used and expose a diminution in gross aid transfers by around 20% of the exports (for bilateral aid transfers). Results available upon request to the authors.

Table 3.6: Debt relief additionality and changes in traditional official flows.

Study period: 1992-2015	(I)	(II)	(III)	(IV)	(V)	(VI)
	Official donors					
Debt relief stage:	Decision Point [+8 years after]			Interim Period [+6 years after]		
Dep. var:	Grants	Loans	GAT	Grants	Loans	GAT
<i>Narrow CG</i>						
Post-Debt relief stage	-2.677*** (-3.633)	-2.211*** (-3.422)	-4.888*** (-4.712)	-2.762*** (-4.189)	-2.647*** (-3.567)	-5.408*** (-6.140)
Observations	816	816	816	692	692	692
R-squared (within)	0.447	0.408	0.492	0.459	0.437	0.521
No. of country	44	44	44	39	39	39
<i>Extended CG</i>						
Post-Debt relief stage	-1.628** (-2.106)	-2.261*** (-3.593)	-3.890*** (-3.287)	-1.416*** (-2.977)	-2.566*** (-4.463)	-3.982*** (-5.427)
Observations	1,775	1,775	1,775	1,651	1,651	1,651
R-squared (within)	0.350	0.275	0.378	0.348	0.309	0.408
No. of country	88	88	88	83	83	83
<i>African CG</i>						
Post-Debt relief stage	-2.098*** (-3.075)	-2.694*** (-4.328)	-4.793*** (-4.678)	-2.240*** (-3.374)	-3.325*** (-4.826)	-5.566*** (-6.261)
Observations	805	805	805	681	681	681
R-squared (within)	0.442	0.382	0.478	0.442	0.425	0.510
No. of country	43	43	43	38	38	38

Notes: Columns (I) to (III) exposes results for a sample of 28 HIPCs that have reached their decision point no later than 2007. Columns (IV) to (VI) exposes results for a restricted sample of 24 HIPCs that have reached their completion point no later than 2009. The set of control variables is the same for all columns and includes **GDP_PC**, **POP**, **GDP_GROWTH**, **GFCF**, **CAB**, **INF**, **TOT_RESV**, **DURABLE**, and **CIVIL_L**. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.7: Debt relief additionality - bilateral vs. multilateral donors.

Study period: 1992-2015	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
Debt relief stage:	Decision Point [with at least +8 years after]						Interim Period [with at least +6 years after]					
Donors:	Bilateral donors			Multi donors			Bilateral donors			Multi donors		
Dep. var.:	Grants	Loans	GAT	Grants	Loans	GAT	Grants	Loans	GAT	Grants	Loans	GAT
<i>Narrow CG</i>												
Post-Debt relief stage	-2.343*** (-3.488)	-0.464*** (-2.904)	-2.807*** (-3.822)	-0.335 (-1.140)	-1.749*** (-3.119)	-2.084*** (-3.435)	-2.368*** (-4.143)	-0.343* (-1.818)	-2.710*** (-4.739)	-0.395 (-1.306)	-2.310*** (-3.750)	-2.705*** (-3.978)
Observations	816	816	816	816	816	816	692	692	692	692	692	692
R-squared	0.467	0.203	0.471	0.253	0.377	0.322	0.478	0.309	0.526	0.273	0.379	0.340
No. of country	44	44	44	44	44	44	39	39	39	39	39	39
<i>Extended CG</i>												
Post-Debt relief stage	-1.813*** (-2.689)	-0.608*** (-2.909)	-2.420*** (-2.941)	0.185 (0.727)	-1.691*** (-3.445)	-10.236 (-0.308)	-1.681*** (-4.210)	-0.402*** (-2.675)	-2.083*** (-4.933)	0.266 (1.392)	-2.221*** (-4.428)	-1.934*** (-3.605)
Observations	1,775	1,775	1,775	1,775	1,631	1,631	1,651	1,651	1,651	1,651	1,507	1,507
R-squared	0.359	0.133	0.367	0.188	0.258	0.240	0.364	0.161	0.404	0.195	0.295	0.261
No. of country	88	88	88	88	81	81	83	83	83	83	76	76
<i>African CG</i>												
Post-Debt relief stage	-1.988*** (-3.228)	-0.686*** (-3.799)	-2.675*** (-3.693)	-0.111 (-0.400)	-2.008*** (-3.738)	-2.119*** (-3.459)	-2.125*** (-3.856)	-0.648*** (-3.958)	-2.773*** (-4.986)	-0.116 (-0.438)	-2.678*** (-4.427)	-2.794*** (-4.012)
Observations	805	805	805	805	805	805	681	681	681	681	681	681
R-squared	0.459	0.195	0.469	0.257	0.335	0.300	0.459	0.307	0.520	0.278	0.360	0.326
No. of country	43	43	43	43	43	43	38	38	38	38	38	38

Notes: Columns (I) to (III) and (VII) to (IX) exposes effect of debt relief on changes in financing flows from bilateral donors (DAC and non-DAC). Other columns report the effect of debt relief on changes in multilateral financing flows. We observe these debt relief effects both around the decision point (Columns (I) to (VI)) and the interim period (Columns (VII) to (XII)) with their respective HIPCs sample. The set of control variables is the same for all columns and includes **GDP_PC**, **POP**, **GDP_GROWTH**, **GFCF**, **CAB**, **INF**, **TOT_RESV**, **DURABLE**, and **CIVIL_L**. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

3.7 Conclusion

Results of this study show that debt relief initiatives have probably affected HIPCs' external public financing. They suggest that having benefited from the Enhanced HIPC initiative leads official lenders to tighten their lending conditions by shortening both grace and maturity periods on new loans (with respect to non-HIPCs). Such adjustments seems to reduce *in fine* the grant element on new official external public debt for HIPCs. Moreover, given the rigidity of multilateral donors' financing policies, we suspect this tightening of lending conditions on new loans to be mostly driven by bilateral creditors seeking higher returns on their investments, especially in a context of budgetary discipline. Furthermore, additional results support that both bilateral and multilateral creditors reduced official financing flows toward HIPCs after having granted debt relief (and as compared with flows provided to non-HIPCs); the reduction in bilateral flows being more pronounced than for multilateral donors.

We think this probably led HIPCs to search for alternative sources of financing. Our study tends to show that HIPCs might have found such opportunities by accessing (again, for some of them) the international financial markets after having been granted full and irrevocable debt relief. As shown by results in Section 6, HIPCs seem to contract more debt from private creditors once they have benefited from ultimate debt cancellations under the MDRI (i.e. once all their remaining multilateral debt stock has been canceled) and when financial markets in high-income countries endure bearish dynamics.

In sum, it appears that the positive impact of debt cancellations on debt sustainability leads official creditors to propose financing to HIPCs on terms that are closer to "real market" conditions. This behavior might even be reinforced by HIPCs' borrowing to private creditors which illustrate the capacity of these countries to contract loans at market conditions. These initiatives have thus driven up the financing opportunities by making borrowing on the international financial markets accessible for countries historically excluded from them. In a way, one might think that debt relief initiatives have helped relieve the "double original sin" that weighed on HIPCs.

Nevertheless, a close eye should be kept on this new borrowing dynamics in order to prevent future unsustainable debt levels. As detailed above, debt to private creditors is often associated with high interest rates, which can easily lead to repayment issues. In October 2015, the IMF *Regional Economic Outlook* reported that some HIPCs such as Zambia, Senegal, Ghana, Gambia, and Malawi were expected to reach, in 2016, debt-to-GDP ratios twice higher than the level recorded right after the MDRI. Even more worrying is the fact that some HIPCs such as Mozambique are suffering from the fall in international commodity prices and are already experiencing repayment difficulties. Stiglitz may have got it right, again.

Complementary results

Appendix A. Control variables: descriptive statistics and expected effects.

Table 3.A1: Descriptive Statistics - Whole sample (112 DCs) [1992-2015]

Variables	Source	Unit	Mean	Std. Dev.	Obs.	% missings
<i>Dependent variables</i>						
AGP	IDS 2016	years	6.14	3.23	2677	1.76
AM	IDS 2016	years	23.21	11.93	2678	1.72
AGE	IDS 2016	in %	54.28	19.48	2415	11.37
AGE_MO	authors' comput.	in %	71.81	21.54	2411	11.52
AGE_MT	authors' comput.	in %	64.20	26.25	2658	2.45
PRIV_BANK	IDS 2016	% of exports	0.77	2.65	2725	0.00
PRIV_CRED	IDS 2016	% of exports	2.77	7.94	2725	0.00
PRIV_CO	IDS 2016	% of exports	2.88	8.38	2725	0.00
<i>Explanatory variables</i>						
GDP_PC	WDI 2016	constant USD, log	7.43	1.02	2644	2.97
POP	WDI 2016	inhabitants, log	15.85	1.90	2708	0.62
GDP_GROWTH	WDI 2016	% change	4.13	6.19	2652	2.67
GFCF	WDI 2016	% of GDP	23.52	9.84	2446	10.23
RES_RENT	WDI 2016	% of GDP	10.76	13.56	2427	10.93
CAB	WDI 2016	% of GDP	-11.76	14.98	2626	3.63
TOT_RES	WDI 2016	months of imp.	4.44	3.77	2235	17.98
INF	WDI 2016	% change	48.12	716.88	2464	9.57
POLIT_IV	Polity IV	[-10; 10]	1.99	5.99	2409	11.59
CIVIL_L	Freedom House	[1; 7]	4.06	1.51	2697	1.02
DURABLE	Polity IV	years	14.72	16.66	2457	9.83
KOF	Dreher (2006)	index	44.09	12.01	2435	10.64
CPIA	CPIA	index	3.23	0.60	2146	21.24
ECO_FREE	Heritage Foundation	index	55.45	8.33	2025	25.68
EXP_DIVERS	IMF	index	3.68	1.04	2049	24.80

Notes: This table exposes descriptive statistics for the whole sample that includes both HIPCs and control group countries. The entire sample consists in an unbalanced sample of 112 developing countries observed between 1992 and 2015.

Table 3.A2: Explanatory variables: expected effects on official financing conditions (and related literature).

Variables	Definition	expect. sign	Studies
GDP_PC	GDP per capita (constant USD, log)	-	Knight and Santaella (1997) , Alesina and Dollar (2000), Bird and Rowlands (2001) , Neumayer (2003) , Berthélemy and Tichit (2004), Berthélemy (2006), <i>Dollar and Levin (2006)</i> , Harrigan et al. (2006), Claessens et al. (2009), Fleck and Kilby (2010), Hoeffler and Outram (2011)
POP	Total population (log)	-	Snyder (1993), Alesina and Dollar (2000), Berthélemy and Tichit (2004), Berthélemy (2006), Claessens et al. (2009), Fleck and Kilby (2010), Hoeffler and Outram (2011)
GDP_G	GDP growth (%)	-	Knight and Santaella (1997) , Bird and Rowlands (2001) , Berthélemy and Tichit (2004), Harrigan et al. (2006), Dreher et al. (2009b), Hoeffler and Outram (2011)
GFCF	Total Investment (% GDP)	-	Knight and Santaella (1997) , Harrigan et al. (2006) , Dreher et al. (2009b) , Dreher et al. (2009a)
CAB	Curr. account net from ext. grants (% GDP)	-	Knight and Santaella (1997) , Bird and Rowlands (2001) , Harrigan et al. (2006) , Dreher et al. (2009b) , Dreher et al. (2009a)
TOT_RESV	International reserves (months of imports)	-	Knight and Santaella (1997) , Bird and Rowlands (2001) , Harrigan et al. (2006) , Dreher et al. (2009b) , Dreher et al. (2009a)
POLIT_IV	Polity IV - autocracy/democracy	+/-	Alesina and Dollar (2000), Alesina and Weder (2002), Neumayer (2003) , Berthélemy and Tichit (2004), Berthélemy (2006), <i>Dollar and Levin (2006)</i> , Harrigan et al. (2006) , Fleck and Kilby (2010), Hoeffler and Outram (2011), Dreher et al. (2009b)
DURABLE	Durability of the government	+	Knight and Santaella (1997) , Bird and Rowlands (2001) , Harrigan et al. (2006) , Fleck and Kilby (2010), Hoeffler and Outram (2011), Dreher et al. (2009b) , Dreher et al. (2009a)
CIVILL	Civil Liberties/Freedom	+	Alesina and Dollar (2000), Bird and Rowlands (2001) , Neumayer (2003) , Hoeffler and Outram (2011)
INF	Inflation rate	-/+	Knight and Santaella (1997) , Dreher et al. (2009b) , Dreher et al. (2009a)
CPIA	Institutional quality	-/+	Claessens et al. (2009), <i>Marchesi and Missale (2013)</i>
UN_VOTE	Vote alignment at the UN gen. assembly	+	Alesina and Dollar (2000), Hoeffler and Outram (2011), Dreher et al. (2009b) , Dreher et al. (2009a)

Notes: Studies in bold font focus on the determinants of multilateral aid or assistance to developing countries while these in normal font aim at identifying the drivers of bilateral aid allocation. Studies in bold and italic font investigate both multilateral and bilateral financing determinants.

Table 3.A3: Explanatory variables: expected effects on financing to private creditors (and related literature).

Variables	Definition	expect. sign	Studies
GDP_PC	GDP per capita (constant USD, log)	+	Cantor and Packer (1996), Eichengreen et al. (2002), Afonso (2003), Afonso et al. (2007), Borensztein and Panizza (2009), Gelos et al. (2011), Richmond and Dias (2008), Benczúr and Ilut (2015)
GDP_G	GDP growth (%)	+	Edwards (1984), Cantor and Packer (1996), Afonso (2003), Borensztein and Panizza (2009), Gelos et al. (2011), Richmond and Dias (2008), Benczúr and Ilut (2015)
CAB	Current account balance net from ext. grants	-/+	Edwards (1984), Cantor and Packer (1996), Ferrucci (2003), Afonso et al. (2007), Borensztein and Panizza (2009), Baldacci et al. (2008), Cruces and Trebesch (2013)
TOT_RESV	International reserves (in months of imports)	+	Edwards (1984), Afonso et al. (2007), Baldacci et al. (2008), Gelos et al. (2011), Hilscher and Nosbusch (2010), Cruces and Trebesch (2013), Benczúr and Ilut (2015)
INF	Inflation rate	-	Cantor and Packer (1996), Borensztein and Panizza (2009), Baldacci et al. (2008), Eichengreen et al. (2002), Afonso (2003), Afonso et al. (2007), Baldacci et al. (2008)
DURABLE/ ECO FREE	Political/Economic risk	-	Borensztein and Panizza (2009), Gelos et al. (2011), Cruces and Trebesch (2013), Cruces and Trebesch (2013), Trebesch and Zabel (2017)
CPIA	Institutional quality	+	Eichengreen et al. (2002), Afonso et al. (2007), Gelos et al. (2011)
KOFE	Globalization/openness index	+	Edwards (1984), Borensztein and Panizza (2009), Gelos et al. (2011), Eichengreen et al. (2002), Ferrucci (2003)
HAIR_CUT	Size of the haircut on prior restructuring	-	Cruces and Trebesch (2013); Trebesch and Zabel (2017)

Table 3.A4: Descriptive statistics on official financing flows.

HIPCs	Obs	Mean	Std. Dev.	Min	Max
<i>All Donors</i>					
GAT (% GDP)	693	13.05	9.23	0.91	94.44
LOANS (Gross in % GDP)	693	3.78	3.59	0	41.18
GRANTS (% GDP)	693	9.27	7.24	0.84	92.21
<i>Bilateral donors</i>					
GAT (% GDP)	693	6.62	5.47	0.41	65.00
LOANS (Gross in % GDP)	693	0.52	1.59	0	29.78
GRANTS (% GDP)	693	6.10	4.82	0.39	64.85
<i>Multilateral donors</i>					
GAT (% GDP)	693	6.42	4.70	0.17	42.26
LOANS (Gross in % GDP)	693	3.25	2.90	0	39.55
GRANTS (% GDP)	693	3.16	3.16	0	27.35
<hr/>					
Non-HIPC countries	Obs	Mean	Std. Dev.	Min	Max
<i>All Donors</i>					
GAT_all_gdp	1836	4.44	5.93	0	57.74
LOANS (Gross in % GDP)	1836	1.24	1.80	0	15.31
GRANTS (% GDP)	1836	3.19	4.77	0	51.74
<i>Bilateral donors</i>					
GAT_bilat_gdp	1836	2.77	3.98	0	43.34
LOANS (Gross in % GDP)	1836	0.40	0.77	0	9.10
GRANTS (% GDP)	1836	2.36	3.73	0	43.34
<i>Multilateral donors</i>					
GAT_multi_gdp	1533	1.59	2.23	0	17.04
LOANS (Gross in % GDP)	1533	0.84	1.45	0	12.06
GRANTS (% GDP)	1836	0.83	1.38	0	27.21

Notes: Data have been retrieved from the OECD-DAC database (*International Development Statistics*). The upper part of the Table exposes statistics for HIPCs sample considered when looking at changes around the interim period (so 24 HIPCs). The bottom half then provides statistics for all the non-HIPCs countries (countries included in the extended control group).

Appendix B. Control groups: composition and suitability.

Table 3.B1: "Extended" control group countries.

Albania	Dominica	Lebanon	Sri Lanka
<i>Algeria</i>	Dominican Republic	Lesotho	St. Lucia
<i>Angola</i>	Ecuador	Malaysia	St. Vincent
Argentina	<i>Egypt</i>	Maldives	Sudan
Armenia	El Salvador	<i>Mauritius</i>	<i>Swaziland</i>
Azerbaijan	Eritrea	Moldova	Syria
Bangladesh	Fiji	Mongolia	Tajikistan
Belarus	Georgia	<i>Morocco</i>	Thailand
Belize	Grenada	Myanmar	Tonga
Bhutan	Guatemala	Nepal	<i>Tunisia</i>
Bosnia and Herzegovina	India	Nigeria	Turkey
<i>Botswana</i>	Indonesia	Pakistan	Turkmenistan
Brazil	Iran. Islamic Rep.	Panama	Ukraine
Cambodia	Jamaica	Papua New Guinea	Uzbekistan
<i>Cape Verde</i>	Jordan	Paraguay	Vanuatu
China	Kazakhstan	Peru	Venezuela
Colombia	Kenya	Philippines	Vietnam
Costa Rica	Kyrgyz Republic	Serbia	Yemen
<i>Djibouti</i>	Lao PDR	<i>South Africa</i>	Zimbabwe

Narrow control group countries
African control group countries

Table 3.B2: Pre-Debt relief period: Descriptive statistics on covariates.

	(I)	(II)	(III)	(IV)
	Pre-Decision Point Mean			
Variable / Group:	HIPC DP	Narrow CG	Extended CG	African CG
Debt (% of exports)	615.33	350.11	162.75	218.79
LIC Status	0.93	0.94	0.31	0.39
GDP_PC (in log)	6.34	6.60	7.67	7.52
POP (inhabitants, log)	15.85	17.08	15.78	15.90
GDP_GROWTH (% change)	3.63	4.56	3.83	3.83
GFCF (% of GDP)	17.65	21.83	24.15	24.89
RES.RENT (% of GDP)	13.75	10.51	7.58	10.26
CAB (% of GDP)	-18.72	-11.07	-8.21	-8.37
TOT.RESV (% of GDP)	2.84	2.88	3.81	4.46
INF (% change)	21.45	23.52	56.18	105.30
POLIT_IV	1.25	-0.99	1.45	-1.25
CIVIL_L	4.31	5.09	4.21	4.62
DURABLE	6.09	13.87	15.77	12.46
KOF	34.62	33.58	42.86	41.84
CPIA	3.03	3.09	3.23	3.06
ECO_FREE	52.95	48.53	54.88	53.78
EXP_DIVERS	4.35	3.54	3.40	3.65
	Pre-Decision Point - Difference in Mean			
Variable / Diff:	(I)	(I) - (II)	(I)-(III)	(I-IV)
Debt (% of exports)	-	265.21***	452.57***	396.53***
LIC Status	-	-0.01	0.61***	0.54***
GDP_PC (in log)	-	-0.25***	-1.32***	-1.17***
POP (inhabitants, log)	-	-1.23***	0.07	-0.04
GDP_GROWTH (% change)	-	-0.93*	-0.20	-0.20
GFCF (% of GDP)	-	-4.18***	-6.49***	-7.24***
RES.RENT (% of GDP)	-	3.24***	6.16***	3.49***
CAB (% of GDP)	-	-7.65***	-10.50***	-10.35***
TOT.RESV (% of GDP)	-	-0.04	-0.96***	-1.61***
INF (% change)	-	-2.06	-34.73***	-83.84***
POLIT_IV	-	2.10***	-0.31	2.36***
CIVIL_L	-	-0.77***	0.10	-0.30***
DURABLE	-	-7.78***	-9.68***	-6.37***
KOF	-	1.03	-8.24	-7.22***
CPIA	-	-0.05	-0.20***	-0.03
ECO_FREE	-	4.41***	-1.92***	-0.82
EXP_DIVERS	-	0.81***	0.94***	0.70***

Notes: Mean values have been computed over the 6 years preceding the decision point of each HIPC. For control groups, we have calculated the weighted average across control group countries and over the 6 years before the decision point of their associated HIPCs' cohort (see explanations in Figure 3.2, p.103). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.B3: Pre-Debt relief period: Descriptive statistics on outcome variables.

	(I)	(II)	(III)	(IV)	(V)
Pre Decision-Point Mean					
Variable / Group:	HIPC DP	HIPC IP	Narrow CG	Extended CG	African CG
AGP (in years)	8.11	8.42	7.33	5.72	4.79
AMP (in years)	31.58	32.71	26.75	20.99	18.73
AGE (in %)	69.23	69.45	56.97	42.25	41.56
AGE_MO (in %)	87.05	86.86	69.33	58.86	61.83
AGE_MT (in %)	85.29	84.62	68.57	51.18	53.16
PRIV_BK	0.14	0.17	0.71	1.30	1.68
PRIV_CR	0.67	0.77	1.54	4.48	3.62
PRIV_CO	0.83	0.96	1.51	4.59	3.39
Pre-Decision Point - Difference in Mean					
Variable / Diff:	(I)	(II)	(I) - (III)	(I)-(IV)	(I-V)
AGP (in years)	-	-	0.78***	2.39***	3.31***
AMP (in years)	-	-	4.83***	10.59***	12.85***
AGE (in %)	-	-	12.26***	26.97***	27.67***
AGE_MO (in %)	-	-	17.71***	28.19***	25.22***
AGE_MT (in %)	-	-	16.71***	34.10***	32.12***
PRIV_BK	-	-	-0.57***	-1.15***	-1.54***
PRIV_CR	-	-	0.86***	-3.81***	-2.95***
PRIV_CO	-	-	-0.65*	-3.75***	2.56***

Notes: Mean values have been computed over the 6 years preceding the decision point of each HIPC. For control groups, we have calculated the average across control group countries and over the 6 years before the decision point of their associated HIPCs' cohort (see explanations in Figure 3.2, p.103). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.B4: Event-Study - Test for parallel trends prior debt relief.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Period	Placebo test [-6;-4] vs [-3; -1]							
Dep. var.	AGP	AMP	AGE	AGE_MO	AGE_MT	PRIV_BK	PRIV_CR	PRIV_CO
<i>Narrow Control Group</i>								
Post_Placebo-Period	0.125 (0.419)	1.660 (1.365)	-1.587 (-0.980)	1.012 (1.002)	3.198** (2.715)	-0.037 (-0.510)	-0.352* (-1.985)	-1.218 (-1.621)
<i>Extended Control Group</i>								
Post_Placebo-Period	0.413 (1.442)	1.456 (1.208)	-1.274 (-0.766)	1.169 (1.118)	2.074* (1.823)	-0.311*** (-3.965)	-1.563*** (-5.228)	-2.001*** (-2.986)
<i>African Control Group</i>								
Post_Placebo-Period	0.430 (1.594)	2.158* (1.718)	-4.568*** (-2.849)	-2.345** (-2.396)	-1.420 (-1.197)	-0.503*** (-5.208)	0.377** (2.409)	-0.856 (-1.149)
Number of HIPCs	29	29	29	29	29	29	29	29
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	174	174	160	160	174	174	174	174

Notes: Robust t-statistics (with standard-errors clustered at the country-level) in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Appendix C. Robustness checks: covariates, control groups, and sample dependence.

Table 3.C1: Alternative selection criteria, alternative control groups.

Panel A		
<i>Debt-to-dom.rev. sup. 250 % and LIC average status at least (3/5)</i>		
Bangladesh	Bhutan	Cambodia
Georgia	Indonesia	Kyrgyz Republic
Lao PDR	Nepal	Pakistan
Sudan	Tajikistan	Vietnam
Yemen	Zimbabwe	
Panel B		
<i>Debt-to-Exports Ratio sup. 170 % and LIC average status at least (0/5)</i>		
Algeria	Argentina	Bangladesh
Bhutan	Cambodia	Cabo Verde
Dominica	Ecuador	Egypt
Eritrea	Georgia	Grenada
India	Jordan	Kenya
Kyrgyz Republic	Lao PDR	Lebanon
Lesotho	Morocco	Nepal
Nigeria	Pakistan	Peru
Samoa	Serbia	Tonga
Sudan	Syria	Vietnam
Yemen	Zimbabwe	
Panel C		
<i>Debt-to-Exports Ratio sup. 0 % and LIC average status at least (5/5)</i>		
Armenia	Azerbaijan	Bangladesh
Bhutan	Cambodia	Eritrea
India	Kenya	Kyrgyz Republic
Lao PDR	Lesotho	Moldova
Mongolia	Nepal	Nigeria
Pakistan	Sudan	Tajikistan
Uzbekistan	Vietnam	Yemen
Zimbabwe		

Table 3.C2: DID estimates - Sensitivity to the narrow control group.

Study period: 1992-2015	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Debt relief stage:	Decision Point [with at least +8 years after]							
Dep. var.:	AGP	AMP	AGE	AGE_MO	AGE_MT	PRIV_BK	PRIV_CR	PRIV_CO
Panel A								
Post-Decision Point	-0.769 (-1.359)	-3.787* (-1.764)	-9.583** (-2.476)	-11.630** (-2.107)	-4.904 (-1.431)	0.723*** (2.867)	0.501 (0.966)	1.024 (1.576)
Observations	758	758	734	734	756	699	699	699
R-squared (within)	0.165	0.150	0.123	0.326	0.273	0.131	0.140	0.109
No. of country	42	42	42	42	42	40	40	40
Panel B								
Post-Decision Point	-0.816 (-1.484)	-4.415** (-2.343)	-9.114*** (-2.989)	-11.270*** (-3.003)	-10.081** (-2.605)	0.890*** (3.162)	1.909 (1.588)	2.365* (1.760)
Observations	950	950	915	915	945	879	879	879
R-squared (within)	0.139	0.093	0.133	0.298	0.233	0.118	0.052	0.053
No. of country	51	51	51	51	51	51	51	51
Panel C								
Post-Decision Point	-1.179* (-1.731)	-5.840** (-2.450)	-8.731** (-2.153)	-11.673** (-2.014)	-10.011** (-2.116)	0.924*** (3.674)	1.296** (2.189)	1.940** (2.484)
Observations	893	893	863	863	890	827	827	827
R-squared (within)	0.178	0.103	0.108	0.278	0.264	0.119	0.087	0.081
No. of country	48	48	48	48	48	48	48	48

Notes: Table exposes results for a sample of 28 HIPCs that have reached their decision point no later than 2007. The set of control variables is the same as for Table 3.2. **Panel A:** Debt/Revenue sup. **250%** and LIC Status at least **(3/5)**, **14** control group countries; **Panel B:** Debt/Exports sup. **170%** and LIC status at least **(0/5)**, **32** control group countries; **Panel C:** Debt/Exports sup. **0%** and LIC status at least **(5/5)**, **22** control group countries. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.C3: DID estimates - Sensitivity to the narrow control group (continued).

Study period: 1992-2015	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Debt relief stage:	Interim Period [with at least +6 years after]							
Dep. var.:	AGP	AMP	AGE	AGE_MO	AGE_MT	PRIV_BK	PRIV_CR	PRIV_CO
Panel A								
Post-Interim Period	-1.560** (-2.376)	-5.468** (-2.342)	-14.693*** (-3.431)	-17.093*** (-2.751)	-7.147 (-1.593)	0.873*** (3.050)	0.807 (1.405)	1.424 (1.669)
Observations	634	634	622	622	632	548	548	548
R-squared (within)	0.197	0.151	0.158	0.363	0.280	0.138	0.144	0.111
No. of country	37	37	37	37	37	36	36	36
Panel B								
Post-Interim Period	-1.319** (-2.230)	-6.545*** (-3.127)	-13.968*** (-3.942)	-15.670*** (-4.006)	-13.346*** (-3.270)	1.062*** (3.287)	3.805* (1.896)	4.297** (2.059)
Observations	826	826	803	803	821	728	728	728
R-squared (within)	0.157	0.089	0.167	0.329	0.244	0.129	0.076	0.074
No. of country	46	46	46	46	46	47	47	47
Panel C								
Post-Interim Period	-1.808** (-2.397)	-8.489*** (-3.026)	-13.115*** (-2.871)	-16.905** (-2.647)	-13.356** (-2.531)	1.160*** (4.111)	1.990*** (2.737)	2.624*** (2.756)
Observations	769	769	751	751	766	676	676	676
R-squared (within)	0.204	0.099	0.122	0.308	0.280	0.138	0.100	0.089
No. of country	43	43	43	43	43	44	44	44

Notes: Table exposes results for a sample of 24 HIPCs that have reached their completion point no later than 2009. The set of control variables is the same as for Table 3.2. **Panel A:** Debt/Revenue sup. **250%** and LIC Status at least (**3/5**), **14** control group countries; **Panel B:** Debt/Exports sup. **170%** and LIC status at least (**0/5**), **32** control group countries; **Panel C:** Debt/Exports sup. **0%** and LIC status at least (**5/5**), **22** control group countries. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.C4: Falsification tests.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Effect of having reached:	the Decision Point							
Dep var.:	AGP	AMP	AGE	AGE MO	AGE MT	PRIV BK	PRIV CR	PRIV CO
<i>Random draw replication: 500</i>								
Coefficient for Post-Decision Point								
Mean	-0.006	-0.003	-0.050	-0.283	0.036	-0.014	-0.009	-0.001
Standard deviation	0.402	1.540	2.887	3.439	2.821	0.328	1.375	1.337
Percent significant	4.80	4.20	4.20	3.80	4.40	6.60	14.60	8.40
Observations	1,769	1,769	1,668	1,667	1,764	1,584	1,584	1,584
No. of country	88	88	88	88	88	92	92	92
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Effect of having fully completed:	the Interim Period							
Dep var.:	AGP	AMP	AGE	AGE_MO	AGE_MT	PRIV_BK	PRIV_CR	PRIV_CO
<i>Random draw replication: 500</i>								
Coefficient for Post-Decision Point								
Mean	0.031	0.094	-0.190	0.297	0.307	0.015	-0.068	-0.089
Standard deviation	0.512	2.098	3.699	4.531	3.543	0.440	1.494	1.636
Percent significant	4.33	6.33	5.00	2.67	4.00	9.67	12.00	8.33
Observation	1,645	1,645	1,556	1,556	1,640	1,433	1,433	1,433
No. of country	83	83	83	83	83	88	88	88
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The upper part of the Table presents the effect of having reached the decision point on our variables representing the financing conditions to official creditors and debt inflows from private creditors. The second part of the Table reports the effect of having fully benefited from the interim period on the same dependent variables. We randomly draw samples of treated countries, estimate the effect of having benefited from debt relief under the decision point or the entire interim period, and then replicate the operation 500 times (or 300 times but not reported here in order to save space). The average statistics (mean and standard error) on the coefficient of interest are reported below the number of replications. Finally, the row “Percent significant” reports the percentage of estimates where the coefficient of interest is statistically significant at the 10% level (over the 500 replications). All the estimates account for macroeconomic covariates as in the main specifications.

Table 3.C5: DID estimates w/r to the extended control group.

Period: 1992-2015*	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
Debt relief stage:	Interim Period [with at least +6 years after]											
Dep. var.:	AGP			AMP			AGE			AGE_MO		
Post-Interim Period	-1.287** (-2.493)	-1.319** (-2.550)	-0.704 (-1.285)	-4.864*** (-2.818)	-4.927*** (-2.836)	-2.411 (-1.214)	-16.784*** (-5.347)	-16.760*** (-5.324)	-8.743** (-2.596)	-13.806*** (-3.563)	-13.779*** (-3.523)	-7.682 (-1.653)
GDP_PC	-1.229 (-1.539)	-1.223 (-1.517)	1.370 (1.395)	-2.471 (-0.825)	-2.322 (-0.767)	5.239 (1.172)	-18.169*** (-3.798)	-18.068*** (-3.805)	-3.132 (-0.489)	-16.748*** (-2.810)	-17.081*** (-2.916)	-6.811 (-1.019)
POP	1.262 (0.729)	1.116 (0.652)	6.789** (2.562)	6.824 (1.050)	6.791 (1.075)	23.369** (2.321)	-11.506 (-0.882)	-11.286 (-0.870)	20.978 (1.338)	-2.574 (-0.143)	-2.866 (-0.159)	4.903 (0.219)
GDP_G	0.040** (2.573)	0.040** (2.612)	0.028 (1.175)	0.132** (2.427)	0.135** (2.470)	0.083 (0.928)	0.199* (1.830)	0.200* (1.826)	0.132 (0.797)	0.355*** (3.447)	0.350*** (3.411)	0.205 (1.287)
GFCF	0.002 (0.175)	0.002 (0.153)	-0.005 (-0.348)	0.006 (0.159)	0.007 (0.172)	-0.035 (-0.655)	-0.051 (-0.644)	-0.049 (-0.628)	-0.035 (-0.351)	-0.154** (-2.232)	-0.158** (-2.284)	-0.127 (-1.289)
CAB	0.004 (0.295)	0.003 (0.238)	0.022 (1.650)	-0.001 (-0.039)	-0.005 (-0.137)	0.056 (1.182)	-0.113* (-1.802)	-0.114* (-1.809)	0.044 (0.736)	-0.238*** (-4.529)	-0.231*** (-4.506)	-0.139** (-1.996)
TOT_RESV	0.056 (1.464)	0.056 (1.465)	-0.017 (-0.261)	0.226* (1.676)	0.239* (1.756)	0.073 (0.289)	0.725** (2.094)	0.739** (2.121)	0.686** (2.062)	1.077*** (2.941)	1.035*** (2.766)	1.060*** (2.941)
INF	-0.000 (-0.301)	-0.000 (-0.447)	0.000 (1.621)	-0.000 (-0.220)	-0.000 (-0.244)	0.001 (1.579)	-0.000 (-0.036)	0.000 (0.018)	-0.000 (-0.279)	0.008*** (2.738)	0.008*** (2.666)	0.005*** (3.323)
DURABLE	0.011 (1.167)	0.012 (1.290)	0.001 (0.036)	0.043 (1.314)	0.042 (1.270)	-0.008 (-0.143)	0.147** (2.528)	0.143** (2.540)	0.052 (0.492)	0.080 (0.783)	0.088 (0.877)	-0.168 (-1.074)
CIVIL_L	-0.230* (-1.858)			-0.717* (-1.787)			-0.134 (-0.170)			0.997 (1.137)		
POLIT_IV		0.060** (2.341)			0.079 (0.922)			-0.078 (-0.439)			0.054 (0.313)	
CPIA			0.292 (1.032)			1.269 (1.118)			0.696 (0.382)			1.864 (0.711)
UN_VOTE			3.027 (0.357)			30.308 (1.057)			14.535 (0.257)			-53.717 (-0.927)
Obs	1,645	1,645	947	1,645	1,645	947	1,556	1,556	915	1,555	1,555	914
R-Squared (within)	0.079	0.081	0.072	0.060	0.059	0.071	0.227	0.227	0.141	0.243	0.242	0.185
No. of country	83	83	77	83	83	77	83	83	77	83	83	77

Notes: Table exposes changes in dependent variable around the interim period for a sample of 24 HIPCs that have reached their completion point no later than 2009. DID estimates for each dependent variable are obtained with respect to the extended control group. We do not report results for AGE_MT since they are really similar to those for AGE_MO. *Note that when including data on UN_VOTE, the study period is shortened to 1992-2008, which excludes HIPCs ending the process after 2007 and reduces the post-interim period for other HIPCs. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.C6: DID estimates w/r to the extended control group (continued).

Period: 1992-2015	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
Debt relief stage:	Interim Period [with at least +6 years after]											
Dep. var.:	PRIV_BK				PRIV_CR				PRIV_CO			
Post-Interim Period	1.250*** (4.049)	0.889*** (4.167)	1.043*** (2.974)	1.095*** (3.264)	2.854*** (2.798)	1.717* (1.748)	1.607 (1.475)	1.981* (1.971)	3.100*** (2.818)	1.677* (1.675)	1.502 (1.271)	2.066* (1.900)
GDP_PC	2.010*** (2.773)	1.644*** (2.988)	2.533*** (2.798)	1.686** (2.553)	3.228 (1.019)	4.773** (2.091)	4.862** (2.150)	1.209 (0.758)	5.405* (1.714)	4.971** (2.158)	7.349** (2.177)	2.878 (1.492)
GDP_G	-0.018 (-1.616)	-0.034** (-2.483)	-0.043** (-2.205)	-0.022 (-1.651)	-0.044 (-1.236)	-0.062*** (-3.039)	-0.069** (-2.028)	-0.025 (-0.780)	-0.043 (-1.027)	-0.059** (-2.442)	-0.074 (-1.359)	-0.029 (-0.708)
CAB	-0.015* (-1.704)	-0.016* (-1.678)	-0.015 (-1.262)	-0.009 (-1.314)	-0.055** (-2.109)	-0.034 (-1.294)	-0.039 (-1.607)	-0.021 (-1.044)	-0.045* (-1.868)	-0.036 (-1.356)	-0.042 (-1.642)	-0.030 (-1.299)
TOT_RESV		-0.086* (-1.947)	-0.014 (-0.275)	-0.042 (-0.968)		-0.207 (-1.073)	0.143 (0.976)	0.052 (0.422)		-0.242 (-1.253)	0.142 (0.932)	0.013 (0.095)
INF			-0.000 (-1.170)	-0.000 (-1.491)			0.000 (0.960)	-0.000 (-0.640)			0.000 (0.813)	-0.000 (-0.737)
DURABLE	-0.013 (-1.074)		-0.012 (-0.917)	-0.008 (-0.621)	-0.075** (-2.045)		-0.077 (-1.603)	-0.063 (-1.588)	-0.071* (-1.897)		-0.076 (-1.659)	-0.062 (-1.528)
ECO_FREE	-0.034 (-1.024)		-0.029 (-0.729)	-0.037 (-0.913)	0.006 (0.060)		0.020 (0.281)	0.118 (1.168)	-0.024 (-0.223)		-0.038 (-0.457)	0.078 (0.702)
CPIA			-0.347 (-0.983)				1.250 (1.158)				1.151 (1.067)	
KOF	0.033 (1.027)			0.053 (1.430)	0.278*** (2.845)			0.279*** (3.028)	0.251** (2.491)			0.270*** (2.772)
RES_RENT	0.001 (0.089)				-0.004 (-0.125)				-0.023 (-0.655)			
Obs	1,433	1,952	1,059	1,297	1,433	1,952	1,059	1,297	1,433	1,952	1,059	1,297
R-Squared (within)	0.094	0.033	0.074	0.085	0.067	0.049	0.075	0.115	0.062	0.040	0.061	0.092
No. of country	88	97	81	83	88	97	81	83	88	97	81	83

Notes: Table exposes changes in dependent variable around the interim period for a sample of 24 HIPCs that have reached their completion point no later than 2009. DID estimates for each dependent variable are obtained with respect to the extended control group. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.C7: DID estimates - Outliers and sample sensitivity.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Dep. var.:	PPG Debt - Disbursements to private banks						
	with respect to the <i>Narrow Control Group</i>						
Debt relief stage:	Decision Point [with at least +8 years after]						
<i>excluding:</i>	Benin	Bolivia	Burkina Faso	Burundi	Cameroon	CAF	Chad
Post-DP	0.811*** (3.080)	0.804*** (3.106)	0.824*** (3.065)	0.832*** (3.193)	0.807*** (3.098)	0.865*** (3.162)	0.831*** (3.181)
<i>excluding:</i>	Congo	Ethiopia	Gambia	Ghana	Guinea	Guinea-B	Guyana
Post-DP	0.868*** (3.263)	0.642*** (2.876)	0.815*** (3.128)	0.858*** (3.131)	0.802*** (3.079)	0.819*** (3.095)	0.840*** (3.115)
<i>excluding:</i>	Honduras	Madagasc.	Malawi	Mali	Mauritan.	Mozamb.	Nicaragua
Post-DP	0.819*** (3.109)	0.803*** (3.072)	0.807*** (3.076)	0.809*** (3.080)	0.796*** (3.050)	0.809*** (3.048)	0.852*** (3.300)
<i>excluding:</i>	Niger	Rwanda	Senegal	Sierra L.	Tanzania	Uganda	Zambia
Post-DP	0.811*** (3.087)	0.815*** (3.123)	0.807*** (2.991)	0.823*** (3.043)	0.769*** (2.926)	0.808*** (3.055)	0.837*** (3.120)
No. of country	42	42	42	42	42	42	42
Debt relief stage:	Interim Period [with at least +6 years after]						
<i>excluding:</i>	Benin	Bolivia	Burkina Faso	Burundi	Cameroon	CAF	Ethiopia
Post-IP	0.982*** (3.184)	0.978*** (3.164)	1.019*** (3.169)	0.984*** (3.229)	0.980*** (3.212)	1.039*** (3.289)	0.753*** (3.443)
<i>excluding:</i>	Gambia	Ghana	Guyana	Honduras	Madagasc.	Malawi	Mali
Post-IP	0.972*** (3.180)	1.019*** (3.245)	1.027*** (3.155)	0.995*** (3.222)	0.976*** (3.226)	0.985*** (3.193)	0.979*** (3.182)
<i>excluding:</i>	Mauritan.	Mozamb.	Nicaragua	Niger	Rwanda	Senegal	Sierra L.
Post-IP	0.957*** (3.163)	0.999*** (3.139)	1.025*** (3.340)	0.980*** (3.231)	0.998*** (3.280)	0.993*** (3.143)	0.988*** (3.177)
<i>excluding:</i>	Tanzania	Uganda	Zambia				
Post-IP	0.941*** (2.987)	0.994*** (3.145)	1.024*** (3.182)				
No. of country	38	38	38	38	38	38	38

Notes: All results are obtained from equation 3.3 where the reference control group is the narrow control group. For each estimate we removed one of the HIPC present into the sample. There are 28 HIPCs in the sample for the Decision point since 28 HIPCs have reached their decision point no later than 2007. The sample for the whole HIPC process (so the interim period) is made up of 24 HIPCs since 24 countries have completed the process no later 2009. All F-statistics are statistically significant at the 1% level. Given our unbalanced panel of HIPCs, observations vary between 732-725 and 584-574 when looking at changes around the decision point and the interim period, respectively. Robust t-statistics in parentheses (clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.C8: DID estimates w/r to the extended control group - Bilat. donors.

Period: 1992-2015*	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
Debt relief stage:	Interim Period [with at least +6 years after]								
	Bilateral donors								
Dep. var.:	GRANTS			LOANS			GAT		
Post-Interim Period	-1.681*** (-4.210)	-1.555*** (-2.726)	-1.596*** (-2.882)	-0.402*** (-2.675)	-0.366*** (-2.700)	-0.349*** (-2.658)	-2.083*** (-4.933)	-1.921*** (-3.228)	-1.945*** (-3.408)
GDP_PC	-1.487 (-1.348)	-1.954 (-1.034)	-2.867* (-1.856)	0.457 (1.481)	0.848* (1.933)	1.120* (1.914)	-1.030 (-1.106)	-1.105 (-0.669)	-1.746 (-1.482)
POP	-1.098 (-0.794)	-2.393 (-0.728)	-0.163 (-0.083)	0.515 (0.986)	1.248 (1.252)	1.353*** (2.752)	-0.583 (-0.414)	-1.145 (-0.368)	1.190 (0.606)
GDP_G	0.038* (1.714)	0.036 (1.422)	0.032 (1.355)	-0.022* (-1.681)	-0.013 (-1.608)	-0.027* (-1.844)	0.016 (1.032)	0.023 (0.918)	0.006 (0.337)
CAB	-0.082*** (-5.226)	-0.085*** (-4.580)	-0.091*** (-5.791)	-0.002 (-0.462)	-0.007 (-1.566)	-0.004 (-0.796)	-0.085*** (-4.833)	-0.092*** (-4.338)	-0.095*** (-5.257)
TOT_RESV	0.090** (2.436)	0.131** (2.566)	0.115** (2.312)	-0.022** (-1.995)	-0.026* (-1.782)	-0.013 (-0.879)	0.068* (1.926)	0.105** (2.171)	0.102* (1.917)
GFCF	-0.054*** (-3.774)	-0.039* (-1.884)	-0.046*** (-2.896)	0.001 (0.108)	-0.005 (-0.812)	-0.002 (-0.311)	-0.053*** (-3.189)	-0.044* (-1.855)	-0.048** (-2.566)
INF	0.001** (2.460)	0.001** (2.193)	0.001* (1.753)	-0.000 (-0.336)	0.000 (0.321)	0.000 (0.763)	0.001* (1.719)	0.001* (1.791)	0.001 (1.529)
POLIT_IV		0.038 (1.461)			-0.011 (-0.827)			0.027 (0.964)	
CIVIL_R	0.137 (1.148)			-0.072 (-1.151)			0.065 (0.543)		
DURABLE	-0.009 (-0.943)			0.007* (1.716)			-0.002 (-0.195)		
CPIA			0.009 (0.033)			-0.017 (-0.166)			-0.007 (-0.027)
UN_VOTE		-6.332 (-0.811)			13.046*** (3.702)			6.714 (0.972)	
Observations	1,651	1,098	1,376	1,651	1,098	1,376	1,651	1,098	1,376
R-squared (within)	0.364	0.288	0.389	0.161	0.233	0.160	0.404	0.335	0.413
No. of country	83	81	87	83	81	87	83	81	87

Notes: Table exposes changes in dependent variable around the interim period for a sample of 24 HIPCs that have reached their completion point no later than 2009. DID estimates for each dependent variable are obtained with respect to the extended sample. *Note that when including data on UN VOTE the study period is shortened to 1992-2008, which excludes HIPCs ending the process after 2007 and reduces the post-interim period for other HIPCs. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.C9: DID estimates w/r to the extended control group - Multi. donors.

Period: 1992-2015*	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
Debt relief stage:	Interim Period [with at least +6 years after]								
	Multilateral donors								
Dep. var.:	GRANTS			LOANS			GAT		
Post-Interim Period	0.266 (1.392)	0.082 (0.334)	0.193 (1.005)	-2.221*** (-4.428)	-1.722*** (-4.491)	-1.758*** (-3.349)	-1.934*** (-3.605)	-1.582*** (-3.388)	-1.547*** (-2.847)
GDP_PC (log)	-0.813** (-2.019)	-0.897 (-1.235)	-1.328*** (-2.743)	-0.838* (-1.849)	-0.659 (-1.206)	-1.243* (-1.986)	-1.554** (-2.059)	-1.390 (-1.339)	-2.444*** (-2.933)
POP	-0.081 (-0.094)	1.239 (0.859)	-0.036 (-0.036)	2.041 (1.336)	3.432** (2.103)	2.108 (1.112)	1.794 (0.925)	3.922 (1.657)	2.358 (1.127)
GDP-G	0.012 (1.578)	0.002 (0.211)	0.011 (1.286)	-0.007 (-0.532)	0.005 (0.638)	-0.016 (-1.178)	-0.003 (-0.174)	0.001 (0.054)	-0.011 (-0.642)
CAB	-0.041*** (-3.304)	-0.038** (-2.608)	-0.051*** (-3.622)	-0.018** (-2.298)	-0.016** (-2.067)	-0.022** (-2.234)	-0.059*** (-3.658)	-0.054*** (-2.815)	-0.072*** (-4.010)
TOT.RESV	0.031** (2.101)	0.012 (0.600)	0.044* (1.698)	0.048* (1.865)	0.036 (1.271)	0.071* (1.888)	0.076** (2.403)	0.049 (1.522)	0.117** (2.610)
GFCF	-0.021* (-1.945)	-0.018 (-1.547)	-0.022* (-1.856)	-0.003 (-0.301)	0.008 (0.638)	-0.004 (-0.445)	-0.022 (-1.633)	-0.008 (-0.446)	-0.024* (-1.775)
INF	0.001*** (2.771)	0.001*** (2.890)	0.001** (2.097)	-0.000 (-0.608)	-0.000 (-0.725)	0.000* (1.749)	0.001* (1.715)	0.000 (1.251)	0.001** (2.520)
POLIT_IV		-0.014 (-0.634)			-0.058* (-1.750)			-0.071 (-1.612)	
CIVIL_R	0.051 (0.728)			0.019 (0.145)			0.039 (0.307)		
DURABLE	0.004 (1.129)			0.007 (0.781)			0.011 (1.078)		
CPIA			0.048 (0.397)			0.479** (2.447)			0.508* (1.887)
UN VOTE		7.112** (2.089)			4.674 (0.960)			11.091* (1.752)	
Observations	1,651	1,098	1,376	1,507	1,028	1,285	1,507	1,028	1,285
R-squared (within)	0.195	0.200	0.192	0.295	0.207	0.344	0.261	0.211	0.302
No. of country	83	81	87	76	75	80	76	75	80

Notes: Table exposes changes in dependent variable around the interim period for a sample of 24 HIPCs that have reached their completion point no later than 2009. DID estimates for each dependent variable are obtained with respect to the extended sample. *Note that when including data on UN VOTE the study period is shortened to 1992-2008, which excludes HIPCs ending the process after 2007 and reduces the post-interim period for other HIPCs. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Table 3.C10: Investigating heterogeneity in HIPCs' market access.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
Debt relief stage:	Interim Period [with at least +6 years after]											
Dep. var.:	PRIV_BK				PRIV_CR				PRIV_CO			
VAR:	GDP PC	RES_RENT	DURABLE	HAIRCUT	GDP PC	RES_RENT	DURABLE	HAIRCUT	GDP PC	RES_RENT	DURABLE	HAIRCUT
<i>Narrow CG</i>												
Post-IP	2.587*	0.820**	0.857**	0.696**	-1.462	1.367*	0.096	0.366	-7.378	2.652**	0.262	0.479
	(1.697)	(2.208)	(2.547)	(2.590)	(-0.406)	(1.850)	(0.122)	(0.465)	(-0.937)	(2.344)	(0.234)	(0.401)
Post-IP*VAR	-0.241	0.012	0.012	0.509*	0.387	-0.019	0.094**	1.323*	1.393	-0.058	0.150**	2.502*
	(-1.160)	(0.660)	(0.966)	(1.804)	(0.724)	(-0.627)	(2.084)	(1.870)	(1.206)	(-0.971)	(2.405)	(1.700)
Observations	593	593	593	593	593	593	593	584	593	593	593	593
<i>Extended CG</i>												
Post-IP	1.349	1.347***	0.850**	0.958***	-9.839*	3.433***	0.140	2.049	-16.090*	3.980***	-0.080	1.631
	(1.056)	(3.290)	(2.571)	(3.273)	(-1.717)	(2.689)	(0.136)	(1.646)	(-1.958)	(3.065)	(-0.064)	(1.086)
Post-IP*VAR	-0.015	-0.007	0.033*	0.524	1.909**	-0.044	0.224***	1.447	2.887**	-0.067	0.262***	2.642
	(-0.082)	(-0.507)	(1.933)	(1.607)	(2.139)	(-0.833)	(2.971)	(1.139)	(2.363)	(-1.298)	(3.217)	(1.462)
Observations	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433	1,433
<i>African CG</i>												
Post-IP	3.451**	1.664**	1.145**	1.317**	-1.100	2.593***	1.002	1.967**	-6.060	3.684***	0.309	1.368
	(2.538)	(2.633)	(2.297)	(2.367)	(-0.331)	(3.094)	(1.041)	(2.067)	(-0.821)	(3.556)	(0.232)	(1.031)
Post-IP*VAR	-0.293	-0.014	0.028	0.329	0.561	0.004	0.132**	1.240	1.294	-0.092	0.181***	2.198
	(-1.534)	(-0.869)	(1.250)	(0.938)	(1.097)	(0.105)	(2.472)	(1.499)	(1.211)	(-1.501)	(2.915)	(1.529)
Observations	585	585	585	585	585	585	585	585	585	585	585	585

Notes: Each regression includes the set of control variables used so far. F-stat are not reported (as well as intercepts) in order to save space but are all significant at the 1% level. Robust t-statistics in parentheses (with standard-errors clustered at the country-level). ***, ** and * denote significance at 10%, 5% and 1%.

Chapter 4

Taxation, Infrastructure, and Firm Performance in Developing Countries

with Lisa Chauvet

4.1 Introduction

Since the early 1960s, there has been growing tendency to see the domestic resource mobilization as a stepping stone for economic development. The impressive work undertaken in recent decades to understand the determinants of taxation and its impact on economic activity has helped policymakers design tax policies in both advanced and developing economies. Yet although the need for further analysis of taxation and development has never let up, interest in these issues by policymakers and scholars has fluctuated considerably. Although the improvement of taxation in low-income countries (LICs) was among the commitments signed by the international community at the Monterrey Conference in 2002, the contribution of taxation to financing the Millennium Development Goals was overshadowed by the strong emphasis on the critical role that foreign aid had to play. In addition, the aid effectiveness dispute of the 2000s and the growing attention to remittances detracted from debates on domestic revenue mobilization. All this has dramatically changed over the past few years. The public finance crisis in advanced economies and the need for greater autonomy in financing for development have placed taxation issues firmly on the development agenda. The June 2015 International Conference on Financing for Development in Addis Ababa brought the question of taxation back to center stage: it reasserted the decisive role of domestic revenue in helping developing countries to grow, and highlighted the need to raise the level of taxes collected given the ambitious sustainable development goals for 2030 and the budgetary constraints faced by traditional donors.

This call from the international community to improve domestic resource mobilization was accompanied by renewed interest from academics and policymakers in improving their understanding of how taxation can affect economic development, especially in countries with substantial financing needs. Our paper investigates the effects of tax revenue on economic growth in developing countries taking a micro approach and focus on their firms' performance. In this, the article sets out to contribute to the literature on taxation and firm growth, as yet very thin

on the ground when it comes to developing countries.

As recently shown in paper by [Aghion et al. \(2016\)](#), the effect of taxation on firm performance can be twofold. On the one hand, taxes can be seen as a disincentive to innovate or invest since one additional dollar of tax is one dollar that is not used for a production activity. This first view is put forward by the large body of theory that builds on neo-classical models of investment ([Jorgenson, 1963](#); [Tobin, 1969](#); [Hayashi, 1982](#)) and posits that taxation is harmful for firm and industry development since it tends to negatively alter firm investment decisions ([Hall and Jorgenson, 1967](#); [Summers et al., 1981](#); [Auerbach et al., 1983](#)). Empirical analyses testing these theoretical predictions in advanced economies find that taxation does indeed depress capital accumulation ([Cummins et al., 1996](#)), the firm growth rate ([Carroll et al., 2001](#)) and entrepreneurship when tax progressiveness is too high ([Gentry and Hubbard, 2000](#)).

Yet on the other hand, tax resources are essential in financing the public infrastructures key to corporate activity. [Aghion et al. \(2016\)](#) argue that the overall effect of taxation on firm performance depends on the relative weight of these two effects, which can be very different depending on the kind of country studied. This condition was initially stated by [Barro \(1990\)](#), who argues that the effect of government spending (and hence taxes since he considers that public finances are balanced) on economic growth depends on the size of the government and especially on the marginal returns of public spending. According to him, a tax increase lowers the growth rate of the economy while the resulting government spending raises it. Yet this second effect dominates only when the government's size is small (i.e. when the ratio of public finance to the GDP is low). If the government is large, then the marginal returns of public spending decrease and the negative tax effect dominates, slowing down GDP growth. Furthermore, as pointed up by both [Aghion et al. \(2016\)](#) and [Goyette \(2015\)](#), the sound use of taxes in financing infrastructure is a necessary condition for the existence of such a positive effect, which depends heavily on the incidence of corruption within the country, and on the government's political accountability and willingness to invest domestic resources in promising projects for corporate activity.

If most studies to date have found that taxation is bad for corporate activity, it may be because they focus on advanced economies where the level of public infrastructures is already satisfactory and the marginal effect of taxation therefore only represents a direct cost for corporates. In keeping with the idea put forward by [Aghion et al. \(2016\)](#), in these countries, the first negative effect hence outweighs the second positive effect. Yet looking at the impact of taxation on firm activity in developing countries can produce different conclusions since the lack of infrastructure in these countries really does hamper business development. A number of studies find that infrastructure needs are a major impediment to economic growth in developing countries, especially LICs ([Collier and Gunning, 1999](#); [Bigsten and Söderbom, 2006](#); [Dollar et al., 2005](#); [Aterido et al., 2011](#); [Harrison et al., 2014](#)). Figure 4.A1 in the Appendix illustrates the relationship between economic development and infrastructure and clearly shows that infrastructure is considered as greater obstacle in poorer countries than in advanced economies. This suggests that taxes in LICs could have a large positive effect on firm activity by means of financing public infrastructure, subject to the condition that public revenue is indeed used for such purposes and not diverted into corruption.

To our knowledge, the only studies that set out to observe the impact of taxation on economic activity in developing countries are [Easterly and Rebelo \(1993\)](#), [Djankov et al. \(2010\)](#), [Fisman and Svensson \(2007\)](#), and [Goyette \(2015\)](#). However since the first two remain at the country-level, and the third considers the specific case of Uganda, the study by [Goyette \(2015\)](#) is the only one that focuses on the average effect of taxation on firm performance in LICs. Although this paper argues that, on average, taxation positively affects firm growth, the author uses firm-level data on sales declared for tax purposes as a proxy for the effective tax rate and does not look specifically at the channels through which taxation benefits firm activity. The purpose of our paper is to use country-level tax variables to see how domestic revenue mobilization taken as a whole (not just considering tax revenue on corporate profits) affects individual firm performance, and what are the transmission channels for these effects.

We therefore examine the ability of taxes to affect firm growth and attempt to control for the way these domestic resources are used. We use micro data on formal firm performance from the World Bank Enterprise Surveys (WBES) ([World Bank, 2015](#)) on 57 countries (including 48 developing countries) covering the period from 2006 to 2015.¹ These surveys have been standardized over time and across all countries, allowing for repeated cross-sectional analysis. We combine data on firm growth with tax data from the Government Revenue Dataset (GRD - ICTD/UNU-WIDER), which provides the most reliable data on taxes to date with its impressive coverage (across countries and over time) and level of disaggregation for domestic revenue ([Prichard et al., 2014](#)).

Estimation of the impact of taxation on economic performance can be subject to a number of estimation biases. The first source of bias is due to omitted variables: unobservable country characteristics may explain variations in both firm growth and tax ratio. We thus include numerous control variables in our estimations, both at the country and the firm-level, as well as country and sector-year fixed effects in order to reduce the omitted variable bias. The second source of bias is reverse causality. In well-performing countries with significant annual GDP growth, an increase in GDP and consequently in the tax base is likely to improve the amount of taxes collected. Yet although reverse causality is indisputable at the macro level, one firm's performance is hardly likely to affect the tax-to-GDP ratio at the country level, however large the firm may be. Nonetheless, our empirical strategy leaves the possibility open for potential simultaneity in our variables of interest since we estimate the effect of taxation on firm growth within countries. Therefore, we may be capturing an average country-level relationship between firm performance and taxation, in which case reverse-causality may still be an issue. In addition, and over the past few years, it has been shown that a few large firms might significantly affect the aggregate economic developments in the context of "granular" economies ([Gabaix, 2011](#); [Di Giovanni and Levchenko, 2012](#); [Di Giovanni et al., 2014](#)). Although these findings are mostly derived from studies based on high income countries, such feedbacks from micro to macro could also be observed in developing countries, thus raising reverse causality issues as well. These

¹The WBES cover more than 130 countries. Since our baseline specification consider within country variation and our IV strategy does not allow for the inclusion of small islands in our sample, we remove one-survey countries and islands permanently from all the other tests. As explained in the Appendix B (p.177) the inclusion of one-survey countries does not bring any information about the relationship we investigate. Moreover, considering small islands with at least two enterprises surveys does not alter the results. We also drop Angola and Kazakhstan, which we consider as outliers. Indeed, including them tends to overestimate the impact of taxation on firm growth.

potential problems are discussed in the next section. Moreover, other sources of endogeneity are likely to bias the estimates. In our model, time-varying unobservable heterogeneity is only accounted for at the industry level and not at the country level. We therefore provide two-stage least squares estimates in which the tax variable is instrumented by the level of taxation and rent from natural resources in neighboring countries. Nevertheless, post-estimation tests suggest that the endogenous feature of our variable of interest, tax revenue, is of little concern in this study.

Across our global sample of 57 countries (including both developed and developing countries), our results find no significant linear effect of the overall tax burden on firm growth. However the relationship between taxation and firm growth appears to be non-linear and conditioned by several factors, particularly by the level of development. We observe significant non-linearity between taxation and firm growth with respect to the level of per capita GDP. While the marginal effect of taxation is positive and quite large for lower levels of development, explicable by the need for public infrastructures, it is negative and significant for firms operating in countries with higher levels of income. In addition, the positive effect of taxation on firm growth in LICs appears to be influenced by the level of corruption. Our results show that when the incidence of corruption is high, the positive impact of taxation on firm growth is largely reduced, confirming the findings of [Aghion et al. \(2016\)](#) and [Goyette \(2015\)](#). This indirectly suggests that the positive contribution of taxation to corporate activity channels goes through the provision of public goods and that, where there is a high level of corruption, taxes collected are not redirected to infrastructure financing and hence merely represent an additional cost for firms. In the same vein, we assume that non-resource taxes are more likely to increase government accountability towards the general public than resource taxes, which can be considered as a rent and therefore do not automatically imply public good counterparts. Using the Government Revenue Dataset (GRD) which differentiates natural resource taxes from non-natural resource taxes, our results find that the positive effect of taxation on firm performance is indeed driven by non-resource taxes.

Lastly, we use an empirical specification similar to [Rajan and Zingales \(1998\)](#) to examine the channels through which taxation positively affects firm growth in developing countries. This specification includes interaction terms between taxation and an exogenous measure of infrastructure intensity at the sector level derived from an input-output matrix of a frictionless market. We find marginal evidence that the positive effect of taxes on firm growth is greater for firms in industries that disproportionately depend on public utilities such as transport, electricity and water supply. This last result hence points up public infrastructure as one of the potential channels through which taxation benefits firm activity.

The rest of this paper proceeds as follows: Section 2 presents our empirical strategy and the data used. Section 3 presents the baseline results and some robustness checks. Section 4 examines how corruption alters the impact of taxation on firm performance. Using sector-specific intensity measures, Section 5 then investigates the infrastructure channels through which domestic resource mobilization potentially benefits firm growth. Section 6 concludes.

4.2 Model and Data

We use World Bank Enterprise Survey (WBES) repeated cross-section data on formal firm performance over the 2006-2015 period to examine the impact of taxation on firm growth.² The WBESs cover a representative sample of firms in the manufacturing and service sectors for each country, and are comparable across countries and years. Table 4.B1 in the Appendix B (p.178) presents the sample of countries considered for this study, the number of firms interviewed per country, and the year of the surveys. We use these data, to estimate the following general model:

$$GROWTH_{i,k,j,(t,t-2)} = \alpha + \beta TAX_{j,(t,t-2)} + \lambda X_{i,k,j,t} + \gamma Y_{j,(t,t-2)} + \mu_j + \tau_{k,t} + \varepsilon_{i,k,j,t} \quad (4.1)$$

where $GROWTH_{i,k,j,(t,t-2)}$ is the annual average growth rate in sales for firm i in industry k in country j over the period $(t, t-2)$.³ The sales in local currencies are deflated using the GDP deflator (with the same base year of 2005 for every country) and then converted into US dollars.⁴ Our main variable of interest is $TAX_{j,(t,t-2)}$, which is the share of total taxes, excluding social contributions, in GDP. It is measured at the country level and on average over the period for which sales growth is computed $(t, t-2)$. We use the Government Revenue Dataset (ICTD/UNU-WIDER) to measure total taxes. The GRD covers information on tax revenue collected by both central and general government. Central government data are more widely available, but as noted by Prichard et al. (2014), could be misleading for federal states with more local taxes. Our rule of thumb is therefore to use general government taxes for a given country whenever the number of observations is as high as for central government taxes. This is the case with half of the countries included in the full sample. Otherwise, central level data are used. In all regressions the country fixed effects, μ_j , account for whether general or central government data are used.⁵

Our model controls for $X_{i,k,j,t}$, a set of firm-level characteristics. We include lagged sales, $SALES_{i,k,j,t-2}$ in order to account for catching-up effects. This variable captures the fact that the smaller the past growth rate, the greater the prospects of higher growth in the future. In keeping with Harrison et al. (2014), we control for the size of the firm, $SIZE_{i,k,j,t}$, which takes the value one if the firm employs less than 20 persons, two if the firm employs between 20 and 100 persons, and three for the largest firms (more than 100 employees). We also include two variables accounting for the firm's ownership structure: $STATE_{i,k,j,t}$ which is equal to one if the state owns part (or all) of the firm, and $FOREIGN_{i,k,j,t}$ which is equal to one if a foreign entity owns part (or all) of the firm. We also control for $EXPORT_{i,k,j,t}$, which is equal to one if the firm is outward-looking, i.e. if part of its production is exported directly or indirectly (supplied to exporting firm). Lastly, the firm-level set of control variables includes $WEBSITE_{i,k,j,t}$, which is equal to one if the firm has a website. This variable is a proxy for the firm's access to a telecommunications infrastructure and has been shown by Harrison et al. (2014) as key in explaining firm growth, especially in Africa.

²Version of November 11th 2015.

³In each survey, firm sales are measured in t , which is the last fiscal year before the year the survey was conducted, and in $t-2$ which is three fiscal years before the survey was conducted.

⁴Data for the GDP deflator and the exchange rate come from the World Development Indicators database.

⁵A dummy variable that is equal to one when general government data are used ($GENGOV_j$) cannot be estimated given that it does not vary over time.

At the country level, $Y_{j,(t,t-2)}$ includes the size of the country, $POPULATION_{j,(t,t-2)}$, in logarithm and on average over the period $(t, t-2)$. We also account for the countries' level of development using the logarithm of per capita income in constant 2005 US dollars, $INCOME_{j,(t-3,t-5)}$. To avoid endogeneity issues, this variable is lagged by one period, and thus averaged over the $(t-3, t-5)$. We also control for a corruption indicator to capture the quality of institutions at the country level. The WBES provides information on how pervasive corruption is perceived by firms. This variable ranges on a scale from 0 (corruption is not perceived as an obstacle to current operations) to 4 (corruption is perceived as a very severe obstacle to current operations). $CORRUPTION_{j,t}$ is the re-aggregation at the country-level of the firm-level perception of corruption. We use the firm probability weights provided by the WBES to compute the mean value of corruption at the country-level.

Considering equation (1), one can see that including country-fixed effects leads our coefficient of interest (β) to capture the contribution of changes in tax revenue to changes in firms growth within country. Therefore, since our variable of interest is observed at the country-year level, we need to have at least two surveys per country in order to observe changes in tax revenue. Indeed, as discussed in the Appendix B (p.177), keeping countries with one round of WBES into our sample of study artificially adds zeros to the taxation variable once the within transformation is achieved. We thus intentionally omit one-survey countries which leads to only consider 57 countries out of 102 available in the WBES.⁶ Table 4.1 shows the summary statistics for the sample of developing countries and low and lower-middle income countries (LICs/LMICs).

The annual average sales growth of formal firms is around 14.5% for the sample of developing countries, and slightly less for LICs/LMICs, at approximately 12.5%. In these countries, some 20% of the firms are outward-looking, i.e. exporting part of their production either directly or indirectly. This proportion is slightly higher for the sample of developing countries (around 25%). The firms operating in LICs/LMICs tend to have less access to the Internet as proxied by $WEBSITE_{i,k,j,t}$. In the other areas (state or foreign ownership, initial sales and size), the two samples of firms are fairly similar.

At the country level, Table 4.1 suggests that corruption is pervasive with an average value of around 1.7 on a scale from 0 to 4. The country-level variation is quite high, however, since some countries return a maximum value of 2.9 (corruption is perceived as a major obstacle at the country-level), and others a minimum value of 0.2 (corruption is not perceived as an obstacle at all). Lastly, the share of taxes in GDP is quite low in our sample of developing countries (16.2%) and even lower for LICs/LMICs (14.3%). Figures for tax revenue and natural resource rents in neighboring countries will be discussed in the next sections of the paper.

⁶Preliminary version of this paper includes the entire sample of countries (102, of which 89 are developing countries). Results do not change, but their interpretation thus becomes relevant only for countries with at least two rounds of WBES.

Table 4.1: Summary statistics.

Variables		mean	sd	min	max	mean	sd	min	max
Firm characteristics									
ALL DCs (N = 36,912)					LICs/LMICs (N = 21,349)				
GROWTH _{<i>i,k,j,(t,t-2)</i>}	%	14.556	72.116	-100	915.085	12.584	76.529	-100	915.085
SALES _{<i>i,k,j,t-2</i>}	logarithm	12.874	2.654	2.056	28.622	12.312	2.852	3.203	27.279
STATE _{<i>i,k,j,t</i>}	dummy	0.014	0.117	0	1	0.013	0.113	0	1
FOREIGN _{<i>i,k,j,t</i>}	dummy	0.109	0.311	0	1	0.104	0.305	0	1
EXPORTS _{<i>i,k,j,t</i>}	dummy	0.251	0.433	0	1	0.201	0.401	0	1
SIZE _{<i>i,k,j,t</i>}		1.683	0.801	0	3	1.606	0.781	0	3
WEBSITE _{<i>i,k,j,t</i>}	Dummy	0.431	0.495	0	1	0.313	0.463	0	1
Country characteristics^a									
ALL DCs (N = 97)					LICs/LMICs (N = 61)				
INCOME _{<i>j,(t-3,t-5)</i>}	logarithm	7.138	1.090	5.013	8.971	6.471	0.767	5.013	7.944
POPULATION _{<i>j,(t,t-2)</i>}	logarithm	16.198	1.284	13.333	18.986	16.353	1.190	13.428	18.986
CORRUPTION _{<i>j,t</i>}		1.713	0.717	0.189	2.985	1.785	0.747	0.189	2.871
TAX _{<i>j,(t,t-2)</i>}	%GDP	16.211	5.810	4.807	31.486	14.376	5.250	4.807	27.730
TAX_NEIGHB _{<i>j,(t,t-2)</i>}	%GDP	16.295	4.226	6.607	27.366	14.545	3.753	6.607	24.143
NRR_NEIGHB _{<i>j,(t,t-2)</i>}	%GDP	12.044	7.901	0.938	34.942	13.929	8.115	1.996	34.942

Notes: ^a Number of observations at the country level. Firm-level variables are from the World Bank Enterprise Surveys (various years). Data at the country level are from the World Development Indicators, except for CORRUPTION (weighted mean of the WBES at the country level) and TAX (GRD - UNU-WIDER/ICTD). Authors' computation.

4.3 Baseline results

We first estimate equation 4.1 for the full sample of countries, including all 57 developing and developed countries. Equation 4.1 is estimated using the OLS estimator and the firm probability weights provided by the WBES. In keeping with Moulton (1990) and Froot (1989), the standard errors are clustered at the country-year level (which is the level for our variable of interest, $TAX_{j,(t,t-2)}$). Column (I) of Table 4.2 presents the results. Across the full sample, we find evidence of a catching-up effect both at the firm and country levels, as suggested by the significantly negative coefficients of $INCOME_{j,(t-3,t-5)}$ and $SALES_{i,k,j,t-2}$. Firms in less developed countries and with lower past performance tend to have higher growth prospects. Results also suggest that foreign ownership is correlated with higher growth, as well as outward-looking operations. Larger firms and firms with good telecommunications access also tend to grow faster. As regards the effect of taxation on firm growth, regression (I) in Table 4.2 displays a positive coefficient for $TAX_{j,(t,t-2)}$, although this is not statistically significant.

This absence of linear relationship between taxation and firm growth for our overall sample of 57 countries may be due to the large country heterogeneity within the sample. Indeed, the impact of taxes on firm performance has to be compared to the marginal effectiveness of taxes

to provide the economic environment conducive to growth. In that sense, the marginal effect of taxes on firm growth may be greater when the scope for public goods provision is extremely high, which is the case when the level of development is low (see Figure 4.A1 in the Appendix, p.170). In highly developed countries with fair public goods provision, the marginal effect of taxation may be lower and tax might represent a burden weighing on firms' profitability and performance. In order to examine the heterogeneity of the tax impact depending on the country's level of development we include, in regression (II) of Table 4.2, an interaction term for $TAX_{j,(t,t-2)}$ with $INCOME_{j,(t-3,t-5)}$.

The interaction term is significantly negative, in line with the idea of a marginal decreasing impact of taxation with the level of development. The turning point in $INCOME_{j,(t-3,t-5)}$, for which taxation shows negative returns is around 4,700 USD per capita, which is the level of development of a country such as Uruguay or Botswana in our sample (both have per capita GDP of around 5,000 USD). Of the 57 countries in the full sample, 14 (corresponding to 14,178 firms, which represents around 30% of our entire sample) display higher levels of income per capita. This result is in line with the findings of Aghion et al. (2016) and the theoretical predictions of Barro (1990) since above a certain level of development/or government's size, the negative effect of taxation on firm's incentive to innovate and invest outweighs the benefits of public goods provision. Columns (III) and (IV) of Table 4.2 confirm this result. The share of taxes in GDP appears to be negatively correlated with firm growth in developed economies, while positively correlated with firm growth in developing countries in which the prospects for improvements in public goods provision are greater.⁷ Among the developing countries, however, the effect of $TAX_{j,(t,t-2)}$ appears to be driven mostly by the low income and LMICs, as shown in regressions (V) and (VI) of Table 4.2.

Yet sales growth may be influenced by factors that do not necessarily reflect firm structural performance. Sales may be affected by aggregate demand dynamics and by the international business cycles. Our model includes industry-year dummies which is a way to account for the variation in firm's sales that does not pertain to the firm performance *per se*. An alternative way to measure firm performance is with labor productivity or even better, with total factor productivity, TFP. The WBES has recently produced estimates of TFP but these are only cross-sectional data, which would preclude using country and industry-year dummies. Labor productivity can easily be computed on our sample of countries and years, as well as its growth rate. However, given that our specification includes the size of the firm on the right-hand side, we expect the results to be very similar if sales growth is replaced with productivity growth. This is indeed confirmed in Table 4.A1 in Appendix (p.172). We re-estimate our benchmark results on labor productivity growth. On the right hand-side initial sales, $SALES_{i,k,j,t-2}$, is replaced with initial labor productivity, $PROD_{i,k,j,t-2}$. We find results which are similar to those presented in Table 4.2.

⁷Figures for non-developing countries have to be considered carefully given the small number of "developed" economies in this sub-sample (9) and the few resulting observations at the country-year level (only 16).

Table 4.2: Baseline estimations of the impact of tax on firm growth.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	GROWTH _{<i>i,k,j,(t,t-2)</i>}					
Sample:	All countries	Non-DCs	DCs			
Sub-samples:			All	LICs/LMICs	UMICs	
Taxation var.						
TAX _{<i>j,(t,t-2)</i>}	1.327 (1.11)	14.414*** (5.17)	-3.064** (1.39)	4.359*** (1.07)	3.238** (1.41)	2.164 (2.21)
TAX * INCOME _{<i>j,(t,t-2)</i>}		-1.706*** (0.63)				
Country-level control var.						
CORRUPTION _{<i>j,t</i>}	-4.155 (5.06)	-6.415 (5.13)	-0.278 (4.52)	-7.812 (5.74)	6.647 (9.89)	-8.327 (7.12)
INCOME _{<i>j,(t-3,t-5)</i>}	-102.229*** (24.71)	-65.143** (27.97)	-81.639** (29.54)	-93.716*** (31.38)	-23.697 (42.73)	-46.861*** (9.32)
POPULATION _{<i>j,(t,t-2)</i>}	83.730* (43.04)	68.790* (41.26)	138.527 (120.24)	105.663* (54.00)	-19.237 (66.26)	597.554*** (71.29)
Firm-level control var.						
SALES _{<i>i,k,j,t-2</i>}	-16.980*** (1.96)	-16.981*** (1.96)	-21.353*** (4.28)	-14.517*** (1.62)	-13.012*** (1.88)	-15.668*** (2.65)
STATE _{<i>i,k,j,t</i>}	1.859 (7.91)	1.899 (7.92)	-10.188 (10.79)	8.583 (8.57)	18.675 (16.52)	2.967 (10.27)
FOREIGN _{<i>i,k,j,t</i>}	10.239** (4.87)	10.322** (4.86)	18.736* (9.43)	4.045 (3.62)	8.623** (4.04)	-1.148 (5.37)
EXPORT _{<i>i,k,j,t</i>}	7.952*** (2.91)	7.947*** (2.91)	8.210 (5.58)	8.315** (3.31)	5.284* (2.98)	10.496** (4.88)
SIZE _{<i>i,k,j,t</i>}	26.358*** (3.23)	26.328*** (3.23)	31.041*** (7.36)	23.611*** (2.65)	22.807*** (3.61)	24.441*** (3.99)
WEBSITE _{<i>i,k,j,t</i>}	13.880*** (2.93)	14.022*** (2.94)	17.243*** (4.61)	11.242*** (3.46)	8.102*** (2.85)	13.782** (5.14)
Constant	-641.963 (795.31)	-615.101 (760.38)	-1,065.801 (1,948.63)	-1,088.310 (1,019.26)	609.032 (1,236.97)	-8,419.858*** (1,087.15)
Observations	44,703	44,703	7,791	36,912	21,349	15,563
R-squared	0.207	0.208	0.220	0.209	0.214	0.229
No. of countries	57	57	9	48	30	18
No. of country-year obs.	116	116	19	97	61	36
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. DCs stands for "Developing countries" and includes aid recipients only. OLS estimations using firm probability weights. Robust standard errors in parentheses (clustered at the country-year level).***, ** and * denote significance at 10%, 5% and 1%.

When estimating the impact of taxation on growth outcomes, there are two main sources of endogeneity bias: (1) reverse causality, which stems from the fact that the creation of wealth in an economy influences the amount of taxes that can be raised; and (2) omitted variables, due to the fact that growth performance and taxes can both be determined by the countries' unobservable structural, historical and institutional characteristics. In the following, we try to provide solutions to minimize these potential estimation biases.

4.3.1 Endogeneity concerns

Feedback from micro to macro

So far, our identification strategy has been based mainly on the introduction of country and industry-year fixed effects and on the different levels of aggregation of the variable of outcome, $GROWTH_{i,k,j,(t,t-2)}$, and of interest, $TAX_{j,(t,t-2)}$. The fact that $TAX_{j,(t,t-2)}$ is measured at the country level, while $GROWTH_{i,k,j,(t,t-2)}$ is measured at the firm level, allays to some extent reverse-causality concerns. We think it is indeed quite unlikely that the growth performance of one firm, even a large one, would determine how much tax is raised in a country.

Yet, such assessment remains debatable since it has been shown that large firms could significantly explain aggregate economic developments (the “granular hypothesis”), especially in high-income countries (Gabaix, 2011; Di Giovanni and Levchenko, 2012; Di Giovanni et al., 2014). In the context of developing countries where the size distribution of firms is highly skewed, the IMF states as a recurrent theme that targeting properly the largest firms might secure around 60 to 80% of domestic taxes (and even more for small islands) (IMF, 2011),

In addition, moving back to the discussion about the sample restriction in the Appendix B (p.177), the β coefficient in equation 4.1 mechanically captures a relationship between taxation and the average firm growth rate at the country level when country fixed effects are included. Under the “granular hypothesis”, it might thus be likely that the average firms growth (or productivity growth), mostly derived from the largest firms, acts upon the country’s GDP growth, and thus determines the amount of taxes collected. Hence reverse causality would be important in this context, and mainly driven by firms observed at the tail-end of distribution.

Therefore, while to our knowledge there is no empirical evidence of such “granular hypothesis” in the context of developing countries, we investigate whether the largest firms of the countries considered for this study affect aggregate economic fluctuations, and *in fine* changes in the tax-to-GDP ratio. Following Gabaix (2011), we thus test whether idiosyncratic movements of the 5% (and alternately 10%) largest firms of each developing countries considered in the sample (and averaged at the country-level), affect aggregate growth developments as well as taxation. We perform this analysis using regression (IV) in Table 4.2 on the sample of developing countries as our baseline result. To this end, we build the average idiosyncratic shock of the largest firms ($\Gamma_{j,t}$) following Gabaix (2011) and use this measure to explain the country-level sales growth rate, GDP growth, and tax-to-GDP ratio (see. Appendix C (p. 179) for the calculation of idiosyncratic shocks).

Table 4.3 below shows the effect of largest firms’ idiosyncratic movements on aggregate economic developments. Results support the absence of “granular hypothesis” meaning that developments encountered by the largest firms have no effect on aggregate economic movements. Indeed, the average idiosyncratic shock of either the 5% (Panel A) or 10% (Panel B) largest firms in a given country, does not seem to explain the within-country variation of aggregate growth nor taxation. Note that adding controls (both directly observed at the country-level or at the firm-level and then aggregated at the country-level) does not alter the results. However, conversely to Gabaix (2011), the composition of our sample is such that we have very few time-variation (maximum 3 years) which probably explains why no effect is to be observed.

Nevertheless, the absence of correlation between the idiosyncratic movements of the biggest firms and the aggregate country performance tends to be re-assuring regarding the potential feedback from micro to macro that may be biasing our baseline results.

Table 4.3: Investigating the "granular hypothesis" in developing countries.

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
Dep. var.:	GROWTH $_{j,(t,t-2)}$			GDP-G $_{j,(t,t-2)}$			TAX $_{j,(t,t-2)}$		
Γ Measure	Γ	Γ_{bis}	Γ_{sect}	Γ	Γ_{bis}	Γ_{sect}	Γ	Γ_{bis}	Γ_{sect}
Panel A - 5% largest firms									
$\Gamma_{j,t}$	0.508 (0.30)	0.256 (0.30)	0.281 (0.20)	0.006 (0.03)	0.008 (0.04)	0.019 (0.02)	0.014 (0.02)	0.022 (0.02)	0.017 (0.02)
Observations	97	97	97	97	97	97	97	97	97
R-squared	0.798	0.740	0.751	0.778	0.778	0.783	0.970	0.970	0.970
No. of firms 5%	1698	1698	1698	1698	1698	1698	1698	1698	1698
Panel B - 10% largest firms									
$\Gamma_{j,t}$	0.522* (0.30)	0.411 (0.43)	0.310 (0.24)	0.007 (0.03)	-0.003 (0.03)	0.009 (0.03)	0.014 (0.02)	0.019 (0.02)	0.016 (0.02)
Observations	97	97	97	97	97	97	97	97	97
R-squared	0.800	0.756	0.747	0.778	0.777	0.778	0.970	0.970	0.970
No. of firms 10%	3451	3451	3451	3451	3451	3451	3451	3451	3451
Γ specification									
Fixed effects	C	CxS	CxSxY	C	CxS	CxSxY	C	CxS	CxSxY
Time FE	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Firm-level controls	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No

Notes: GROWTH $_{j,(t,t-2)}$ denotes the average sales growth rate at the country-level (for country j , between t and $t - 2$). GDP-G $_{j,(t,t-2)}$ is the GDP growth rate of country j over the same time period. Lastly, TAX $_{j,(t,t-2)}$ represents the average tax-to-GDP ratio (used in above regressions) for country j , between t and $t - 2$. Γ denotes the average idiosyncratic shock for largest firms when idiosyncratic components of the productivity growth have been calculate with country fixed effects (C). Γ_{bis} is obtained from residuals derived from a specification where we replace country fixed effects with country-sector fixed effects (CxS). Lastly, Γ_{sect} is based on residuals derived from a specification with country-sector-year fixed effects (CxSxY). **Panel A** reports results when the average idiosyncratic shock is based on the largest 5% firms, while **Panel B** when this measure is based on the 10% largest firms. The higher one percent of firms with the largest growth rates has been dropped from the sample before collapsing the variables at the country-year level (using firm probability weights) and before computing the various Γ measures. Robust standard-errors in parentheses (cluster at the country level). ***, ** and * denote significance at 10%, 5% and 1%.

Omitted variable bias

Regarding the other potential sources of endogeneity, the introduction of country and industry-year fixed effects in the baseline specification does not fully preclude an omitted variable bias.

Regression (IV) in Table 4.2 on the sample of developing countries is our baseline result. In the following, we provide robustness checks of this baseline estimation that address both confounding

factors and reverse-causality issues. First, we examine the robustness of the baseline result to additional covariates. Given that $TAX_{j,(t,t-2)}$ is measured at the country level, the primary source of omitted variable bias is likely to be at the country level. Panel A of Table 4.4 includes country characteristics that may be correlated with both the tax ratio and firm performance. In keeping with the existing literature on taxation in developing countries, we include variables that have been shown as being major determinants of the domestic revenue mobilization (Agbeyegbe et al., 2006; Crivelli and Gupta, 2014; Teera and Hudson, 2004; Bornhorst et al., 2009). We include variables that account for internal determinants of taxation: a measure of institutional quality, $POLITY_{j,(t,t-2)}$, the growth rate of the GDP ($GROWTH_{j,(t,t-2)}$), and the share of natural resource rent in GDP, $NRR_{j,(t,t-2)}$. In column (IV) of Table 4.4, we also include the tax share squared in order to capture any non-linearity in the tax ratio rather than in development level as we did in Table 4.2.

We also include external sources of financing that may substitute or complement taxation. We test the robustness of our baseline by adding foreign direct investments (net inflows) in percentage of GDP ($FDI_{j,(t,t-2)}$). As underlined in Morrissey et al. (2016), we also include imports ($IMPORTS_{j,(t,t-2)}$) and exports ($EXPORTS_{j,(t,t-2)}$) (both expressed as a share of GDP) since both flows usually face different tariffs and tax regimes.⁸ Finally, we include foreign aid as a share of GDP, $AID_{j,(t,t-2)}$. This latter variable is introduced in a non-linear way to capture the marginal decreasing returns in aid effectiveness (Hansen and Tarp, 2001; Lensink and White, 2001). All these variables are downloaded from the World Development Indicators (World Bank, 2016), except for foreign direct investment flows which have been retrieved from the UNCTAD database (UNCTAD, 2016) and aid which was downloaded from the OECD-DAC website.

Column (I) in Panel A of Table 4.4 replicates the baseline estimate for the sample of developing countries. Columns (II) to (IX) in Panel A of Table 4.4 show that when the macroeconomic covariates are sequentially introduced in the baseline OLS estimations, none of them is significant with the exception of FDI—with an unexpected sign—and aid and its square term (jointly significant, p -value = 0.027).⁹ In all columns, $TAX_{j,(t,t-2)}$ remains significantly positive and in similar ranges (the coefficient ranges from 4.5 to 5.5). When we include the squared term of $TAX_{j,(t,t-2)}$ in column (V), this additional variable is not significant, and $TAX_{j,(t,t-2)}$ becomes marginally significant (p -value = 0.100).

Our second approach to deal with endogeneity concerns consists in estimating Equation 4.1 with the two-stage least squares estimator (TSLS). We use two instrumental variables, both relying on the assumption that the tax ratio in country j is linked, through tax competition, to the tax ratio of its neighboring countries n . Indeed, Lee and Gordon (2005) have shown that tax rates between nearby countries are highly correlated, as illustrated in Figure 4.1. However, it is fairly unlikely that the private sector activity of a given country affects the taxation of its neighboring countries, which therefore makes the average tax ratio of the neighbors a good instrument for this study. In addition, we also consider the average natural resource rents of

⁸We also included the share of trade (imports plus exports) in GDP, and found that this variable is not significant and does not alter the coefficient of taxation.

⁹The turning point in aid suggests that aid has a positive impact on firm growth for countries receiving less than 11% of their GDP in aid, which is in line with Chauvet and Ehrhart (2015).

neighboring countries as an instrument since variation in resource rent is induced mostly by price fluctuations on international markets, and can directly affect the tax rate of the country (as shown by [Bornhorst et al. \(2009\)](#), [Thomas and Treviño \(2013\)](#), and [Crivelli and Gupta \(2014\)](#)),¹⁰ and can consequently impact the tax rate of its neighbors under the tax competition argument. So we define the first instrument as the average of the neighbors' tax ratios (as a share of GDP), $TAX_NEIGHB_{j,(t,t-2)}$, and the second one as the average of the neighbors' natural resource rents (as a share of GDP), $NRR_NEIGHB_{j,(t,t-2)}$. They are both obtained from:

$$TAX_NEIGHB_{j,(t,t-2)} = (1/N_j) \sum_{n=1}^N TAX_{n,(t,t-2)} \times NEIGHBOR_{j,n}$$

$$NRR_NEIGHB_{j,(t,t-2)} = (1/N_j) \sum_{n=1}^N NRR_{n,(t,t-2)} \times NEIGHBOR_{j,n}$$

where $NEIGHBOR_{j,n}$ is a dummy variable equal to 1 if country n shares a land border with country j (with N_j its total number of neighboring countries). Column (I) of Panel B of Table 4.4 displays the results. In this regression we use the same specification as in column (IV) of Table 4.2 with no additional covariates. The TOLS estimate is close to the OLS estimate in Panel A, with a slightly higher coefficient for $TAX_{j,(t,t-2)}$.¹¹ The first-step estimate is satisfactory, with both instruments being significantly correlated with $TAX_{j,(t,t-2)}$ and displaying the expected sign. The Hansen test for over-identification and Kleibergen-Paap F-Stat also suggest that the instruments are valid.

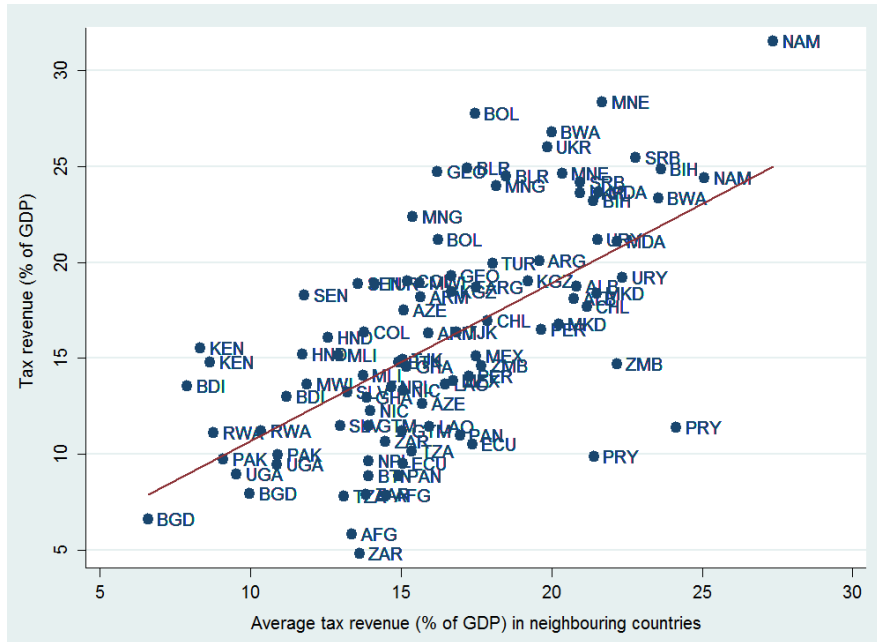
One key condition for $TAX_NEIGHB_{j,(t,t-2)}$ and $NRR_NEIGHB_{j,(t,t-2)}$ to be valid instruments is that they affect firm growth, $GROWTH_{i,k,j,(t,t-2)}$, solely through their impact on $TAX_{j,(t,t-2)}$. This exclusion restriction may, however, be violated if the instruments affect firm growth through other macroeconomic covariates, such as trade, for example. One way to investigate the validity of the instruments and check for the exclusion restriction is to include in the TOLS estimations the other potential channels through which the instruments may affect firm growth. This test is performed in Panel B, regressions (II) to (IX) of Table 4.4. The results suggest that the TOLS estimate of the coefficient of $TAX_{j,(t,t-2)}$ is unaltered by the introduction of additional macroeconomic covariates. The first-step results remain largely unchanged, as do the Hansen and Kleibergen-Paap F-Stat. In column (V), we also instrument tax rate squared, with the squared expression of the two instruments.¹² The instruments perform quite poorly, as illustrated by the Hansen and Kleibergen-Paap F-Stat, which might explain why $TAX_{j,(t,t-2)}$ records an unexpected large coefficient in column (V).

¹⁰Although it is less obvious as suggests Figure 4.1.

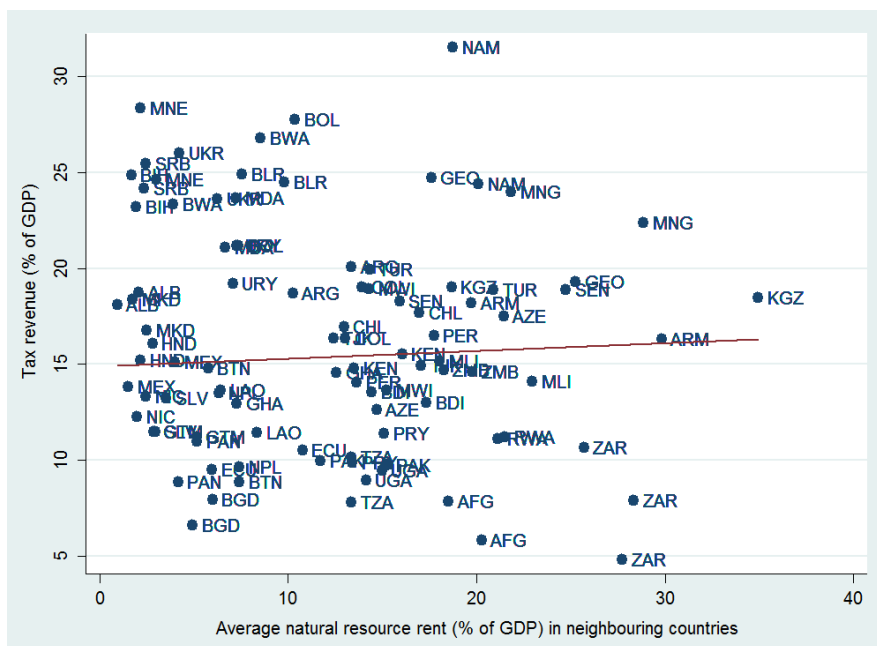
¹¹Although the OLS coefficient is not significantly different from the one obtained with the TOLS estimate since their confidence intervals overlap.

¹²The results are very similar when we remove the squared terms of the two instruments, although we slightly lose in statistical significance.

Figure 4.1: Raw correlation between countries' tax revenue and instruments.



(a) Countries' tax revenue and the av. tax revenue of their neighbors.



(b) Countries' tax revenue and the av. nat. resource rents of their neighbors.

Notes: Each dot of these scatters represents a country-year observation. The x-axis denotes the average tax share and natural resource rents (in percentage of GDP) in neighboring countries (for graph (a) and (b) respectively) of a given country, while the y-axis represents the share of tax revenue for this country in the year of observation.

Table 4.4: Additional macroeconomic covariates and TSLS estimations.

Sample: DCs	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
Dep: var.: $GROWTH_{i,k,j,(t,t-2)}$									
VARIABLE $_{j,(t,t-2)}$		POLITY	GROWTH	TAX ²	NRR	FDI	EXP	IMP	AID
Panel A									
OLS									
TAX $_{j,(t,t-2)}$	4.359*** (1.07)	4.905*** (1.05)	4.151*** (1.36)	6.535 (3.95)	4.838*** (1.15)	5.558*** (0.96)	4.495*** (1.09)	5.200*** (1.28)	5.256*** (1.08)
VARIABLE $_{j,(t,t-2)}$		0.563 (1.05)	0.340 (1.22)	-0.055 (0.09)	-0.913 (0.85)	-1.800*** (0.51)	-0.387 (0.58)	-0.606 (0.54)	2.287 (2.40)
VARIABLE $^2_{j,(t,t-2)}$									-0.108** (0.05)
Panel B									
TSLS									
TAX $_{j,(t,t-2)}$	6.624** (3.29)	7.713*** (2.76)	7.352 (4.80)	20.020** (7.95)	7.289** (3.53)	10.960*** (3.99)	6.047** (3.03)	7.223** (3.46)	7.148** (3.34)
VARIABLE $_{j,(t,t-2)}$		0.846 (1.06)	-0.425 (1.90)	-0.372* (0.19)	-1.225 (1.10)	-2.377*** (0.73)	-0.451 (0.58)	-0.889 (0.57)	2.708 (2.61)
VARIABLE $^2_{j,(t,t-2)}$									-0.123** (0.06)
First-step									
TAX_NEIGHB $_{j,(t,t-2)}$	0.303*** (0.09)	0.285*** (0.08)	0.201* (0.10)	0.556* (0.29)	0.234** (0.10)	0.267*** (0.09)	0.314*** (0.099)	0.291*** (0.08)	0.275*** (0.09)
NRR_NEIGHB $_{j,(t,t-2)}$	-0.164** (0.06)	-0.226*** (0.06)	-0.166*** (0.05)	0.004 (0.13)	-0.193*** (0.06)	-0.146** (0.07)	-0.201*** (0.06)	-0.129* (0.07)	-0.182*** (0.06)
F-Stat 1 st Step (p-value)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kleibergen-Paap Wald F-Stat	14.53	19.92	9.62	8.91	12.56	8.61	16.56	12.86	17.63
% bias included	≤ 15%	=10%	≤ 20%	≤ 20%	≤ 15%	≤ 25%	≤ 15%	≤ 15%	≤ 15%
Hansen J-Stat (p-val.)	0.548	0.945	0.560	0.106	0.908	0.569	0.643	0.440	0.747
Hausman endog. (p-val.)	0.501	0.257	0.473	0.237	0.418	0.159	0.620	0.655	0.514
Observations	36,912	35,792	36,912	36,912	36,912	36,912	36,912	36,912	36,912
No. of countries	48	48	48	48	48	48	48	48	48
Country/Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. Panel A: OLS estimations using probability weights. Panel B: 2SLS estimations using firm probability weights. Robust standard errors (clustered at the country-year level) in parentheses.***, ** and * denote significance at 10%, 5% and 1%.

Table 4.4 thus suggests that when country-level confounding factors and reverse causality are accounted for, the baseline results remain largely unchanged. However, Table 4.4 also reports for each TSLS estimate the Hausman exogeneity test (its p-value). We observe that for each TSLS estimate, the p-value associated with the Hausman test is larger than 0.05 which prevents us to reject the null hypothesis under which the variable defined as endogenous ($TAX_{j,(t,t-2)}$) is actually exogenous.

Endogeneity concerns may also be raised regarding firm-level covariates. First, we check whether the specification omits any firm-level variable that may be correlated with both firm performance and the tax ratio. Thus, we investigate the robustness of the baseline result to the inclusion of additional firm-level covariates. The results are presented in Panel A of Table 4.A2 in Appendix A (p.173). Again, column (I) replicates the baseline result. In column (II), we control for whether the firm’s CEO is a female, using a dummy variable, as well as whether the firm faces strong infrastructure obstacles, either electricity (column (III)) or transport obstacles (column (IV)).¹³ Lastly, in column (V) we also add a dummy variable indicating whether the firm has experienced power outages in the last fiscal year. Table 4.A2 shows that the coefficient of $TAX_{j,(t,t-2)}$ is unaltered by the introduction of these additional firm-level covariates.

Second, we examine whether the potential endogeneity of firm-level controls affects the estimated coefficient of $TAX_{j,(t,t-2)}$. One simple way to deal with firm-level control endogeneity is to aggregate all the firm-level controls on cells at the sector-region level (Harrison et al., 2014). Column (VI) of Panel A of Table 4.A2 displays the results when firm-level controls are aggregated on these cells: the coefficient of $TAX_{j,(t,t-2)}$ is virtually unchanged. Lastly, we perform the same test sets (including additional firm-level covariates and aggregating all the firm-level controls) using the TSLS estimator. The results are displayed in Panel B of Table 4.A2. Including additional firm covariates and aggregating the controls alter neither the TSLS estimate of the coefficient of $TAX_{j,(t,t-2)}$ nor the validity of the instruments. Moreover, as for results reported in Table 4.4, we note that p-values associated with Hausman tests all reject the endogenous feature of our variable of interest. This let us think that the relationship between tax revenue and the dynamism of formal firms’ activity in developing countries is not as straightforward as one might thought.

The additional firm-level control variables in Table 4.A2 aim at capturing, as much as possible, the time-varying observable heterogeneity in firm performance. In order to take into account the time-invariant firm-level heterogeneity we also estimate the impact of $TAX_{j,(t,t-2)}$ on firm performance measured for a sample of firms in 29 developing countries for which we have two observations in time. This estimation thus allows us to include a firm fixed effect into the estimation.¹⁴ The estimations also include industry-year dummies and the standard errors are clustered at the country-year level. Table 4.A3 (in the Appendix A, p.174) presents the results when firm performance is measured either using sales growth, $GROWTH_{i,k,j,(t,t-2)}$, or labor productivity growth, $PRODUCTIVITY_{i,k,j,(t,t-2)}$. The coefficient of $TAX_{j,(t,t-2)}$ is negative in columns (I) and (III) (and significant in column (III)) which is consistent with our baseline results given that around half of the 29 countries for which we can perform these estimation are upper middle-income countries. Consistently with column (II) of our baseline Table 4.2, we thus

¹³Both electricity and transport variables range from 0 (low obstacle) to 4 (severe obstacle).

¹⁴For a detailed presentation of the firm-level panel dataset, see Chauvet and Ehrhart (2015).

estimate 4.1 with firm panel data but include in columns (II) and (IV) an interaction term of $TAX_{j,(t,t-2)}$ with the level of income per capita. In line with our previous conclusions, estimates results suggest that the level of taxation is positively correlated with firm performance in low and lower-middle income countries, for income per capita levels below 1,230 USD.

4.3.2 Further robustness checks

In Tables presented in Appendix D, we provide further robustness checks on the baseline results. The first set of robustness checks consists in examining whether the results are altered by the choice of the fixed effects introduced in equation 4.1. Panel A of Table 4.D1 in the Appendix D (p.180) presents the coefficient for $TAX_{j,(t,t-2)}$ when the sector-year dummies are replaced by sector and year dummies. The coefficients are very similar to those in Table 4.2, with the exception that the average positive effect of taxation on firm performance for the overall sample is now statistically significant at the 10% level. Panel B then re-estimates the same specification as in the baseline (with sector-year dummies), but this time we change the level of clustering. Instead of clustering the standard errors at the country-year level, we cluster them at the country level. The significance of the coefficient of $TAX_{j,(t,t-2)}$ in column (IV) for the sample of developing countries, is unaffected. Only the result for the full sample (column (I)) loses significance. Lastly, in Panel C, we examine robustness to a change in both the fixed effects and the level of clustering. As in Panel A, the results are unchanged, except that the negative effect of taxation on firm growth in advanced economies is now marginally significant (around the 10% level). Table 4.D1 (in the Appendix D, p.180) thus suggests that the estimated coefficient of $TAX_{j,(t,t-2)}$ is robust to the kind of clustering and fixed-effects introduced, especially for the sample of developing countries in column (IV).

The last set of robustness checks examines the issue of sample dependence, as well as potential bias due to outliers. First, regression (IV) of Table 4.2 is re-estimated with each regional sub-sample excluded (one at a time) in order to check that the baseline results are not driven by one specific region. Table 4.D2 in the Appendix D (p.181) shows that the coefficient of $TAX_{j,(t,t-2)}$ is again unaltered by these sample changes. Second, Table 4.D3 in the same Appendix (p.181) re-estimates the baseline regression (IV) for Table 4.2 dropping one country at a time. They both provide evidence that the coefficient of $TAX_{j,(t,t-2)}$ is unaffected when the developing countries in the sample are excluded one at a time, suggesting that the results are not driven by one specific country, or potential outliers. In the same vein, we alternately drop sub-samples of firms belonging to each of the 21 sectors in our sample in order to see whether results are driven by sector specific characteristics (although we control for sector fixed effects and sector-year fixed effects in Table 4.D1). The results are presented in Table 4.D4 (Appendix D, p.183) and highlight that, as with the previous robustness checks, the positive effect of taxation on firm growth remains statistically significant and is not driven by a sub-sample of firms operating in a more buoyant sector than the others.

Third, although we control for firm time-varying characteristics via the inclusion of firm-level covariates, our benchmark result for the developing countries could potentially be driven by a small cluster of firms presenting specific features. We consequently run estimate (IV) on Table 4.2, this time dropping sub-samples of firms based on a given feature. For instance, Panel B in

Table 4.D5 in the Appendix D (p.184) presents the results for our benchmark specification when state-owned firms are dropped from the sample. Panel F does the same, excluding this time small-size firms (with less than 20 employees). The results in Table 4.D5 show that the positive effect of taxation on firm performance remains significant across all these different panels, and is not driven by a specific type of firm.

Lastly, as illustrated by Table 4.B1 (p.178), the number of firms surveyed in each country varies quite a lot depending notably on the level of development. Because our variable of interest is measured at the country level, the unbalanced number of firms for the different countries implies that some countries are over-represented in the sample of firms. To account for this problem, we randomly draw, for each survey, sub-samples of firms (100 firms, 200 firms, and 300 firms), re-run the baseline estimation on these sub-samples (replicating the random draw 500 times), and compute the average coefficient for $TAX_{j,(t,t-2)}$, as well as the proportion of regressions in which the coefficient is not statistically significant. Table 4.D6 in the Appendix D (p.185) presents the results. We observe that starting from a draw of 200 firms, the coefficient of $TAX_{j,(t,t-2)}$ is almost always statistically significant over the entire replication and stands, on average, at around 3.4.

Overall, Tables 4.D1 to 4.D6 all suggest that the positive effect of the share of taxes in GDP on firm growth in developing countries is robust to sub-sample estimations as well as to changes in the specification of the fixed effects and in the level of clustering.

4.4 Taxation and Corruption Nexus

The main mechanism explaining how taxation can positively affect firm growth is that it is used to provide public goods that are conducive to growth. These public goods are infrastructure (electricity and transportation in the main), as well as education and health facilities conducive to the effectiveness and social well-being of the labor force and ultimately capital accumulation.

In this section we provide indirect evidence that the positive effect of taxation disappears when the conditions are not met for it to transform into public goods provision. We examine two mechanisms that can prevent taxation from contributing to the provision of public goods: (1) lack of government accountability; and (2) embezzlement by the political elite.

Government accountability is closely linked to its reliance on the taxation of citizens. Without taxation, any democracy would fail: taxation is what makes governments accountable to the population. It has been shown in the literature that windfall finance tends to reduce the accountability of governments to the citizens (Tsui, 2011). It has also been emphasized that the impact of windfall finance, such as natural resource rents, on growth outcomes is more adverse when institutions are weak (Mehlum et al., 2006). Lastly, natural resources also tend to adversely impact the demand for accountability through the decrease in taxation that they induce (Bornhorst et al., 2009; McGuirk, 2013; Crivelli and Gupta, 2014).

In the following, we examine whether all forms of taxation produce the accountability effect that is required for taxation to transform into public goods provision. The Government Revenue Dataset (ICTD/UNU-WIDER) provides information on whether taxation is raised from non-resource sectors, $NRTAX_{j,(t,t-2)}$, or from the extraction of natural resources $RTAX_{j,(t,t-2)}$.

In line with the GRD glossary, resource taxes do not include royalties and other revenue from exploitation rights. Resource taxes thus cover direct taxes on corporations operating in the resource sector, and indirect resource taxes (such as excise duty on refined products for instance). We therefore examine whether the positive effect of taxation holds when taxation stems from the resource sector, which we assume does not discipline the government into providing public goods to the population. Table 4.5 provides summary statistics on disaggregated taxes. The number of country-year observations falls from 97 on the full sample of developing countries to 93. Despite being a small part of all taxes, $RTAX_{j,(t,t-2)}$ in some countries represents almost 10% of GDP. Yet Table 4.5 shows that, on average, resource taxes remain a minor source of revenue for the countries in our sample.

Table 4.5: Summary statistics on disaggregated taxes.

Variable	mean	sd	min	max	obs
All DCs					
$TAX_{j,(t,t-2)}$	16.211	5.810	4.807	31.486	97
$NRTAX_{j,(t,t-2)}$	15.631	5.715	4.807	30.537	94
$RTAX_{j,(t,t-2)}$	0.644	1.744	0.000	8.598	93

Table 4.6 presents the results when the $TAX_{j,(t,t-2)}$ variable we have used so far is divided into non-resource taxes, $NRTAX_{j,(t,t-2)}$, and resource taxes, $RTAX_{j,(t,t-2)}$. The first column of Table 4.6 reproduces our baseline result in column (IV) of Table 4.2. Column (II) then estimates the same regression on the sample of countries for which we have information on the resource and non-resource components of taxation. The $TAX_{j,(t,t-2)}$ coefficient remains positive, statistically significant, and in the same magnitude as the benchmark coefficient. In column (III), we disaggregate between resource and non-resource taxation.

The results suggest that only the non-resource taxes display a positive correlation with firm growth. Taxes raised from the resource sector are not significantly associated with firm outcome. These results hence suggest that when taxation is not associated with some form of government accountability to the citizens, as is likely to be the case when taxation stems from natural resources, then the positive effect of taxation disappears. This finding is in line with the idea that the positive impact of taxation on firm growth stems from the public goods provision that it entails.

Table 4.6: Impact on growth of resource and non-resources taxes.

Sample: DCs	(I)	(II)	(III)
Dep. var.:	GROWTH _{<i>i,k,j,(t,t-2)</i>}		
TAX _{<i>j,(t,t-2)</i>}	4.359*** (1.07)	4.292*** (1.21)	
NRTAX _{<i>j,(t,t-2)</i>}			3.683*** (1.11)
RTAX _{<i>j,(t,t-2)</i>}			-2.036 (3.18)
Observations	36,912	35,947	35,947
R-squared	0.209	0.209	0.210
No. of countries	48	48	48
Country-level var.	Yes	Yes	Yes
Firm-level var.	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors clustered at the country-year level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

The second mechanism that we examine is embezzlement by the political elite. This mechanism has already been evidenced by [Aghion et al. \(2016\)](#) using US data and by [Goyette \(2015\)](#) for a small sample of developing countries. Corruption generally diverts public resources from their purpose, namely the provision of public goods. If taxation has a positive impact on firm growth that stems from the provision of public goods, then this requires that corruption is not too pervasive. In [Table 4.7](#) we examine the relationship between taxation, corruption, and growth by introducing an interaction term between the taxation variable and the corruption variable. We use two measures of corruption, both re-aggregating at the country-level information provided in the WBES.¹⁵ The first measure is the perception of corruption as an obstacle to firm activity, *CORRUPTION*_{*j,t*} averaged at the country level, which is the measure of corruption used so far as one of our country-level control variables.

The second measure, *BRIBE*_{*j,t*}, provides information on whether the firm had to pay an informal payment over the past year (as well as two years before). This is also averaged at the country level. Consequently, when re-aggregated at the national level, this variable represents the share of resident firms that have had to pay a bribe over the past year. These two measures of corruption have advantages and disadvantages. The first is a perception indicator and suffers from the respondent's subjectivity, implying that it may well be endogenous to firm performance (even though this may be a minor issue at the country level). The second measure is a more objective measure of corruption, but may be plagued by the reluctance of firm managers to declare informal payments. This under-declaration bias is also likely to be correlated with other

¹⁵The country averages are computed using firms' weights.

firm characteristics. We therefore use both measures, bearing in mind their limitations.

In Table 4.7, we augment the baseline specification with an interaction term between the tax variables and the corruption variables. In Panel A, we use the full sample of developing countries. The first column reproduces our baseline regression (IV) in Table 4.2. Then in column (II), we interact $CORRUPTION_{j,t}$ with $TAX_{j,(t,t-2)}$. In column (III), we disaggregate $TAX_{j,(t,t-2)}$ into non-resource taxes, $NRTAX_{j,(t,t-2)}$, and resource taxes, $RTAX_{j,(t,t-2)}$. Non-resource taxes have been shown to display a positive impact on firm growth, and we expect that their impact should be most affected by corruption. In column (IV) we interact $BRIBE_{j,t}$ with $TAX_{j,(t,t-2)}$. Finally, in column (V) we replace total taxes with non-resource taxes and resource taxes and examine their interaction with $BRIBE_{j,t}$. In all columns (II) to (V) of Panel A the interaction terms between taxes and corruption is not significant, suggesting no substitution effect between the two.

Yet in order to deepen our understanding of the mechanisms we further reduce the sample to the LICs and LMICs. This sample reduction makes sense since, as shown in Table 4.1, LICs/LMICs face a higher level of corruption compared with the entire sample of developing countries. In addition, looking at Table 4.8 on summary statistics by income group across the entire sample of developing countries, it can be observed that the prevalence of corruption, based on both $CORRUPTION_{j,t}$ and $BRIBE_{j,t}$ measures, is indeed significantly higher in LICs/LMICs than in UMICs. Furthermore, Table 4.8 displays a lower level of tax revenues for LICs/LMICs than for UMICs. This is also supported by Figure 4.A2 in the Appendix A (p.171), which plots tax revenue with the perception of corruption for our sample of developing countries, but differentiates between LICs/LMICs and UMICs. Figure 4.A2 first suggests that, within our sample, tax revenue is negatively associated with corruption. This is in line with the existing literature (Ghura, 1998; Tanzi and Davoodi, 1998; Teera and Hudson, 2004; Bird et al., 2008; Bornhorst et al., 2009). Yet we also note that over three-quarters of the LICs/LMICs post a level of taxes below the average value for the entire sample of developing countries. Among them, more than half even display both a lower-than-average level of taxation and a higher-than-average level of corruption (north-west area in Figure 4.A2).

Therefore, the dampening effect of corruption on the positive relation between taxation and firm growth should be higher in LICs/LMICs since the few taxes they manage to collect —as compared with UMICs— are more likely to be diverted away from infrastructure financing given the higher incidence of corruption. Indeed, in UMICs, although corruption also prevails, the higher level of tax revenue logically gives government public funds (even after bribes have been paid) to finance promising projects for firms. Panel B of Table 4.7 displays the results when the sample is restricted to LICs/LMICs.

In all columns (II) to (V), the interaction term between taxes (either all taxes or non-resource taxes) and the corruption variables (either perceived or observed) is significantly negative. In line with Aghion et al. (2016) and Goyette (2015), our results suggest that taxation has a positive impact on firm performance except in the case where corruption is too pervasive.

Table 4.7: Impact of taxation on growth depending on corruption.

	(I)	(II)	(III)	(IV)	(V)
Dep. var.:	GROWTH _{<i>i,k,j,(t,t-2)</i>}				
Panel A	<i>All DCs</i>				
Measure of CORRUPTION _{<i>j,t</i>}	<i>Corruption (Index)</i>			<i>Bribe (Dummy)</i>	
TAX _{<i>j,(t,t-2)</i>}	4.359*** (1.07)	3.045 (2.08)		2.625* (1.46)	
NRTAX _{<i>j,(t,t-2)</i>}			2.695 (2.04)		1.659 (1.55)
RTAX _{<i>j,(t,t-2)</i>}			0.346 (4.85)		-3.049 (2.72)
CORRUPTION _{<i>j,t</i>}	-7.812 (5.74)	-18.314 (20.57)	-12.944 (23.37)	-13.586 (16.96)	0.553 (24.65)
TAX _{<i>j,(t,t-2)</i>} * CORRUPTION _{<i>j,t</i>}		0.730 (1.13)		0.536 (1.13)	
NRTAX _{<i>j,(t,t-2)</i>} * CORRUPTION _{<i>j,t</i>}			0.503 (1.24)		0.287 (1.08)
RTAX _{<i>j,(t,t-2)</i>} * CORRUPTION _{<i>j,t</i>}			-1.186 (4.33)		-0.521 (3.30)
Observations	36,912	36,912	35,947	35,591	34,626
R-squared	0.209	0.209	0.210	0.210	0.211
No. of countries	48	48	48	48	48
Panel B	<i>LICs/LMICs</i>				
Measure of CORRUPTION _{<i>j,t</i>}	<i>Corruption (Index)</i>			<i>Bribe (Dummy)</i>	
TAX _{<i>j,(t,t-2)</i>}	3.238** (1.41)	7.801*** (1.75)		5.477*** (1.23)	
NRTAX _{<i>j,(t,t-2)</i>}			7.756*** (2.88)		5.222*** (1.89)
RTAX _{<i>j,(t,t-2)</i>}			16.692 (38.88)		2.979 (11.66)
CORRUPTION _{<i>j,t</i>}	6.647 (9.89)	48.787** (18.99)	61.225*** (20.37)	90.037** (43.44)	106.483** (46.23)
TAX _{<i>j,(t,t-2)</i>} * CORRUPTION _{<i>j,t</i>}		-3.148*** (1.09)		-5.177** (2.06)	
NRTAX _{<i>j,(t,t-2)</i>} * CORRUPTION _{<i>j,t</i>}			-3.971*** (1.24)		-5.968** (2.28)
RTAX _{<i>j,(t,t-2)</i>} * CORRUPTION _{<i>j,t</i>}			-9.899 (20.49)		51.077 (78.12)
Observations	21,349	21,349	20,384	20,028	19,063
R-squared	0.214	0.216	0.217	0.217	0.218
No. of countries	30	30	30	30	30
Country-level var.	Yes	Yes	Yes	Yes	Yes
Firm-level var.	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors clustered at the country-year level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

The level at which perceived corruption is so great that taxation has a negative impact on firm performance (the negative incentive effect outweighs the positive public good effect) is around 2.5 (which is the case for almost 30% of the sample of just LICs/LMICs). As evidenced in columns (III) and (V) the pervasive effect of corruption on taxation seems to be mostly at play for non-resource taxes.

Overall the results of Tables 4.6 and 4.7 provide indirect evidence that the positive effect of taxation crucially depends on how taxes are spent. When taxes are not associated with government accountability or when corruption is too pervasive, then taxation has no positive effect on firm growth (and may even have a negative effect).

Table 4.8: Prevalence of corruption by income group^a.

	(1)	(2)	(3)	(4)
	Total	LICs/LMICs	UMICs	Diff. (2)-(3)
Observations	97	61	36	
	mean (sd)	mean (sd)	mean (sd)	mean (sd)
$TAX_{j,(t,t-2)}$	16.211 (0.58)	14.376 (0.67)	19.320 (0.90)	-4.943*** (1.11)
$CORRUPTION_{j,t}$	1.713 (0.07)	1.785 (0.09)	1.590 (0.10)	0.194* (0.15)
$BRIBE_{j,t}$	0.308 (0.03)	0.327 (0.04)	0.276 (0.06)	0.051 (0.07)

Notes: ^a Number of observations at the country-year level. Difference significance :***, ** and * denote significance at 10%, 5% and 1%.

4.5 The Missing Link: Public Goods Provision

As discussed above, if taxation drives up firm growth, this suggests that it finances the public goods required for firm activity. This condition has been assumed in previous papers (Aghion et al., 2016; Goyette, 2015) without ever being tested. Simple descriptive statistics indeed imply that the infrastructure constraint is perceived as being less pervasive in countries with higher taxation rates (see Figure 4.2 below).

In the following we provide evidence that taxation has a greater impact on the growth performance of firms whose activity is structurally more dependent on infrastructure and social facilities. A first step in that direction is to examine whether the impact of taxation on firm performance depends on firm characteristics. In Table 4.9 we reestimate our baseline estimation (regression (IV) of Table 4.2) in which we introduce $TAX_{j,(t,t-2)}$ in interaction with the firm-level characteristics of the estimation. The results suggest that the impact of taxation on firm performance is not altered by the introduction of these interaction terms. Moreover, none of the interaction terms are significant —with the exception of the interaction term of $TAX_{j,(t,t-2)}$ with $WEBSITE_{i,k,j,t}$ — suggesting that state-owned, foreign-owned, exporting firms, and larger or smaller firms, do not disproportionately benefit from taxation. The negative effect of $TAX_{j,(t,t-2)}$

x $WEBSITE_{i,k,j,t}$ (column (V) of Table 4.9) however suggests that firms already well-connected to the internet tend to benefit less from higher taxation. This result is in line with the idea that taxation may benefit more to the firms which activity is constrained by weak infrastructure in developing countries.

We then push further the analysis of the heterogeneous effect of taxation on firm performance. We notably examine whether taxation has a greater impact on the growth performance of firms whose activity is structurally more dependent on infrastructure and social facilities. To do so, we adopt the empirical strategy used by [Rajan and Zingales \(1998\)](#). These authors examine the impact of financial development on growth. They address the omitted variable bias that plagues this relationship by working on industry level data and filtering the effect of financial development (at the country level) based on the dependence of each industry on external finance. This strategy moreover solves the country-level omitted variable bias since the equation includes country-year dummies and the country-level variable of interest is introduced in interaction with reliance on external financing measured at the industry level. We apply this methodology to our research question to estimate the following equation:

$$GROWTH_{i,k,j,(t,t-2)} = \alpha + \beta X_{i,k,j,t} + \delta TAX_{j,(t,t-2)} * INTENSITY_k + \gamma_{j,t} + \mu_k + \tau_t + \varepsilon_{i,k,j,t} \quad (4.2)$$

where we replace the country-level variables in equation 4.1 with country-year dummies, $\gamma_{j,t}$, and include an interaction term of taxation with various industry-level intensities, $INTENSITY_k$. We also control for an industry fixed effect, μ_k , and year dummies, τ_t . This strategy reduces the endogeneity issue at the macro level thanks to the country-year dummies. It also demonstrates the potential channels through which taxation positively affects firm growth.

We use four different intensity variables. The main characteristic of these intensity variables is that they have to be exogenous to the industry characteristics in the developing countries. In their analysis, [Rajan and Zingales \(1998\)](#) use US data on firms' dependence on external financing, assuming that the US credit market is frictionless. We use the same strategy. In keeping with [Levchenko \(2007\)](#) and [Nunn \(2007\)](#), we use the 2000 US input-output matrix which provides information on how much each sector uses as inputs from other sectors (on a frictionless market), especially from public utilities (electricity and gas supply), transport, telecommunications, construction, and education. We download the US input-output matrix from the [WIOD \(2015\)](#) database (World Input Output Database. See also [Timmer et al. \(2015\)](#)). The 2000 US input-output matrix is used to calculate the intensity in public goods for each sector in the economy.

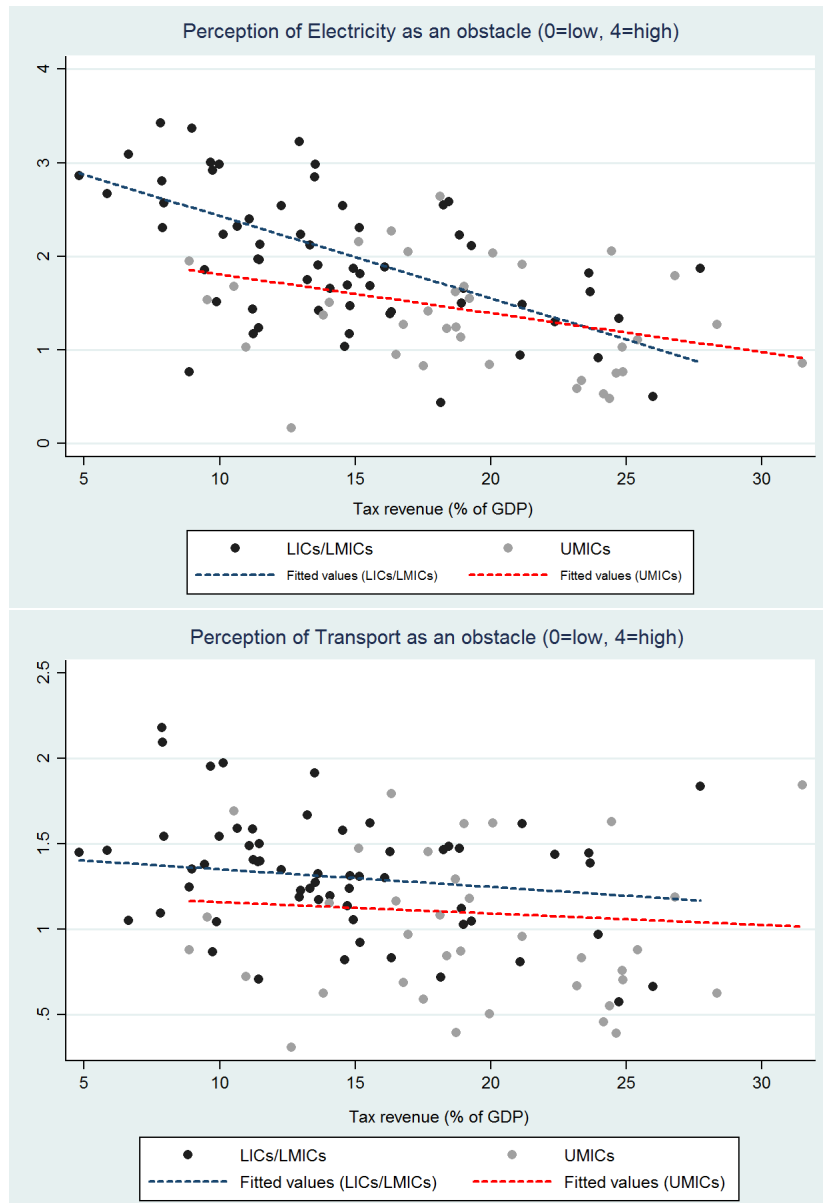
For infrastructure, we identify three kinds of intensities: intensity in public utilities, $Pub_Utilities_k$, which is the share of public utilities in the total intermediate consumption of sector k ; intensity in transport, $Transport_k$, which is the share of transportation (inland, water, rail, and transportation support activities) in total intermediate consumption; and intensity in both transport and construction, $Transp_Constr_k$, into which the additional input from the construction sector is added.

Table 4.9: Effect of taxation according to firm-level characteristics.

Sample: DCs	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)
Dep. var.: GROWTH _{<i>i,k,j,(t,t-2)</i>}									
VARIABLE _{<i>i,j,k,t</i>}		STATE	FOREIGN	EXPORTS	WEBSITE	SIZE	SMALL	MEDIUM	BIG
TAX _{<i>j,(t,t-2)</i>}	4.359*** (1.07)	4.348*** (1.07)	4.358*** (1.07)	4.461*** (1.08)	4.782*** (1.10)	4.151*** (1.13)	4.231*** (1.11)	4.177*** (1.14)	4.208*** (1.14)
TAX _{<i>j,(t,t-2)</i>} x VARIABLE _{<i>i,j,k,t</i>}		0.691 (0.97)	0.098 (0.51)	-0.434 (0.37)	-0.875*** (0.33)	0.137 (0.20)	-0.130 (0.41)	0.424 (0.48)	-0.066 (0.55)
VARIABLE _{<i>i,j,k,t</i>}		-5.936 (18.01)	2.349 (9.22)	16.145*** (5.24)	26.443*** (6.75)	21.279*** (3.90)	-20.301*** (5.93)	5.121 (6.08)	30.406*** (6.84)
Observations	36,912	36,912	36,912	36,912	36,912	36,912	36,912	36,912	36,912
R-squared	0.209	0.209	0.209	0.209	0.210	0.209	0.194	0.182	0.188
Country/Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country/Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS estimations using probability weights. Robust standard errors (clustered at the country-year level) in parentheses.***, ** and * denote significance at 10%, 5% and 1%.

Figure 4.2: Infrastructures provision and level of taxation.



Notes: Obstacle perception and taxes excluding social contribution are averaged over the period on which sales growth is computed ($t, t-2$).

We also examine whether there is greater consumption of the education input in some sectors than in others. Taking the same input-output matrix, we construct, for each sector, the intensity in education, $Education_k$, which is the share of education in the sum of all inputs. Table 4.A4 in the Appendix A (p.175) displays the four intensities sector by sector. Table 4.10 shows the estimation results for Equation 4.2 with the different public good intensities.

We again identify two samples, the sample of all developing countries (Panel A) and the sample restricted to LICs/LMICs (Panel B). Given that taxation may take some time to transform into infrastructure, we examine both the effect of our usual variable of taxation averaged over the period ($t, t-2$), $TAX_{j,(t,t-2)}$ and of taxation averaged over a longer period, $TAX_{j,(t,t-5)}$. The

interaction term between the two tax variables and the different intensities across the full sample of developing countries does not produce clear results (Panel A). This is hardly surprising since the positive effect of taxation is driven mostly by the LIC/LMIC sub-sample of countries. Indeed, for Panel B, the interaction term between the tax variables, $TAX_{j,(t,t-2)}$ and $TAX_{j,(t,t-5)}$, and intensity in public utilities and education are both positive and significant (though marginally). This suggests that taxation has a positive effect on firms in sectors that tend to rely more on public utilities. Results in column (IV) suggest that taxation is also benefiting firms which activity is intensive in social sector services.

Hence, firms belonging to sectors more intensive in public goods such as electricity or education tend to benefit more from taxation. In Table 4.A5 in Appendix A (p.176), we show that the conclusions are similar when firm performance is measured with labor productivity growth instead of sales growth.

Table 4.10: Channel of public good provision.

	(I)	(II)	(III)	(IV)
Dep. var.:	GROWTH _{<i>i,k,j,(t,t-2)</i>}			
INTENSITY	Pub_Uilities	Transport	Transp_Constr.	Education
Panel A	<i>All DCs</i>			
with TAX _{<i>j,(t,t-2)</i>}				
TAX * INTENSITY _{<i>k,j,(t,t-2)</i>}	14.816 (9.44)	9.263 (5.50)	9.088* (5.12)	20.620 (12.14)
Observations	36,912	36,912	36,912	36,912
R-squared	0.202	0.202	0.202	0.202
No. of countries	48	48	48	48
with TAX _{<i>j,(t,t-5)</i>}				
TAX * INTENSITY _{<i>k,j,(t,t-2)</i>}	12.289 (8.52)	8.714 (5.05)	8.401* (4.74)	21.350* (12.36)
Observations	36,912	36,912	36,912	36,912
R-squared	0.202	0.202	0.202	0.202
No. of countries	48	48	48	48
Panel B	<i>LICs/LMICs</i>			
with TAX _{<i>j,(t,t-2)</i>}				
TAX * INTENSITY _{<i>k,j,(t,t-2)</i>}	33.188* (17.74)	4.439 (9.50)	5.605 (8.96)	36.521* (17.63)
Observations	21,349	21,349	21,349	21,349
R-squared	0.200	0.198	0.198	0.198
No. of countries	30	30	30	30
with TAX _{<i>j,(t,t-5)</i>}				
TAX * INTENSITY _{<i>k,j,(t,t-2)</i>}	32.830* (17.64)	5.485 (9.54)	6.641 (9.03)	39.776** (16.15)
Observations	21,349	21,349	21,349	21,349
R-squared	0.199	0.198	0.198	0.198
No. of countries	30	30	30	30
Firm-level var.	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors clustered at the sector level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

4.6 Conclusion

In recent years, taxation issues have come back to center stage with a peak in interest at the latest International Conference on Financing for Development. The public finance crisis in advanced economies and the prioritization of national defense expenditures in response to the terrorism threat are cutting back official development assistance budgets, and push developing countries to look for new sources of financing (such as international financial markets for some of them). However, even though a positive view can be taken of such options, development players all agree that the best source of financing is inevitably domestic revenue mobilization.

The macroeconomic literature has indeed pointed up, quite extensively, the positive impact that taxation can have on economic development. However, little work has been done on the micro effects of domestic revenue mobilization in developing countries. The lack of contributions on this issue is due mainly to the poor quality of taxation data available to researchers in past decades. However, the impressive work done by the ICTD in recent years has resulted in a priceless database (The Government Revenue Dataset) including domestic revenue time series for more than 200 countries with high levels of disaggregation. By combining this database with the World Bank Enterprise Surveys which contain remarkable information on firm performance for more than 100 countries, we can now investigate the relationship between taxation and firm performance.

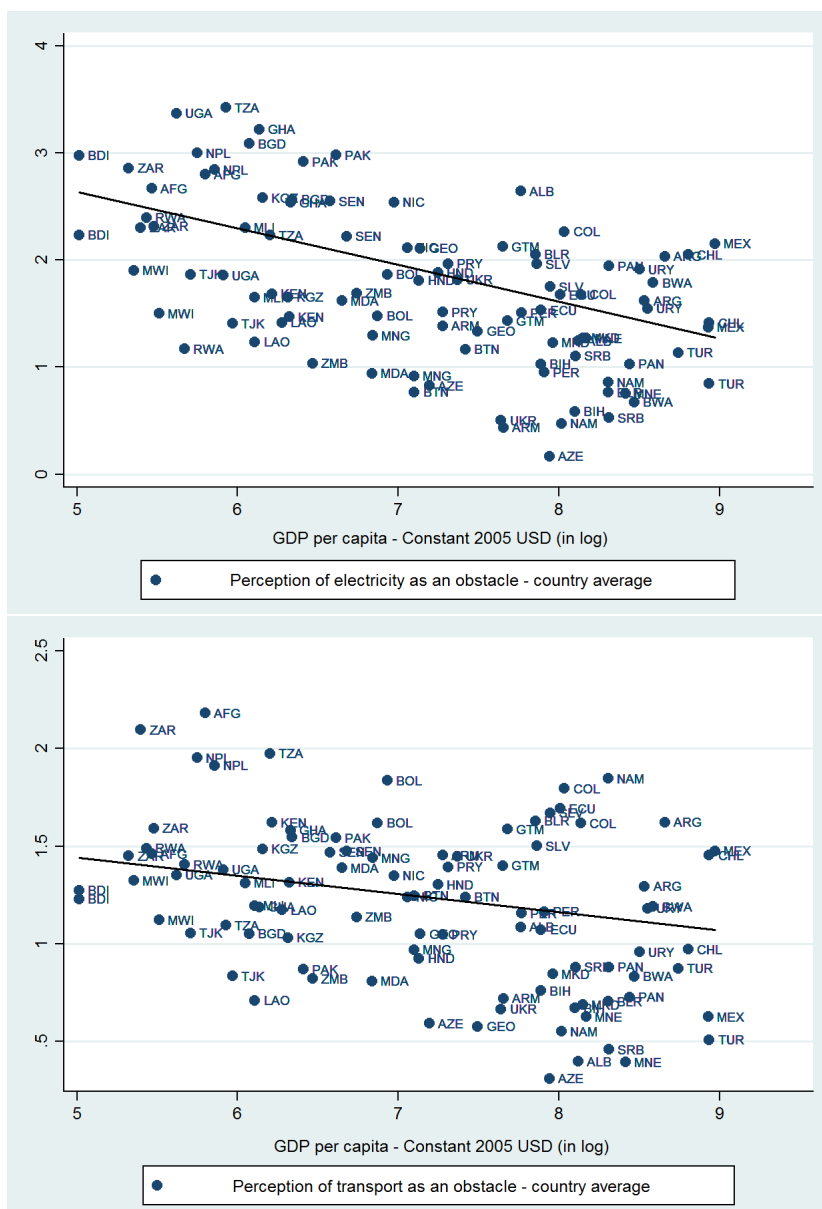
Our results suggest that tax revenue benefits to firm growth in developing economies, and especially in LICs and LMICs. This study runs several robustness checks to show that our findings are robust to the addition of macro and firm-level covariates, and that sample dependence does not plague our results. Throughout this paper, we also seek to identify the channels through which taxation can positively affect firm growth. First, we find that when tax revenue is not raised from the general public's income or corporate profits, such as windfall revenue from natural resources exploitation, the positive effect of taxation on firm activity disappears. We argue that, since this kind of revenue is not levied on taxpayers, governments feel less accountable to redistribute taxes through the provision of public goods. Then, using an alternative specification, we provide evidence that the positive effect of domestic revenue mobilization on firm performance is likely to be reduced when corruption is too pervasive. In particular, our results show that this crowding-out effect of corruption is only observed for countries where tax revenue is low and where corruption incidence is higher than in other developing countries. This suggests that when corruption is pervasive, tax revenue is diverted and therefore not used to finance public infrastructure vital for firm activity. In keeping with [Rajan and Zingales \(1998\)](#), we lastly test whether the positive contribution of taxation to firm growth is driven by this "infrastructure provision" argument. Using exogenous measure of infrastructure dependence, we find fragile evidence that tax revenue has a positive effect on firms operating in sectors that tend to rely more on public utilities, transport and education. This highlights public infrastructure as a plausible transmission channel for the positive effect of taxation.

This study thus shows that taxation can be good for economic development, particularly for the private sector, thus supporting improvements in domestic revenue mobilization in developing countries. Yet our findings also underline the need for a healthy and accountable institutional environment to turn tax revenues into growth-enhancing public goods.

Complementary results

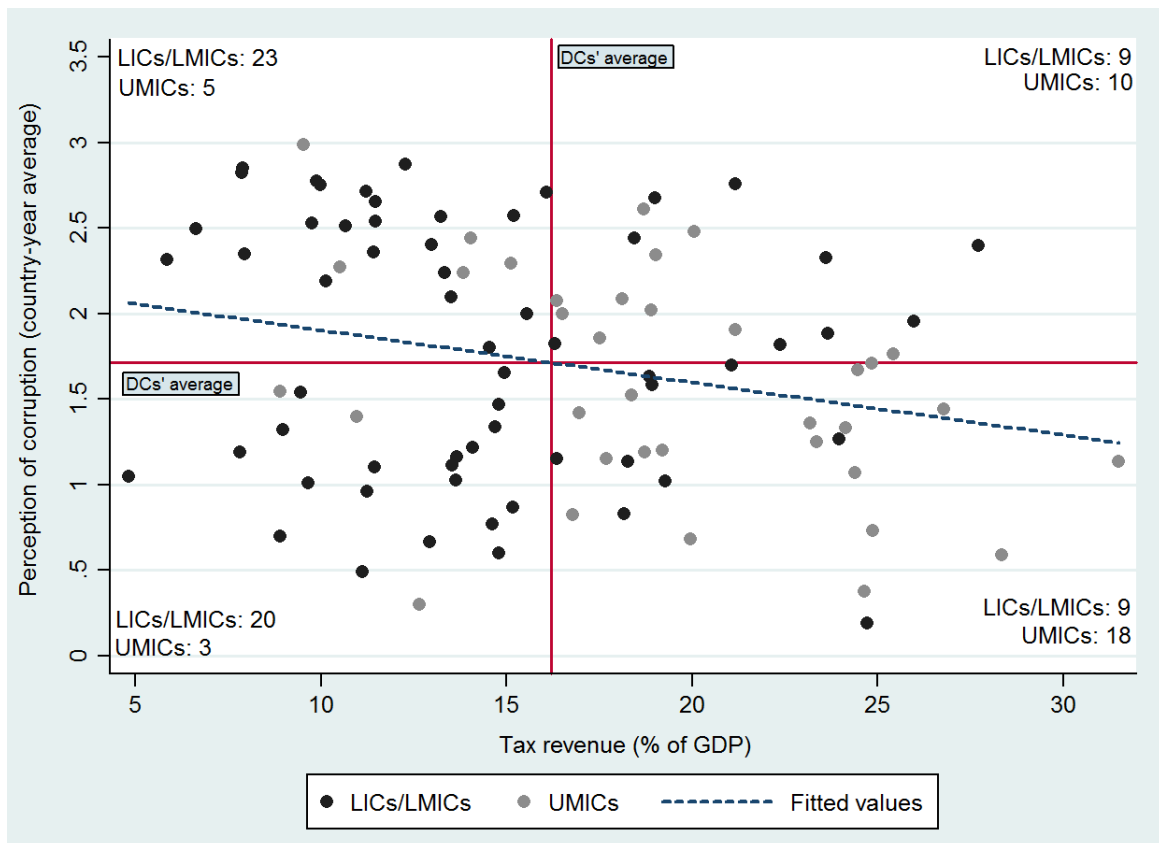
Appendix A. Additional core results.

Figure 4.A1: Infrastructures provision and level of development.



Notes: For the measure of infrastructure quality, we use the perception of electricity and transport as an obstacle. Both variables are reported at the firm level within the World Bank Enterprise Survey (WBES). We thus aggregate the measure at the country level in order to plot it with respect to the level of GDP per capita. We use firm probability weights provided by the WBES to compute the mean value of the perception of electricity and transport as an obstacle (0=low, 4=high) at the country-level. A higher infrastructure variable value thus denotes a stronger obstacle to firm activity.

Figure 4.A2: Corruption and tax revenue by income group.



Notes: Red lines represent the average value of both taxes and corruption for the entire sample of developing countries. Numbers in each corner of the diagram report the number of LICs/LMICs and UMICs in each cardinal square (North-West, North-East, South-West, South-East).

Table 4.A1: Baseline estimations of the impact of tax on firm productivity growth.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	PRODUCTIVITY _{<i>i,k,j,(t,t-2)</i>}					
Sample:	All countries		Non-DCs	DCs		
Sub-samples:				<i>All</i>	<i>LICs/LMICs</i>	<i>UMICs</i>
Taxation var.						
TAX _{<i>j,(t,t-2)</i>}	2.040*	10.724**	-0.781	4.070***	2.954***	2.264
	(1.08)	(4.51)	(2.03)	(1.00)	(0.96)	(1.70)
TAX * INCOME _{<i>j,(t,t-2)</i>}		-1.131**				
		(0.55)				
Country-level control var.						
CORRUPTION _{<i>j,t</i>}	-4.247	-5.759	-3.366	-6.348	1.427	-10.330*
	(5.04)	(5.17)	(6.65)	(5.66)	(9.71)	(5.95)
INCOME _{<i>j,(t-3,t-5)</i>}	-69.048***	-44.181	-52.072	-64.503*	-10.347	-27.407*
	(25.16)	(28.18)	(43.83)	(32.50)	(39.67)	(14.15)
POPULATION _{<i>j,(t,t-2)</i>}	70.465	61.135	114.373	89.888*	-6.819	479.404***
	(42.86)	(42.83)	(145.14)	(52.30)	(53.88)	(59.97)
Firm-level control var.						
PROD _{<i>i,k,j,t-2</i>}	-16.158***	-16.161***	-20.250***	-14.044***	-13.353***	-14.678***
	(2.36)	(2.36)	(4.83)	(2.31)	(2.02)	(3.82)
STATE _{<i>i,k,j,t</i>}	2.827	2.855	-3.464	5.778	15.786	-0.021
	(7.53)	(7.56)	(16.58)	(5.98)	(13.07)	(5.91)
FOREIGN _{<i>i,k,j,t</i>}	11.006**	11.053**	21.711*	3.160	8.163**	-0.866
	(5.29)	(5.29)	(10.58)	(3.54)	(3.20)	(5.00)
EXPORTS _{<i>i,k,j,t</i>}	4.284*	4.292*	4.822	4.477**	3.117	5.420**
	(2.38)	(2.39)	(5.11)	(1.80)	(2.47)	(2.32)
SIZE _{<i>i,k,j,t</i>}	-1.860	-1.874	-2.159	-1.755	3.447	-4.534***
	(1.17)	(1.17)	(1.90)	(1.57)	(2.88)	(1.50)
WEBSITE _{<i>i,k,j,t</i>}	10.385***	10.480***	12.938***	8.774***	7.731***	9.823***
	(1.93)	(1.93)	(3.15)	(2.14)	(2.40)	(3.22)
Constant	-628.138	-621.765	-1,169.530	-1,002.548	316.538	-6,719.476***
	(792.69)	(787.88)	(2,479.01)	(992.19)	(1,042.38)	(962.46)
Observations	42,947	42,947	7,561	35,386	20,254	15,132
R-squared	0.203	0.203	0.220	0.198	0.201	0.223
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. DCs stands for "Developing Countries" and includes aid recipients only. OLS estimations using firm probability weights. Robust standard errors in parentheses (clustered at the country-year level).***, ** and * denote significance at 10%, 5% and 1%.

Table 4.A2: Additional firm covariates and TSLS estimations.

Sample: DCs Dep.: $GROWTH_{i,k,j,(t,t-2)}$	(I)	(II)	(III)	(IV)	(V)	(VI)
VARIABLES	FEMALE		ELECTRY.	TRANSPT.	OUTAGE	CELL
Panel A	OLS					
TAX $_{j,(t,t-2)}$	4.359*** (1.07)	5.456*** (0.90)	4.296*** (1.09)	3.980*** (1.08)	4.361*** (1.08)	4.061*** (1.14)
VARIABLE $_{j,(t,t-2)}$		-1.989 (2.66)	1.393 (1.26)	0.785 (0.74)	-1.663 (1.66)	
SALES $_{cell,j,t-2}$						-13.658*** (2.10)
STATE $_{cell,j,t}$						3.962 (12.95)
FOREIGN $_{cell,j,t}$						3.738 (5.76)
EXPORT $_{cell,j,t}$						10.579 (6.44)
SIZE $_{cell,j,t}$						24.211*** (4.69)
WEBSITE $_{cell,j,t}$						2.663 (4.76)
Panel B	TSLS					
TAX $_{j,(t,t-2)}$	6.624** (3.29)	8.108** (3.33)	6.362* (3.30)	5.256* (3.17)	6.674** (3.29)	5.042 (3.17)
VARIABLE $_{j,(t,t-2)}$		-1.960 (2.63)	1.380 (1.25)	0.793 (0.74)	-1.530 (1.63)	
First-step						
TAX_NEIGHB $_{j,(t,t-2)}$	0.303*** (0.09)	0.312*** (0.09)	0.303*** (0.09)	0.302*** (0.09)	0.301*** (0.09)	0.301*** (0.09)
NRR_NEIGHB $_{j,(t,t-2)}$	-0.164** (0.06)	-0.167** (0.06)	-0.164** (0.06)	-0.166** (0.06)	-0.165** (0.06)	-0.166** (0.06)
F-Stat 1 st Step (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
Kleibergen-Paap Wald F-Stat	14.52	13.60	14.52	14.66	14.56	14.61
% bias included	≤ 15%	≤ 15%	≤ 15%	≤ 15%	≤ 15%	≤ 15%
Hansen J-Stat (p-val.)	0.548	0.553	0.566	0.389	0.530	0.397
Hausman endog. (p-val.)	0.501	0.392	0.544	0.794	0.495	0.770
Observations	36,912	36,004	36,812	36,567	36,695	36,912
No. of countries	48	48	48	48	48	48
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. Panel A: OLS estimations using probability weights. Panel B: 2SLS estimations using firm probability weights. Robust standard errors (clustered at the country-year level) in parentheses. ***, ** and * denote significance at 10%, 5% and 1%. P-value of the 2SLS coefficient for TAX in columns (VI) is 0.111.

Table 4.A3: Firm fixed effect estimations.

Sample: DCs	(I)	(II)	(III)	(IV)
Dep. var.:	GROWTH _{<i>i,k,j,(t,t-2)</i>}		PRODUCTIVITY _{<i>i,k,j,(t,t-2)</i>}	
TAX _{<i>j,(t,t-2)</i>}	-2.219 (2.472)	38.697** (14.916)	-4.177* (2.308)	47.754*** (16.108)
TAX * INCOME _{<i>j,(t-3,t-5)</i>}		-5.442** (2.094)		-6.854*** (2.199)
CORRUPTION _{<i>j,t</i>}	8.900 (8.795)	12.113 (9.679)	25.691* (13.161)	47.378*** (14.952)
INCOME _{<i>j,(t-3,t-5)</i>}	49.826 (81.028)	214.913** (104.764)	91.055 (73.113)	317.077** (114.922)
POPULATION _{<i>j,(t,t-2)</i>}	237.479** (104.835)	225.993** (87.254)	273.794** (133.052)	154.830 (126.218)
SALES _{<i>i,k,j,t-2</i>}	-9.709*** (1.963)	-10.301*** (1.925)		
PRODUCTIVITY _{<i>i,k,j,t-2</i>}			-11.455*** (2.292)	-12.430*** (2.410)
STATE _{<i>i,k,j,t</i>}	15.837 (12.173)	15.913 (11.249)	24.267 (16.378)	23.602 (14.727)
FOREIGN _{<i>i,k,j,t</i>}	1.044 (2.005)	1.896 (1.915)	0.076 (2.380)	1.113 (2.175)
EXPORT _{<i>i,k,j,t</i>}	3.919* (2.243)	4.416* (2.168)	-0.191 (1.879)	0.605 (1.615)
SIZE _{<i>i,k,j,t</i>}	5.116** (1.897)	5.714*** (1.752)	-4.950 (3.043)	-4.729 (3.007)
Constant	-4274.364** (2026.991)	-5306.065*** (1837.126)	-5128.186** (2311.020)	-4924.123** (2090.324)
Observations	8684	8684	7594	7594
R-squared	0.211	0.224	0.186	0.198
No. of countries	29	29	29	29
No. of country-year obs.	58	58	58	58
Firm FE	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. DCs stands for "Developing Countries" and includes aid recipients only. OLS estimations using firm probability weights. Robust standard errors in parentheses (clustered at the country-year level).***, ** and * denote significance at 10%, 5% and 1%.

Table 4.A4: Intensities by sectors.

INTENSITY	Pub.Utilities	Transport	Transp.Constr	Education
<i>MANUFACTURING</i>				
FOOD AND TOBACCO	2.535	4.668	5.046	0.001
TEXTILE AND GARMENTS	2.978	3.070	3.391	0.001
LEATHER	1.819	3.195	3.450	0.002
WOOD AND FURNITURE	3.543	5.134	5.866	0.001
PAPER AND PUBLISHING	3.664	4.876	5.494	0.063
CHEMICALS	4.282	3.392	3.965	0.005
RUBBER & PLASTIC	4.142	3.066	3.737	0.004
METALLIC & MINER.	7.922	9.970	11.05	0.002
FABRICATED METAL	4.779	3.806	4.575	0.002
MACHINERY AND EQUIP.	1.539	2.492	2.887	0.003
ELECTRONICS	1.729	1.666	2.150	0.005
MOTOR VEHICLES	0.980	2.048	2.245	0.002
REFINED PETRO	1.310	3.214	3.386	0.011
OTHER MANUF	1.899	3.950	4.445	0.002
<i>SERVICES</i>				
RETAIL	5.152	7.215	8.060	1.281
WHOLESALES	2.505	9.300	9.745	0.458
IT	1.771	2.105	4.192	0.140
TRANSPORT & CONSTR.	1.034	8.410	8.878	0.034
SALES OF MOTOR VEHICLES	2.011	3.031	3.348	0.024
HOTEL	6.086	3.991	4.839	0.001
OTHER SERVICES	3.668	2.608	3.140	0.145

Notes: Authors' computation.

Table 4.A5: Channel of public good provision.

	(I)	(II)	(III)	(IV)
Dep. var.:	PRODUCTIVITY $_{i,k,j,(t,t-2)}$			
INTENSITY	Pub_Uilities	Transport	Transp_Constr.	Education
Panel A	<i>All DCs</i>			
with TAX $_{j,(t,t-2)}$				
TAX * INTENSITY $_{k,j,(t,t-2)}$	12.553 (9.04)	2.887 (4.85)	2.457 (4.40)	11.593 (9.58)
Observations	35,386	35,386	35,386	35,386
R-squared	0.194	0.193	0.193	0.194
No. of countries	48	48	48	48
with TAX $_{j,(t,t-5)}$				
TAX * INTENSITY $_{k,j,(t,t-2)}$	11.004 (8.54)	1.691 (4.55)	1.191 (4.14)	11.507 (10.38)
Observations	35,386	35,386	35,386	35,386
R-squared	0.194	0.193	0.193	0.194
No. of countries	48	48	48	48
Panel B	<i>LICs/LMICs</i>			
with TAX $_{j,(t,t-2)}$				
TAX * INTENSITY $_{k,j,(t,t-2)}$	26.764* (14.41)	4.944 (7.48)	5.246 (6.89)	22.603* (11.74)
Observations	20,254	20,254	20,254	20,254
R-squared	0.192	0.191	0.191	0.191
No. of countries	30	30	30	30
with TAX $_{j,(t,t-5)}$				
TAX * INTENSITY $_{k,j,(t,t-2)}$	27.155* (14.33)	5.191 (7.46)	5.513 (6.89)	25.751* (11.02)
Observations	20,254	20,254	20,254	20,254
R-squared	0.192	0.191	0.191	0.191
No. of countries	30	30	30	30
Firm-level var.	Yes	Yes	Yes	Yes
Country-Year FE	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors clustered at the sector level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Appendix B. Sample discussion and composition.

Discussion about sample restrictions:

As exposed by equation 4.1 in the section 4.2, our empirical specification includes country-fixed effects and thus aims at investigating the effects of changes in tax revenue from the country-average level of tax revenue on the deviation of a given firm performance from the country-average's firm performance. Our model hence captures the effect of tax revenue changes on the within variation of firm growth. Omitting the set of control variables in order to simplify the writings and using the WITHIN transformation, the empirical specification can be written as follows:

$$GROWTH_{i,k,j,(t,t-2)} - GROWTH_{\bullet,\bullet,j,\bullet} = \alpha + \beta [TAX_{j,(t,t-2)} - TAX_{j,\bullet}] + \tau_{k,t} + \varepsilon_{i,k,j,t} \quad (4.3)$$

Looking at this equation, it appears as quite obvious that including countries with only one WBES survey will not bring any information for our empirical specification. Indeed, within regressions for countries with only one survey would lead to have $TAX_{j,(t,t-2)} = TAX_{j,\bullet}$ and thus would artificially include zeros into the regression. Keeping these countries into the sample would thus provide no additional information as regards the effect of tax revenue on firm performance and would bias the interpretation of the β coefficient, since it reflects the average effect of tax revenue on firm performance, not for the entire sample, but only for countries where two surveys are available. We therefore decide to exclude countries with one WBES survey from the sample of study. Table 4.B1 (below) presents the final sample considered for this study.

Table 4.B1: Sample of study.

country	nb. of firms	year of survey	country	nb. of firms	year of survey
Afghanistan	332	2008; 2014	<i>Lithuania</i>	374	2009; 2013
Albania	260	2007; 2013	Macedonia, FYR	583	2009; 2013
Argentina	1,574	2006; 2010	Malawi	397	2009; 2014
Armenia	394	2009; 2013	Mali	502	2007; 2010
Azerbaijan	460	2009; 2013	Mexico	2,349	2006; 2010
Bangladesh	2,761	2007; 2013	Moldova	586	2009; 2013
Belarus	384	2008; 2013	Mongolia	622	2009; 2013
Bhutan	444	2009; 2015	Montenegro	162	2009; 2013
Bolivia	533	2006; 2010	Namibia	428	2006; 2014
Bosnia and Herzegovina	517	2009; 2013	Nepal	772	2009; 2013
Botswana	444	2006; 2010	Nicaragua	635	2006; 2010
<i>Bulgaria</i>	1,343	2007; 2009; 2013	Pakistan	1,253	2007; 2013
Burundi	351	2006; 2014	Panama	468	2006; 2010
Chile	1,596	2006; 2010	Paraguay	592	2006; 2010
Colombia	1,613	2006; 2010	Peru	1,36	2006; 2010
Congo, Dem. Rep.	826	2006; 2010; 2013	<i>Poland</i>	561	2009; 2013
<i>Croatia</i>	766	2007; 2013	<i>Romania</i>	678	2009; 2013
<i>Czech Republic</i>	357	2009; 2013	<i>Russian Federation</i>	2,922	2009; 2012
Ecuador	738	2006; 2010	Rwanda	318	2006; 2011
El Salvador	781	2006; 2010	Senegal	759	2007; 2014
Georgia	401	2008; 2013	Serbia	598	2009; 2013
Ghana	900	2007; 2013	Tajikistan	386	2008; 2013
Guatemala	813	2006; 2010	Tanzania	716	2006; 2013
Honduras	564	2006; 2010	Turkey	1,256	2008; 2013
<i>Hungary</i>	402	2009; 2013	Uganda	900	2006; 2013
Kenya	1,184	2007; 2013	Ukraine	824	2008; 2013
Kyrgyz Republic	346	2009; 2013	Uruguay	773	2006; 2010
Lao PDR	526	2008; 2012	Zambia	931	2007; 2013
<i>Latvia</i>	388	2009; 2013			

Notes: Countries in italic and bold font are not classified as developing countries.

Appendix C. Computation method for average idiosyncratic shocks of largest firms.

In keeping with [Gabaix \(2011\)](#), we start by identifying the largest firms for each developing country of the sample. We thus first select the top 5% firms of each country (and for each year of the country-survey) with respect to the level of their sales in $t-3$. This leads us to consider a sample of 1,698 firms across 48 developing countries.

We then run productivity growth estimates on this restricted subsample of M large firms (so at the firm-level), where the within-country variation in productivity growth is explained by various firm-level controls such as the productivity in $t-2$, a dummy variable denoting whether the firm is partly state-owned, foreign-owned, has some exporting activities, or has a website. In addition to the country-fixed effects, we also augment the specification with time-fixed effects. We thus assume that productivity evolves as:

$$PRODUCTIVITY_{i,k,j,(t,t-2)} = \beta X_{i,k,j,t} + \mu_j + \delta_t + \epsilon_{i,k,j,t} \quad (4.4)$$

where $X_{i,k,j,t}$ includes the above defined firm level controls. As in [Gabaix \(2011\)](#), we investigate whether $\epsilon_{i,k,j,t}$, which denotes idiosyncratic component of total factor productivity growth of large firms, can affect aggregate economic developments. Using predicted residuals from equation 4.4, we compute the sum of idiosyncratic firm shocks, weighted by size, which thus represents the “granular residual” (Γ) and is obtained as follows:

$$\Gamma_{j,t} = \sum_{i=1}^M \frac{SALES_{i,k,j,t-2}}{SALES_{j,t-2}} \times \hat{\epsilon}_{i,k,j,t} \quad (4.5)$$

where $SALES_{j,t-2}$ denotes the country-level amount of sales (in constant USD) in $t-2$ for country j , and $SALES_{i,k,j,t-2}$, the firm-level amount of sales (in constant USD) in $t-2$ for the large firm i , in sector k , in country j . Lastly, $\hat{\epsilon}_{i,k,j,t}$ represents the predicted idiosyncratic component of total factor productivity growth for the large firm i , in sector k , in country j at year t derived from equation 4.4.

We also defined two alternative measures of $\Gamma_{j,t}$ by changing specification 4.4. We first replace μ_j with $\mu_{k,j}$ in order to observe the within-country-sector variation of productivity growth. $\Gamma_{bis_{j,t}}$ is thus obtained using the predicted residuals stemming from this new specification. Lastly, as in [Gabaix \(2011\)](#), we compute $\Gamma_{sect_{j,t}}$ which uses predicted residuals derived from the equation 4.4, where we only consider as explanatory variable country-sector-year fixed effects, and thus leads to obtain predicted residuals which represent the difference in productivity growth for large firms as compared with the average growth rate of large firms in sector k , country j , in year t . Note that we also compute these three variables when considering the 10% largest firms, instead of the top 5%.

We then use these various measures of “granular residual” to explain aggregate economic developments (see Table 4.3 in the core text).

Appendix D. Additional Robustness checks.

Table 4.D1: Estimations with alternative fixed effects specifications and clusters.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.	GROWTH _{<i>i,k,j,(t,t-2)</i>}					
Sample	All countries		Non-DCs	DCs		
Sub-samples				All	LICs/LMICs	UMICs
Panel A	(country, sector, year fixed effects - cluster (country-year level))					
TAX _{<i>j,(t,t-2)</i>}	1.782 (1.13)	17.142*** (5.06)	-3.086** (1.40)	4.777*** (1.06)	3.751*** (1.34)	1.526 (2.33)
TAX * INCOME _{<i>j,(t,t-2)</i>}		-2.005*** (0.62)				
Panel B	(country, sector-year fixed effects - cluster (country level))					
TAX _{<i>j,(t,t-2)</i>}	1.327 (1.43)	14.414*** (5.17)	-3.064* (1.48)	4.359*** (1.36)	3.238* (1.79)	2.164 (2.92)
TAX * INCOME _{<i>j,(t,t-2)</i>}		-1.706*** (0.63)				
Panel C	(country, sector, year fixed effects - cluster (country level))					
TAX _{<i>j,(t,t-2)</i>}	1.782 (1.46)	17.142*** (5.06)	-3.086* (1.54)	4.777*** (1.35)	3.751** (1.67)	1.526 (3.21)
TAX * INCOME _{<i>j,(t,t-2)</i>}		-2.005*** (0.62)				
Observations	44,703	44,703	7,791	36,912	21,349	15,563
No. of countries	57	57	9	48	30	18
No. of country-level obs.	116	116	19	97	61	36

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors in parentheses (clustered at the level specified for each panel). ***, ** and * denote significance at 10%, 5% and 1%.

Table 4.D2: Estimations on regional sub-samples.

Sample: DCs	(I)	(II)	(III)	(IV)	(V)	(VI)
Dep. var.:	GROWTH _{<i>i,k,j,(t,t-2)</i>}					
Region dropped:	none	EAP	ECA	LAC	SA	SSA
TAX _{<i>j,(t,t-2)</i>}	4.359*** (1.07)	4.792*** (1.05)	6.034*** (1.41)	3.195** (1.38)	3.674*** (1.33)	4.732*** (1.10)
Impact tax (+10%)	46.01	50.48	68.37	36.11	37.64	46.32
Observations	36,912	35,764	29,755	22,523	31,350	28,256
R-squared	0.209	0.210	0.179	0.233	0.211	0.220
Nb. of countries	48	46	34	34	43	35
Countries dropped		2	14	14	5	13
Country-level var.		Yes	Yes	Yes	Yes	Yes
Firm-level var.		Yes	Yes	Yes	Yes	Yes
Country FE		Yes	Yes	Yes	Yes	Yes
Sector-Year FE		Yes	Yes	Yes	Yes	Yes

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. **EAP** stands for East-Asia and Pacific, **ECA** for Europe and Central Asia, **LAC** for Latin America and Caribbean, **SA** for South-Asia, and finally **SSA** for Sub-Saharan Africa. OLS estimations using firm probability weights. Robust standard-errors clustered at the country-year level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Table 4.D3: Dropping one country at a time.

Sample: DCs	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Dep. var.:	GROWTH _{<i>i,k,j,(t,t-2)</i>}						
Country omitted		AFG	ALB	ARG	ARM	AZE	BGD
TAX _{<i>j,(t,t-2)</i>}	4.359*** (1.07)	4.598*** (1.07)	4.364*** (1.07)	4.306*** (1.07)	4.585*** (1.07)	4.607*** (1.04)	3.492*** (1.10)
Observations	36,912	36,580	36,652	35,338	36,518	36,452	34,151
Country omitted	BLR	BTN	BOL	BIH	BWA	BDI	CHL
TAX _{<i>j,(t,t-2)</i>}	3.399*** (1.17)	4.357*** (1.07)	3.716*** (1.18)	4.744*** (1.03)	4.320*** (1.07)	4.674*** (1.08)	4.292*** (1.08)
Observations	36,528	36,468	36,379	36,395	36,468	36,561	35,316
Country omitted	COL	ZAR	ECU	SLV	GEO	GHA	GTM
TAX _{<i>j,(t,t-2)</i>}	4.356*** (1.07)	4.733*** (1.01)	4.238*** (1.09)	4.301*** (1.08)	3.692*** (1.09)	4.088*** (1.06)	4.460*** (1.16)
Observations	35,299	36,086	36,174	36,131	36,511	36,012	36,099
Country omitted	HND	KEN	KGZ	LAO	MKD	MWI	MLI
TAX _{<i>j,(t,t-2)</i>}	4.463*** (1.08)	4.293*** (1.04)	4.342*** (1.07)	4.373*** (1.07)	4.422*** (1.07)	4.949*** (0.99)	4.500*** (1.07)
Observations	36,348	35,728	36,566	36,386	36,329	36,515	36,410
Country omitted	MEX	MDA	MNG	MNE	NAM	NPL	NIC
TAX _{<i>j,(t,t-2)</i>}	4.272*** (1.10)	4.682*** (1.11)	4.776*** (1.05)	4.443*** (1.09)	4.070*** (1.32)	4.444*** (1.25)	4.463*** (1.05)
Observations	34,563	36,326	36,290	36,750	36,484	36,140	36,277
Country omitted	PAK	PAN	PRY	PER	RWA	SEN	SRB
TAX _{<i>j,(t,t-2)</i>}	4.414*** (1.08)	4.324*** (1.08)	4.322*** (1.08)	4.070*** (1.14)	4.360*** (1.07)	4.538*** (1.11)	4.172*** (1.08)
Observations	35,659	36,444	36,320	35,552	36,594	36,153	36,314
Country omitted	TJK	TZA	TUR	UGA	UKR	URY	ZMB
TAX _{<i>j,(t,t-2)</i>}	4.388*** (1.07)	4.414*** (1.07)	4.143*** (1.20)	4.298*** (1.08)	4.258*** (1.04)	4.261*** (1.09)	4.347*** (1.09)
Observations	36,526	36,196	35,656	36,012	36,088	36,139	35,981

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors clustered at the country-year level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Table 4.D4: Dropping one sector at a time.

Sample: DCs	(I)	(II)	(III)
Dep. var.:	GROWTH _{i,k,j,(t,t-2)}		
Omitted sector:	Food & Tobacco	Textile & Garments	Leather
TAX _{j,(t,t-2)}	4.339*** (1.13)	4.429*** (1.07)	4.291*** (1.07)
Observations	31,831	31,881	36,235
Omitted sector:	Wood & Furnitures	Paper & Publishing	Refined petroleum
TAX _{j,(t,t-2)}	4.512*** (1.17)	4.246*** (1.05)	4.363*** (1.07)
Observations	35,073	35,875	36,880
Omitted sector:	Chemicals	Rubber & Plastics	Metal. & non-Met. Mineral
TAX _{j,(t,t-2)}	4.582*** (1.06)	4.452*** (1.07)	3.948*** (1.00)
Observations	34,686	35,876	35,287
Omitted sector:	Fabricated Metal pdt	Machinery & Equipment	Electronics
TAX _{j,(t,t-2)}	4.158*** (1.06)	4.372*** (1.08)	4.352*** (1.08)
Observations	35,141	35,911	36,430
Omitted sector:	Motor Vehicles	Other Manufacturing	Sales of Motor Vehicles
TAX _{j,(t,t-2)}	4.348*** (1.07)	4.313*** (1.10)	4.537*** (1.09)
Observations	36,695	36,468	36,166
Omitted sector:	Wholesales trade	Retail trade	Hotel & Restaurants
TAX _{j,(t,t-2)}	4.636*** (1.17)	4.408*** (1.18)	4.662*** (1.03)
Observations	32,600	35,389	35,432
Omitted sector:	IT	Transport & Constr.	Other services
TAX _{j,(t,t-2)}	4.519*** (1.12)	3.571*** (1.06)	4.428*** (1.22)
Observations	36,511	34,250	33,623

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors clustered at the country-year level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Table 4.D5: Sensitivity to firms' characteristics.

Effect of $TAX_{j,(t,t-2)}$ on $GROWTH_{i,k,j,(t,t-2)}$		
Panel A: All firms	4.359***	(1.07)
Observations	36,912	
Panel B: Not owned by the state	4.314***	(1.06)
Observations	36,394	
Panel C: Not foreign-owned	4.270***	(1.07)
Observations	32,885	
Panel D: Exporting firms	5.465**	(2.09)
Observations	9,286	
Panel E: Not exporting firms	4.211***	(1.13)
Observations	27,626	
Panel F: More than 20 employees	2.800**	(1.32)
Observations	20,056	
Panel G: Not medium firms (20-100 employees)	5.449***	(1.51)
Observations	24,729	
Panel H: Less than 100 employees	4.272***	(1.15)
Observations	29,941	
Panel J: Without a website	5.555***	(1.56)
Observations	20,968	
Panel I: With a website	3.518**	(1.34)
Observations	15,944	

Notes: The higher one percent of firms with the largest growth rates has been dropped from the sample. OLS estimations using firm probability weights. Robust standard-errors clustered at the country-year level in parentheses. ***, ** and * denote significance at 10%, 5% and 1%.

Table 4.D6: Random draw of firms.

Dep. var.: $GROWTH_{i,k,j,(t,t-2)}$	(1)	(2)	(3)
No. of firms randomly draw	100	200	300
Coefficient of $TAX_{j,(t,t-2)}$, 500 replications			
Mean	2.968	3.345	3.391
Standard deviation	1.442	0.609	0.414
Percent not significant	30.6	1.8	0
Observations	9,613	18,153	24,338
Country FE	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes
Level of se clustering	country-year	country-year	country-year
Firm-level controls	Yes	Yes	Yes
Country-level controls	Yes	Yes	Yes

General conclusion

Since July 2015, the Addis Ababa Action Agenda strongly emphasizes the need for developing countries to increase financial resources in order to face upcoming challenges resulting from global warming and to lift the bottom billion out of the poverty. Among the numerous solutions that the AAAA suggests to satisfy such financial needs, taxation has been appointed as a top priority. Historically, and in spite of all the efforts deployed by national governments and the international community, domestic revenue mobilization in developing countries has encountered many obstacles hindering its development. Fortunately, over the last few years, and after decades of stagnation, taxation started to improve, hence highlighting the willingness of policy makers in developing countries to be the primary actors of their country's development as well as their increasing awareness about the need to develop solid and efficient tax systems. However, although having a crucial role in the achievement of the SGDs, the AAAA has pointed out that taxation should be considered as a necessary but not sufficient condition. Indeed, as stated by Maria Emma Meija Velez (President of ECOSOC) "*the importance of domestic resources mobilization cannot be overemphasized. But, that cannot happen without an enabling international environment in support of development*".¹⁶ The AAAA thus underlines the need for developing countries to resort to other financial sources such as foreign investment, trade, international aid, and both domestic and external borrowing. However, such strategy will help countries reaching these goals only if increasing resort to external financing and borrowing is associated with sound economic management and do not lead to the same debt issues than those experienced throughout the 1980s and 1990s.

Consequently, alongside these recommendations, the AAAA restated the need to secure LICs' long term debt sustainability, through debt restructuring and for the most extreme cases, debt relief. Yet, although the multilateral debt relief initiatives of the early 2000s undoubtedly succeeded in reducing debt burden, the academic literature has provided very few empirical evidence about the economic effects of these policies and their impacts on the overall economic development.

This thesis first proposes an empirical assessment of the debt relief effects on public finance in recipient countries, focusing both on the resource and spending sides. Reviewing the largest debt relief programs for LICs of the past decades, the first three essays highlight that debt cancellations under both the Enhanced HIPC initiative and the MDRI have significantly affected, mostly in a positive way, public finance of beneficiary governments. Lastly, the fourth essay revisits the growth-taxation nexus by investigating the effects on domestic revenue mobilization

¹⁶<http://www.un.org/esa/ffd/ffd3/wp-content/uploads/sites/2/2015/07/Statement-by-ECOSOC.pdf>

on private sector development in order to provide evidence that AAAA's recommendations do not contradict each other.

Chapter 1 exposes that debt relief granted under the Enhanced HIPC initiative have resulted, mainly through the channel of conditionality, in public investment increase for beneficiary countries. In line with the debt overhang theory, such effects seem to be higher for HIPCs which were repaying their debt prior to debt relief. Results thus suggest that the debt relief initiatives have helped freeing up additional resources intended to finance development infrastructures and reduce poverty in order to reach the Millennium Development Goals, supposed to be achieved by 2015. Moreover, our analysis also highlights that investment undertaken after the Enhanced HIPC initiative could benefit from extra financial support thanks to ultimate debt relief granted under the MDRI. As a result, it seems fair to say that debt relief contributes to finance the development of LICs, and that its impact might be enhanced when debt relief comes with strong and development-oriented conditionality. In addition, our results also support a positive contribution of these initiatives on domestic revenue mobilization which, according to us, is probably derived from the programs' conditionality. Such increase is all the more beneficial to HIPCs that expansion of public domestic resources might help financing upcoming spending needed to maintain public investment undertaken thanks to these multilateral debt relief initiatives.

Yet, the relationship between taxation and debt relief is not that straightforward. Building on first chapter's findings and a large theoretical body investigating the relationship between adjustment effort and debt relief, **chapter 2** intends to empirically assess the effect of these initiatives on recipient governments' adjustment efforts, when those relate to fiscal capacity. Results suggest that the positive contribution of debt relief to tax effort is, by large, due to the conditionality and the efforts made beforehand in order to be eligible for the initiative. Indeed, since one of the various requirements for benefiting from the Enhanced HIPC initiative is to implement a macro-stabilizing program—which often aims at improving tax system functioning—, HIPCs tend to strongly comply with conditionality by increasing their effort over the years following first debt cancellations.

Nevertheless, additional results suggest that HIPCs ease off their tax effort once they have been granted full and irrevocable debt relief under the MDRI, thus emphasizing moral hazard stemming from the design of these initiative where once countries complete the debt relief process this marks the end of the conditionality and IFIs' monitoring. Yet, moral hazard around the MDRI is not observed for all HIPCs and seems to be driven by some countries' peculiarities. I find that tax effort is more likely to reduce after MDRI when governments of recipient countries are characterized by large instability. Political instability has indeed been shown as conducive to behaviors which favor short term consumption instead of investment which would secure larger revenue and increase future consumption. Under debt relief settings, this translates into a reduction of investment in fiscal capacity once governments have obtained full debt relief and are not subject to IFIs monitoring anymore. In the same vein, additional findings suggest that government with weak institutions before the MDRI experience more difficulties in sustaining tax effort levels once they have benefited from this initiative. While institutions quality partly

reflects government's performance as regards taxation, one can fairly assume that, without changing their institutional quality, countries could overperform in terms of tax effort in order to become eligible, maintain significant adjustment efforts as long as there is debt relief to get, and then slacken off once complete debt forgiveness is granted. In such scenario, countries with weak institutions quality right before being granted debt relief under the MDRI are more prone to adopt such behaviors, as our findings suggest.

Lastly, results also show that moral hazard might be fostered by the surfacing of new financing sources such as domestic debt markets. Indeed, easing-off in tax effort seems to be more important for countries where domestic debt increases in the post-MDRI period. This might be explained by large financing resources being easier to get with immediate borrowing (especially when borrowing is not subject to exchange risks), rather than through improvement in tax system which pays off later on, and for which outcomes are likely to depend on the economic and political environment.

Chapter 3 follows chapter 2 findings but focuses the analysis on the relationship between debt relief and external public financing. Departing from the existing literature about market access and reputation costs derived from sovereign default, we try to empirically assess the consequences of debt relief on borrowing to external private creditors. Simultaneously, we also review the effect of these initiatives on lending condition from the first providers of debt relief; the official creditors. We find that having benefited from the multilateral debt relief initiatives, yields official creditors to tighten their lending conditions which translates into shorter grace and maturity periods and *in fine*, lower grant-element on new financing. Results also suggest that official creditors, besides increasing the cost of financing for HIPCs as compared with other LICs, significantly reduce official aid flows. Going further, we observe that such reduction is mainly driven by the diminution of bilateral gross aid transfers (both loans and grants) and multilateral loans. Consequently, given the financing needs of HIPCs to achieve sustainable development (as defined by the SDGs), and their renewed borrowing capacity, it seems that shortfall in official flows is compensated (though not fully offset) with loans from private creditors.

The last section of our study also suggests that the interest of private creditors for HIPCs—which were historically excluded from international financial markets—, materializes only after the MDRI, once benefiting governments regained a full borrowing capacity. In addition, we provide some evidence that foreign private banks are more likely to lend to HIPCs during financial bust in advanced economies. Low market returns and sluggish economic environment in high-income countries hence lead investors to seek for high-return investment in developing countries, among which, HIPCs seem to be favored. As a result, though the external debt of HIPCs was (on average) nearly null after additional cancellations under the MDRI, increasing amounts of loans contracted from private creditors, by definition at larger costs, lays doubts about the effects of this new type of financing on future debt sustainability.

Lastly, **chapter 4** departs from debt relief to revisit the taxation-growth nexus adopting a macro-micro approach. Using firm-level data, this last essay tries to empirically assess the effect of taxation on firms performance in the particular context of developing countries. While

increase in taxation is supposed to raise up production costs and distort investment incentives, such additional revenue can be used to finance public goods such as infrastructure which are crucial for firms activity. Though we expect the overall effect of taxation to be negative in advanced economies given the already satisfying stock of public infrastructures, taxation could be beneficial in developing countries where marginal returns of public spending are substantial, especially for private businesses. Our findings support these theoretical intuitions, highlighting a positive effect of taxation on the growth rate of firms' sales and labor productivity for firms operating in developing countries. Yet subsequent findings suggest that such positive effect can however be reduced when corruption is significant, in particular for LICs' firms. This let us think that the positive effect of taxation on firms performance goes through the provision of public goods since when corruption is spread all over the economy and among public institutions in particular, extra tax revenue hardly translate in additional public goods intended to benefit to the private sector. Lastly, we investigate this public good provision channel in a more straightforward way using an approach similar to the one of [Rajan and Zingales \(1998\)](#) where we estimate the impact of taxation on firms operating in sectors structurally more dependent in infrastructure. Results provide fragile evidence that taxation is more beneficial for firms belonging to sectors that are more dependent on public utilities, transport and construction activities, or that intensively resort to human capital, thus highlighting sound public goods provision as a potential determinant of the effect of taxation on private sector development.

* * *

These various findings line up with the recommendations made by the Addis Ababa Agenda for Actions and suggest that its objectives do not contradict each other. Indeed, chapter 4 underlines the crucial role of taxation in private sector development. However, this essay also underlines necessary prerequisites for such relationship to be observed and warns about the consequences of rising domestic revenue mobilization in highly corrupt environment where a significant share of of collected taxes would be diverted and where resulting public goods would be not enough to offset the additional costs derived from taxation.

Among the potential ways for improving fiscal capacity in low income countries, the first two essays shows that debt relief might be of importance in that respect. Findings highlights a positive contribution of debt relief to tax effort in recipient countries which however does not seem to be robust for every governments being granted debt relief. Indeed, results suggest that governments with high preference for present and low quality institutions are more likely to slacken off once they have benefited from ultimate debt relief and that the IFIs monitoring stops. Moral hazard might however be overcome by reinforcing cooperation between recipient governments and IFIs. According to our results, for governments exposing peculiarities identified as driving moral hazard around the MDRI, it would be preferable to ensure that tax reforms and other fiscal improvements are settle and associated with sound management before granting ultimate debt relief in order to secure the initial efforts. This is even more important in a context where easing off in tax effort seems to be associated with more borrow-

ing on domestic and international debt markets where lending conditions are less favourable than what these countries used to get. The necessity to secure the government fiscal capacity thus appears as necessary if one wants to avoid repeating past errors that lead numerous LICs trapped in the debt spiral and the international community to make substantial concessions.

Further research thus needs to be done as regards the financing strategies of HIPC countries. Recent evolutions fueled serious doubts regarding their capacity to embrace a virtuous way of financing their development. These concerns have been formulated by [Stiglitz and Rashid \(2013\)](#) and again by the IMF over the past few years. As stated during the Addis Ababa conference, domestic efforts need to be done but also necessitate an enabling international environment preventing low income countries to face debt distress again. In light of the results exposed throughout this thesis, it would be prejudicial for countries having benefited from debt relief to go back to old policies since sustained tax effort has been shown as conducive to economic growth and to the private sector development in particular, which seems fundamental given the ambitious SDGs supposed to be achieved by 2030.

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Résumé

Cette thèse propose une analyse empirique de deux stratégies majeures du financement du développement; les annulations de dette et la mobilisation des ressources domestiques. Les trois premiers chapitres tentent d'analyser les effets des annulations de dette du début des années 2000 sur les finances publiques et les possibilités de réendettement des gouvernements bénéficiaires. Nos résultats montrent que les annulations de dette concédées via les initiatives PPTe et IADM ont permis d'améliorer significativement la composition budgétaire des gouvernements récipiendaires et de diversifier leurs sources de financement. Néanmoins, d'autres résultats mettent en lumière l'existence d'un aléa moral induit par ces initiatives, nécessitant ainsi une surveillance plus accrue des politiques budgétaires, notamment une fois l'annulation de dette octroyée. Enfin, le quatrième chapitre tente de revisiter la relation entre fiscalité et croissance en adoptant une approche macro-micro à l'aide de données de firmes. Notre analyse montre que la fiscalité est bénéfique à l'activité des entreprises, en particulier celles des pays à faible revenu. Par ailleurs, d'autres résultats suggèrent que cet effet est renforcé lorsque ces mêmes firmes font face à une faible corruption, réitérant ainsi la nécessité pour les pays en développement d'établir un environnement économique et politique sain.

Mots Clés

Finances publiques, annulation de dette, fiscalité, financement extérieur, concessionnalité, aléa moral, performances de firme, pays à faible revenu.

Abstract

This thesis aims at investigating empirically the effects of two financing strategies for developing countries; debt relief and taxation. The first three chapters focus on the consequences of debt relief for public finance and new external borrowing. Results show that cancellations granted under the multilateral debt relief initiatives have been beneficial for recipient governments by significantly improving the composition of their budget and widening financing opportunities. However, findings also underline the risk of moral hazard stemming from these initiatives and thus call for continuous sound fiscal management, especially after debt relief. Lastly, the fourth chapter revisits the taxation-growth nexus adopting a macro-micro approach. Using firm-level data in developing countries, our findings suggest that taxation is favorable to firms' activity, especially when firms operate in poor countries characterized by a significant lack of infrastructure. Moreover, this effect of taxation seems to be maximal in the absence of corruption, hence reaffirming the need for healthy and enabling economic and political environments in developing countries.

Keywords

Public finance, debt relief, taxation, external financing, conditionality, moral hazard, firm performance, low-income countries.