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Marcos Aurélio Diaz Ramirez

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Institut d'études politiques de Paris
ECOLE DOCTORALE DE SCIENCES PO
Programme doctoral en économie
Département d'économie
Doctorat en Sciences économiques

**Three essays on Development Economics:
Public Policies and Geographical
Discontinuities**

Marcos Aurelio Díaz Ramírez

Thesis supervised by Sergei Guriev, Professor at Sciences Po Paris

Defended on 15 June 2020

Jury

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Notes to the reader

The three chapters of this dissertation are self-contained research articles, also referred to as papers. The sequence of the chapters simply follows their order of appearance over the past four years. Since the three articles are co-authored, I acknowledge the corresponding co-authors at the beginning of each chapter. A summary in English precedes the chapters, while a résumé in French is included at the end of the manuscript.

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Summary

Introduction

Evidence-based policies are crucial to maximize well-being. In recent years, governments, international development organizations and academia (see Sanderson, 2002; Roberts, 2005) have mainstreamed the need for data and evidence in the design, implementation and evaluation of public policies.

The 2019 Nobel Prize in economics awarded to Duflo, Banerjee and Kremer is another clear example of the relevance of policy evaluation to tackle many global and local development issues. While randomized experiments appear to be one of the most precise ways to identify the causal effect of policies (Banerjee, Duflo and Kremer, 2016), a wide range of government programs are not designed in a way that ensures their ex-post evaluation (Duflo and Kremer, 2003) – as this can be costly and often requires human resources and capacity that tend to be scarce particularly in developing countries and regions. Yet policy makers need evidence to adjust policies, re-allocate budget and adapt actions in order to maximize people’s well-being given the available resources.

This thesis presents three cases where ex-post policy evaluation is possible either by exploiting geographical discontinuities in implementation of the policy (Chapters 1 and 3) or regional discontinuities created by policy regulations (Chapter 2). Each chapter focuses on different (but highly interrelated) issues of the 2030 Agenda and the Sustainable Development Goals (SDGs) (see UN, 2017). While Chapter 1 assesses the impact of universal healthcare on maternal and perinatal mortality¹, Chapter 3 explores the effect of decentralization on outcomes

¹ SDG 3 for Good health and well-being: “3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100 000 live births”, and “3.2 By 2030, end preventable deaths of newborns and children [...]” (UN, 2017).

related to the global goal to end hunger², notably on food security. Chapter 2 studies how funds stimulate business creation and productivity, which is part of the SDGs for economic prosperity³.

Chapter 1:

Can Universal Healthcare reduce Perinatal and Maternal Mortality? The case of Mexico's Seguro Popular

This chapter quantifies the effect of Mexico's universal healthcare policy – also known as Seguro Popular – on both perinatal and maternal mortality, and explores the channels through which the program had most of its impact.

It is estimated by the World Health Organization (WHO) that worldwide and every year, around 300 thousand women die during pregnancy and childbirth, while 5.3 million babies are either stillborn or die during the first 28 days of life (WHO, 2018a). Most of these deaths can be avoided as the required medical interventions are already known and exist. However, the inaccessibility to quality healthcare services during pregnancy, delivery and in the following weeks after childbirth remains one of the main causes for unsuccessful pregnancies in developing and middle-income countries.

Global development agendas such as the UN's Sustainable Development Goals (SDGs) are setting the target of achieving a maternal mortality ratio of 7 or fewer deaths per 10 000 live births by 2030 (UN, 2017). Similarly, the WHO is now leading initiatives, such as The Every Newborn Action Plan, which suggest a target of 12 or fewer stillbirths per 1 000 births by 2030 (WHO, 2018b).

² SDG 2 for Zero hunger: “2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round” (UN, 2017).

³ SDG 8 for Decent work and economic growth: “8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services” (UN, 2017).

In Mexico from 1995 to 2000, perinatal and maternal mortality rates were considerably above the levels suggested by the SDGs and the WHO, with around 17.5 perinatal deaths per every 1 000 live births and 16.5 maternal deaths per every 10 000 live births – close to 46% and 136% above their respective target. Yet, both rates fell substantially after 2004, to levels close to 14 perinatal deaths and 6 maternal deaths per every 1 000 and 10 000 living births, respectively. The universal healthcare program Seguro Popular (SP) that was created in 2002 to provide health services to the uninsured population in Mexico – close to 60% of the whole Mexican population between 1995 and 2002 – may have played an important role in reducing perinatal and maternal mortality to rates closer to the ones suggested by international organizations.

This chapter contributes to the literature that assesses the impact of universal healthcare on different health variables. More precisely, we study the impact of Mexico's Seguro Popular on perinatal and maternal mortality. While previous work has explored the impact of the SP on other mortality outcomes based mostly on survey and self-reported data (see Pfütze, 2015) or municipal level aggregates (see Conti and Ginja, 2016), this study analyses the effect of the program using detailed administrative registers of births and deaths at the individual level (more than 30 million observations for the period 1995-2015), thus allowing a better quantification of the effect of the program.

To identify the causal effect of the policy we exploit the differences in the timing of implementation of the program across municipalities and estimate a difference-in-differences model while controlling for several characteristics at the individual and municipality levels.

From 1995 to 2015, perinatal and maternal mortality rates have decreased by 40 and 3.5 deaths per every 10 000 pregnancies respectively; we find that the program Seguro Popular accounts for 50 and 40% of these reductions, which on average represents 3 200 less perinatal deaths and 224 less maternal deaths every year. Most of the effect of the program can be explained by the reduction of deaths related to improvements in the health of the mother rather than to the deaths associated to congenital or inherited conditions of the fetus.

The program has incentivized pregnant women to displace more to municipalities where hospitals are located; while movements alone reduce the probability of a successful birth, the negative effect of displacement is completely offset by the positive effect of receiving

professional medical care in a hospital through Seguro Popular. The universal healthcare program in Mexico has proven effective in reducing perinatal and maternal mortality in its short period of implementation.

Chapter 2:

How does European Cohesion Policy affect Regional Business Dynamics?

This chapter assesses whether European Cohesion Policy funds from the 2007-2013 programming period affected business dynamics in European regions.

Cohesion Policy is a large fiscal transfer system, representing around one-third of the EU budget (€347 billion), delivered through three types of funds: the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). The main objective of Cohesion Policy is to achieve economic, social and territorial cohesion across the regions of the European Union (EU). In particular, by supporting growth in the least developed regions so they can catch up faster with the EU average level of development – also known as the convergence objective (European Union, 2013).

Previous work has demonstrated that the Cohesion Policy positively affects GDP per capita growth in recipient regions (see Becker et al., 2010; Pellegrini et al., 2013). However, little is known about the exact mechanisms through which funds influence regional economic growth. This chapter uses novel data on regional business demography to argue that firm dynamics is one important mechanism underlying the economic effects of Cohesion Policy.

To quantify the impact of Cohesion Policy on business dynamics, we implement a regression discontinuity strategy, where the discontinuity is generated by the rule for regions to receive more funds: having a GDP per capita lower than 75% of the EU average. We verify that regional expenditure of EU funds is clearly discontinuous around the 75% of regional GDP per capita as a share of the EU (or 75-threshold). On average, regions below the 75-threshold spent around 5.5 times more funds than regions with GDP per capita levels above the 75-threshold. More importantly, the discontinuity is starker and more exogenous the closer to the cut-off line, which allows estimating the effects of funds through a fuzzy regression discontinuity design (RDD) approach.

First, we quantify the direct impact of the Cohesion, Social and Regional Development funds on business creation and business destruction at the regional level, and verify whether such impact is also reflected in the levels of regional labour productivity. We show that regions receiving more funds experience higher business creation and lower business destruction, which translates into higher net firm creation and growing employment in firms. Our results show that a €100 million increase in annual funds (around 0.2% of the average annual budget of the EU) is associated to the net creation of around 241 new firms and 159 new jobs per every 10 000 existing firms and jobs respectively. In addition, we observe that regions receiving more funds show higher increases in per worker gross value added (GVA). Our interpretation is that faster business creation stimulates competition and a more efficient reallocation of skills and resources across firms, generating higher levels of regional labour productivity.

Second, we examine whether the effects on regional business dynamics differ by type of fund. The results suggest that larger shares of ERDF and ESF, relative to CF shares, are associated with higher business dynamic outcomes and higher levels of labour productivity. Moreover, the impact of larger shares of ESF is higher and more statistically significant than that of ERDF on employment and labour productivity. These results are in line with the main objectives for which these funds were designed. ERDF and ESF are mainly dedicated to promote SMEs and employment, respectively, whereas CF focuses typically on financing transport infrastructure projects.

Subsequently, we assess the role of quality of governance in shaping these effects. It is widely accepted that institutions matter for economic development. Previous work has shown that the effectiveness of public investment largely depends on the institutional and governance capacity of regions to manage and allocate resources. When we explore the role of governance to shape the impact of funds, we find that for southern European regions with lower levels of corruption, the effect of funds is conducive to positive net business employment creation, but it has no significant effect on firm creation and churning. Consequently, this does not translate into higher productivity for these regions. This goes in line with our argument that the main business demography driver of productivity is firm creation and churning. In the absence of firm dynamics, productivity is not expected to increase.

*Chapter 3:**Can Decentralization enhance Policy effectiveness? Evidence from the Peruvian Complementary Food Program*

This chapter estimates the impact of decentralizing the Peruvian Complementary Food Program (PCA) on its efficacy and explores the channels through which this governance shift improved food security across Peruvian regions.

Since the 1980s, many countries around the globe have initiated decentralization processes that reshaped the way they address most social, development and economic issues. Many authors have studied the impact of decentralization on a wide range of areas such as institutions, economic growth, poverty and education (e.g. Basurto et al., 2018; Leer, 2016; Galasso and Ravallion, 2005); however, little research has been done on the impact of decentralization on food security. This chapter contributes to filling this gap in the literature by providing evidence about the effects of decentralization on food security.

Ensuring food security and good nutrition across the World is still a major and evolving issue. Worldwide, one person out of ten is suffering from hunger and contrary to the common belief, food insecurity has been on the rise again for the past years due to new conflicts, drought and disasters associated to climate change, mostly in Africa and South America – from 2014 to 2017 the number of undernourished people increased by 37 million (FAO et al., 2018).

Despite remarkable progress in the last years, food security and nutrition remains an important topic in Peru. In 2000, around one-fifth of the Peruvian population was undernourished, leading the government to the creation of programs such as the Complementary Food Program (PCA). The PCA is one of the oldest and most important social programs dedicated to food aid in Peru. The main objective of the PCA is to increase food consumption of the poorest and most vulnerable populations, by providing them with additional food intakes distributed in social centers that are operated by volunteers from local communities. Since its creation in 1992, the central government fully managed the PCA. However, with the objective to enhance its effectiveness and to tackle regional inequalities in food security, the government decided to decentralize the PCA. Between 2003 and 2014, the

management of the program was progressively transferred to the subnational authorities of the country.

To assess the causal impact of the PCA's decentralization on households' food security, we implement an adapted difference-in-differences model that relies on the gradual implementation of decentralization across subnational governments. We combine rich data on households' food consumption (items and quantities) with official tables of calorie needs by gender-age groups to construct an indicator of food security, also referred to as gap in calories, which measures the difference between household calorie consumption and household calorie needs. The variable of gap in calories can either take negative values (the household suffers from a food deficit and is at risk of undernourishment) or positive values (the household consumes the minimum caloric requirements or more).

Our results indicate a negative overall impact of decentralization on the surplus of households' calorie intakes with respect to their minimum calorie requirements. However, the impact of the policy is not homogeneous across territories; our estimates show that the consumption of calories decreased in Lima while it increased in the rest of the provinces of the country, leading to a regional convergence in food security in Peru. Our results show that decentralizing the PCA generated a decrease of 219 kcal per day in Lima with respect to the required minimum levels in an average household; while it increased the calorie intake for households living in the rest of the provinces (excluding Lima) by 318 kcal per day with respect to their minimum needs.

We explain these findings by the existence of two opposite effects of decentralization – a positive “proximity effect” and a negative “capacity effect”. These effects originate respectively from the fact that on the one hand subnational governments have a better understanding of local communities and regional specificities, relative to the central government; while on the other hand, they tend to suffer from lower financial, technical and human resources.

In the provinces outside Lima, decentralizing the PCA is beneficial to the population's food security because the positive “proximity effect” overweighs the negative “capacity effect”. The advantages associated to the transfer of the program to the provincial authorities – that are by essence closer to local populations than the national government – are greater than potential

drawbacks stemming from their lower institutional and financial capacity. On the other hand, decentralization has a negative effect on calorie consumption in Lima because the negative “capacity effect” surpasses the positive “proximity effect”. The province of Lima concentrates on its territory both the central administration and the local district authorities. Being based in the same place, local government employees benefit from the same knowledge of the situation in Lima than the central government officials, which generates a close to zero gain in the “proximity effect” after decentralization. Yet, compared to the central government, local district authorities have less technical and financial capacity, which results in a negative “capacity effect” after decentralization.

Finally, using complementary measures of food security, we show that regional convergence in calorie intakes in Peru is welfare improving. While decentralizing the PCA boosted the consumption of calories in provinces with initial high levels of undernourishment, the fall in calorie intake in the districts of Lima is mainly driven by a share of the population shifting from very high levels of calorie consumption (“over-nourished”) to ones that are more standard.

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Chapter 1. Can Universal Healthcare reduce Perinatal and Maternal Mortality? The case of Mexico's Seguro Popular

Co-authored with Miguel Cárdenas Rodríguez

Abstract: This paper quantifies the effect of Mexico's universal healthcare policy – also known as Seguro Popular – on both perinatal and maternal mortality, and explores the channels through which the program had most of its impact. To estimate the causal effect of the policy we make use of rich administrative data on births and deaths at the individual level and exploit the staggered implementation of the program across small geographical units. From 1995 to 2015 perinatal and maternal mortality rates have decreased by 40 and 3.5 deaths per every 10 000 pregnancies respectively; the program Seguro Popular (SP) accounts for 50 and 40% of these reductions, which on average represents 3 200 less perinatal deaths and 224 less maternal deaths every year. Most of the effect of the program can be explained by the reduction of deaths related to improvements in the health of the mother rather than to the deaths associated to congenital or inherited conditions of the fetus. The program has incentivized pregnant women to displace more to municipalities where hospitals are located; while movements alone reduce the probability of a successful birth, the negative effect of displacement is completely offset by the positive effect of receiving professional medical care in a hospital through Seguro Popular. The universal healthcare program in Mexico has proven effective in reducing perinatal and maternal mortality in its short period of implementation.

1.1. Introduction

It is estimated by the World Health Organization (WHO) that worldwide and every year, around 300 thousand women die during pregnancy and childbirth, while 5.3 million babies are either stillborn or die during the first 28 days of life (WHO, 2018a). Technical reports and field studies from the same organization claim that most of these deaths can be avoided as the required medical interventions are already known and exist. However, the inaccessibility to quality healthcare services during pregnancy, delivery and in the following weeks after childbirth remains one of the main causes for unsuccessful pregnancies in developing and middle-income countries, which can result in severe health consequences or even the death of either the baby or the mother.

Aware of the large number of preventable maternal deaths, the United Nations set – as part of the Sustainable Development Goals (SDGs) – the target of reducing by 2030 the global maternal mortality ratio to less than 7 deaths per 10 000 live births (UN, 2017). Moreover, the 4th Millennium Development Goal focused on reducing child mortality rates by two-thirds between 1990 and 2015. While stronger focus has been given to maternal and child mortality, lower attention has been paid to perinatal mortality, which generally refers to fetal deaths (i.e. stillbirths) and deaths in the first week of life. According to the WHO, stillbirths across the World have remained unchanged since 2011 and at high levels (around 2.6 million per year). As half of stillbirths occur during labor and thus are largely preventable, the WHO and UNICEF (United Nations Children's Fund) are now leading initiatives such as The Every Newborn Action Plan which has set the target of 12 or fewer stillbirths per 1 000 births by 2030 (WHO, 2018b).

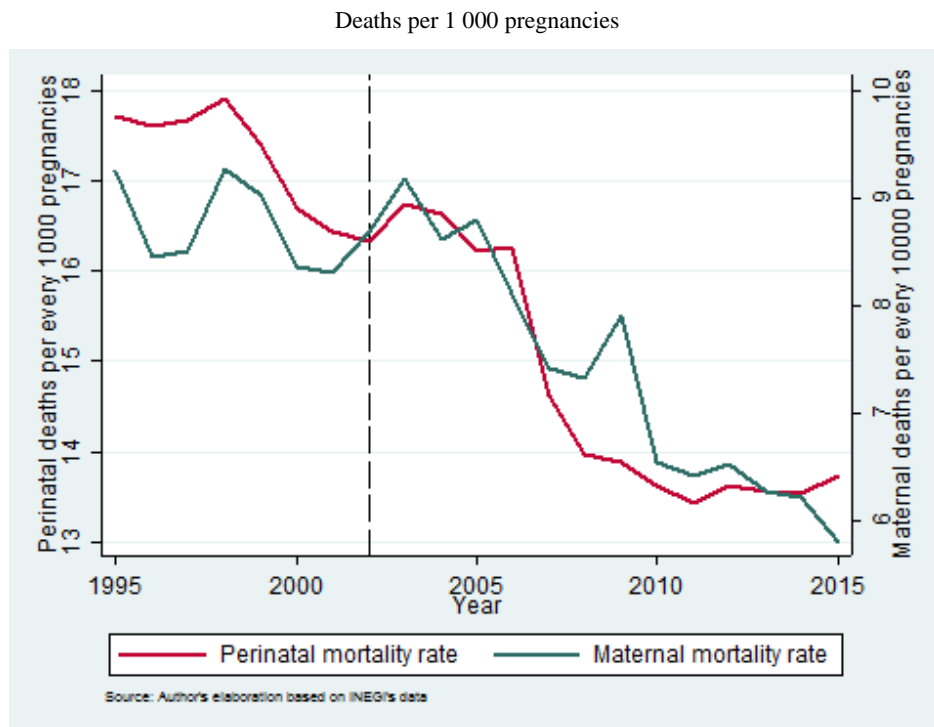
In Mexico from 1995 to 2000 perinatal and maternal mortality rates were considerably above the levels suggested by the SDGs and the WHO, with around 17.5 perinatal deaths per every 1 000 live births and 16.5 maternal deaths per every 10 000 live births – close to 46% and 136% above their respective target (Figure 1.1). Yet, both rates fell substantially after 2004, to levels close to 14 perinatal deaths and 6 maternal deaths per every 1 000 and 10 000 living births, respectively. The universal healthcare program Seguro Popular (SP) that was created in 2002 to provide health services to the uninsured population in Mexico – close to 60% of the whole Mexican population between 1995 and 2002 (Figure 1.2) – may have played an important

role in reducing perinatal and maternal mortality to rates closer to the ones suggested by the SDGs and WHO.

As summarized by Pfutze (2015), the implementation of Seguro Popular has motivated many research that can be classified in three main groups: 1) distortions on the labor market due to the implementation of a non-contributory healthcare system; 2) the effect on access to health insurance and its subsequent impact on households' expenditure on health services; and 3) the impact of the program on different health outcomes. For the first broad group of topics one can refer to Levy, 2008; Aterido et al., 2011; Azuara and Marinescu, 2013; Barros, 2008; Bosch and Campos-Vázquez, 2014; Camacho et al., 2014; Campos-Vázquez and Knox, 2013; and Duval-Hernández and Smith-Ramírez, 2011. While for the second line of research, the reader is invited to see Knox, 2008; Sosa-Rubi et al., 2009; Grogger et al., 2010; Gakidou et al., 2006; Knaul et al., 2006; and King et al., 2009.

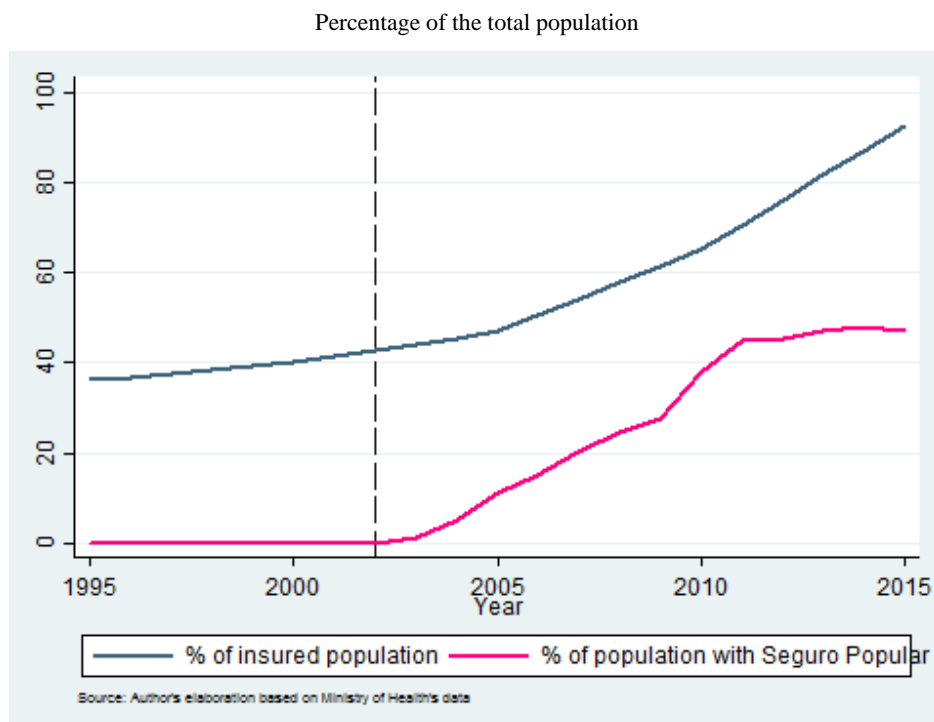
This paper contributes to the literature that assesses the impact of Seguro Popular on different health variables. King et al. (2009) were among the first ones to explore the impact of the program on health outcomes, finding no immediate effects. Ruvalcaba and Parker (2010) argue that the Seguro Popular was associated with reductions in the incidence of cholesterol and high blood pressure; however, no incidence on chronic diseases such as diabetes was found. Pfutze (2014), using data on reported births, finds that the program reduced infant mortality by close to 5 deaths per 1 000 births. Similarly, using survey data, Pfutze (2015) shows a significant reduction in the risk of miscarriage. Finally, Conti and Ginja (2016), using administrative data aggregated at the municipal level, find that the program reduced child mortality in poor municipalities. While previous literature is based mostly on survey or self-reported data, this paper analyses the effect of the program using administrative data of the population of births and deaths at the individual level, thus allowing a better quantification of the effect of the program.

Figure 1.1. Perinatal and Maternal mortality rates in Mexico, 1995-2015



Source: Authors' elaboration based on INEGI's data.

Figure 1.2. Insured population and affiliation to Seguro Popular, 1995-2015



Source: Authors' elaboration based on INEGI's data.

The objective of this research is to quantify the causal impact of Seguro Popular on perinatal and maternal mortality. This paper also analyses the channels through which the program had most of its impact. To estimate the causal effect of the policy we make use of rich administrative data on births and deaths at the individual level and exploit the staggered implementation of the program across small geographical units. From 1995 to 2015, perinatal and maternal mortality rates have decreased by 40 and 3.5 deaths per every 10 000 pregnancies respectively. This paper finds that the program Seguro Popular accounts for 50 and 40% of these reductions, which on average represents 3 200 less perinatal deaths and 224 less maternal deaths every year. Most of the effect of the program can be explained by the reduction of deaths related to improvements in the health of the mother rather than to the deaths associated to congenital or inherited conditions of the fetus. The program has incentivized pregnant women to displace more to municipalities where hospitals are located; while movements alone reduce the probability of a successful birth, the negative effect of displacement is completely offset by the positive effect of receiving professional medical care in a hospital through Seguro Popular.

The following section presents the context in which Seguro Popular was created and summarizes the specificities of the program. Next, we describe the data and explain the empirical strategy used for the analysis. Results are then presented for a range of specifications, analyzing the channels through which the program had most of its impact. The last section briefly provides some conclusions and policy implications.

1.2. Social security in Mexico and the Seguro Popular

The Seguro Popular was created in a context of structural inequalities in access to healthcare largely due to the fragmented nature of the social security system in Mexico (Barraza-Lloréns et al., 2002). Prior to the Seguro Popular, health insurance in Mexico was differentiated between the employed and unemployed, and was divided into three systems: 1) a public healthcare system that covered formal workers from the public and private sectors, 2) various private health insurance providers, and 3) few public hospitals that provided care to the uninsured population – a population composed mostly of informal workers and poor households (Conti and Ginja, 2016; Frenk et al., 2006). While the public system was funded through employers' and employees' payroll contributions and enabled immediate care without co-payment, both private health insurance companies and social care units for the uninsured

required the patients to advance their health expenses and pay for their medication at the point of delivery; resulting in a system based on out-of-pocket payments for the uninsured population (Conti and Ginja, 2016; Parker and Wong, 1997; Frenk et al., 2006).

As more than half of the Mexican population did not have access to a proper healthcare system, the Ministry of Health decided to launch the Seguro Popular to provide health insurance to the population that was so far uninsured. The program started as a pilot in 24 municipalities in 2002 and covered 2 448 municipalities by 2008 (out of 2 454 in total at the time of writing). The objective of Seguro Popular is to enable the provision of basic health services to the uninsured population, including perinatal and maternal care. Although the program is supposed to be contributory for certain socio-economic groups, in practice less than 1% of the affiliated population pays for the coverage (see Frenk et al., 2006); the rest of the funding is provided by revenues of federal and state taxes.

Enrollment in Seguro Popular is voluntary and requirements are very easy to meet (residence in Mexico, self-declaration of lack of health insurance, and a valid ID), the main practical criteria for eligibility being the lack of health insurance. Once enrolled in Seguro Popular, households are paired with a doctor and a health center belonging to an accredited network of hospitals, where they can easily access a large range of health services without co-payments (see Conti and Ginja, 2016, for further details). Families enrolled in the program can also visit other affiliated health centers, even if they are not located in their home municipality.

1.3. Data

This paper makes use of detailed administrative data on births and fetal and maternal deaths at the individual level, covering each municipality across the whole country from 1995 to 2015 (around 33 million observations). This is a methodological improvement compared to most of previous works on perinatal and maternal mortality that rely on surveys, which likely yield biased estimates due to high underreporting of fetal deaths. The main data sources used in this paper come from the following official registers:

- *Registers of births from 1995 to 2015* (The National Institute of Statistics and Geography – INEGI by its name in Spanish)

-
- *Registers of fetal deaths and stillbirths from 1995 to 2015* (INEGI)
 - *Registers of general deaths from 1995 to 2015* (INEGI)
 - *Registers of affiliated people to the Seguro Popular from 2002 to 2015* (Ministry of Health – Secretaría de Salud by its name in Spanish)

From the registers of births and deaths there is available information on the characteristics of the mother (e.g. age, schooling, labour market status, civil status, municipality of residence, having delivered a born child before), as well as on the place and conditions of the delivery (e.g. in a hospital, assisted by doctor, municipality of occurrence, date of occurrence). All these detailed characteristics at the individual level allow us to better control for many potential determinants of our variables of interest – i.e. perinatal and maternal mortality rates.

Although the World Health Organization defines perinatal mortality as the number of stillbirths and deaths in the first week of life per 1 000 total births, where the perinatal period commences at 22 completed weeks of gestation and ends seven completed days after birth, definitions can vary across countries (WHO, 2018a). Following Mexico's methodology to collect fetal deaths and stillbirths (INEGI, 2017b), we define perinatal deaths as the number of fetal deaths (spontaneous intrauterine death of a fetus at any time during pregnancy after 12 weeks of gestation), stillbirths (a baby born with no signs of life) and deaths during the first day of life (within the 24 hours after delivery). In the same line, we estimate Perinatal Mortality Rates (PMR) as the number of perinatal deaths per every 1 000 live births⁴.

On the other hand, maternal deaths are defined in this paper exactly as by the World Health Organization, as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes" (WHO, 2018c).

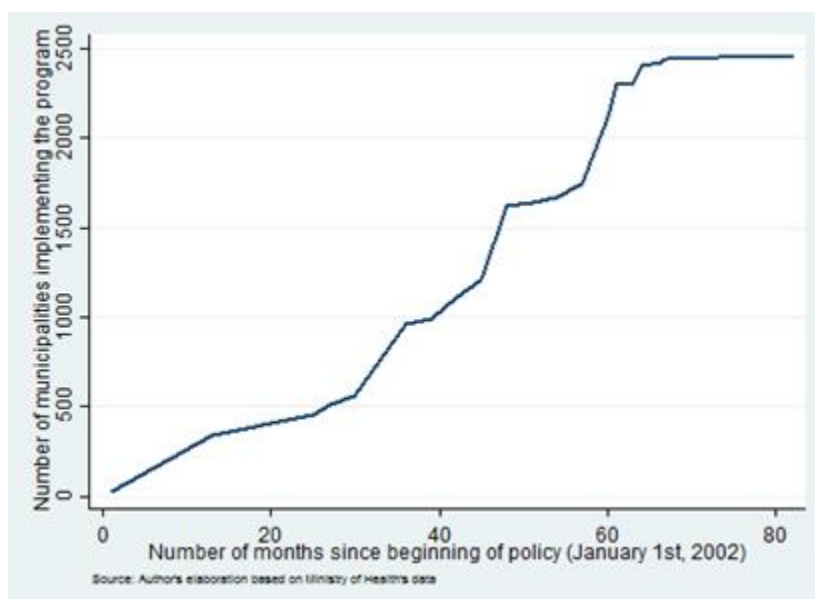
⁴ We sometimes refer to the perinatal or maternal mortality rate as the number of perinatal or maternal deaths per number of pregnancies – where pregnancies can be obtained by simply adding the number of live births plus the death events in question (either the number of perinatal or maternal deaths).

1.4. Empirical strategy

The identification strategy exploits the differences in timing of implementation of the program across municipalities to estimate an adapted difference-in-differences model while controlling for several characteristics at the individual and municipality levels. Potential endogeneity issues might arise. For instance, one has to verify that the date of entry of municipalities into the program Seguro Popular was not determined by the health outcomes of interest (i.e. perinatal and maternal mortality rates), and that the groupings for treatment share a common trend for both perinatal and maternal mortality before the implementation of the policy.

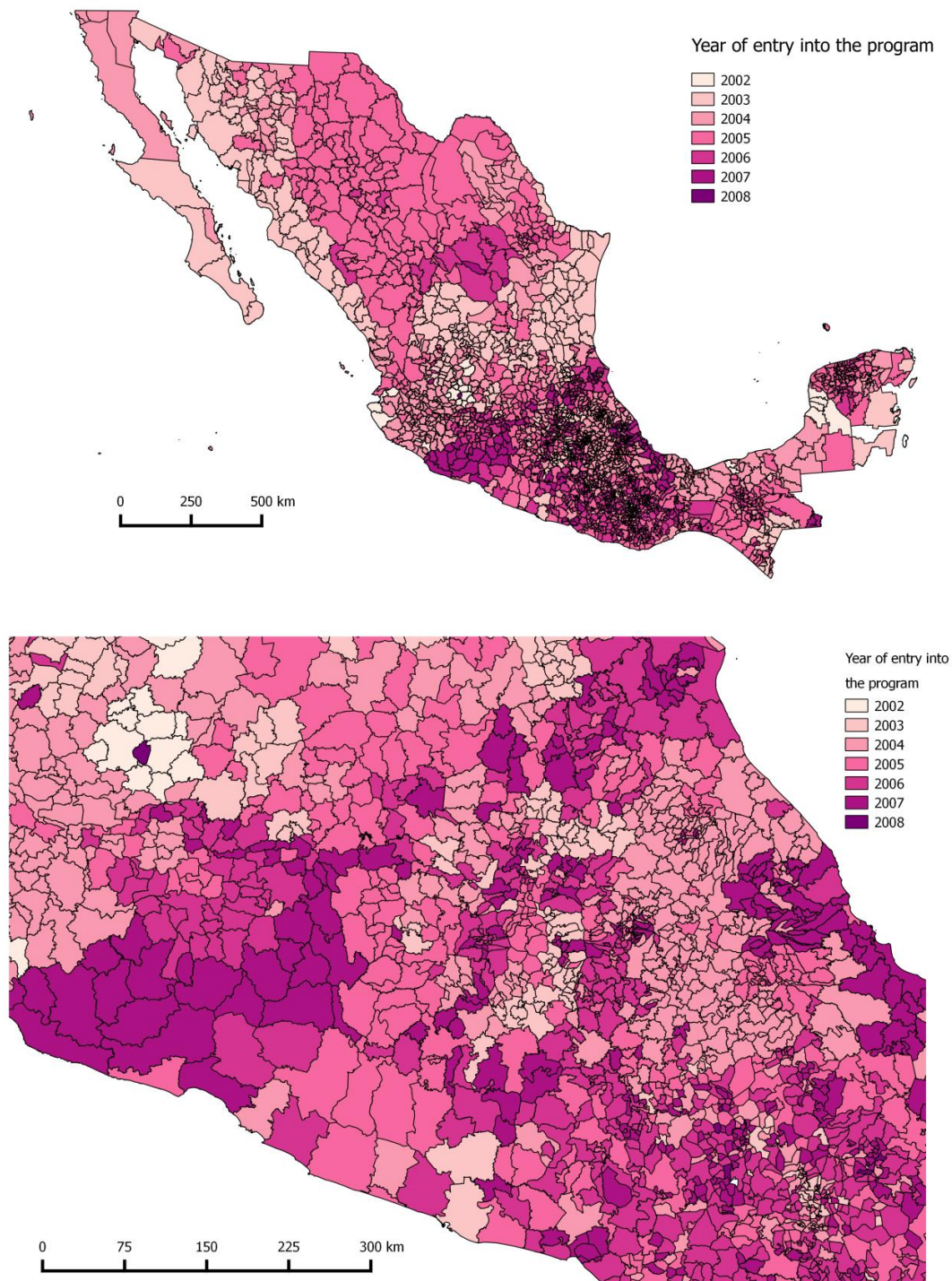
The government provided guidelines for the implementation of the program at the state level. These guidelines prioritized states with low social security coverage, large number of low-income households, available infrastructure to provide the services, and other criteria (Diario Oficial de la Federación, 2003). In practice, however, these guidelines were not clearly followed at the state level; and in particular, no guidelines existed at the municipal level (Conti and Ginja, 2016). Moreover, no rules of operation were determined at the municipality level, which allowed each state to highly influence the roll-out of the Seguro Popular within its territory.

Figure 1.3. Number of municipalities implementing the program over time



Source: Authors' elaboration based on Ministry of Health's data.

Figure 1.4. Roll-out dates of implementation of the program across municipalities



Source: Authors' elaboration based on Ministry of Health's data.

The program started as a pilot in 2002 in a few municipalities of five states, then in the following year 15 more states started implementing the Seguro Popular, and in 2004 the remaining 12 regions signed in into the program; however, within states, municipalities rolled-out the program at very different timing. In the first month of 2002, the program was *de facto* implemented in only 24 municipalities, and it was only after July 2009 that all the 2 454 municipalities of the country adopted the policy (Figure 1.3). Figure 1.4 shows some heterogeneity in the implementation of the program across states, but most importantly, it reveals considerable variations in the adoption of Seguro Popular across municipalities within and between states.

To explore the potential determinants of entry into the program at the municipality level, we perform OLS regressions following Equation 1.1, where the dependent variable $Month_{m(s)}$ is the month of entry into the program for municipality m from state s .

$$Month_{m(s)} = R_s + E_{m(s),2000}D + \eta_{m(s)} \quad 1.1$$

R_s is the fixed effect of state s ; $E_{m(s),2000}$ is the set of municipality characteristics of m in 2000 (the selected pre-policy year due to data availability at the municipality level) that could determine the time of adoption of the policy. The remaining variation of the dependent variable is captured by the error term $\eta_{m(s)}$.

According to our results, perinatal and maternal mortality do not predict entry into the program (Table 1.1), which decreases concerns about problems of simultaneity. However, the percent of the population without social security and the size of the municipality in terms of population predict an early implementation of the policy (a result also observed by Pfutze, 2014 and 2015; and Conti and Ginja, 2016). As a way to mitigate omitted variable bias, these predictors are always incorporated in our regressions.

To specify the baseline model we make use of the 7 treatment groups of municipalities T_g , characterized for implementing the policy in year g ; for instance, “treatment group 2002 (T_{2002})” represents the 24 municipalities implementing the program in 2002; while “treatment group 2003 (T_{2003})” stands for the 311 municipalities that adopted the program in 2003; etc. until “treatment group 2008 (T_{2008})”.

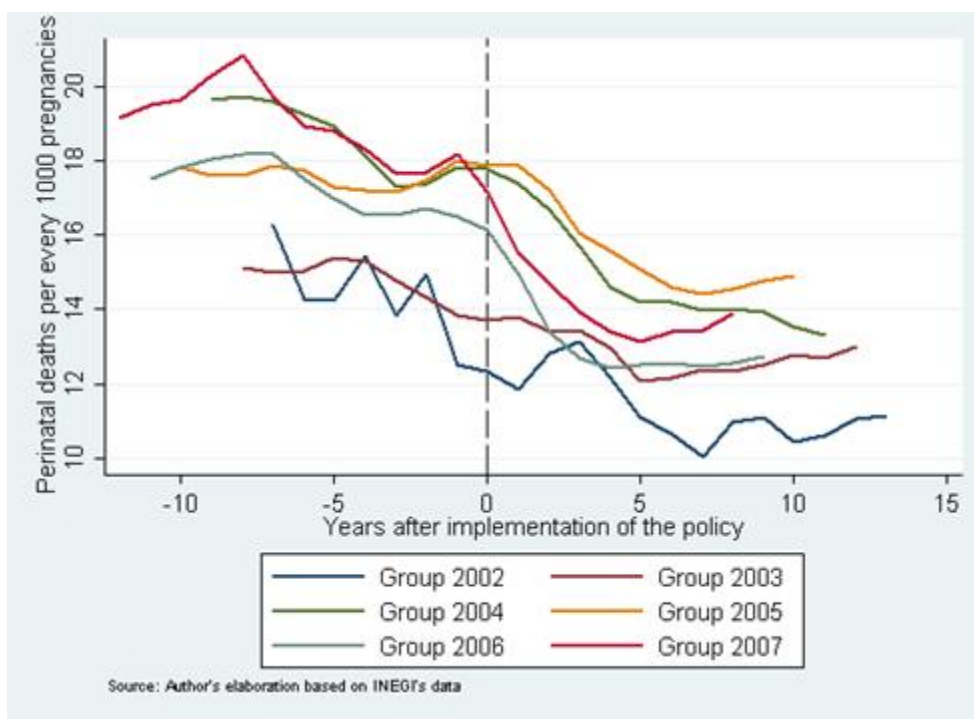
Table 1.1. Determinants of entry into the program

	(1)	(2)	(3)
	Month of entry	Month of entry	Month of entry
Perinatal mortality	-0.0166 (0.0208)	-0.0186 (0.0204)	
Maternal mortality	0.000338 (0.00111)	-0.000400 (0.00103)	
General mortality	0.212 (0.168)	-0.00994 (0.155)	
Infant mortality	-0.00255 (0.00215)	-0.00362* (0.00206)	-0.00367* (0.00201)
Share of population without social security	-8.570*** (2.771)	-13.76*** (2.764)	-13.34*** (2.615)
Doctors per every 10000 people	0.0252 (0.0595)	-0.0172 (0.0505)	
Hospitals per every 10000 people	-0.000359 (0.0977)	0.00886 (0.0858)	
Log of population	-3.355*** (0.317)	-2.816*** (0.350)	-3.157*** (0.252)
Food poverty	16.05*** (2.516)	12.97*** (2.604)	11.42*** (2.236)
Gini index	-11.44** (5.089)	2.514 (4.505)	
Log of total expenditure per capita	-3.678*** (0.624)	0.934 (0.656)	
Share of expenditure in services	-6.864** (3.257)	4.380 (3.116)	
Share of expenditure in social transfers	-16.93*** (2.953)	-3.343 (2.778)	
Constant	106.6*** (6.887)	56.20*** (8.119)	67.49*** (4.032)
Observations	2,454	2,454	2,454
R-squared	0.183	0.479	0.478
Adjusted R-squared	0.179	0.470	0.470
State FE	No	Yes	Yes

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Another important aspect for the reliability of our model and results is the validity of the common trend assumption for both perinatal and maternal mortality across all treatment groups. Figure 1.5 and Figure 1.6 show the trends in perinatal and maternal mortality, respectively, around the year of implementation of the policy (year zero). The pre-policy trends for perinatal mortality seem to be similar across all groups, which brings more confidence on the validity of our strategy. However, the trends in maternal mortality before the implementation of the policy do not seem to be homogeneous for all the displayed groups over the whole period. While pre-trends look very similar for the groups 2002, 2003, 2004 and 2005 over the whole period, the pre-trend of groups 2006 and 2007 look parallel to the rest of the groups only within the 5 years before the implementation of the policy in their respective geographical areas.

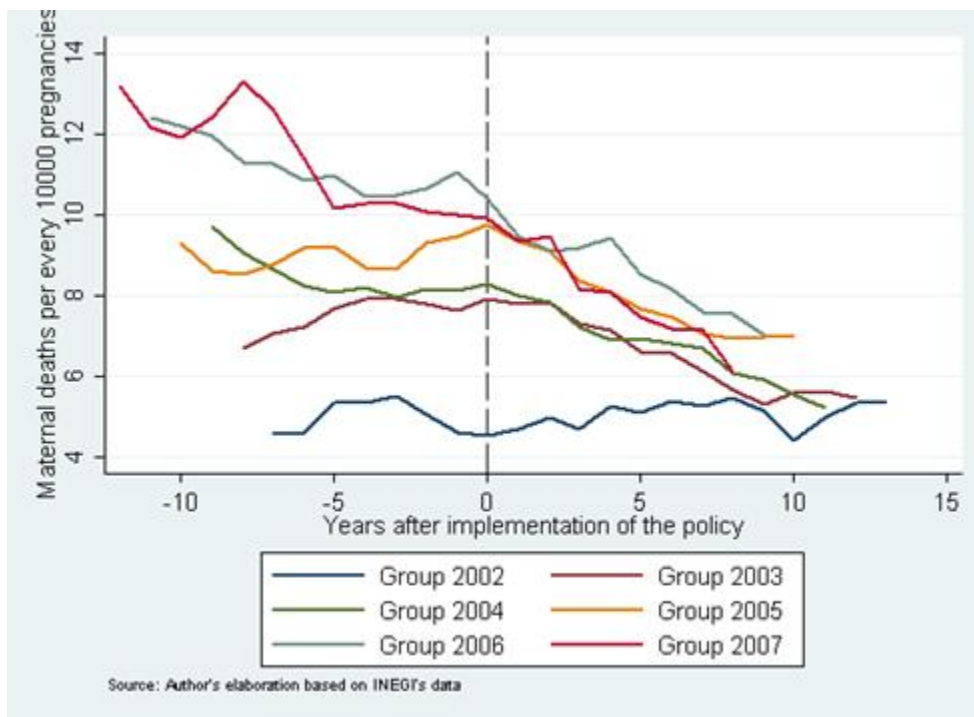
Figure 1.5. Trends in fetal mortality by treatment group



Note: For presentation purposes, the graph excludes the 2008 treatment group. Idem for Figure 1.6.

Source: Authors' elaboration based on INEGI's data.

Figure 1.6. Trends in maternal mortality by treatment group



Source: Authors' elaboration based on INEGI's data.

The effect of the policy is estimated through the interactions “treatment group after treatment”, while controlling for treatment group fixed effects and the post-treatment trend. The baseline specification consists of a Logit regression of the form below (Equation 1.2), where $D_{i(g,y)}$ is a dummy variable representing either the perinatal or maternal death (death=1) of individual i in treatment group g (group of municipalities entering in year g) and year y .

$$D_{i(g,y)} = X_{i(g,y)}A + Z_{m,y}B + R_s + E_{m,2000}C + T_g + \theta_{2002} + P_{g,t} + \varepsilon_{i(g,y)} \quad 1.2$$

$X_{i(g,y)}$ stands for a very rich set of controls at the individual level, mostly characteristics of the mother; $Z_{m,y}$ is a set of time-varying municipality controls, R_s stands for the fixed effect of state s ; $E_{m,2000}$ is the set of municipality characteristics in 2000 that influenced time of entry into the program (see Table 1.1); T_g is the fixed effect associated to being in group g ; θ_{2002} is the fixed effect of first post treatment (year > 2002); and $P_{g,t}$ the effect of the policy that comes from the interaction of treatment group g in its post treatment years ($y = g + 1$). We interpret the latter coefficient as an intention-to-treat effect. The remaining variation of the dependent variable is captured by the error term $\varepsilon_{i(g,y)}$.

1.5. Results

1.5.1. Generalized effect of the Seguro Popular on perinatal and maternal mortality

The results of estimating Equation 1.2 (our main specification) are presented in Table 1.2. Columns 1 and 3 show the global effect of Seguro Popular for perinatal and maternal mortality, respectively; while columns 2 and 4 break down the global effect of the policy into the effect for each group of municipalities (according to its year of entry into the program).

As expected, everything else being equal, both perinatal and maternal mortality decrease with higher levels of education of the mother, while women with a partner have more chances of a successful pregnancy than the single ones. Moreover, being relatively too young or old during the pregnancy increases the probability of both perinatal and maternal death, as shown by the coefficients of age and age squared of the mother.

Table 1.2. The effect of the Seguro Popular on perinatal and maternal mortality (main specification)

	(1)	(2)		(3)	(4)	
	Perinatal death	Perinatal death	Marginal effects	Maternal death	Maternal death	Marginal effects
Age of the mother	-0.179*** (0.00805)	-0.173*** (0.00830)		-0.194*** (0.0108)	-0.187*** (0.0114)	
Age-squared of the mother	0.00342*** (0.000134)	0.00333*** (0.000138)		0.00404*** (0.000174)	0.00393*** (0.000184)	
Lower than primary education	-0.135*** (0.0242)	-0.129*** (0.0247)	-0.002	0.0757** (0.0333)	0.0794** (0.0336)	0.00006
Primary or less than lower-secondary education	-0.727*** (0.0235)	-0.719*** (0.0240)	-0.01	-1.356*** (0.0382)	-1.351*** (0.0384)	-0.00107
Lower-secondary or less than upper-secondary education	-1.039*** (0.0280)	-1.031*** (0.0281)	-0.015	-1.483*** (0.0411)	-1.476*** (0.0410)	-0.00117
Upper-secondary education	-0.989*** (0.0297)	-0.982*** (0.0298)	-0.014	-1.591*** (0.0456)	-1.586*** (0.0457)	-0.00126
Tertiary education	-1.205*** (0.0375)	-1.199*** (0.0376)	-0.017	-1.591*** (0.0526)	-1.587*** (0.0525)	-0.00126
Inactive or unemployed	0.0450 (0.0287)	0.0484* (0.0289)	0.001	-0.0105 (0.0324)	-0.00442 (0.0328)	-0.00001
Divorced, separated or widowed	0.806*** (0.0572)	0.811*** (0.0574)	0.012	0.969*** (0.0705)	0.975*** (0.0708)	0.00077
Married	-0.356*** (0.0355)	-0.354*** (0.0358)	-0.005	-0.594*** (0.0368)	-0.593*** (0.0372)	-0.00047
Other civil union	-0.404*** (0.0377)	-0.402*** (0.0380)	-0.006	-0.692*** (0.0422)	-0.690*** (0.0425)	-0.00055
Has delivered a born child before	-0.0201 (0.0183)	-0.0238 (0.0183)				
Sex of product	0.0978*** (0.00430)	0.0987*** (0.00431)				
Infant mortality (2000)	0.00154*** (0.000133)	0.00155*** (0.000133)		-0.000769*** (0.000215)	-0.000758*** (0.000213)	
Share of people in food poverty (2000)	0.431*** (0.107)	0.421*** (0.106)		1.493*** (0.176)	1.474*** (0.175)	
Share of population without social security (2000)	-1.363*** (0.115)	-1.304*** (0.117)		-1.726*** (0.187)	-1.637*** (0.191)	
Log of population	-0.0328*** (0.0121)	-0.0261** (0.0125)		-0.162*** (0.0208)	-0.151*** (0.0217)	
Global effect of the SP (Policy)	-0.133*** (0.0149)		-0.002	-0.181*** (0.0230)		-0.00014
Group that enters in 2002, after treat.		-0.583*** (0.107)	-0.008		-0.904*** (0.189)	-0.00071
Group that enters in 2003, after treat.		-0.0827** (0.0404)	-0.001		-0.180*** (0.0469)	-0.00014
Group that enters in 2004, after treat.		-0.172*** (0.0284)	-0.002		-0.154*** (0.0471)	-0.00012
Group that enters in 2005, after treat.		-0.0711*** (0.0260)	-0.001		-0.152*** (0.0336)	-0.00012
Group that enters in 2006, after treat.		-0.197*** (0.0354)	-0.003		-0.168*** (0.0486)	-0.00013
Group that enters in 2007, after treat.		-0.203*** (0.0651)	-0.003		-0.286*** (0.0628)	-0.00023
Group that enters in 2008, after treat.		-0.389 (0.281)	-0.006		12.62*** (0.491)	0.00997
Observations	32,893,440	32,893,440		32,438,483	32,438,483	
Treatment group FE	Yes	Yes		Yes	Yes	
Time trend	Yes	Yes		Yes	Yes	
State FE	Yes	Yes		Yes	Yes	
Log pseudolikelihood	-2.420e+06	-2.420e+06		-195397	-195343	

Note: "treat." stands for "treatment". Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

The policy reduces both the probability of perinatal and maternal death. The marginal effects suggest that these reductions are, respectively, of 20 and 1.4 less deaths per every 10 000 pregnancies (these estimates are robust to the inclusion of municipality-time trend fixed effects, see Annex Table 1.A.1). When breaking down the global effect into group-of-municipalities effects, we find that for perinatal mortality the policy has had a higher impact on the groups that entered in 2002, 2006 and 2007; which coincides with the beginning of the general program in 2002 and later with the expansion of Seguro Popular through the feature Seguro Médico Nueva Generación in December 1st, 2006 – that guaranteed health insurance to every child under age five years old since that day (Conti and Ginja, 2016).

1.5.2. Channels of impact of the Seguro Popular

The staggered roll-out of the program might have had some unintended consequences. For instance, the availability of the program in further away locations before its release in the original place of residence might have incentivized mobility in order to receive the treatment. More precisely, we look at the effect of distance from the place of residence of the mother to the municipality where the delivery took place. Moreover, an important provision of the health program is the access to qualified medical personnel and installations; therefore, we study the impact of being assisted by a doctor and/or in a hospital during the event as opposed to home births.

Our results show that the distance from place of residence to municipality of delivery⁵ affects positively the probability of perinatal death (Table 1.3). This implies that the distance to health facilities is costly for the mother, potentially due to less medical oversight throughout the pregnancy. However, in the presence of the program in the place of delivery, this effect is attenuated (column 4, interaction Policy x Hospital). A possible interpretation of this result is that the Seguro Popular ensures that the mother will be treated in a hospital with qualified medical personnel, even if this means sending the mother to a near-by municipality to receive the services. Thus, the access to these services offsets the negative impact of mothers' mobility to the health care centers.

⁵ This information was not available for maternal deaths at the time of writing.

Table 1.3. The role of distance and access to hospitals in the effectiveness of SP

	(1)	(2)	(3)	(4)
	Perinatal death	Perinatal death	Perinatal death	Perinatal death
Distance in Km	0.000242*** (5.54e-05)	0.000285*** (5.60e-05)	0.000406*** (5.62e-05)	0.000399*** (5.56e-05)
Event was treated by a Doctor	1.450*** (0.0725)			
Global effect of the SP (Policy)	-0.126*** (0.0155)	-0.00918 (0.0531)	-0.121*** (0.0158)	-0.00713 (0.0531)
Event was treated in a Hospital	-1.339*** (0.0512)	-0.167*** (0.0594)	-0.199*** (0.0628)	-0.167*** (0.0593)
Policy x Hospital		-0.127** (0.0593)		-0.124** (0.0594)
Policy x Distance			-0.000267*** (5.34e-05)	-0.000252*** (5.38e-05)
Observations	32,893,440	32,893,440	32,893,440	32,893,440
Benchmark model's controls	Yes	Yes	Yes	Yes
Log pseudolikelihood	-2.410e+06	-2.420e+06	-2.420e+06	-2.420e+06

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.

Table 1.4. The role of affiliation in the effectiveness of SP

	(1)	(2)	(3)	(4)	(5)	(6)
	Perinatal death	Perinatal death	Perinatal death	Maternal death	Maternal death	Maternal death
Global effect of the SP (Policy)	-0.133*** (0.0149)			-0.181*** (0.0230)		
Affiliated to SP per capita		-0.363*** (0.0259)			-0.478*** (0.0422)	
Affiliated to SP / (Affiliated to SP + People without Social Security)			-0.211*** (0.0225)			-0.389*** (0.0349)
Marginal effects	-0.002	-0.005	-0.003	-0.00014	-0.0004	-0.0003
Decrease in period 1995-2015	0.004	0.004	0.004	0.00035	0.00035	0.00035
Decrease due to Policy	50%			40%		
Expected change due to a 1-unit increase		125%	75%		114%	86%
Observations	32,893,440	32,893,440	32,893,440	32,438,483	32,438,483	32,438,483
Benchmark model's controls	Yes	Yes	Yes	Yes	Yes	Yes
Log pseudolikelihood	-2.420e+06	-2.420e+06	-2.420e+06	-195397	-195327	-195336

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Since enrollment is voluntary, the fact that the policy is available in a municipality does not imply full coverage of the uninsured. The impact of the program depends, among other things, on its effectiveness to affiliate the uncovered. Therefore, to analyze the effect of the increasing coverage at the municipality level on health outcomes, we explore the intensity in affiliation, i.e., the number of affiliated individuals per capita in the municipalities and the number of affiliated persons to Seguro Popular over the total number of people affiliated and uninsured. The results of Table 1.4 suggest that a 100% coverage of the uninsured population would have generated 3 less perinatal deaths per 1 000 pregnancies (column 3), while full coverage of the population (insured and uninsured) would have resulted in around 5 less

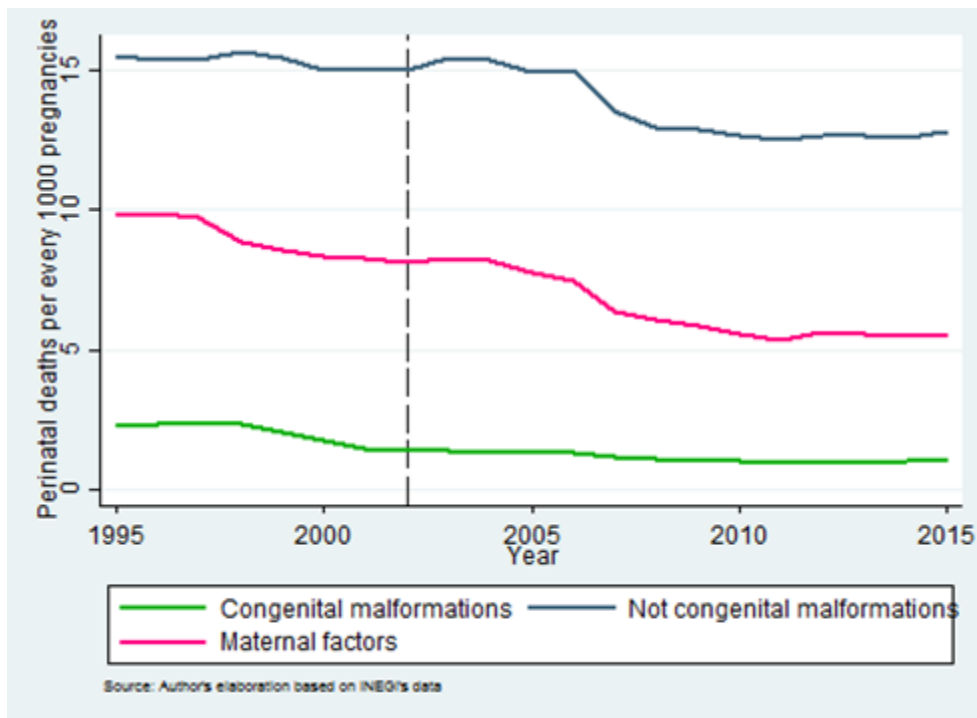
perinatal deaths per 1 000 pregnancies (column 2). Similarly, full coverage of the uninsured is associated with a reduction of 3 maternal deaths per 10 000 pregnancies (column 6). Table 1.4 also reveals that part of the effect of the policy could come from people that affiliated to the program even though they were already insured through other healthcare system.

1.5.3. The effect of the Seguro Popular by causes of death

In this section, we quantify the impact of the policy according to different causes of perinatal and maternal deaths. This can further shed light on the channels through which the policy has improved the success probability of births and whether these are associated with conditions at delivery (e.g. being at a hospital), medical oversight during the pre-delivery period or congenital characteristics. Following the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) (WHO, 2010) one can classify the perinatal causes of death in two broad groups, *Congenital malformations, deformations and chromosomal abnormalities* and *Other conditions* ("Not congenital"); from the latter it is also possible to extract the smaller subset of causes *Fetus and newborn affected by maternal factors*. As expected, since the Seguro Popular provides access to basic perinatal and maternal care services, Figure 1.7 shows that most reductions of perinatal deaths in Mexico come from maternal health factors and non-congenital causes.

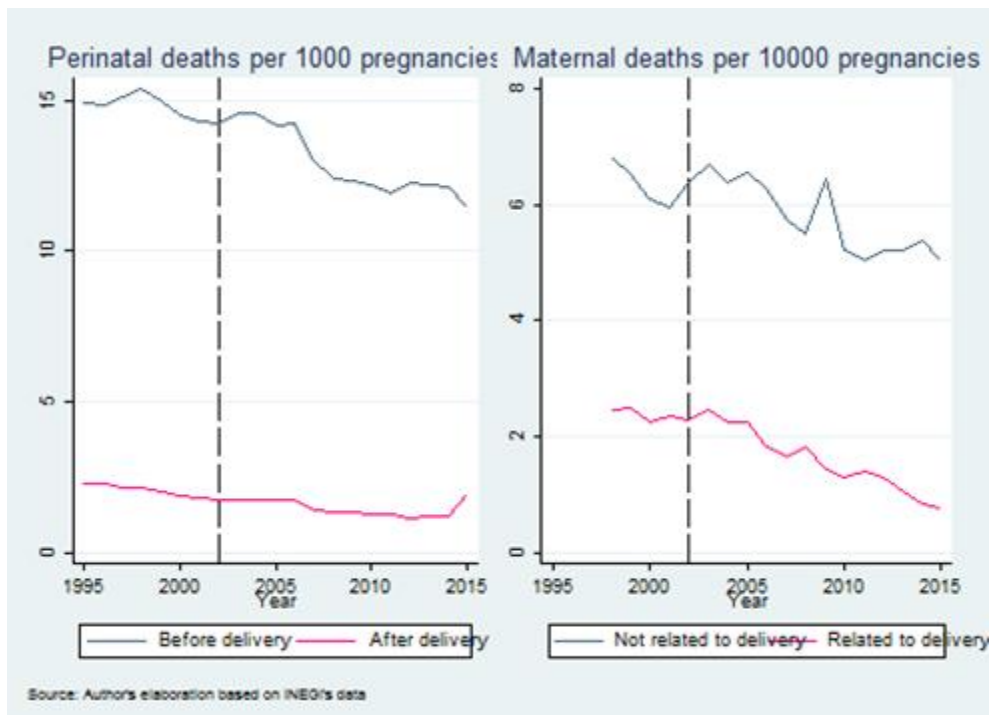
Moreover, for both perinatal and maternal mortality, one can also classify the causes of deaths by their timing with respect to the delivery. The left panel of Figure 1.8 shows that across Mexico, perinatal deaths have decreased mostly for the period *before* delivery, indicating that pregnancy oversight has likely been an important element provided by the Seguro Popular. On the other hand, the right panel related to maternal mortality shows a relatively steeper decrease in maternal deaths related to delivery, suggesting that the program has also been effective in improving the overall conditions of delivery.

Figure 1.7. Cause-specific perinatal deaths, 1995-2015



Source: Authors' elaboration based on INEGI's data.

Figure 1.8. Delivery-specific perinatal and maternal deaths, 1995-2015



Source: Authors' elaboration based on INEGI's data.

To verify further the channels through which the implementation of the Seguro Popular impacted perinatal and maternal mortality, we perform modified versions of the main specification (Equation 1.2) where the dependent variable is now a cause-specific perinatal or maternal death. Table 1.5 shows the main results associated to these specifications.

The Seguro Popular is contributing to better outcomes across all types of perinatal and maternal mortality (Table 1.5, columns 1 to 7). However, the policy is clearly more effective in decreasing certain causes of perinatal and maternal mortality. Our results suggest that the program is reducing perinatal and maternal mortality mainly by improving the conditions of delivery (columns 5 and 7), e.g. providing access to hospitals, doctors and qualified medical care during delivery. For the case of perinatal mortality, the policy does not seem as effective to treat congenital conditions or malformations of the fetus or newborn as it is to improve the mother's health, the latter being also a key determinant of the probability of a successful birth (column 3).

Table 1.5. Cause-specific perinatal and maternal deaths

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Perinatal death: Congenital malformations	Perinatal death: Not congenital malformations	Perinatal death: Maternal factors	Perinatal death: Before Delivery	Perinatal death: During or after Delivery	Maternal death: Not related to Delivery	Maternal death: Related to delivery
Global effect of the SP	-0.186***	-0.129***	-0.289***	-0.118***	-0.211***	-0.0958***	-0.433***
Marginal effects	(0.0210) -0.0003	(0.0154) -0.0017	(0.0161) -0.002	(0.0151) - 0.0015	(0.0254) -0.00033	(0.0262) -0.00057	(0.0431) -0.00078
Decrease in period 1995-2015	0.0128	0.0027	0.004	0.0035	0.00036	0.000175	0.000172
Decrease due to Policy	2.3%	63%	50%	42.9%	91.6%	32.6%	45.3%
Observations	32,457,222	32,849,309	32,637,974	32,832,871	32,464,243	27,893,622	27,886,295
Benchmark model's controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log pseudolikelihood	-324166	-2.240e+06	-1.302e+06	-2.170e+06	-369800	-132760	-43193

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

1.6. Conclusions

The program Seguro Popular has reduced both perinatal and maternal mortality significantly across Mexico. The results presented here suggest that these reductions are of 20 and 1.4 less deaths per every 10 000 pregnancies, respectively. Having access to hospitals and

doctors are the main channels through which the program reduced perinatal deaths. The distance from place of residence to place of delivery increases the risk of perinatal mortality. This effect can be related to the distance costs for the mother, which we interpret as less medical oversight throughout the pregnancy. However, the implementation of Seguro Popular has offset this effect, likely due to access to hospitals and qualified medical personnel, which is ensured when obtaining the affiliation.

A rather unexpected result shows that part of the effect of the policy comes from people that affiliated to the program even though they were already covered by another healthcare scheme. This points to a lack of monitoring of the insured population and might indicate some crowding-out of other health insurance services. Hypothetically, the coverage of the totality of the uninsured population would have resulted in 3 less, instead of 2, perinatal deaths per every 1 000 pregnancies. These differences might underline deficiencies in the current available health insurance systems.

Our results suggest that the program is reducing perinatal and maternal mortality mainly by improving the conditions of delivery; for example, providing access to hospitals, doctors and qualified medical care. For the specific case of perinatal mortality, the policy does not seem as effective to treat congenital conditions or malformations of the fetus or newborn as it is to improve the mother's health, which is also crucial for a successful pregnancy.

The Seguro Popular has proven effective in reducing perinatal and maternal mortality in its short period of implementation. Thanks to the rapid expansion and the increasing penetration of the program among the uninsured population, it is expected that reductions in other risks and diseases are likely to be observed in the medium or long-term. These achievements point to the importance of a universal health system that can reach remote and low-income municipalities. Overall, our findings can shed some light on the current discussions of the reforming of the Seguro Popular, and are crucial for the achievement of the Sustainable Development Goals in Mexico.

Annex 1.A. Robustness checks: main specification

We run modified versions of our main specification to explore the importance of the fixed effects included in the model, and to verify the stability of the magnitude of our main results on perinatal mortality (Annex Table 1.A.1). Due to computational power limitations, linear probability regressions are performed instead of logits. The coefficient associated to the policy can be interpreted as the marginal effect. After controlling for municipality fixed effects and time fixed effects (column 4), as well as municipality fixed effects and specific municipality-time trends (column 5), the impact of the policy remains statistically significant and very similar in magnitude to the main specification – we find a decrease of 16 instead of 20 deaths (see overall effect in Table 1.2) per every 10 000 pregnancies.

Annex Table 1.A.1. Robustness checks for the main specification

	(1)	(2)	(3)	(4)	(5)
	Perinatal death	Perinatal death	Perinatal death	Perinatal death	Perinatal death
Global effect of the SP	-0.00194*** (0.000193)	-0.00170*** (0.000239)	-0.00185*** (0.000214)	-0.00161*** (0.000267)	-0.00160*** (0.000210)
Observations	32,893,440	32,893,440	32,893,440	32,893,440	32,893,440
R-squared	0.020	0.020	0.021	0.021	0.022
Benchmark model's controls	Yes	Yes	Yes	Yes	Yes
Time trend	Yes	No	Yes	No	No
Time FE (for years of entry)	No	Yes	No	Yes	No
State FE	Yes	Yes	No	No	No
Municipality FE	No	No	Yes	Yes	Yes
Municipality-specific trends	No	No	No	No	Yes
Adjusted R-squared	0.0202	0.0202	0.0213	0.0213	0.0219

Note: Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Chapter 2. How does European Cohesion Policy affect Regional Business Dynamics?

Co-authored with Lukas Klein-Rueschkamp and Paolo Veneri

Abstract: This paper assesses whether European Cohesion Policy funds from the 2007-2013 programming period affected business dynamics in European regions. First, we quantify the direct impact of the Cohesion, Social and Regional Development funds on business creation and business destruction at the regional level, and verify whether such impact is also reflected in the levels of regional labour productivity. Second, we examine whether the effects on regional business dynamics differ by type of fund. Subsequently, we assess the role of quality of governance in shaping these effects. Using a regression discontinuity approach, we show that regions receiving more funds experience higher business creation and lower business destruction, which translates into higher net firm creation and growing employment in firms. In addition, we observe that regions receiving more funds show higher increases in gross value added per worker. Our interpretation is that faster business creation stimulates competition and a more efficient reallocation of skills and resources across firms, generating higher levels of regional labour productivity. Finally, we find that for southern European countries, funds have a significantly higher effect on net business employment creation in regions with lower levels of perceived corruption, although this is not necessarily conducive to higher levels of labour productivity.

2.1. Introduction

One of the main pillars of the European Union's integration strategy, and the EU's main investment programme, is the EU Regional Policy, a large fiscal transfer system mainly delivered through three types of funds: the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). These three types of funds together are referred to as the European Cohesion Policy (CP). Broadly speaking, the objective of the EU Cohesion Policy is to reduce economic and structural disparities between regions and countries within the EU's single market. More than one third (36%) of the EU budget in 2007-2013 (€346.5 billion) was dedicated to these funds, targeted mainly – but not only – to the less economically developed European regions (European Union, 2013).

As a consequence of the political relevance and economic magnitude of the EU Cohesion Policy, many studies have investigated the impact of these funds on recipient regions and the EU overall. The vast majority of the literature has focused on two questions: (i) Have transfers induced economic improvements in recipient regions? (e.g. in employment, see Giua, 2017; or in accessibility and patents, see Ferrara et al., 2017), and (ii) Have transfers enabled less developed regions to catch-up with the most developed ones through higher growth rates (i.e. contributed to regional convergence)? In some studies, of which Becker et al. (2010) is one of the most known in the literature, these questions have been addressed by exploiting one of the EU's funding allocation rules, which is predominantly based on a region's GDP per capita relative to the GDP per capita of the EU⁶.

Previous work has demonstrated that the EU Cohesion Policy positively affects GDP per capita growth (e.g. Becker et al., 2010, 2012, 2013 and 2018; Ramajo et al., 2008, Mohl and Hagen, 2010; Pellegrini et al., 2013; Barone et al., 2016; Gagliardi and Percoco, 2016; Crescenzi and Giua, 2019). However, little is known about the exact mechanisms through which funds influence regional economic growth (Berkowitz et al., 2019). Using novel data on

⁶ For the 2007-2013 programming period, regions with a GDP per capita (in euros PPP, average 2000-2002) lower than the 75% of the GDP per capita of the EU25 were entitled to more ERDF and ESF, while regions of countries with a GNI per capita (in euros PPP, average 2001-2003) lower than 90% of the EU25 received more CF.

regional business demography, we focus on firm dynamics as one possible mechanism underlying the economic effects of EU Cohesion Policy.

The main objective of this paper is to identify the causal effect of the EU's Cohesion Policy on business dynamics, mainly on the net creation of firms and jobs; and, in a second step, to examine the role of institutions in enhancing the effectiveness of Cohesion Policy funds.

We show that firm dynamics play an essential role in explaining the positive effects of funds on regional labour productivity and economic growth. Specifically, we examine the impact of funds on the creation and destruction of firms and the jobs associated to these events. Using measures of quality of governance, this paper also explores the role of institutions in shaping the effectiveness of the policy on net business employment creation and regional labour productivity.

We identify empirically the causal effect of EU Cohesion Policy on regional business dynamics by employing a regression discontinuity design approach that compares NUTS-2 regions that are similar in economic, demographic and geographical characteristics but differ substantially in the amount of funds for which they are eligible. We show that regions that spend more EU funds record positive firm birth rates and close to zero firm death rates, which translates into higher rates of net firm creation and more business employment. This creation of new firms and jobs – which raises competition, stimulates innovation and a better reallocation of resources – might be one of the mechanisms underlying the observed higher levels of regional labour productivity, which in turn is a key component of regional economic development. Finally, we find that for southern European regions, better regional institutions enhance the effectiveness of funds on business employment. On average, in regions where corruption is lower, funds have a significantly higher effect on the rates of net business employment creation.

The remainder of the paper is organised as follows, section 2.2 briefly discusses the relevance of Regional Business Dynamics (RBD) for regional development and provides the background of the EU Cohesion Policy funds. Section 2.3 describes the data we use in our study and provides some key summary statistics, while section 2.4 explains our identification strategy and empirical model. The results and conclusions are discussed in the last two sections, while selected robustness checks are summarised in the annex.

2.2. Regional Business Dynamics and Cohesion Policy Funds

2.2.1. Regional Business Dynamics

Business creation is a key driver of both local employment and regional productivity, and thus crucial for regional development (OECD, 2017). Theoretical (Schumpeter, 1942; Aghion and Howitt, 1990) and empirical work (Foster et al., 2001; Asturias et al., 2019; Alon et al., 2018) has demonstrated the importance of business creation and churning (creative-destruction of firms) for productivity.

The entry of new firms into the market can trigger productivity through different channels. For example, new businesses increase competition and are likely to introduce new technologies, processes and forms of organization into the economy. If new firms are more productive than the existing ones, overall productivity is boosted. The entry of new firms can lead to the destruction of the less productive incumbent firms (churning or creative-destruction). However, if the incumbent firms adapt and become more efficient due to the pressure of more competition (Aghion et al., 2005; Nickell, 1996), productivity can be enhanced without firm destruction. What is more, business creation without (or with less) firm destruction is likely to generate higher levels of employment if jobs are maintained in the incumbent firms.

In the EU, annual regional business creation constitutes around 10.5% of the total existing firms. Nevertheless, cross-regional disparities are stark. For instance, while in some European regions new businesses represent more than 20% of the existing businesses, in the less entrepreneurial regions, firm creation amounts for less than 5% of the active firms. What is more, regional business destruction is also high in the EU, with average levels that go up to 9.1% with respect to existing firms, leading to levels of net business creation that range from 4% to 8% across regions. New firms also contribute significantly to regional employment growth. On average, the jobs created by new firms every year represent 3.4% of the total existing jobs in active firms; in some regions, this can go up to 7.4% (Table 2.1).

Academic research has shown the importance of access to finance for business creation and entrepreneurship (Evans and Jovanovic, 1989; Kerr and Nanda, 2009). Since capital is crucial to start a new business, financial constraints tend to exclude potential entrepreneurs and limit the creation of new firms. What is more, access to funds is also essential for firms to innovate and grow. Previous work has documented a positive relationship between access to

finance and firm performance, including for SMEs and start-ups (Rajan and Zingales, 1998; Cabral and Mata, 2003; Guiso et al., 2005).

2.2.2. Cohesion Policy Funds 2007-2013

With the overarching objective of ensuring economic, social and territorial cohesion across its regions, the EU created the Cohesion Policy, a financial instrument that supports a broad range of policy areas including SMEs, jobs and skills, and infrastructure. Cohesion Policy encompasses three types of funds, the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF). For the programme period 2007-2013, Cohesion Policy funds represented close to €347 billion – of which 58% corresponded to ERDF, 22% to ESF and 20% to CF. Since all Cohesion Policy projects are co-financed by national or regional stakeholders, the total expenditure in EU regions associated to this policy amounted to €700 billion in the whole period (European Union, 2013).

General objectives

For the programming period 2007-2013, Cohesion Policy financed EU regional policy within the three main objectives of 1) Convergence, 2) Regional competitiveness and employment and 3) European territorial cooperation (European Union, 2014).

1. *Convergence*: this objective (hereafter also referred to as objective 1) aims at triggering growth in the least developed EU countries and regions for them to catch up faster with the EU average. Around 81.5% of the total CP funds were allocated to this objective. Public expenditure co-financing this objective is limited to 75% of the ERDF and ESF, and to 85% of the CF.

2. *Regional competitiveness and employment*: this objective seeks to enhance regional competitiveness and attractiveness and to promote regional employment. To achieve this, objective 2 focuses on boosting innovation and entrepreneurship, as well as promoting environmental protection and the development of labour markets. It mainly pertains regions not classified as the least developed ones (from objective 1). The European Commission (EC) has allocated 16% of the total CP funds to this objective. The co-financing of this objective is limited to 50% of the public expenditure.

3. *European territorial cooperation:* objective 3 (also known as INTERREG programme) aims at strengthening cross-border, transnational and inter-regional cooperation. It supports the collaboration of neighbouring regional administrations to find common solutions for development, and promotes economic relations and networking between small and medium-sized enterprises (SMEs) across regions. Only 2.5% of the total CP funds are assigned for this objective. Co-financing for territorial cooperation is allowed up to 75% of total public expenditure.

While objective 1 on convergence can benefit from the three types of Cohesion Policy funds (i.e. ERDF, ESF and CF); objective 2 on competitiveness and employment can use resources only from the ERDF and the ESF, and objective 3 on territorial cooperation is financed only through the ERDF (for more details see European Union, 2014).

Management, Allocation and Beneficiaries

The implementation of Cohesion Policy funds is based on a shared management system between the EU, national governments and regional administrations (European Commission, 2017). EU states have the responsibility of setting Management and Control Systems (MCS) for Operational Programs (OPs). These MCS have to align with EU regulations and need to be validated by the European Commission (EC). OPs are defined as the implementation of one of the three Cohesion Policy objectives with a single fund (either ERDF, ESF or CF).

Each EU state has to delegate the administration of Operational Programs to specific Managing Authorities (MAs). MAs are typically hosted by government bodies, such as Ministries, and or by regional administrations – the latter generating Managing Authorities for Cohesion Policy at the regional level (OECD, 2020). Besides MAs, EU states have to designate a Certifying Authority (CAs) and an Audit Authority (AAs) – corresponding to a national, regional or local public authority or body. While CAs are in charge of certifying statements of expenditure and applications for payment before they are sent to the EC, the AAs are in charge of auditing the functioning of the management and control system (European Union, 2014).

Beyond the management and controls of the transfer system, the planning and delivery of all Cohesion Policy related projects is typically ensured by partnerships between the EU, national and regional administrations, and numerous local stakeholders, including NGOs, universities and the civil society (European Commission, 2017).

A wide range of legal entities can benefit from EU Cohesion Policy funding, including public and private sector organizations, universities, NGOs and other types of civil society associations. In practice, however, the majority of beneficiaries are businesses – 120 000 start-ups and 400 000 SMEs in the period 2007-2013 (European Commission, 2016) – and government authorities (e.g. ministries, regional governments and municipal administrations).

Nevertheless, the allocation and expenditure of funds varies widely across regions. For example, in the period 2007-2013, some regions benefited and spent less than €1 million of CP, while the most supported regions received and spent over €1 billion (Table 2.1). This heterogeneity in the expenditure of funds is explained by the 2007-2013 allocation rules: regions with a GDP per capita (in euros PPP, average 2000-2002) lower than the 75% of the GDP per capita of the EU25 were entitled to more ERDF and ESF, while regions of countries with a GNI per capita (in euros PPP, average 2001-2003) lower than 90% of the EU25 received more CF. It is worth noting that while all regions can access ERDF and ESF, only the regions from the least developed countries can benefit from CF.

European Regional Development Fund

The ERDF contributes to the three main objectives of Cohesion Policy by providing:

- Investments in companies (mainly SMEs and start-ups) to create sustainable jobs;
- Investments in infrastructures, in particular related to innovation, R&D, telecommunications, transport, energy and the environment;
- Financial instruments to support regional and local development (including support and services for SMEs);
- Other technical assistance measures (European Union, 2013).

European Social Fund

The ESF, characterized by a strong focus on human capital, finances projects that contribute to the first two objectives of Cohesion Policy. More concretely, this fund supports:

- Adaptation of workers and enterprises, for example, through training and lifelong learning programs, as well as promoting innovative working schemes;
- Access to jobs for the unemployed, women, migrants and other groups;

-
- Integration of vulnerable or disadvantaged groups into the labour market by combating discrimination;
 - The improvement of educational systems and teaching networks to enhance human capital (European Union, 2013).

Cohesion Fund

The CF only supports projects directed to the achievement of CP's objective 1, with a strong focus on sustainable development. The infrastructure projects financed by CF relate to:

- Transport systems (including trans-European transport networks);
- The environment (including sustainable development) (European Union, 2014).

2.3. Data

The data for our main explained variables, which correspond to indicators of firm births and deaths (as a rate of the number of active firms) as well as the resulting creation or loss of employment (as a rate of the employment of active firms), were taken from Eurostat's database on regional business demography (Eurostat, 2018). This database provides annual regional statistics for European regions (NUTS-2 and NUTS-3 level) for the period 2008 to 2014. On top of the space and time dimensions, the indicators are also disaggregated by economic sector (10 sectors following NACE Rev.2) and by type of firm (employer and non-employer firms). In the EU, regional business creation represented around 10.5% of the total active firms in the period 2008-2014. However, business destruction was also high and amounted for 9.1% of the existing firms, leading to average levels of net business creation of 1.4% (Table 2.1).

To examine the effects of EU's Cohesion Policy (i.e. ERDF, ESF and CF) for the budget cycle of 2007 to 2013, we use data provided by the EC (European Commission, 2018) on the total amount of funds (by type of fund) actually spent by a region (NUTS-2 level) in a given year. For the programming period 2007-2013, the annual average expenditure of a region in total Cohesion Policy was of €166.5 million, of which 57% corresponded to ERDF (Table 2.1).

To explore the heterogeneous effects of funds due to differences in the quality of institutions, we use a regional (NUTS-2 level) survey-based indicator of quality of governance (QoG) from the Quality of Government Institute at the University of Gothenburg. This indicator

covers the years 2010 and 2013 and focuses on the pillar of governance related to corruption. Higher values in the index of less corruption denote lower levels of perceived corruption among the population (Charron et al., 2015). The index is centred and expressed in standard deviations (z-score).

The other variables of interest such as indicators of regional labour productivity (by sector), measured as GVA per worker (in the corresponding sector), or the GDP per capita as a share of the EU25, come from the OECD Regional Database (OECD, 2018). Average labour productivity in the EU regions was close to the USD 63 000 (in 2010 PPP) in the period 2008-2014. However, labour productivity is highly unequal across regions. For instance, while some regions have levels of per worker GVA below the USD 16 000 (in 2010 PPP), the most productive regions in the EU surpass the USD 100 000 (in 2010 PPP) (Table 2.1).

Table 2.1. Summary statistics

	Regional average	Standard deviation	Minimum	Maximum
<i>Business Demography outcomes, 2008-2014</i>				
Active firms (in thousands)	131.7	139.4	2.878	863.5
Active firms per 10 000 people	649.3	228.0	218.9	1,918
Birth rate of firms (%)	10.52	2.778	5.179	24.58
Death rate of firms (%)	9.166	3.365	4.661	28.88
Net birth rate of firms (%)	1.422	2.912	-4.298	7.977
Employees in active firms (in thousands)	617.7	754.6	11.59	6,599
Employees in active firms per 10 000 people	3,002	1,309	1,125	10,011
Employment increase due to firm births (%)	3.402	1.228	0.830	7.427
Employment decrease due to firm deaths (%)	3.389	1.503	0.626	9.046
Net employment increase due to firm births and deaths (%)	-0.0107	0.961	-6.189	2.911
<i>Cohesion Policy Funds 2007-2013, expenditure in millions of euros</i>				
Cohesion Policy Fund	166.5	201.8	0.691	1,041
European Regional Development Fund	93.99	121.8	0.269	745.3
European Social Fund	35.86	39.95	0.422	341.7
Cohesion Fund	36.68	60.44	0	394.5
<i>Other variables</i>				
Index of less corruption (centred and normalized)	-0.0954	0.955	-2.912	2.359
Population (in millions)	2.054	1.799	0.0280	11.84
GDP per capita as a share of the EU	82.55	36.76	18.29	171.6
GVA per worker (USD PPP at prices of 2010)	62,958	15,350	25,559	112,392

Note: Averages of 159 EU regions with available data over the period 2007-2014.

Source: Author's elaboration based on Eurostat (2018), European Commission (2018), Charron et al. (2015), and OECD (2018).

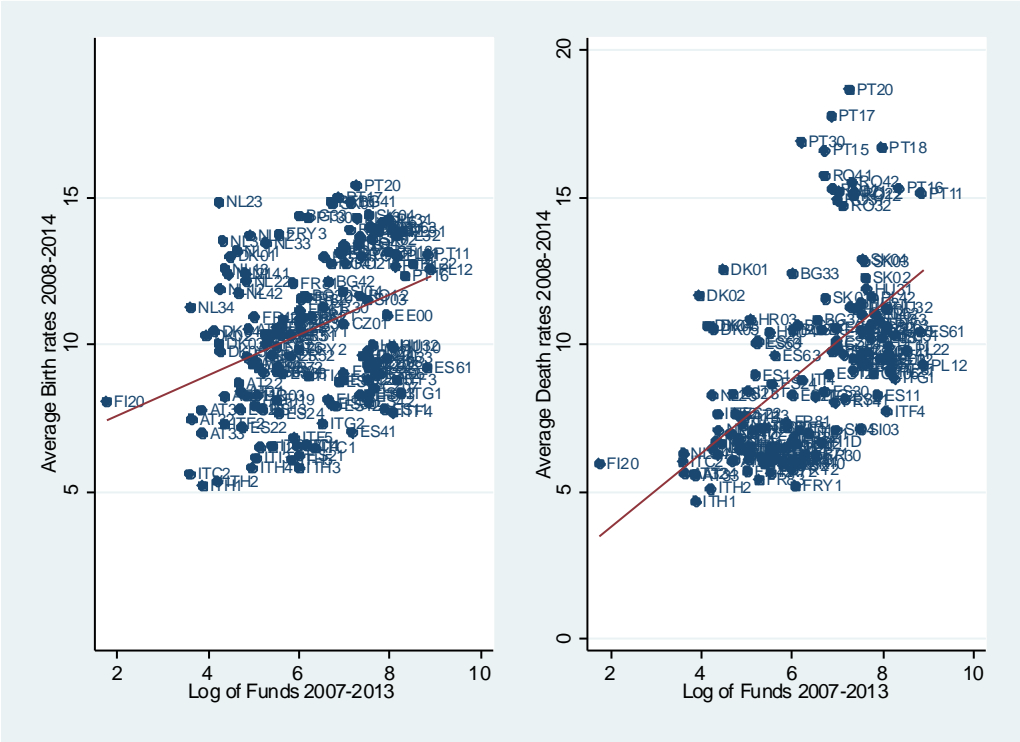
In total, there are 159 non-repeated regions from 18 countries in our database. However, since each region can be broken down by economic sector, employer or non-employer status and year, this increases the samples for the analysis to around 20 000 observations.

2.4. Empirical strategy

Across European regions, the amount of funds (in log terms) a region spends is strongly correlated with its firm dynamics. More funds are not only associated with higher rates of business creation, but also with higher death rates of firms (Figure 2.1).

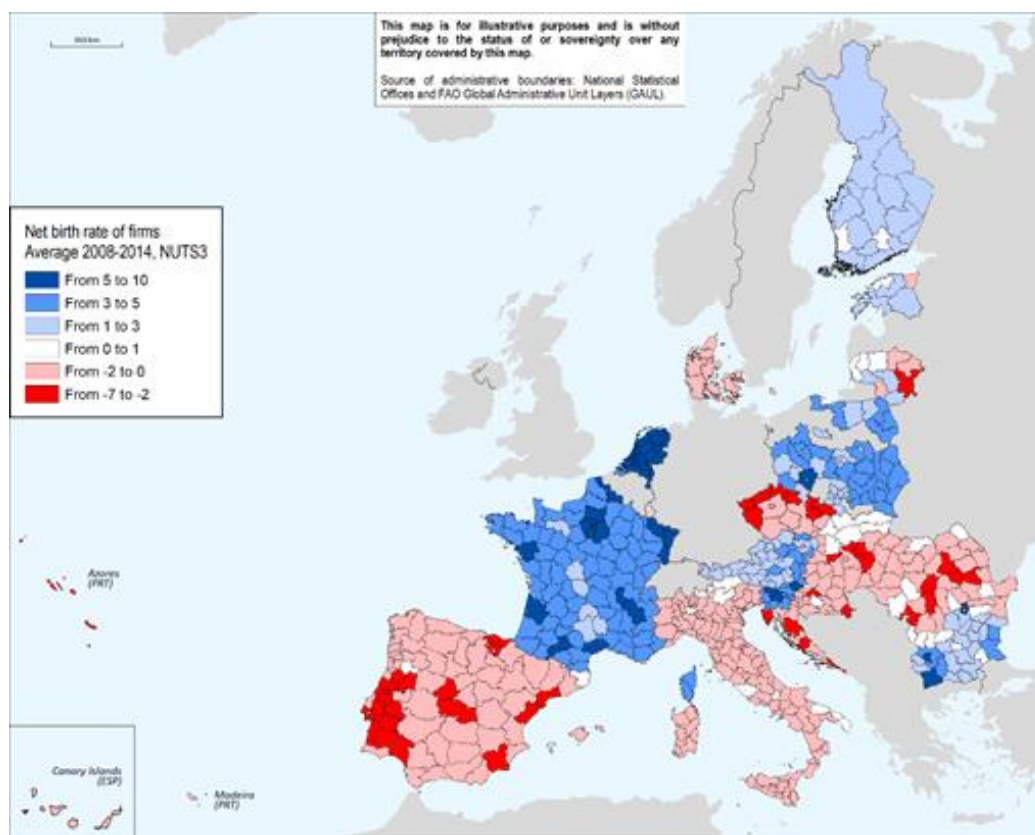
This correlation is only suggestive, as regions can differ along many other dimensions that can simultaneously affect the amount of funds they receive as well as the firm birth and death rates. Furthermore, Figure 2.1 does not reveal if there is any effect on net firm creation rates (firm birth minus firm death rates), which vary widely across European regions (see Figure 2.2). In the following, we present the empirical strategy used in this paper to estimate the causal impact of regional funds on business dynamics.

Figure 2.1. European Funds vs. Births and Deaths of firms



Source: Author’s elaboration based on European Commission (2018), and Eurostat (2018).

Figure 2.2. Net birth rate of firms in small regions (NUTS-3 level)



Source: Author's elaboration based on Eurostat (2018).

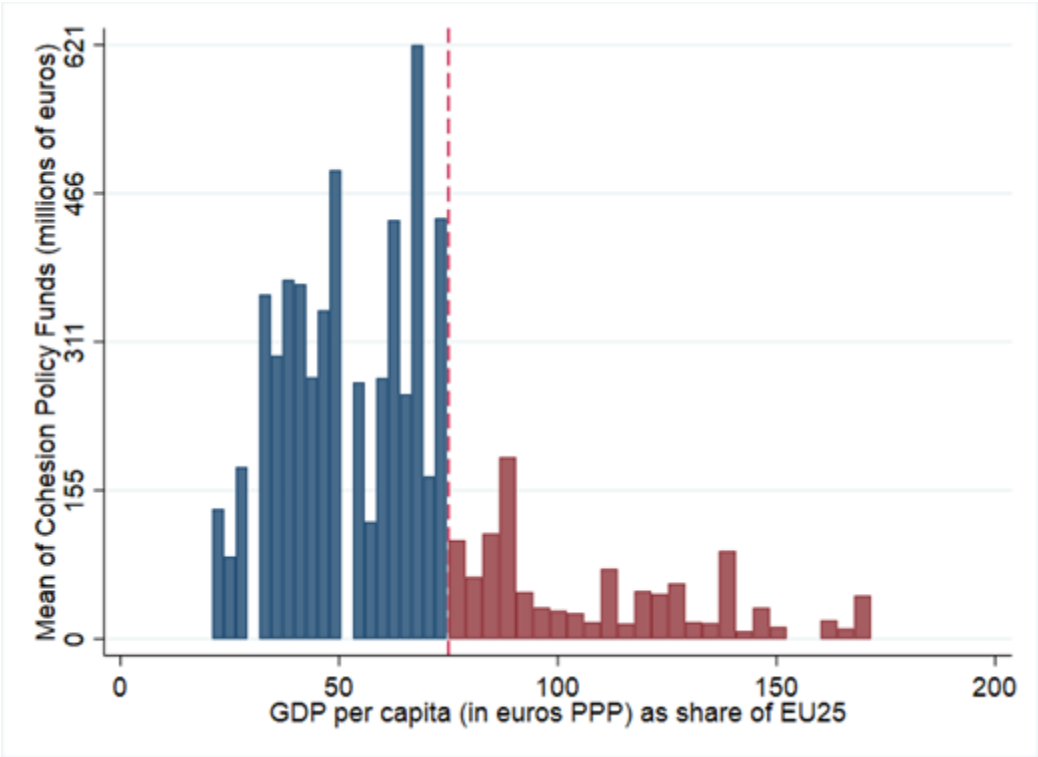
To identify empirically the effect of EU Cohesion Policy funds on regional business dynamics we use a regression discontinuity design (RDD) in a 2-stage least squares (2SLS) framework. The funding allocation rule for the less prosperous regions gives rise to an exogenous variation for funds allocated to regions. Regions with a GDP per capita (in euros PPP, average 2000-2002) below 75% of the EU25 average qualify for more funds (this is also known as EU objective 1 funding). Public institutions, the private sector (in particular small and medium enterprises or SMEs), universities and NGOs located in the target regions can apply for funds through the corresponding regional authorities, which results in a considerable increase in the amount of funds that regional stakeholders can access and thus spend.

Regional expenditure of EU funds is clearly discontinuous around the 75% of regional GDP per capita as a share of the EU25 (Figure 2.3). On average, regions below the 75% EU's GDP per capita cut-off line (hereafter 75-threshold) spent around 5.5 times more funds than regions with GDP per capita levels above the 75-threshold. More importantly, the discontinuity

is starker and more exogenous the closer to the cut-off line, which allows estimating the effects of funds through a regression discontinuity design (RDD) approach. What is more, this discontinuity also holds for allocated funds, which decreases concerns about potential omitted variable issues related to the lack of local capacity to even spend their allocated funds (Annex Figure 2.A.1 shows the stark discontinuity around the 75-threshold for allocated funds, while Annex Figure 2.A.2 displays the strong correlation between allocated and spent funds).

One concern that emerges when using RDD is that the main explanatory variable (here EU funds) might not be the only discontinuous variable around the 75-threshold that could be affecting regional business dynamics. This circumstance could bias the coefficient associated to EU funds. The Annex provides evidence that other selected variables (possible determinants of business dynamics), such as population, employment and institutions, are not discontinuous around the 75-threshold (Annex Figure 2.B.1).

Figure 2.3. Expenditure of Funds and GDP per capita

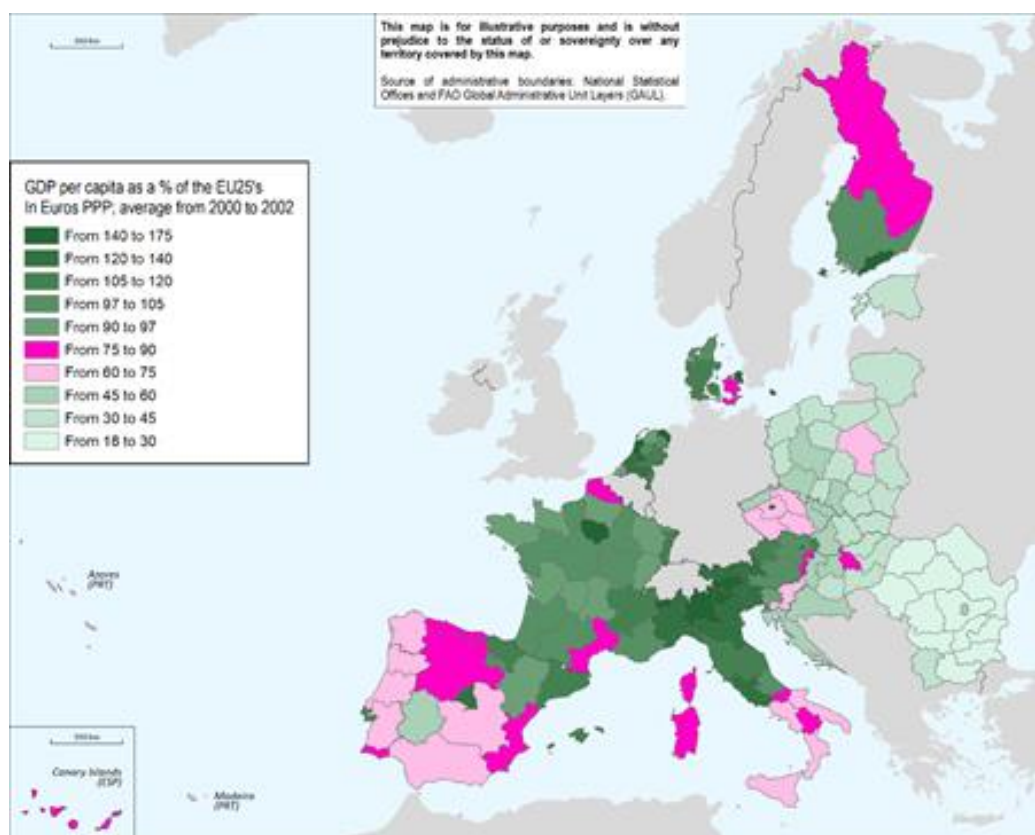


Note: “Funds” refer to the European Regional Development Funds (ERDF), European Social Funds (ESF) and Cohesion Funds (CF), this note applies to all graphs and tables.
Source: Author’s elaboration based on OECD (2018) and European Commission (2018).

Having a GDP per capita larger than 75% of the EU (i.e. non-eligibility for EU objective 1 funding) does not imply that regions do not receive any EU regional transfer at all (as can be observed in Figure 2.3). In light of this imperfect compliance in the allocation of funds, we employ a “fuzzy” regression discontinuity design instead of a “sharp” RDD. While the sharp RDD exploits the discontinuity rule to identify the treatment and control groups in a deterministic manner, the fuzzy RDD employs the discontinuity rule to predict the probability of being treated, thus becoming an instrumental variable for treatment status (Angrist and Pischke, 2009).

Only the regions close to the 75-threshold are used for the RDD estimation. Figure 2.4 gives an overview of regions included in our analysis and shows in pink the regions just below or just above the 75-threshold. More precisely, this figure highlights the regions with a GDP per capita between 60% and 90% of the GDP per capita of the EU average (hereafter bandwidth 60-90).

Figure 2.4. Regional GDP per capita as a share of the EU25



Source: Author's elaboration based on OECD (2018).

Most of the regions that are 15 percentage points above or below the 75-threshold are concentrated in Southern Europe, with the exception of a few regions in Nordic countries (Denmark and Finland) and Central Europe (e.g. Czech Republic and Hungary) (Figure 2.4). To increase the comparability of the regions around the threshold (by reducing potential omitted variable bias due to unobservable geographical characteristics) and to improve the reliability of the estimates, we select the 60-90 bandwidth and spatially restrict our sample to regions of Southern European countries only, namely Portugal, Spain and Italy. To test the robustness of the results and their external validity, we also estimate the main empirical regression specification using a number of alternative bandwidths that yield different samples of regions (see Annex Table 2.C.1-Annex Table 2.C.3).

2.4.1. OLS regressions around the discontinuity

We begin the analysis with a simple OLS model as in Equation 2.1, where $BD_{r,s,e,t}$ stands for the business dynamic variable (e.g. birth rate of firms) in region r , economic sector s , employer status e , and year t .

$$BD_{r,s,e,t} = Funds_{r,t-1}\beta + Z_{r,t}C + \gamma_s + \phi_e + \omega_c + \lambda_t + \eta_{r,s,e,t} \quad 2.1$$

$Funds_{r,t-1}$ is the amount of Cohesion Policy funds spent in the previous year (hereafter “Funds”, which include ERDF, ESF and CF) in millions of euros. While the amount of spent funds might have a contemporaneous effect on business dynamics, we argue that most of the effect should be reflected in next year’s business registers. $Z_{r,t}$ is a set of controls that contains GDP per capita (as a share of the EU) and its square, and the log of population – as the development of the region in terms of GDP per capita and its population size may be associated to the local capacity to obtaining more funds and also to a more dynamic business sector. Our specifications also include economic sector, employer class, country and year fixed effects (denoted by ϕ_e , γ_s , ω_c and λ_t respectively), which reduces the variation in business dynamic outcomes driven by industrial activity, employment size, and other time-invariant country characteristics or year-specific shocks.

We start our analysis by presenting the coefficients of the standard OLS regressions using the whole sample of regions (Table 2.2). This first specification suggests that more funds are associated to more business creation (column 1) but also to more business destructions

(column 2), which leads to a non-significantly different from zero net growth in the number of active businesses (column 3). The same pattern is observed for the employment associated to this business dynamic (columns 4 to 6). Nonetheless, the fact that this specification compares very heterogeneous regions across Europe raises concerns on the reliability of the coefficients associated to the funds, which most likely are biased due to unobserved omitted variables. One of our main concerns is that the characteristics that make a region more “entrepreneurial” (e.g. low risk aversion, preference for self-employment, access to financial instruments, etc.) are also the abilities that facilitate the capturing of Cohesion Policy funds, in which case our coefficients for birth and death rates will be upwardly biased.

Table 2.2. OLS for all regions

	(1)	(2)	(3)	(4)	(5)	(6)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate
Funds	0.184*** (0.0195)	0.192*** (0.0381)	-0.00827 (0.0353)	0.0428*** (0.0124)	0.0615*** (0.0188)	-0.0186 (0.0152)
GDP per capita as share of EU	-5.218*** (0.940)	-4.508** (1.807)	-0.711 (1.861)	-6.897*** (0.400)	-7.183*** (0.678)	0.286 (0.650)
(GDP per capita as share of EU) ²	0.0233*** (0.00450)	0.0170** (0.00767)	0.00633 (0.00805)	0.0218*** (0.00180)	0.0227*** (0.00290)	-0.000886 (0.00280)
Log of Population	16.41*** (3.871)	8.425* (4.741)	7.982 (5.081)	-10.64*** (2.253)	-7.516*** (2.455)	-3.120 (2.399)
Employer firms	69.63*** (7.688)	175.7*** (16.93)	-106.1*** (16.76)	20.50*** (3.967)	61.58*** (7.624)	-41.08*** (7.297)
Observations	11,235	11,235	11,235	11,015	11,015	11,015
R-squared	0.384	0.179	0.117	0.515	0.251	0.085
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.382	0.176	0.114	0.514	0.249	0.0819

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

To reduce potential omitted variable bias, we restrict the sample to regions whose GDP per capita lies around the 75-threshold of the EU25 average, thereby comparing regions close to each other in terms of potentially unobservable characteristics associated to their economic development. Additionally, we focus on regions located in Southern European countries (Portugal, Spain and Italy), which reduces the effects of unobservable geographically or culturally determined characteristics. The preferred bandwidth of regional GDP per capita (in euros PPP) ranges from 60% to 90% (i.e. bandwidth 60-90) of the EU25 average, a window also used in Becker et al. (2010). This sample restriction represents close to 15% of all available non-repeated regions (7.5% below and 7.5% above the 75-threshold).

The results of the restricted OLS specification within the 60-90 bandwidth, shown in Table 2.3, confirm the initial hypothesis that the previous unrestricted OLS estimates were upwardly biased for both birth rates and death rates of firms.⁷ Richer regions, with typically higher productivity levels and business churn (Tsvetkova et al., 2020) might be more likely to request and acquire larger amounts of funds due to their endogenously greater entrepreneurial activity (Table 2.2). When reducing this type of endogeneity (by comparing regions around the 75-threshold), we find that more funds generate more businesses creation but are not significantly associated with more firm destruction (Table 2.3, columns 1 and 2), leading to a significantly net birth rate of firms (column 3). The same logic applies for the employment associated to the net creation of businesses employment (columns 4 to 6): more funds are associated to a positive net growth of jobs.

Table 2.3. OLS for regions around the 75%-threshold

Bandwidth from 60% to 90%, regions of Portugal, Spain and Italy

	(1)	(2)	(3)	(4)	(5)	(6)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate
Funds	0.0460* (0.0240)	-0.00296 (0.0274)	0.0490** (0.0227)	0.0408** (0.0190)	-0.0151 (0.0252)	0.0559*** (0.0188)
GDP per capita as share of EU	-69.95*** (22.28)	-78.01*** (24.74)	8.055 (21.27)	-10.59 (16.46)	-46.25* (23.69)	35.66* (18.88)
(GDP per capita as share of EU) ²	0.426*** (0.140)	0.485*** (0.155)	-0.0593 (0.134)	0.0534 (0.104)	0.271* (0.147)	-0.218* (0.117)
Log of Population	-16.62** (7.598)	-1.995 (7.355)	-14.62** (7.176)	-17.77*** (5.127)	-6.754 (5.495)	-11.02** (5.150)
Employer firms	166.5*** (12.13)	99.74*** (12.75)	66.81*** (11.36)	49.77*** (8.975)	29.21*** (10.49)	20.56** (8.244)
Observations	1,647	1,647	1,647	1,637	1,637	1,637
R-squared	0.520	0.453	0.476	0.537	0.500	0.381
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.514	0.446	0.469	0.531	0.493	0.373

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Although the empirical specification of Table 2.3 decreases part of the potential omitted variable bias issue, it does not clearly address potential reverse causality – e.g. regions with a more developed business environment, endogenously more entrepreneurial, may be better at applying and obtaining more funds. To address this, a Regression Discontinuity Design (RDD)

⁷ These results also hold for the bandwidth 60-90 without restricting the sample to Southern European regions, see Annex Table 2.C.1.

in a 2-stage least squares (2SLS) model is used, where the amount of funds is predicted using the exogenous 75-threshold rule as an instrumental variable.

2.4.2. Main specification (RDD 2SLS)

Our preferred model consists in a RDD in a 2SLS specification of the form:

		2.2
1 st stage	$\widehat{Funds}_{r,t} = T_{r,2001}A + Z_{r,t}B + \omega_c + \lambda_t + \varepsilon_{r,t}$	2.2.a
2 nd stage	$BD_{r,s,e,t} = \widehat{Funds}_{r,t-1}\beta + Z_{r,t}C + \gamma_s + \phi_e + \omega_c + \lambda_t + \eta_{r,s,e,t}$	2.2.b

In the first stage, we predict the amount of funds spent by a region r in year t , using $T_{r,2001}$, the dummy variable for the 75-threshold being 1 if the average GDP per capita of the region as a share of the EU average was below 75%. Additionally, we control for the same variables described in Equation 2.1. In the second stage, we run the predicted funds (lagged one year) from the first stage $\widehat{Funds}_{r,t-1}$ on Business Dynamics variables $BD_{r,s,e,t}$ (for region r , sector s , employer class e , and year t), while controlling for the set of variables $Z_{r,t}$ (GDP per capita as a share of the EU and its square, and the log of population), and a set of country, sector, employer class and year fixed effects. As in the previous OLS model, we estimate this regression on the sample of Southern European regions within the bandwidth of 60 to 90% of GDP per capita as a share of the EU.

2.5. Results

2.5.1. The impact of Cohesion Policy Funds on Business Dynamics

The results support the interpretation that the creative effect of funds generates more competition and reallocation of jobs in the economy, which leads recipient regions to achieve higher levels of labour productivity (Table 2.4). What is more, the competition generated by the new firms entering the market is not associated to firm destruction, which results in higher levels of employment and labour utilization in the recipient regions. These results hold qualitatively for a variety of different bandwidths, although the magnitude or significance can slightly vary from one specification to another (see Annex Table 2.C.1-Annex Table 2.C.3).

Our findings can be interpreted as a variation of the creative-destruction argument that new and more innovative firms replace the old and less innovative ones (Schumpeter, 1946;

Aghion and Howitt, 1990) generating higher levels of productivity. In our results, more competition associated with new firms entering the market might lead to more productivity also through the adaptation of incumbent firms – instead of through pure firm destruction. Additionally, in a context of business creation without significant firm and job destruction, employment is also increased.

The effects of funds on business birth and death rates of the RDD 2SLS (Table 2.4) are stable (i.e. same direction of signs and order or magnitude) compared to the restricted OLS specification (of Table 2.3) – although the coefficients of the latter model seem to be underestimating the real effect of European Cohesion Policy funds.

Our results show that a €100 million increase in annual funds (around 0.3% of the total Cohesion Policy budget for the period 2007-2013) is associated to the net creation of around 241 new firms and 159 new jobs per every 10 000 existing firms and jobs respectively (RDD 2SLS specification, see Table 2.4 columns 3 and 6). Finally, our results also indicate that funds have a significant and positive effect on labour productivity (column 7).

Table 2.4. The impact of Cohesion Policy funds on Business dynamics (main specification)

RDD 2SLS, 2nd stage; bandwidth 60-90, regions of Portugal, Spain and Italy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate	GVA per worker
Predicted Funds	0.193** (0.0801)	-0.0482 (0.0852)	0.241*** (0.0787)	0.107* (0.0624)	-0.0525 (0.0714)	0.159*** (0.0509)	31.36*** (7.045)
GDP per capita as share of EU	-66.80*** (23.19)	-80.53*** (26.12)	13.73 (22.02)	-11.97 (17.70)	-46.59* (23.85)	34.62* (17.91)	-1,788 (1,937)
(GDP per capita as share of EU) ²	0.418*** (0.144)	0.497*** (0.162)	-0.0795 (0.137)	0.0670 (0.110)	0.270* (0.147)	-0.203* (0.111)	14.60 (12.56)
Log of Population	-28.89*** (10.44)	2.279 (10.92)	-31.17*** (10.23)	-22.52*** (7.898)	-3.727 (8.934)	-18.79*** (7.093)	-5,627*** (924.0)
Employer firms	166.4*** (12.12)	99.78*** (12.76)	66.60*** (11.35)	50.01*** (9.001)	29.12*** (10.49)	20.88** (8.250)	
Observations	1,647	1,647	1,647	1,637	1,637	1,637	1,512
R-squared	0.520	0.453	0.478	0.536	0.500	0.379	0.964
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.514	0.446	0.471	0.530	0.493	0.371	0.964

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

2.5.2. Disentangling the role of different funds

The European Cohesion Policy is articulated through three main types of funds with potentially different impacts on business dynamics. It is worth noting that our main

specification (Equation 2.2.a and 2.2.b) allows for a causal identification through RDD 2SLS of the global impact of Cohesion Policy funds on net business creation and employment. The same approach cannot be applied by type of fund separately as the allocation rules and the discontinuity around the 75-threshold for each type of fund are overlapping (see Annex Figure 2.D.1-Annex Figure 2.D.3). On the other hand, Table 2.5 explores the relative impact of the distribution of funds by type (i.e. ERDF, ESF and CF) on our business dynamic variables, by adding to the model the share of each fund as a percentage of the total amount of funds.

Results suggest that larger shares of European Regional Development Funds and European Social Funds (as % of the total funds, i.e. ERDF+ESF+CF), relative to Cohesion Funds shares, are associated with higher business creation, confirming the effectiveness of these funds to encourage entrepreneurship in recipient regions. Moreover, the impact of larger shares of ESF is higher and more statistically significant than that of ERDF on employment and labour productivity. These results are in line with the main objectives for which these funds were designed. ERDF and ESF are mainly dedicated to promote SMEs and employment, respectively, whereas CF focuses typically on financing infrastructure projects.

Table 2.5. Business dynamics and the distribution of Funds by type

RDD 2SLS, 2nd stage; bandwidth 60-90, regions of Portugal, Spain and Italy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate	GVA per worker
Predicted Funds	0.191** (0.0870)	-0.0196 (0.0917)	0.211** (0.0844)	0.102 (0.0681)	-0.0716 (0.0791)	0.173*** (0.0562)	38.17*** (7.940)
Share of ERDF	99.83 (67.78)	-81.65 (72.70)	181.5*** (63.69)	64.41 (51.42)	31.01 (62.77)	33.40 (47.51)	5,224 (8,131)
Share of ESF	181.4** (81.70)	-18.98 (83.12)	200.3*** (71.13)	107.3* (63.23)	-22.86 (68.27)	130.2*** (48.85)	15,788** (7,481)
Benchmark model's controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,647	1,647	1,647	1,637	1,637	1,637	1,512
R-squared	0.522	0.454	0.479	0.537	0.500	0.382	0.965
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.515	0.446	0.472	0.530	0.493	0.373	0.964

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Benchmark controls refer to the GDP per capita as a share of the EU and its square, the log of population and the employer firm dummy variable. This note applies to the rest of the tables.

2.5.3. The role of Quality of Governance

It is widely accepted that institutions matter for economic development (see for example, North, 1991; Acemoglu and Robinson, 2010). For instance, the effectiveness of public investment largely depends on the institutional and governance capacity of regions to manage and allocate the funds they receive (Becker et al., 2013; Ederveen et al., 2006; OECD, 2013 and 2020). In Europe, the quality of institutions has been shown to vary substantially across regions (Charron et al., 2015), which can generate significant heterogeneous effects of funds across regions.

We extend our analysis in order to examine whether regional institutions have an effect on the impact of funds on firm dynamics. To explore the role of governance in mediating the effects of the Cohesion Policy, we modify our baseline model (Equation 2.2.a and 2.2.b) by adding the variable *Less corruption*, as well as its interaction with the variable *Funds*.

Table 2.6. Business dynamics, Funds and Quality of Governance

RDD 2SLS, 2nd stage; bandwidth 60-90, regions of Portugal, Spain and Italy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate	GVA per worker
Predicted Funds	0.0522 (0.0888)	-0.145 (0.101)	0.197** (0.0920)	0.0441 (0.0731)	-0.0929 (0.0858)	0.137** (0.0597)	25.00*** (7.568)
Predicted Funds X Less corruption	0.00744 (0.0732)	-0.0808 (0.0757)	0.0882 (0.0755)	0.141*** (0.0535)	0.0274 (0.0669)	0.114** (0.0572)	-31.15*** (10.29)
Index of less corruption	-78.89*** (28.28)	-17.87 (28.31)	-61.02** (28.57)	-98.80*** (20.96)	-51.24** (24.43)	-47.56** (20.49)	8,620*** (3,241)
Benchmark model's controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,531	1,531	1,531	1,521	1,521	1,521	1,386
R-squared	0.576	0.502	0.523	0.548	0.510	0.436	0.970
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.570	0.494	0.516	0.541	0.502	0.428	0.970

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

When funds are interacted with less corruption, the effect is positive on the net growth of business employment (Table 2.6, column 6), which adds up to the positive effect of funds alone. This result is mainly driven by a positive impact on the employment associated to the newly born firms (column 4). However, this increase in the number of jobs does not translate into increases in the levels of labour productivity (GVA per worker) for these regions (column 7).

This is not surprising as only the number of workers is growing due to the interaction effect (column 6), while the gross value added remains stable due to a zero net creation of firms.

The variable of less corruption is associated with lower birth rates of firms (Table 2.6, column 1). One possible interpretation for this result is that in regions with better institutions there are also more regulations (e.g. administrative procedures and requirements to open new businesses), as well as more protections for existing firms and workers, which slows down churning rates. While quality of institutions matters for the effectiveness of public investment through the channel of less corruption (Everhart and Sumlinski, 2001; Tanzi and Davoodi, 1998), strong levels of product market regulation tend to be associated with lower levels of net business creation (OECD, 2017).

2.6. Conclusions

By looking at regional business dynamics, our analysis uncovers one potential mechanism underlying the positive effects of European Cohesion Policy funds on regional economies. Our results support the hypothesis that regional transfers induce positive business dynamics' outcomes. They foster the net rate of firm creation and the jobs associated to such creation. This combination of higher firm creation and faster reallocation of jobs appears to increase competition and a more efficient utilisation of resources in regions, which ultimately raises regional labour productivity. Thus, our results offer a plausible explanation of why Cohesion Policy funds increase economic growth.

We also find that the positive impact of Cohesion Policy on net business creation is mainly driven by the European Social Fund (ESF) and the European Regional Development Fund (ERDF), relative to the Cohesion Fund (CF). On the other hand, most of the impact on employment creation is explained by the ESF alone. This goes in line with the objectives of each fund. While the ERDF tends to focus more broadly on SMEs and regional development projects, the ESF highly focuses on supporting employment and human capital for a stronger labour market.

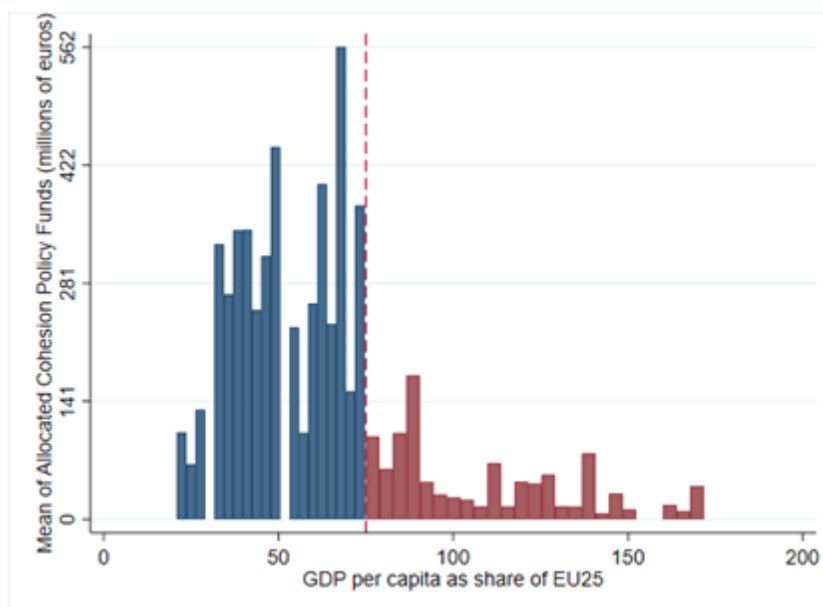
Finally, this work also provides evidence that regional institutions matter for the effectiveness of public investment – their quality enhances the impact of funds on business employment. In regions with lower levels of corruption, the effect of funds is conducive to

positive net business employment creation, but it has no significant effect on firm creation and churning. Consequently, this does not translate into higher productivity for these regions. This goes in line with our argument that the main business demography driver of productivity is firm creation and churning. In the absence of firm dynamics, productivity is not expected to increase.

The impact of funds on firm creation and business employment is robust to different bandwidths and can be extrapolated to all European regions. On the other hand, the enhancing effect of quality of governance on funds is only applicable for Southern European regions, which around the 75-threshold share similar levels of institutions.

Annex 2.A. Allocation and Expenditure of Cohesion Policy Funds

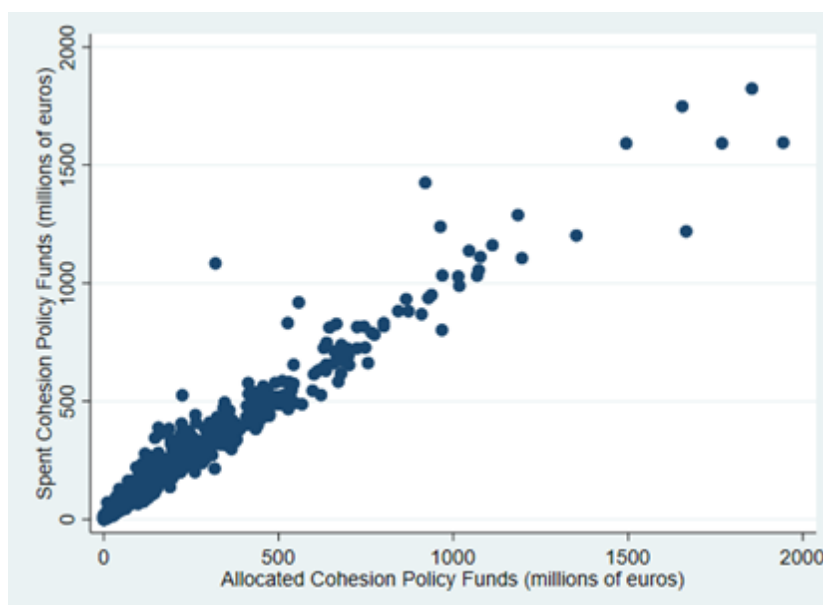
Annex Figure 2.A.1. Allocation of Funds and GDP per capita



Source: Authors' elaboration based on OECD (2018) and European Commission (2018).

Annex Figure 2.A.2. Cohesion Policy Funds 2007-2013: Expenditure vs. Allocation

By region and year, 2007-2013

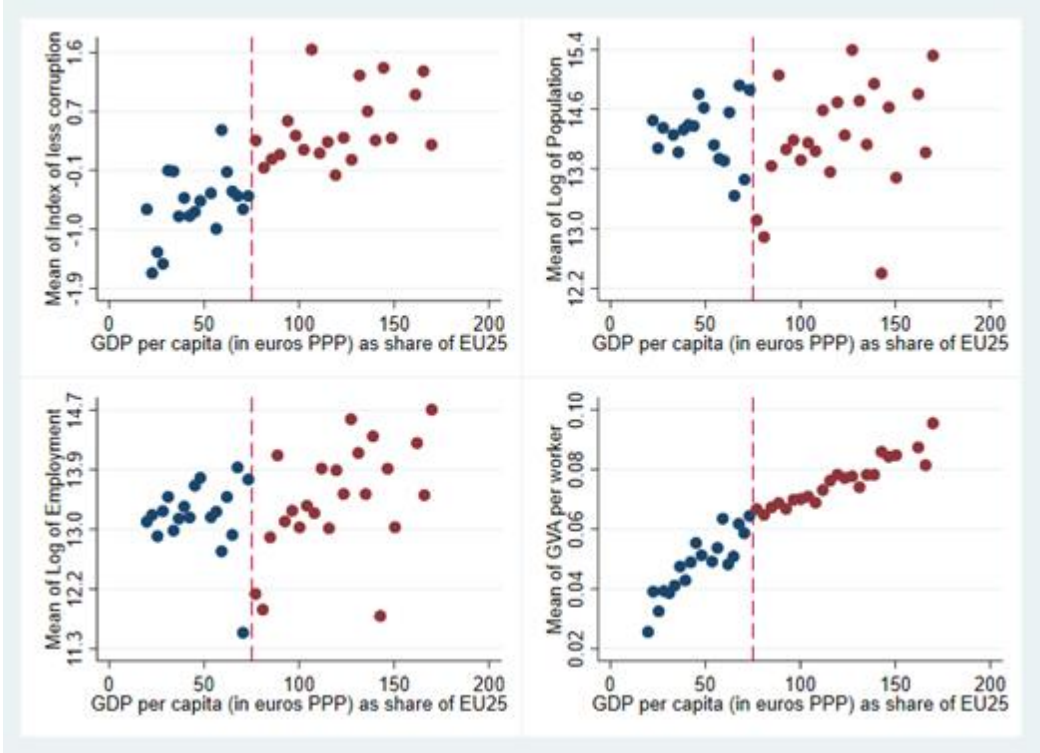


Note: Correlation coefficient of 0.97, statistically significant at the 95% level.

Source: Authors' elaboration based on OECD (2018) and European Commission (2018).

Annex 2.B. Non-discontinuity of selected variables around the 75-threshold

Annex Figure 2.B.1. Non-discontinuity of selected variables around the 75-threshold



Source: Authors' elaboration based on OECD (2018), Eurostat (2018) and Charron et al. (2015).

Annex 2.C. Robustness checks: different bandwidths for the RDD 2SLS specification

Annex Table 2.C.1. Robustness checks, all regions within bandwidth 60-90

RDD 2SLS, 2nd stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate	GVA per worker
Predicted Funds	0.166**	-0.0453	0.212**	0.112*	-0.0431	0.155***	37.40***
	(0.0759)	(0.0884)	(0.0872)	(0.0590)	(0.0698)	(0.0514)	(7.427)
GDP per capita as share of EU	-44.72**	-39.17	-5.545	5.756	-15.61	21.36	1,458
	(19.51)	(27.57)	(25.21)	(15.32)	(21.92)	(16.28)	(2,160)
(GDP per capita as share of EU) ²	0.281**	0.240	0.0416	-0.0473	0.0755	-0.123	-5.323
	(0.122)	(0.171)	(0.157)	(0.0954)	(0.135)	(0.102)	(13.85)
Log of Population	-13.92	14.27	-28.20**	-23.37***	0.625	-23.99***	-5,639***
	(10.28)	(10.48)	(11.16)	(7.400)	(8.443)	(7.029)	(1,011)
Employer firms	142.6***	196.1***	-53.53***	43.03***	61.28***	-18.25**	
	(11.55)	(12.43)	(13.34)	(7.553)	(9.232)	(7.902)	
Observations	2,494	2,494	2,494	2,431	2,431	2,431	2,214
R-squared	0.404	0.442	0.381	0.506	0.464	0.278	0.910
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.397	0.435	0.373	0.500	0.457	0.269	0.909

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Annex Table 2.C.2. Robustness checks, bandwidth 50-100

RDD 2SLS, 2nd stage; regions of Portugal, Spain and Italy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate	GVA per worker
Predicted Funds	0.208***	-0.0143	0.222***	0.0595	-0.0369	0.0964**	22.83***
	(0.0679)	(0.0698)	(0.0665)	(0.0527)	(0.0586)	(0.0430)	(6.503)
GDP per capita as share of EU	-5.059	-2.152	-2.907	-9.357*	-14.69***	5.335	1,742**
	(6.743)	(6.149)	(6.832)	(5.490)	(5.665)	(4.871)	(809.8)
(GDP per capita as share of EU) ²	0.0249	0.00223	0.0226	0.0425	0.0706**	-0.0281	-9.612*
	(0.0406)	(0.0370)	(0.0411)	(0.0325)	(0.0338)	(0.0290)	(5.020)
Log of Population	-25.10**	6.212	-31.31***	-18.76**	-2.041	-16.72**	-4,689***
	(10.31)	(10.64)	(9.948)	(7.589)	(8.673)	(6.903)	(930.8)
Employer firms	172.4***	109.2***	63.17***	55.26***	35.64***	19.62***	
	(11.10)	(11.47)	(10.40)	(8.259)	(9.491)	(7.553)	
Observations	1,909	1,909	1,909	1,899	1,899	1,899	1,701
R-squared	0.532	0.460	0.485	0.551	0.514	0.389	0.962
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.526	0.454	0.480	0.546	0.508	0.382	0.962

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Annex Table 2.C.3. Robustness checks, bandwidth 65-85

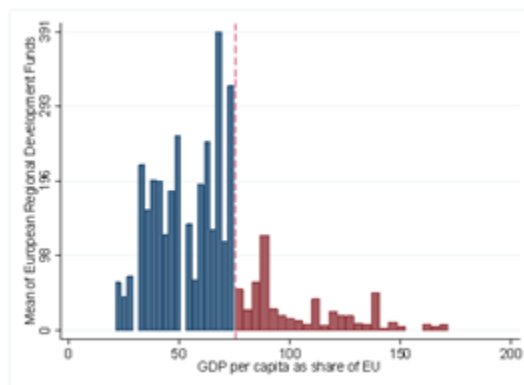
RDD 2SLS, 2nd stage; regions of Portugal, Spain and Italy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Firms Birth rate	Firms Death rate	Firms Net birth rate	Employment Birth rate	Employment Death rate	Employment Net birth rate	GVA per worker
Predicted Funds	0.0847	-0.390***	0.475***	0.0563	-0.217***	0.274***	17.81*
	(0.0917)	(0.0934)	(0.0956)	(0.0677)	(0.0799)	(0.0669)	(9.957)
GDP per capita as share of EU	74.54*	96.77**	-22.23	36.92	-2.219	39.14	-1,246
	(39.44)	(42.49)	(39.26)	(29.75)	(41.78)	(33.25)	(4,137)
(GDP per capita as share of EU) ²	-0.561**	-0.765***	0.204	-0.276	-0.0673	-0.209	8.881
	(0.260)	(0.280)	(0.261)	(0.197)	(0.273)	(0.218)	(28.17)
Log of Population	-39.15***	16.31	-55.45***	-24.55***	4.757	-29.31***	-4,361***
	(13.02)	(13.07)	(12.93)	(9.189)	(10.42)	(9.219)	(1,192)
Employer firms	161.1***	89.28***	71.78***	45.58***	26.27**	19.32**	
	(14.04)	(14.71)	(12.86)	(10.30)	(12.28)	(9.581)	
Observations	1,275	1,275	1,275	1,265	1,265	1,265	1,197
R-squared	0.509	0.457	0.471	0.538	0.494	0.359	0.966
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.501	0.448	0.463	0.531	0.485	0.349	0.966

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

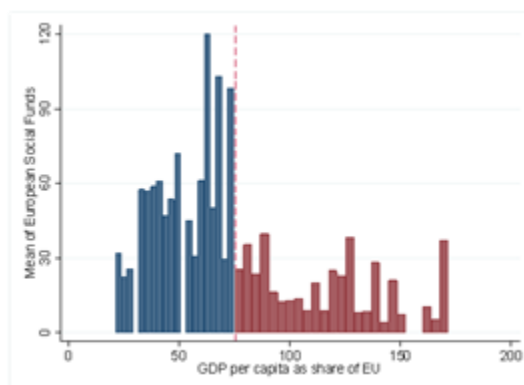
Annex 2.D. Discontinuity of Funds by type around the 75-threshold

Annex Figure 2.D.1. European Regional Development Funds vs GDP per capita



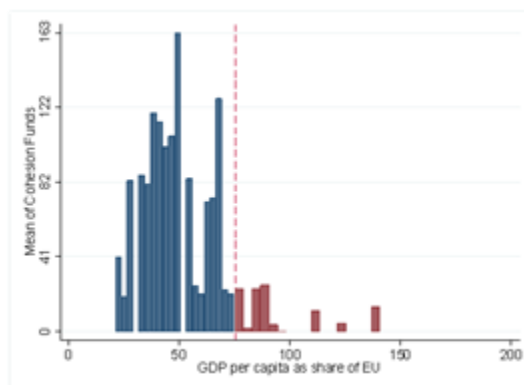
Source: Authors' elaboration based on OECD (2018) and European Commission (2018).

Annex Figure 2.D.2. European Social Funds vs GDP per capita



Source: Authors' elaboration based on OECD (2018) and European Commission (2018).

Annex Figure 2.D.3. Cohesion Funds vs GDP per capita



Source: Authors' elaboration based on OECD (2018) and European Commission (2018).

Chapter 3. Can Decentralization enhance Policy effectiveness? Evidence from the Peruvian Complementary Food Program

Co-authored with Leslie Bermont

Abstract: This paper estimates the impact of decentralizing the Peruvian Complementary Food Program (PCA) on its efficacy and explores the channels through which this governance shift improved food security across Peruvian regions. We exploit differences in the timing of decentralization between local authorities to implement a difference-in-differences approach. Our results indicate a negative overall impact of decentralization on the surplus of households' calorie intakes with respect to their minimum calorie requirements. However, the impact of the policy is not homogeneous across territories; our estimates show that the consumption of calories decreased in Lima while it increased in the rest of the provinces of the country, leading to a regional convergence in food security in Peru. We explain these findings by the existence of two opposite effects of decentralization – a positive “proximity effect” and a negative “capacity effect”, originating respectively from the fact that on the one hand subnational governments have a better understanding of local communities and regional specificities; while on the other hand, they tend to suffer from lower financial, technical and human resources. Finally, using complementary measures of food security, we show that regional convergence in calorie intakes in Peru is welfare improving. While decentralizing the PCA boosted the consumption of calories in provinces with initial high levels of undernourishment, the fall in calorie intake in the districts of Lima is mainly driven by a share of the population shifting from very high levels of calorie consumption (“over-nourished”) to ones that are more standard.

3.1. Introduction

The 2030 Agenda for the Sustainable Development Goals (SDG) adopted in September 2015 by the member Countries of the United Nations defines the “fight against hunger” as the Second Global Goal, with the aim to “ensure access to safe, nutritious and sufficient food for all [and to] eliminate all forms of malnutrition”. Despite remarkable progress by some countries, there were still 821 million undernourished people worldwide in 2017 (FAO et al., 2018), meaning that one person out of ten is suffering from hunger. Contrary to the common belief, food insecurity has been on the rise for the past years due to new conflicts, droughts and disasters associated to climate change (UN, 2018b), mostly in Africa and South America.

As highlighted by the UN and the OECD who advocate for the “localization” of the Sustainable Development Goals, the active participation of all levels of governments as well as private organizations and citizens is key to achieve a durable reduction in hunger at a larger scale (UN, n.d.). “Localizing” implies understanding subnational realities and their impact in people’s lives to generate adequate and more effective solutions for sustainable development. It also promotes a bottom-up approach that requires local governments to fully engage and participate in the process. To unleash their capacity to design and implement policies that are better adapted to the local context, subnational governments need to have, among other things, enough political power for decision-making. In this perspective, processes of decentralization that promote cooperation and support among all levels of government are a positive step towards better policies for development.

It has been shown that, under certain conditions, decentralization can contribute to reduce territorial inequalities, foster economic growth and improve democracy – through the higher efficiency in the delivery of public services (Wallis and Oates, 1988; Bardhan, 2002; Leer, 2016). However, some risks are also associated to decentralization. For example, local authorities may lack the adequate financial, administrative and institutional capacities to sustain the provision of public services and social programs (OECD, 2019).

This paper explores whether in a context of large inequalities in access to food, decentralization can lead to an increase in the efficacy of public policies that fight undernourishment, and if so, under which conditions.

In the last two decades, Peru has experienced one of the greatest economic and social progress compared to its Latin American neighbors; yet the levels of poverty and food insecurity in the country remain high. In 2011, two thirds of the Peruvian population were facing food insecurity problems (FAO, 2013); and in 2016, 7.5% of the population were undernourished and living below the minimum level of dietary energy requirements (WHO, 2018a). Territorial inequalities in nutrition and access to food, often masked by country-averages, are persistent in Peru. The prevalence of undernourishment is more severe in the rural Andean and Amazonian areas than in the urban zones of the coast (World Food Program, 2018).

With the objective to halt the growing disparities in regional development and food security outcomes, the Peruvian central government launched in 2003 a process of decentralization of an important food aid program – the Complementary Food Program (Programa de Complementación Alimentaria – PCA). At the same period, the prevalence of undernourishment started to decrease sharply, passing from 22.6% in 2003 to 7.9% in 2015, which draws the attention on the role that the decentralization of the program played in the reduction of food insecurity in Peru. To the best of our knowledge, there is no research on the links between decentralization and food security in Peru and very few studies test the channels through which decentralization affects social outcomes in general (Leer, 2016). This paper contributes to the literature on decentralization by proposing an interpretation of the mechanisms – a positive “proximity effect” and a negative “capacity effect” – that explain the heterogeneous effects of a decentralization policy in Peru.

In this paper, we empirically study the causal effect of decentralizing the Peruvian Complementary Food Program and test whether it helped improve food security within the country. We exploit differences in the timing of decentralization between local authorities to estimate the causal impact of the policy; more precisely, we run a difference-in-differences model using multiple treatment groups. We exploit data from the National Households Survey about Living Conditions and Poverty (ENAHO), a rich database from the Peruvian National Institute of Statistics (INEI) covering the whole country, that enables us to analyze a large array of households’ characteristics and food consumption habits over the period 2001-2016. This survey is representative at the national level as well as for various subnational divisions –

departmental, urban and rural. Thanks to the richness of the database, we are able to construct our own indicator of food security, which is the adequacy of households' calorie intakes with respect to their minimum calorie requirements.

The results indicate a non-homogeneous impact of decentralization across the country. While the consumption of calories was reduced in Lima due to decentralization, it was improved in the other provinces of the country. We explain these results by the existence of two opposite effects of decentralization – a positive “proximity effect” and a negative “capacity effect”, originating respectively from the fact that subnational authorities have a better understanding of local communities and their specific issues compared to the national government, but are restrained by lower financial and technical resources. An exploration of complementary food security indicators reveals that national inequalities in terms of calorie consumption are lessened after decentralization. While we find that decentralizing the PCA enables a greater consumption of calories in provinces that are on average undernourished, we show that the fall in calorie intakes in the Province of Lima is partly due to a lower risk of being “over-nourished”, i.e. of consuming calories in excess.

The following section sets the scene by explaining the context of food security in Peru. It then presents the findings of the literature on decentralization and summarizes the characteristics of the PCA and its process of decentralization. While section 3.3 presents the data and explains the construction of our variables, section 3.4 defines the empirical strategy. Finally, section 3.5 discusses the results and section 3.6 concludes.

3.2. Food Security, Decentralization and the Peruvian Complementary Food Program

Ensuring Food Security and good nutrition across the World is still a major and evolving issue. Food security and the fight against hunger have been at the forefront of the global political agenda for many years with a distinctive and increasing engagement of national and subnational governments, as well as international and civil organizations around the World. The World Food Conference of 1974 is one of the first examples of this global effort, followed by the Millennium Development Goals (MDG). Today, the 2030 Agenda for the Sustainable Development Goals (SDG) – adopted in September 25, 2015 by 193 member countries of the United Nations – defines the “fight against hunger” as the second Global Goal, with the aim to

“ensure access to safe, nutritious and sufficient food for all [and to] eliminate all forms of malnutrition”.

More efforts and new strategies are needed to tackle food insecurity across the globe, especially as the shapes and consequences of this issue have been evolving and becoming more complex – nowadays, not only people suffer from undernourishment and undernutrition; but also from obesity and overweight issues due to the low quality of food that is available and affordable to them. Undernutrition and obesity are phenomena that coexist within countries (FAO et al., 2018), regions, and even families, making the fight against food insecurity even more challenging in terms of public policies. While 151 million children under the age of five are still stunting and 50 million suffer from wasting, one adult over eight is obese (FAO et al., 2018).

The short- and long-term consequences of food insecurity are immense, as suffering from malnutrition intensifies individual vulnerability to other diseases – including the current global pandemic – and increases the risk of mortality. Beyond health issues, malnutrition (either undernourishment or obesity) negatively affects the capacity of individuals to acquire education and work, and thus to generate income, since it deteriorates physical and cognitive abilities (Paciorek et al., 2013). When experienced at the fetal stage, or early in life, malnutrition enters the mechanism called “metabolic imprinting”, which states that early life food security conditions predetermine the risk of diseases during the adult life (FAO et al., 2018). Being malnourished early in life, even during a short period, can thus hinder long-term individuals’ cognitive and physical development, and have strong repercussions during the whole life cycle. Eliminating malnutrition is thus critical to improve people’s health and well-being, and to ensure sustainable development around the world.

3.2.1. Food Security and Nutrition in Peru

Undernourishment in Peru

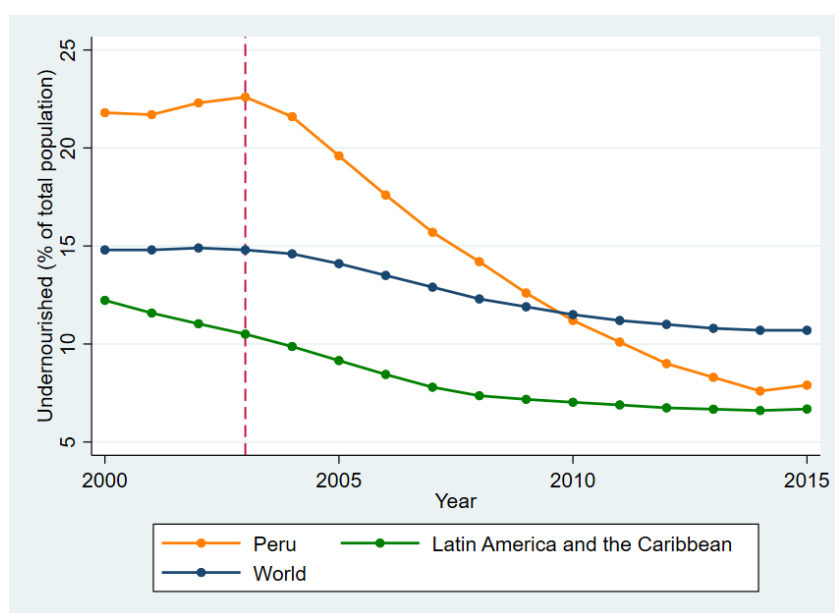
Food insecurity and malnutrition in Peru remain at high levels. In the last two decades, Peru has experienced one of the greatest economic and social progress compared to its Latin American neighbors. The country has taken advantage of its rapid economic growth to favor development in many areas. However, levels of poverty and food insecurity remain high; for example, around one third of the population was food insecure in 2011 (FAO, 2013). The

country is lagging behind with respect to its Latin American peers and is ranked at the 53rd position in terms of food security (out of 113 countries internationally) by the Economist's Global Food Security Index (FAO, 2018b). Over the period 2014-2016, 7.5% of the total Peruvian population was undernourished and living below the minimum level of dietary energy requirements defined jointly by the Food and Agricultural Organization (FAO), the World Health Organization (WHO) and the United Nations (UN) (WHO, 2018a).

Besides, such figures hide latent and persistent territorial inequalities in nutrition and access to food. In general, the prevalence of undernourishment is more severe in the rural Andean and Amazonian areas than in the urban zones of the coast. For example, while the country average suggests that only 13.1% of children under the age of five suffer from chronic malnutrition (i.e. either wasting, stunting or underweight), more granular estimates reveal that in rural areas the share of children suffering from chronic malnutrition goes up to 33.4% (World Food Program, 2018).

To halt the exacerbation of such sharp regional disparities and to ensure food security everywhere in the country, the government has adopted a multi-stakeholder approach that promotes the engagement of all levels of government and members of society in the fight against hunger. The first step was the launch of the decentralization process in the early 2000s. In 2003, in an attempt to stimulate adaptability and efficiency in public policies (Willis et al., 1999), the central government started to officially transfer the responsibilities of several public programs to local authorities. The Complementary Food Program (Programa de Complementación Alimentaria – PCA), the policy of interest of this paper, was part of the first wave of decentralization.

From 2000 to 2015, the prevalence of undernourishment in Peru decreased by close to 14 percentage points – from around 22% in 2000 to 8% in 2015. According to Figure 3.1, the sharp decrease in undernourishment began in 2003, the same year that the PCA's decentralization process started. This paper aims at quantifying the impact of decentralizing the PCA in shaping food security outcomes in Peru.

Figure 3.1. Prevalence of undernourishment in Peru, 2000-2015

Source: Authors' elaboration based on FAO's data, Health Nutrition and Population Statistics.

Over-nourishment in Peru

Being “food secured” implies having access to enough and nutritious food. Malnutrition can lead to overweight and obesity, which are other forms of food insecurity. This type of food insecurity has now become a global issue that affects developed and developing countries (Amugsi, 2018). Around the World, obesity has tripled since 1975 and it now coexists with undernourishment and hunger within the same countries, cities or even households (WHO, 2018b).

Medical research has highlighted that the roots of obesity are complex but mainly rely on lifestyles changes associated to urbanization and globalization (WHO, 2018; Kim et al., 2017). Life in cities de-incentivizes physical activity (Day et al., 2013) and makes it easier (e.g. large presence of supermarkets that sell processed food) and sometimes inevitable to consume energy-dense products (Kirby, 2013). Fast food can indeed appear as the only affordable diet for the poorest populations, providing them with low-quality food, rich in calories but poor in nutrients and in fibers (Rosenheck, 2008; French et al., 2000). An increased consumption of calories coupled with a decrease in physical activity can result in more unbalanced diets and potentially lead to overweight, obesity or other chronic diseases (Kim et al, 2017).

Peru is no exception to the worldwide growing obesity issue. The prevalence of overweight and obesity in the Peruvian population has been increasing at a rapid pace, leading to an average obesity rate of 18.3% and an overweight prevalence rate of 54% in 2016 (Ministerio de Salud, 2017). Nevertheless, large territorial disparities prevail in the country as overweight and obesity mainly concern coastal and urban regions and, above all, Lima (Ministerio de Salud, 2017; Preston E.C. et al., 2015; Wisniewski, 2017; Pajuelo-Ramírez, 2017; Villena Chávez 2017; Hernández-Vásquez, 2014; Diez-Canseco, 2017).

3.2.2. Decentralization

Since the 1980s, many countries around the globe have initiated decentralization processes that reshaped the way they address most social, development and economic issues (Bardhan, 2002; Dethier, 2000). Decentralization happened for diverse reasons across countries and took different forms. Decentralizing means transferring part of the responsibilities and decision-making power from central governments to subnational authorities (OECD, 2019; von Braun and Grote, 2003; Leer, 2016). However, fiscal, political and policymaking competences are not necessarily all devolved at the same time.

We can distinguish several types of decentralization (OECD, 2019; von Braun and Grote, 2003; Schneider, 2003): 1) *political* decentralizations, which consist of the creation of new lower administrative units and the organization of local elections; 2) *fiscal* decentralizations, which refer to the new fiscal power and authority of subnational governments to raise taxes and receive financial support from national governments; and 3) *administrative* decentralizations, that represent the devolution of policymaking and implementation responsibilities in the area of public policies (von Braun and Grote, 2003; Litvack and Seddon, 1999). In practice, these three elements are often interlinked; however, in this paper we only refer to the “administrative decentralization” component and consider that “decentralizing” means that the central government transfers the management of public policies and social programs to subnational authorities, along with the budget allocated to them.

Although the specific motivations for undertaking a decentralization process are very different across countries according to their own history and economic situation, we can identify common goals, such as the willingness to improve democracy in highly concentrated economies, or to raise efficiency in the delivery of public services (OECD, 2019). Therefore,

decentralization has been largely promoted by international organizations and was often a condition for international development aid (Jütting et al., 2004; White, 2011). Yet, it has been argued that decentralization is not a flawless answer to foster development and, under certain conditions, could be detrimental to economic growth and people's well-being (OECD, 2019; Leer, 2016).

Decentralization, a complex process with conflicting effects

While many authors have studied the impact of decentralization on a wide range of topics, such as institutions (Carlitz, 2017; Azfar et al., 1999; Joanis, 2014; Bardhan and Mookherjee, 2005), economic growth and reforms (Aizenman and Isard, 1993), poverty and inequalities (Bardhan, 2002; Galasso and Ravallion, 2005; von Braun and Grote, 2003; Alderman, 2002; Basurto et al., 2018; Jütting et al., 2004), public services and education (Joanis, 2014; Leer, 2016; Martinez-Vazquez et al., 2017; Galiani et al., 2002), and health outcomes (Hutchinson and LaFond, 2004; Boyer et al., 2010); little research has been undertaken about the impact of decentralization on food security. This paper aims at filling this gap in the literature by providing evidence about the effects of decentralization on food security in Peru.

Some research advocates for decentralization since, under certain conditions, it can improve democracy, foster economic growth and reduce territorial inequality thanks to higher efficiency in the public sector that ensures a better quality in the delivery of public services. The literature highlights a number of mechanisms explaining the positive outcomes of decentralization.

One of the main advantages of decentralization is that it enables a bottom-up approach in policymaking. Since local authorities are in direct contact with local populations, they are able to obtain relevant information about citizens' needs and preferences at a lower cost compared to the central government. By being more aware of local challenges, subnational governments have a greater faculty to design and implement policies tailored to local populations' needs, and in a more efficient way (OECD, 2019; Wallis and Oates, 1988; Bardhan, 2002; Leer, 2016). Since local authorities are more relevant to identify specific causes of poverty and inequality, they are also more able to combat them (von Braun and Grote, 2003). Obtaining local information is too costly for central governments, which often incentivize them to apply uniform – and potentially less effective – policies across the country (OECD, 2019).

Decentralization is also expected to give more incentives to subnational governments to respect their political engagement. As local authorities are closer to the citizens (who have the power to reelect them or not), they have more incentives than the national government to deliver public services with high quality and at a lower cost. Competition with neighboring localities intensifies this phenomenon as each local authority seeks to attract workers and foster economic activity in their jurisdiction to ensure their reelection (Hatfield, 2015; OECD, 2019; von Braun and Grote, 2003; Leer, 2016). It follows that if subnational governments are more accountable, citizens will have more incentives to participate in the civil life of their community (e.g. by volunteering in social programs).

Despite these beneficial mechanisms, the literature also identifies several detrimental effects of decentralization. The main sources of inefficiency from decentralizing relate to the lack of financial resources and the typically low administrative, political and technical capacity of subnational authorities. For this reason, decentralization should always be implemented in a context of strong subnational capacity and adequate resources or, alternatively, be accompanied by a process of capacity building and investment plans for the local authorities (Willis et al., 1999; Falleti, 2005).

Local authorities are often in need of the adequate resources to implement effectively the new policies they are in charge of (OECD, 2019). In practice, under-funded mandates are common as subnational governments may not have the capacity to raise their own taxes – or may not be allowed to do so (e.g. due to legal constraints). To improve the efficacy of decentralization while preserving local governments' autonomy, a right balance must be found between their own sources of revenue and the financial support coming from the national government.

Beyond financial constraints, local authorities may lack the appropriate skills and competences to assume their new responsibilities. In 2015, 65% of subnational governments within OECD countries declared lacking the capacities for their strategic planning activities (OECD, 2019). Lower managerial capacities may come from a lack of expertise in policymaking, fewer human resources with a lower education profile than the employees working in national institutions, and weaker institutional and legal frameworks (Leer, 2016). Finally, the literature on decentralization also highlights the risk of a capture of power by local

elites (Devas and Delay, 2006; OECD, 2019), which would endanger the efficiency of public policies implemented by local authorities and deteriorate the participation of the citizens (von Braun and Grote, 2003).

We classify the positive and negative effects of decentralization into two main channels: a negative “capacity effect” and a positive “proximity effect”. Since these two effects are opposite, the overall impact of decentralization in a given territory will depend on the respective intensity of each effect. While the “proximity effect” should always be positive, the “capacity effect” can be either negative, null or positive. Nevertheless, in the particular case of Peru (as in most developing countries), evidence suggests that the capacity of subnational authorities is lower than that of the central government, and thus the “capacity effect” should be negative.

A negative “capacity effect” refers to the fact that subnational authorities tend to face higher financial and managerial constraints than the national government. They may be less able to allocate sufficient budget to the programs they are in charge of, as their capacity to raise taxes is weaker, and may also face managerial difficulties as their employees’ professional training and education tend to be lower on average compared to national institutions. On the contrary, the “proximity effect” is positive as it refers to the fact that subnational governments tend to have a better knowledge of local contexts and challenges. They may also be more able to generate trust and confidence from the population as they are in more direct and transparent contact with the citizens (e.g. a mayor has more opportunities to discuss local problems with the population than a minister does). This can trigger positive spillovers since more trust should increase the willingness of the population to participate in the implementation of the programs.

The weaknesses of decentralization in Peru

Some studies have highlighted disappointing results of decentralization in Peru. The World Bank (2010) performed a very rich analysis of the country’s decentralization process and showed that the quality of public services has not been improved afterwards. However, this research underlines that when subnational authorities are capable of generating more revenues by themselves, social programs deliver better results. This fact goes in line with the argument that weaker local capacities can jeopardize policy effectiveness.

In Peru, the transfer of social programs to local authorities in 2003 was undertaken at a premature stage of the country’s political development. It was only in 2002 that the

Constitutional Reform (27680) established the creation of the current regional and local authorities. After the fall of the dictatorial and highly centralized Fujimori's regime (1990-2000), both authorities and citizens pushed for a more decentralized organization of the country, which led to initiate the decentralization process right after the 2001 elections. This process lacked from a common vision and strategy between the different levels of government (including the newly created local authorities), in particular regarding the modalities of decentralization of the social programs.

3.2.3. The Peruvian Complementary Food Program (PCA)

The Peruvian Complementary Food Program (PCA) is one of the oldest and most important social programs dedicated to food aid that have been implemented in Peru with a national coverage over the past decades.⁸ Even though the coverage of the PCA varies widely across districts and provinces, the program reaches up to 35% of the population in certain areas⁹ and all households living in poverty are eligible beneficiaries of the program. The PCA is the first food aid program to have been decentralized in Peru, and its decentralization process offers interesting modalities that enable us to build a solid identification strategy.

In 1992, the Ministry of Women and Social Development merged several food programs into a unique national program, under the name of PRONAA (Programa Nacional de Asistencia Alimentaria), with the general aim of reducing undernourishment across the country. This program then became the PCA and started to be decentralized in 2003, leading the decentralization wave that was going to spread over the country in the 2000s.

⁸ Among other influential food aid programs are the program "Vaso de Leche" that provides dairy products only, primarily to children and to pregnant or breastfeeding mothers; as well as the program "Qali Warma" that provides food complement to pupils directly at schools. While the former was created in 1985, the latter dates back only to 2012. (FAO, ALADI and CEPAL, 2019; Ministerio de Desarrollo e Inclusión Social).

⁹ In the province of Ayabaca, the population benefiting from the PCA represents 35% of the total provinces' population. Authors' calculations based on INEI's population data and Ayabaca municipality's data (<http://www.muniayabaca.gob.pe/pagina.php?post=644>).

The main objective of the PCA is to increase food consumption of the poorest and most vulnerable populations¹⁰, by providing them with additional food intakes distributed in social centers that are operated by volunteers from local communities.

Although distribution centers are more likely to be located in rural and in poor urban areas, the program is nationwide and available in all provinces and districts. Although all food baskets delivered to the beneficiaries should cover around 30% of their daily energy needs, their content varies widely across territories as it depends on: 1) local populations' consuming habits, 2) local populations' needs regarding their environment and type of daily activities (e.g. rural workers have in general higher energy needs due to higher physically activity), 3) local availability of food, and 4) local authorities' budget for the program. The reference food basket for a household of one person is composed of 150g of cereals, 50g of vegetables, 20g of fish or meat and 10g of fat (MIDIS, 2013).

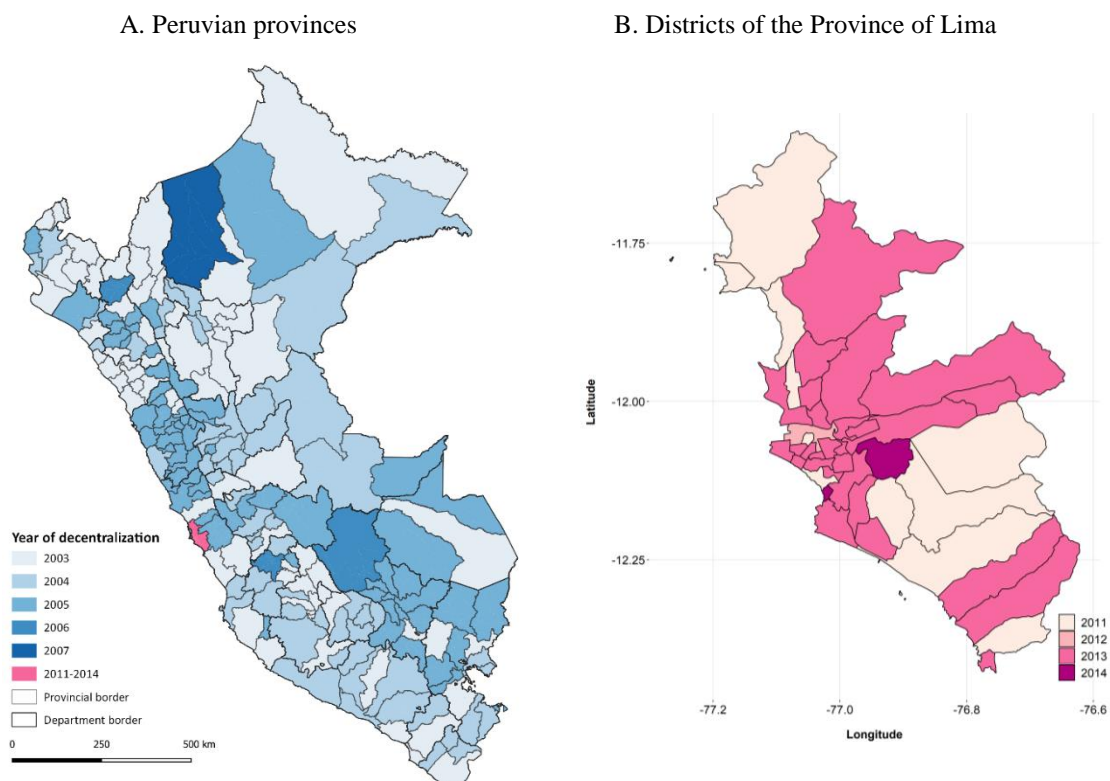
The PCA's decentralization process

Since its creation in 1992, the PCA had been fully managed by the national government; then, between 2003 and 2007, the program was progressively transferred to the provincial authorities across the country, except for the Province of Lima. In Lima, the PCA was directly and gradually handed to the 43 district authorities composing the province between 2011 and 2014¹¹. Since the Province of Lima presents structural differences – being the urban, political and economic center of Peru – the national government considered that delegating the program to a lower level of government was possible and more adequate. As coordinating with district authorities was a more complex process, it was decided to start the decentralization process for Lima in a second phase (Ministerio de Justicia, 2006; CND, 2006b). Figure 3.2 shows the heterogeneous timing of decentralization across the territory.

¹⁰ Primary targets are poor and extremely poor households, children and adults with mental and physical disabilities, victims of domestic or political violence, as well as volunteer workers and individuals suffering from tuberculosis and their families.

¹¹ Peru is organized through three main administrative levels, namely departments (25), provinces (196) and districts (1 976) (INEI, 2018).

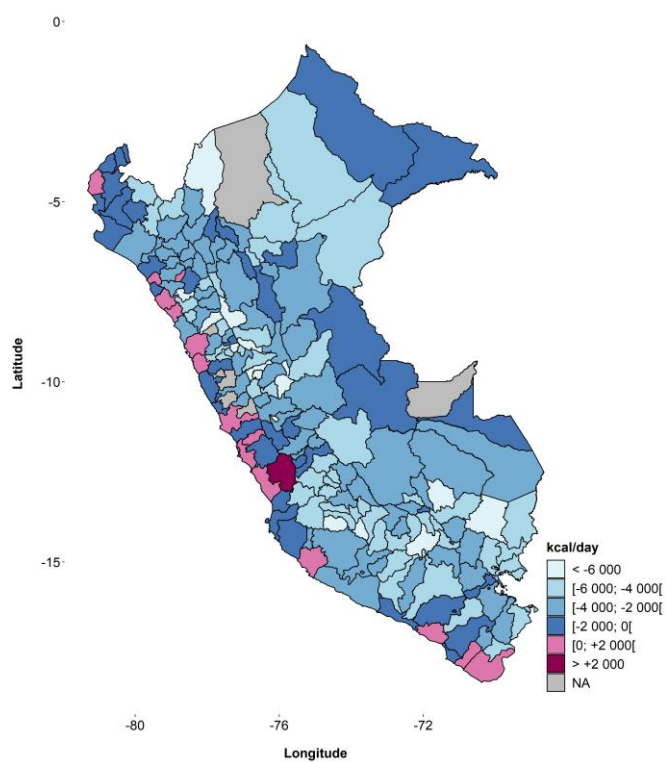
Figure 3.2. Roll-out dates of decentralization across the Peruvian territory



Source: Authors' elaboration based on the Peruvian Official Journal and GADM's data.

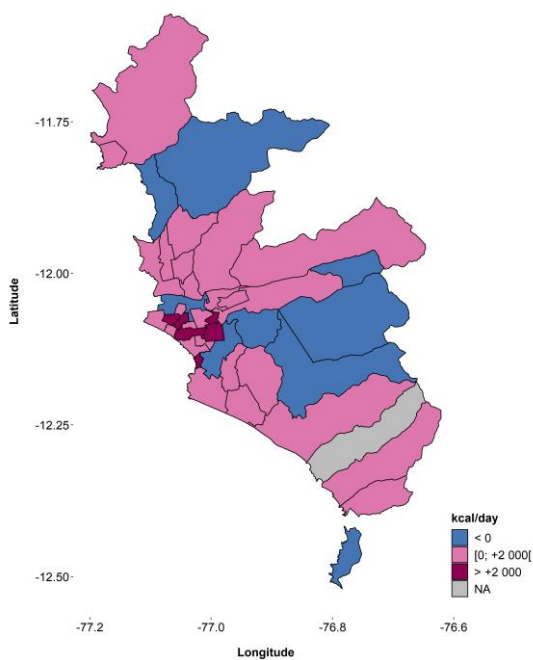
One of the main objectives of decentralizing the PCA was to reduce the large territorial inequalities in food security in Peru. Figure 3.3 reveals important disparities in provinces' average food deficits in 2002, a year before the launch of the decentralization policy. While all provinces of the Andean and Amazonian regions suffer on average from a food deficit (i.e. the population consumes less calories than they need), some provinces of the coastal area are not considered at risk of undernutrition (the pink provinces on Figure 3.3). Such averages also hide large inequalities within provinces – Figure 3.4 depicts the average adequacy of calorie intakes relative to the needs for Lima districts, and reveals that residing in a large urban area does not guarantee protection against undernutrition.

Figure 3.3. Average gap in calories by province, 2002



Source: Authors' elaboration based on INEI's data.

Figure 3.4. Average gap in calories by district in the Province of Lima, 2002



Source: Authors' elaboration based on INEI's data.

By decentralizing the management of the PCA to subnational authorities, the effectiveness of the program was expected to increase as local governments should more easily: 1) reach all the potential beneficiaries of the program to leave no one behind while avoiding free riding behaviors; 2) design an adequate food basket to better fit local needs and to increase the program cost-efficiency by reducing food wastes and food shortages; and 3) incentivize citizens in participating in the distribution of the food baskets, so as to foster the efficacy and scope of the program in the long-run.

With the decentralization of the program, the provincial and district authorities are responsible for the design, implementation and management of the PCA. The national government, through the Ministry of Development and Social Inclusion (MIDIS), still has a pivotal role to play as it transfers funds to support the subnational governments in the implementation of the program. The central government should also provide technical assistance and capacity building along the process, particularly for the monitoring of the program. Both parties are tied by a bilateral contract (named “Convenio de Gestión”) signed after the subnational governments are validated and authorized by the National Council of Decentralization (CND – Consejo Nacional de Descentralización) to receive the transfer of responsibilities.

3.3. Data

3.3.1. Main sources of data

Food insecurity is a multidimensional concept that can take various forms, from undernutrition (i.e. insufficient calories and nutrients consumption) to excessive food intakes or unbalanced diets. It relates to both the quantity and the quality of the food consumed and, in this sense, can be measured in a variety of ways. Since the main goal of the PCA is to increase calorie intake in Peru, our analysis focuses on measures of calorie consumption. Our main indicator of food security is the gap in calorie intake at the household level, measured as the difference between the calories consumed and the calories needed by the household. This indicator, as well as other necessary controls and information for our empirical strategy, were collected or constructed using the following databases:

- The *National Households Survey about Living Conditions and Poverty*¹² (ENAHO) from the Peruvian Institute of Statistics (INEI) (2001-2016);
- The *Peruvian Tables of Food Composition*¹³ (2009) prepared by the National Center for Food and Nutrition (CENAN);
- The *Energy Requirements of the Peruvian Population*¹⁴ (2012) constructed by the CENAN;
- The *National Record of Municipalities*¹⁵ (RENAMU) from the INEI (2004 and 2009); and
- Supreme Decrees and Ministerial Resolutions from the Peruvian Official Journal *El Peruano*¹⁶.

The ENAHO is a very rich database representative at the national and departmental levels. From this survey, it is possible to obtain precise data on households' food consumption (items and quantities) and location (GPS coordinates) by year, for each of the 16 years spanning the period 2001-2016, as well as other household and individual characteristics that we include as control variables, such as income, age, sex and education of household's head, among others. Our baseline sample¹⁷ is composed of more than 300 000 households for which we are able to analyze their consumption patterns based on 482 food items overall.

While the Peruvian Tables of Food Composition provide the content in calories of each of the aforementioned 482 food items, the Energy Requirements of the Peruvian Population estimate individuals' needs in calories, according to their age, sex and place of residence. By

¹² “Encuesta Nacional de Hogares sobre Condiciones de Vida y Pobreza” (INEI), available at: <http://iinei.inei.gob.pe/microdatos>.

¹³ “Tablas Peruanas de Composición de Alimentos” (CENAN), available at: <http://www.ins.gob.pe/insvirtual/images/otrpubs/pdf/Tabla%20de%20Alimentos.pdf>.

¹⁴ “Requerimientos de Energía para la Población Peruana” (CENAN), available at: <https://fr.scribd.com/document/140295535/Requerimiento-de-energia-para-la-poblacion-peruana-pdf>.

¹⁵ “Registro Nacional de Municipalidades” (INEI), available at: <http://iinei.inei.gob.pe/microdatos>.

¹⁶ Accessible at: <https://busquedas.elperuano.pe/>.

¹⁷ After cleaning the database and excluding anomalies and outliers, such as households at both ends of the distribution of the calorie consumption (bottom and top 1%).

combining these elements together, it is possible to construct the variable “gap in calories” of each household.

3.3.2. *Measuring Food Security*

While the first part of the analysis focuses on the impact that the PCA’s decentralization had on caloric intake – measured as households’ gap in calories; subsequent sections of this chapter explore and discuss complementary food security measures, such as over-consumption of calories.

The main dependent variable: household’s gap in calories

The gap in calories is calculated as the difference between calorie intakes and calorie needs ($gap = calorie\ intakes - calorie\ needs$). As we measure it at the household level, it represents the distance of each household from meeting the aggregated daily energy requirements of its members. A negative household calorie gap reflects a food deficit, meaning that on average the household’s members are not eating enough food to reach the minimum calories they should consume each day, putting them at risk of undernutrition. On the contrary, a positive household gap in calories highlights either an adequate intake of calories (since eating more than the minimum requirements is good until a certain point) or an excessive intake of calories (if it exceeds a certain threshold, this possibility is discussed later in this chapter).

We use the following steps to construct the gap variable:

1. We determine the quantity in kilograms (q_{iht}) of each food item i purchased by household h over year t (using the ENAHO database, INEI);
2. Following the methodology of Babatunde and Qaim (2010) and Hoddinott (1999), we assign a coefficient ($coef_i$) to each food item i to convert its consumption in kilograms into kilocalories (the content in kilocalories of one gram of each food product is given by the *Peruvian Tables of Food Composition*, CENAN);
3. We sum the consumption of kilocalories over all products consumed by household h in year t , and divide by the number of days in year t to obtain an approximation of the household’s daily calorie intakes in that year (c_{ht}), expressed as:

$$c_{ht} = \frac{\sum_{i=1}^k q_{iht} \times coef_i}{365 \text{ (or } 366)}$$

-
4. We determine the total calorie needs of each household (r_{ht}), by aggregating the individual needs of each member m in household h and year t ($r_{ht} = \sum_{m=1}^n r_{mht}$). Individual calorie needs are based on age, gender and place of residence. While the ENAHO allows identifying the age, gender and place of residence of each household member, the tables of *Energy Requirements of the Peruvian Population* (from CENAN) provide the calorie needs by socio-demographic groups.

Thanks to this database conceived specifically for the Peruvian population, we are able to assign specific minimum calorie requirements for each individual, adapted to its age, sex and place of residence. This is an improvement compared to previous literature, as authors are often limited to the use of the generic WHO's worldwide average minimum energy requirements, regardless of the country or the population they are focusing on (Babatunde and Qaim, 2010). On the other hand, it is worth noting that the personal minimum energy requirements for the Peruvian population have been calculated only once with data of 2012. Due to this data limitation, we assume that energy requirements by age, gender and place of residence in Peru have not dramatically changed in the period of study.

5. We calculate the household gap in calories as the difference between the calories consumed and the calories needed, for each household:

$$gap_{ht} = c_{ht} - r_{ht}$$

While negative values represent a deficit in calories (i.e. the household is undernourished as a whole), positive values stand for an adequate or, in some cases, for an excessive consumption of calories on average for the household.

It is worth noting that due to the scope of ENAHO, our measure of gap in calories does not take into account the calories from food prepared and consumed outside the house (e.g. restaurants and street food).

Discussion on the main food security variable: the household's gap in calories

Household vs. Per capita gap in calories

Since individual food consumption is not provided by our main data source, we are only able to obtain a measure of the gap in calories at the household level. Although some of the

papers of the literature prefer to use a measure of calories at the individual level (Smith et al., 2016), we focus on the household variable and choose not to divide it by an adult equivalent scale that would give us an approximate measure of consumption per capita. The main reason for this is to avoid imposing either high or low intra-households inequalities in calorie consumption. For example, a measure of kilocalories per capita would generate inefficient allocations of calories as working adults require more kilocalories than children do. On the other hand, assuming that everyone consumes a proportion according to its needs would minimize potential intra-household inequalities in food security (see Lise and Seitz, 2011). Yet, evidence suggests that in Peru, large intra-household inequalities in the repartition of food exist. For example, some households can present excessive calories consumption due to obese parents, while children are undernourished.

Although the variable gap in calories at the household level does not allow us to measure intra-household inequalities in calorie consumption, it does not force us to make any assumption about it. The risk associated with a gap variable at the household level is that we could miss out some level effects in our regression analysis. To address this, we always include a control for the size of the household in each of our regressions.

Gap in calories vs. Nutrition variables

There is no consensus in the literature about the best indicators to measure food security. The most suitable indicator depends on the topic, the context, available data and the objectives of the research. In this chapter, we chose to focus on a measure of the “quantity” of food and energy transferred to the body through diet choices, based on the number of calories consumed. This indicator does not allow us to scale the quality of the diet. High levels of calorie consumption do not guarantee a balanced healthy diet and can even be detrimental if excessive (e.g. fast foods) (Headey and Ecker, 2013).

Nevertheless, we prefer this indicator over nutrition variables (e.g. nutrient content or diversity of the diet) for the following reasons: 1) the main objective of the PCA is to increase calorie consumption and our goal is to gauge the efficacy of the program to reach its objectives after its decentralization; 2) the Peruvian national government considers the evolution of calorie intakes as a key indicator in its “National Strategy of Food and Nutrition Security” (Comisión Multisectorial de Seguridad Alimentaria y Nutricional, 2013); 3) since calories are still widely

used in the literature about undernutrition to measure the sufficiency of the diet (Iram and Butt, 2004; Tschirley and Weber, 1994), our measure of the gap in calories could increase the comparability of our results with other studies and official reports; and 4) international organizations utilize the consumption of calories to calculate the prevalence of undernourishment, a key indicator in the UN SDGs framework to measure SDG 2 on Food Security (FAO et al., 2018; UN, 2018a).

Complementary measures of food security: undernourishment and over-nourishment

The primary objective of this chapter is to evaluate the impact of decentralization on the PCA's efficacy to increase calories consumption. However, we also use complementary food security measures to explore the effects of the policy on other types of food insecurity in Peru. More precisely, we are also interested in verifying if the policy helped families to exit the undernutrition status, as well as the effect on over-nourished households. Using the variable gap in calories, we construct the following three binary variables that categorize households according to their consumption of calories relative to their needs:

Undernourishment. We construct a dummy variable taking value 1 if the households' calorie consumption is strictly below their recommended needs (i.e. if the gap in calories is negative), and 0 otherwise (i.e. if the households eat the right number of calories, or more).

Over-nourishment. Excessive calorie intakes can put individuals at risk of overweight, obesity and other related health issues. We consider that households are over-nourished when their consumption of calories represents at least 150% of their actual energy requirements (also referred to as the "150-threshold") – i.e. their consumption is 50% or more above their actual needs.

It is worth noting that there is no literature linking which calorie consumption threshold is most adequate to determine a risk of overweight. This comes from the fact that overweight is a complex issue that also depends on other factors, such as the intakes of nutrients and the intensity of the physical activity. As an example, Bonnet et al. (2014) consider that eating 20% more fats than required significantly increases the probability of being obese. As our own threshold is to a certain extent arbitrary, we do not pretend to define a generic level over which calorie intakes would always be excessive and dangerous for health. However, this threshold

helps us to approximate excessive consumption of calories. To verify our results, we perform robustness checks using different thresholds to define an excessive calorie consumption.

Good track. This variable is equal to 1 if households are neither undernourished nor over-nourished, i.e. if their intakes of calories are superior to their minimum energy needs but below the 150-threshold (or other tested thresholds).

3.3.3. *Explanatory variables*

To evaluate the impact of decentralizing the PCA, it is necessary to control for several characteristics at the household and provincial or district level that could also account for the gap in calories.

From the ENAHO database, it is possible to make use of the data related to the households' overall economic and well-being situation. The regressions always include household gross equivalized income and its square, as well as characteristics of the household's head such as its educational attainment, its gender and if its sector of activity is agriculture. Households in the agriculture sector could require more energy on average to sustain their daily physical workload, while they could also benefit from their own food production. In this perspective, we also include a variable for self-consumed food (i.e. food produced by the households for their own consumption). This variable also allows controlling, to a certain extent, for the households' degree of exposure to international food prices – the less food-sufficient households are the most vulnerable to volatility in prices of imported food. Finally, we consider the size of the household (i.e. the number of members) to account for the level effects generated by the aggregated needs of calories measured at the household level.

The roll-out dates of the decentralization of the PCA in each of the 195 provinces of the country and the 43 districts of Lima were collected from official decrees published in the Peruvian Official Journal. Complementary data on provinces and districts characteristics were obtained from the National Record of Municipalities (RENAMU).

From the RENAMU database, we extract information on each local authority (provinces and Lima districts) that helps us controlling for the local context before decentralization. The regressions include the controls of population size by locality, the number of government employees in local administrations per 1 000 inhabitants, the administrative status of each local authority (e.g. if the province is the capital of a department), and a measure of local government

capacity to spend the budget, namely the budget utilized by the local authority at the end of the budgeting period as a percentage of the budget planned at the beginning of the year. To account for the quality of governance, we use perception-based measures of corruption from the ENAHO. We look at the perception in the evolution of corruption (the percentage of people that believe corruption has risen over the last year). When exploring the capacity effect of decentralization, we focus on the share of people that believe corruption is among the three main problems in the country.

Finally, to explore the role of proximity in the gains associated to decentralization of the PCA, we use one variable of physical and cultural distance. For physical distance, we simply calculate the geographical distance of each province or district to Lima capital – where the national government is based. The largest the distance to Lima, the stronger the “proximity effect” should be – as the local government should have more knowledge of the local communities, relative than the central government¹⁸. On the other hand, our variable of cultural distance relates to language. This variable measures the difference in the proportion of the population speaking Spanish in the provinces and districts compared to Lima capital. Spanish is one of the three official languages of Peru¹⁹, and has been dominantly spoken in Lima over the years. Yet, Peru is one of the most culturally diverse countries in South America, with 47 other languages being spoken across its territory (Ministerio de Educación, 2017) by around 55 native indigenous peoples. The purpose of this variable is to measure the cultural proximity of local authorities to their population, as opposed to the central government. We calculate the proportion of native Spanish speakers in each province and district using data from the ENAHO (individuals were asked which language they have been speaking since childhood).

¹⁸ We compute the distance of each province’s and district’s centroid to the center of the capital city Lima using the `gCentroid` function in R. Distances to Lima are constant over the studied period.

¹⁹ Quechua and Aymara are the two other official languages. In Lima, 89% of the population speaks Spanish as their main language, while in the rest of the provinces this is the case for 73% of the population. However, large discrepancies in the proportion of Spanish speakers remain across provinces (based on INEI’s data).

3.4. Empirical strategy

To assess the causal impact of the PCA's decentralization on households' gap in calories, we implement an adapted difference-in-differences model that relies on the gradual implementation of the policy (decentralization) across subnational governments.

The transfer of the program (PCA) from the central government to the local authorities (provinces and districts) was made progressively across the national territory between 2003 and 2014. In the first year (2003), 67 provinces received the responsibility to manage the PCA; in the following year (2004), the program was transferred to another 58 provinces (Decreto Supremo n°088-2003-PCM, 2003; MIMDES, 2005). This gradual execution of decentralization took place almost annually until 2014, when the last two remaining districts (in the Province of Lima) inherited the administration of the program. Provinces and districts were thus treated at different dates. We exploit this geographic discontinuity in the timing of the PCA's decentralization to estimate its impact, with a difference-in-differences methodology that builds on multiple years of treatment and evolving control groups.

Based on the year of treatment (decentralization), the model identifies a total of nine treatment groups, named T_g (dummy variables), denoting the local governments that received the transfer of the PCA in year g . For instance, T_{2003} gathers the 67 provinces for which the program was decentralized in 2003 ($T_{2003} = 1$); while, for the same year, all the other provinces and districts of Peru are considered as part of the control group ($T_{2003} = 0$). In 2004, 58 new provinces become responsible for the administration of the PCA – and thus are classified as the treatment group T_{2004} . The same logic is applied until year 2014, where the last two districts that received the program are denoted as $T_{2014} = 1$.

3.4.1. Construction of the decentralization variable

The Decentralization Policy variable $D_{g,t}$, which is our explanatory variable of interest, is a binary variable representing the interaction between the treatment group dummy T_g and its corresponding post-treatment time dummy. In other words, the policy variable is equal to 1 only when a household from a locality that adopted the program in year g is observed from year g onwards (i.e. when the actual year t is equal or higher than the year of entry into the program, $D_{g,t} = 1$ if $t \geq g$). For instance, for households living in a province that was decentralized in

2004 (i.e. belonging to treatment group T_{2004}), the policy variable equals 0 when we observe these households in years 2001, 2002 and 2003, but it equals 1 when the households are observed in 2004 and all the following years (our period of observation ranges from 2001 to 2016). The policy variable ($D_{g,t}$) captures the overall effect of decentralization from the moment it was first rolled-out in each province and district, until the last year available of observation.

3.4.2. Potential endogeneity issues

To ensure that our estimates capture the causal effect of decentralization, we need to verify that the identification strategy is not biased by an endogenous selection of the provinces and districts into the roll-out process of decentralization. Two potential sources of endogeneity in the date of decentralization exist: 1) simultaneity bias and 2) omitted variable bias.

First, a simultaneity bias may appear if pre-treatment food security outcomes played a role in the timing of decentralization. For example, if the national government considered the least food secure provinces and districts as priority areas, it might have granted them an access to the management of the program earlier. Alternatively, if the government assumes that the least food secure areas are less capable of managing the program, decentralization could have started later in these regions (i.e. asymmetric decentralization due to capacity of local authorities).

Secondly, omitted variable bias might affect our estimates if there are some characteristics of the provinces and districts that explain both food security outcomes and the date of entry into the program. Although each subnational government had to validate the same prerequisites to prove their preparedness to receive the transfer of the PCA, the completion of these criteria could have been highly dependent on their initial economic and demographic endowments, such as population size, poverty rates and degree of rurality, among others.

More precisely, the requirements for decentralization related mostly to the local governments' institutional and managerial capacity (e.g. having a Local Development Plan, constituting specific committees for the fiscal management of the program, etc.) and to the strength of their human resources (e.g. sufficient number of government employees) (CND, 2006a; MIMDES, 2011b). Thus, depending on their initial endowments before 2003 – the

starting date of the PCA's decentralization policy – some subnational governments might have been able to fulfil the requirements more easily than others, which could explain different dates of entry into the program and different outcomes in food security.

Political outcomes might be another potential source of bias. For example, provinces and districts with more political influence (e.g. better connections with the incumbent government) might have been favored by the central government and authorized to roll-out the decentralization of the PCA earlier than others – even without fulfilling the prerequisites. We address this point by controlling for perceived evolving corruption in the timing of the decentralization process. If corruption in Peru was predominantly low, the political connections of provinces and districts with the central government should not determine the date for decentralization. On the contrary, high levels of corruption could have accelerated unevenly the process of decentralization across the national territory.

Testing for endogeneity in the year of treatment

To test if the date of decentralization is endogenous to our variables of interest, we explore whether certain characteristics of the provinces and districts before the first year of decentralization influenced the year in which they received the transfer of the PCA. More specifically, we examine if ex-ante average levels of food security, poverty, population size, rurality, corruption and other institutional and managerial capacities are associated to the actual year of decentralization of provinces and districts. To do so, we apply the simple linear regression model described by Equation 3.1, where $group_m$ stands for the date of decentralization of the province or district m .

$$group_m = FS_{m,y_0}A + TC_{m,y_0}B + prerequisites_{m,y_0}C + rcorruption_{m,y_0}D + \gamma_d + \varepsilon_m \quad 3.1$$

FS_{m,y_0} is either the average amount of calories consumed or average gap in calories (calories consumed minus calories required) observed in the province or district m in year y_0 , where y_0 stands for the year just before the start of the decentralization process (i.e. 2002 for the provinces and 2009 for the districts of Lima). TC_{m,y_0} is a set of indicators encompassing territorial characteristics of the province or district m before the start of the decentralization policy, namely poverty rate, population size, percentage of the population that is rural, and a dummy that equals 1 if the province is the capital of its department. Similarly,

$prerequisites_{m,y_0}$ is a set of variables that capture the prerequisites of the “verification mechanism” for decentralization. More precisely, it accounts for the administrative capacity of the local authority m before the treatment and includes: 1) the number of local government employees per 1 000 inhabitants²⁰, 2) public expenditure as a percentage of total budget, and 3) a dummy variable that equals 1 if the local authority has a formal Local Development Plan to guide its development policy.

Finally, corruption is also taken into account. The variable $rcorruption_{m,y_0}$ is defined as the share of the population in the province or district m that perceived more corruption in year y_0 than during the year before. As other contextual (time-invariant) characteristics of each department may influence the preparedness of provinces to receive the qualification for the transfer of the program, department fixed effects (γ_d) are also included (except for the regressions that consider only the districts of Lima since they all belong to the same department). Finally, ε_m stands for the error term. Standard errors are corrected for heteroskedasticity.

Is the date of decentralization endogenous?

Table 3.1 shows which regional characteristics observed before the start of the policy predict date of entry into the decentralization process. While columns 1 and 3 explore entry into the program using the variable of average consumption of calories, columns 2 and 4 use our measure of gap in calories (our preferred measure of food security as it takes into account the actual caloric needs of the household). The indicator of average consumption of calories is included since it is more likely that policy makers would have looked at this variable to prioritize decentralization rather than to a more detailed measure such as gap in calories. Regardless of the measure of caloric intake, Table 3.1 shows no significant correlation between pre-program food security levels and the year of the decentralization, which excludes one of the main concerns about potential endogeneity in the model.

²⁰ As the provinces outside Lima are concerned, we could not measure human resources endowments and the other administrative variables before 2003 due to a lack of data in the RENAMU database. Instead, we use data from 2004 and assume that the changes were marginal between 2002 and 2004.

In all specifications showed in Table 3.1, it is possible to observe that decentralization began later in the most populated provinces and districts – a result potentially driven by the year of entry of the districts of Lima (since all of them decentralized after 2010). On the other hand, the PCA's transfer began earlier in provinces that are capital of their department. There is evidence that capital-regions tend to be more economically developed than their peer regions (OECD, 2019), which might also relate to having greater technical capacities, resources (budget) and political connections with the central government.

Table 3.1. Testing for endogeneity in the date of decentralization

	All provinces and Lima districts			
	(1)	(2)	(3)	(4)
	Date of decentralization	Date of decentralization	Date of decentralization	Date of decentralization
Average calories	-0.0000959 (0.000121)		-0.0000968 (0.000122)	
Average gap in calories		-0.000141 (0.000122)		-0.000146 (0.000124)
Poverty rate	-0.0185 (0.0102)	-0.0195* (0.00966)	-0.0192 (0.0103)	-0.0204* (0.00982)
Population size (thousands)	0.00282* (0.00121)	0.00268* (0.00120)	0.00276* (0.00123)	0.00261* (0.00122)
Rurality rate	-1.280 (0.763)	-1.534 (0.851)	-1.371 (0.797)	-1.652 (0.896)
The municipality is a capital of department	-1.26 1** (0.435)	-1.253** (0.427)	-1.253** (0.439)	-1.243** (0.430)
Government employees per 1 000 inhabitants	0.306* (0.135)	0.319* (0.136)	0.297* (0.136)	0.309* (0.137)
Budget capacity	0.00994 (0.00803)	0.0102 (0.00803)	0.0105 (0.00805)	0.0109 (0.00806)
Local Development Plan	-0.258 (0.298)	-0.269 (0.300)	-0.243 (0.298)	-0.252 (0.299)
Evolving corruption in the last year			-0.786 (0.952)	-0.885 (0.955)
<i>N</i>	196	196	196	196
<i>R</i> ²	0.822	0.824	0.823	0.825
adj. <i>R</i> ²	0.787	0.789	0.787	0.789
Department FE	Yes	Yes	Yes	Yes

Note: Due to data availability, this table only includes 159 provinces (out of 196) and 37 districts of Lima (out of 43). *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

Subnational governments with a higher number of government employees per capita decentralized the PCA in later years, and there is no significant role of either local public expenditure or the fact of having a local development plan. Thus, provinces and districts that seemingly fulfilled the pre-requisites for decentralization in 2002 do not seem to have received the management of the PCA before others. Overall, we do not find a significant contribution of

corruption in the timing of decentralization (columns 3 and 4). Finally, poverty rates in 2002 seem to be associated to early entry into the program.

Since the pre-policy characteristics of population size, being a capital-region, government employees per capita and poverty rates are significantly associated to the date of decentralization, we include them as control variables in all the specifications that aim at measuring the impact of decentralization on food security outcomes.

3.4.3. Validity of the common trend assumption

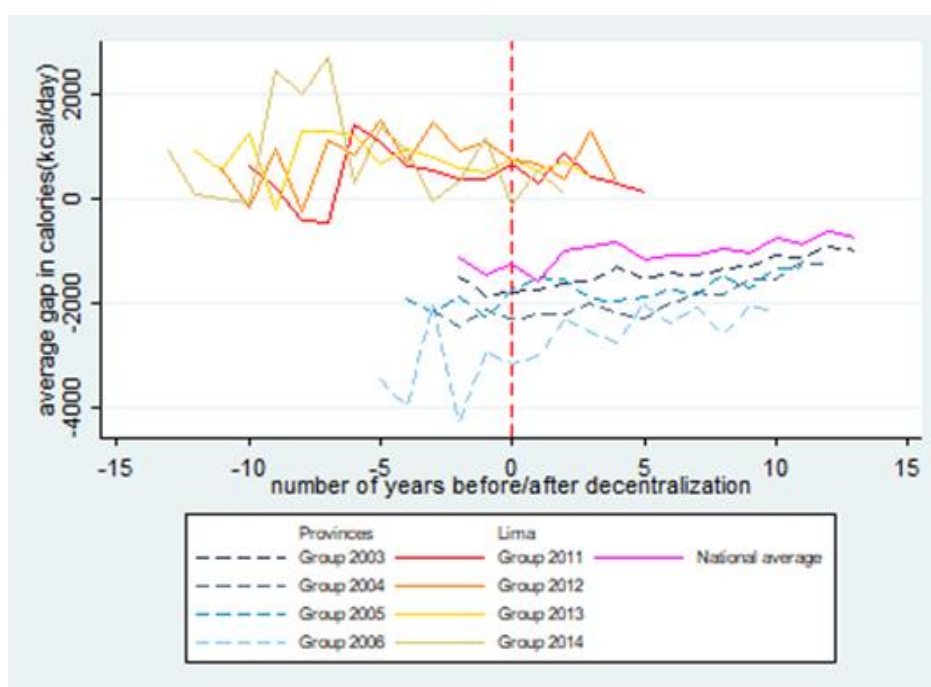
Figure 3.5 plots the evolution of the average gap in calories by treatment group and enables us to verify the common trend assumption – necessary to validate our adapted difference-in-differences approach – for two different groups of local authorities, the provinces and the districts of Lima.

Two opposite patterns of calorie consumption appear across Peru's local authorities. The provinces that were decentralized between 2003 and 2007 (i.e. all the provinces except Lima) present on average a food deficit before being decentralized. Over the years after decentralization, and despite some fluctuations, these provinces follow a similar upper trend in their average consumption of calories and are getting progressively closer to a zero gap in calories. Overall, their situation seemed to have improved at an akin pace after decentralization.

Contrary to the provinces, the districts of Lima do not suffer from initial levels of calorie deprivation, on average. What is more, they display positive gaps in calories before decentralization, meaning that overall Limeans were consuming substantially more calories than their minimum requirements. However, Figure 3.5 shows that after decentralization all the districts of Lima experienced a similar decrease over time in their average consumption of calories, relative to their needs.

Thus, the overall trends in calorie intakes with regards to energy needs seem to follow common patterns before decentralization. What is more, levels are very similar within two main groups of local authorities – the districts of Lima on one side and the rest of provinces on the other side – suggesting a regional convergence in food security over the period after decentralization.

Figure 3.5. Trends in the average gap in calories by group of decentralization



Notes: The horizontal axis displays the number of years before and after decentralization for each treatment group (e.g. for the 2006 treatment group, the value 0 represents 2006 and the value 10 stands for 2016, ten years after they rolled-out the policy). For presentation purposes, the graph excludes the 2007 treatment group.

Source: Authors' calculations based on INEI's data.

3.4.4. Main specification

To capture the overall effect of the decentralization of the PCA on households' food security (gap in calories variable), and based on the identification strategy previously described, we define our baseline model as in Equation 3.2, where gap_{hgt} is our preferred food security variable and stands for the gap in calories for household h who belongs to the treatment group g^{21} and is observed in year t .

$$gap_{hgt} = D_{gt}\beta + Z_{my0}A + X_{hgt}B + F_m + post2002_t + \varepsilon_{hgt} \quad 3.2$$

D_{gt} is the decentralization variable for a household belonging to the treatment group g in year t . The yielding coefficient β can be interpreted as the intention-to-treat effect of the policy. Z_{my0} is the set of pre-decentralization characteristics that are correlated to the date of entry in

²¹ Belonging to the treatment group g means that the household resides in a province or district that received the transfer of the program in year g .

the decentralization process for the province or district m . Besides, X_{hgt} is a group of time-variant controls at the household level and F_m are province and district fixed effects that account for time-invariant territorial characteristics. Finally, $post2002_t$ is a time fixed effect that enables us to distinguish the periods before and after the start of the general decentralization process (i.e. after 2002). ε_{hgt} is the error term; standard errors are corrected for heteroskedasticity and clustered at the province and district level. All regressions are weighted (based on the weights provided in the survey).

Due to data limitations, we cannot control for the effect of other food aid programs; however, considering the magnitude of the PCA across the whole country, it is very unlikely that other small or medium size food aid programs would significantly affect our estimates. What is more, we argue that our results are not driven by the decentralization of the other social programs because they were all decentralized in a second step, after the PCA was completely transferred to all local authorities (Contraloría General de la República, 2014).

3.5. Results

This section shows whether the decentralization of the PCA was successful in improving the consumption of calories in Peru, it analyzes the mechanisms at play and explores other food security outcomes, such as over-consumption of calories (which can also lead to malnutrition), to better understand the effect of the policy across the country. As a reminder, the variable gap in calories is measured as the difference between household calorie consumption and household calorie needs. The variable of gap in calories can either take negative values (the household suffers from a food deficit and is at risk of undernourishment) or positive values (the household consumes the minimum calorie requirements or more).

3.5.1. *The heterogeneous impact of the PCA's decentralization across the territory*

We present the results of our main specification (Equation 3.2) in Table 3.2. The first column of this table gathers the overall results for Peru – pooling all provinces and Lima districts together – and enables us to verify some associations between the dependent and the control variables. For example, households with higher incomes tend to consume more calories, although this relationship is not linear and consumption of calories finds its maximum at a certain level of income. Table 3.2 also suggests that when the head of the household is a woman,

the availability of calories in the household is higher. This result echoes with other works showing that women are more likely to spend the family's revenues in health and education (EBRD and World Bank, 2013; UN Women). We also observe that households relying on self-consumption and working in agriculture are more likely to consume fewer calories with respect to their needs, whereas the consumption of calories increases with the educational attainment of the household's head.

Table 3.2. The impact of decentralizing the PCA on households' gap in calories (main specification)

	All provinces and Lima districts (1)	Provinces (excluding Lima) (2)	All districts of the Province of Lima (3)
	Gap in calories	Gap in calories	Gap in calories
Decentralization policy	-274.5*** (62.86)	318.3* (133.4)	-219.5*** (60.21)
<i>Local authority characteristics before decentralization</i>			
The local authority is a capital	-560.1*** (20.15)	168.5*** (14.13)	-162.7*** (40.34)
Government employees (per 1,000 inhabitants), circa 2002	-26.74*** (3.853)	286.2*** (2.157)	-80.09*** (5.938)
Population (in thousands), circa 2002	0.906*** (0.0491)	2.786*** (0.0507)	0.114*** (0.0242)
Poverty rate, circa 2002	-49.96*** (0.770)	-18.01*** (0.618)	-30.05*** (0.482)
<i>Household characteristics</i>			
Gross equivalized income	23.32*** (3.526)	44.78*** (5.183)	-0.217 (1.856)
Gross equivalized income ²	-0.0746*** (0.0154)	-0.169*** (0.0339)	0.00648 (0.00666)
Self-consumed food	-0.612*** (0.0191)	-0.596*** (0.0213)	-0.645*** (0.0465)
Household's size	-580.9*** (31.07)	-673.6*** (39.94)	-288.4*** (26.57)
Main activity: agriculture	-1149.9*** (74.22)	-1059.5*** (69.16)	153.5 (235.8)
Household head is a woman	149.8*** (29.84)	211.8*** (30.10)	-83.09 (56.90)
Primary education (head)	-30.27 (34.81)	25.16 (32.97)	-339.7*** (79.93)
Secondary education (head)	77.72 (49.78)	150.9** (51.42)	-329.6*** (72.57)
Tertiary education (head)	200.5*** (52.62)	301.6*** (59.88)	-255.4** (87.26)
<i>N</i>	260454	238011	22443
<i>R</i> ²	0.343	0.365	0.105
adj. <i>R</i> ²	0.342	0.364	0.103
Province / Lima district FE	Yes	Yes	Yes
Post 2002 FE	Yes	Yes	Yes

Note: The category of reference for the educational attainment is "No education". Robust standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Overall, the decentralization of the PCA had a negative impact on calorie consumption, with respect to calorie needs (Table 3.2, column 1). However, the effects are very heterogeneous across regions (columns 2 and 3). In particular, the generalized negative effect of the policy is mainly driven by the districts of the province of Lima, which are relatively more populated than the rest of the provinces.

When analyzing the differentiated effect of the policy across groups of regions, our results reveal a negative effect of the policy in the districts of Lima (Table 3.2, column 3), but a positive one in the rest of the provinces (Table 3.2, column 2). More precisely, decentralizing the PCA decreased calorie consumption (relative to calorie needs) in the households of Lima by 219 kcal per day on average. On the other hand, the policy increased calorie consumption (relative to calorie needs) by around 318 kcal per day for households living in the rest of the provinces. This amount of energy for the provinces represents around 4% of the average requirements for a Peruvian household²².

Channels of impact of the decentralization policy

To explain the heterogeneous regional effects of the policy, and based on the literature of decentralization, we identify two major mechanisms behind the process of decentralization – a positive “proximity effect” and a negative “capacity effect” that tend to vie with each other.

Our interpretation is that in the provinces (excluding Lima), decentralizing the PCA was beneficial to the population’s calorie consumption (relative to their needs) because the “proximity effect” overweighed the “capacity effect”. The advantages associated to the transfer of the program to the provincial authorities – who are by essence closer to local populations than is the national government – are greater than the potential drawbacks stemming from their lower institutional and financial capacity. It is easier and less costly for subnational governments to communicate with local populations and obtain information about their needs or preferences. For instance, provincial authorities may be better able to target the population in need of food support and may choose a more suitable composition of the food basket regarding local populations’ typical daily activities or culture. Central governments, on the

²² These calculations are based on the average energy requirement of the average Peruvian household (1900 kcal/day), based on INEI’s and CENAN’s data.

other hand, tend to face more difficulties to access such information, as they are generally located somewhere else (e.g. capital cities – here Lima) and operate through larger institutions that are less accessible to the citizens. Thus, even if provincial governments in Peru face tighter capacity constraints compared to the national government, the gains they obtain by tailoring the program to the local needs seem to dominate.

Conversely, we project that decentralization had a negative effect on calorie consumption (relative to their needs) in Lima because the “capacity effect” surpassed the “proximity effect”. The Province of Lima concentrates on its territory both the central administration and the local district authorities. Being based in the same place, it is very likely that government employees working in either one or the other of these administrations benefit from the same knowledge and awareness of the situation in Lima. Yet, they differ in their financial and management capacities. Literature has shown that financial resources and managerial skills of local authorities are likely to be weaker than those of central governments (OECD, 2019). Consequently, transferring the program from the Ministry of Woman and Social Development to the district authorities in Lima should be mainly associated with a decrease in management and budget capacities, without any or a very marginal gain in the knowledge of the local context.

Testing the “proximity” and “capacity” effects

To estimate the “proximity” and “capacity” effects of decentralization separately, we use Equation 3.3; which is a modified version of Equation 3.2 that includes the “proximity” variables of distance and language, or the “capacity” variables of budget utilization and perceived corruption, as well as their interaction with the decentralization policy variable.

3.3	
3.3.a	$gap_{hgt} = D_{gt}\beta_1 + distance_m\beta_2 + (D_{gt} * distance_m)\beta_3 + Z_{mgb}A + X_{hgt}B + F_m + post2002_t + \varepsilon_{hgt}$
3.3.b	$gap_{hgt} = D_{gt}\gamma_1 + language_{mt}\gamma_2 + (D_{gt} * language_{mt})\gamma_3 + Z_{mgb}A + X_{hgt}B + F_m + post2002_t + \varepsilon_{hgt}$
3.3.c	$gap_{hgt} = D_{gt}\alpha_1 + budget_m\alpha_2 + (D_{gt} * budget_m)\alpha_3 + Z_{mgb}A + X_{hgt}B + F_m + post2002_t + \varepsilon_{hgt}$
3.3.d	$gap_{hgt} = D_{gt}\theta_1 + corruption_m\theta_2 + (D_{gt} * corruption_m)\theta_3 + Z_{mgb}A + X_{hgt}B + F_m + post2002_t + \varepsilon_{hgt}$

The variable $distance_m$ stands for the geographical distance to Lima city from the province or district m (3.3.a). As a proxy of cultural distance we use the variable $language_{mt}$,

which is the difference in the proportion of native Spanish speakers between Lima district and the province or district m in year t (3.3.b). For the equations testing the capacity variables, $budget_m$ (3.3.c) denotes the capacity of the local government to utilize its budget (percentage of total budget spent at the end of the budget period), while $corruption_m$ indicates the level of perceived corruption in government by the local population. The food security variable gap_{ngt} and the rest of the controls are the same as in Equation 3.2. The coefficients of interest for proximity are β_3 and γ_3 that respectively measure how the effect of decentralizing the PCA varies with physical or cultural distance to the central government. On the other hand, α_3 and θ_3 capture the interaction effect of decentralization with either budget utilization or corruption, respectively.

We find that decentralization is more beneficial in regions farther away from the central government, both in terms of physical and cultural distance. While larger physical distance to the central government is negatively associated with food security outcomes, the interaction decentralization and physical distance is positively associated to adequate calorie consumption. The latter result also holds for the interaction of decentralization and cultural distance (Table 3.3, columns 1 and 2). Although the overall effect of the policy is negative when pooling together all the provinces (including Lima), the provinces farther away from Lima have positive gains from the proximity effect of decentralization. More precisely, and everything else being equal, the gain of decentralization for a province which is at 390 km from Lima capital district (the average distance in the sample) is of around 483 kcal per day by household.

Ideally, capacity should be measured through the level of skills or performance of the managing authorities before and after decentralization. This would imply measuring the capacity of the central government to manage the PCA before decentralization (for each province and district), and then the capacity of the new (local) managing authorities after decentralization (by province and district). Due to data availability constraints, we can only provide rough estimates of the role of capacity of local authorities at the time of decentralization (one point in time) in shaping the effectiveness of the policy.

According to Table 3.3 (columns 3 and 4), the provinces or districts with more capacity to spend their budget and with lower levels of perceived corruption tend to benefit more from decentralization. However, this positive association is not very robust – only statistically

significant at the 90% level. Overall, the most robust channel seems to be the proximity effect through physical distance, which is statistically significant at the 99%.

Table 3.3. The “proximity” and “capacity” effects

	All provinces and Lima districts			
	(1)	(2)	(3)	(4)
	Gap in calories	Gap in calories	Gap in calories	Gap in calories
Decentralization policy	-464.9*** (63.49)	-407.2*** (68.34)	-908.9** (282.60)	213.8 (191.10)
<i>Proximity effect</i>				
Decentralization*Distance to Lima	1.241*** (0.19)			
Decentralization*Difference in the main language spoken		11.20* (4.57)		
Distance to Lima	-4.922*** (0.19)			
Difference in the main language spoken		-3.099 (4.87)		
<i>Capacity effect</i>				
Decentralization*Budget capacity			6.798* (2.98)	
Decentralization*Perceived corruption				-15.19* (5.97)
Budget capacity			137.8*** (2.69)	
Perceived corruption				284.1*** (5.69)
Benchmark model's controls	Yes	Yes	Yes	Yes
N	260454	246682	258971	260454
R ²	0.343	0.342	0.341	0.343
Adjusted R ²	0.343	0.341	0.341	0.342
Post 2002 FE	Yes	Yes	Yes	Yes
Province/District FE	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001.

To verify which effect dominates, we include both proximity and capacity variables simultaneously in the horseshoe regressions of Table 3.4. Columns 1 and 2 show that the coefficient of the interaction of decentralization with physical distance is very stable even when including alternative variables of capacity, such as budget utilization and perceived corruption. What is more, the interaction effect of distance remains statistically significant at the 99%, while the interaction effects of capacity lose their statistical significance.

On the other hand, while the interaction effect of cultural distance remains similar in magnitude when including capacity variables, its statistical significance is low. When controlling for any interaction of decentralization with physical or cultural distance, budget capacity after decentralization loses its statistical significance even at the 90% (columns 1 and

3). These results support our interpretation that the proximity effect is the main channel through which decentralization improved the effectiveness of the program in the provinces. Lima districts are too close from the capital to significantly benefit from proximity effects.

Table 3.4. Horserace between the “Proximity” and “Capacity” effects

	All provinces and Lima districts			
	(1)	(2)	(3)	(4)
	Gap in calories	Gap in calories	Gap in calories	Gap in calories
Decentralization policy	-709.2* (273.14)	-291.0 (199.04)	-885.9* (367.87)	94.75 (252.83)
<i>Proximity effect</i>				
Decentralization*Distance to Lima	1.192*** (0.21)	1.163*** (0.21)		
Decentralization*Difference in the main language spoken			9.986* (4.96)	10.40* (4.73)
Distance to Lima	-1.931*** (0.21)	-6.901*** (0.20)		
Difference in the main language spoken			-2.191 (5.05)	-2.989 (4.96)
<i>Capacity effect</i>				
Decentralization*Budget capacity	2.726 (2.92)		5.249 (3.98)	
Decentralization*Perceived corruption		-5.030 (6.00)		-15.11* (7.56)
Budget capacity	111.1*** (3.11)		169.3*** (5.51)	
Perceived corruption		-144.4*** (5.91)		342.7*** (8.61)
Benchmark model’s controls	Yes	Yes	Yes	Yes
N	258971	260454	245257	246682
R ²	0.342	0.344	0.340	0.342
Adjusted R ²	0.341	0.343	0.339	0.341
Post 2002 FE	Yes	Yes	Yes	Yes
Province/District FE	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001.

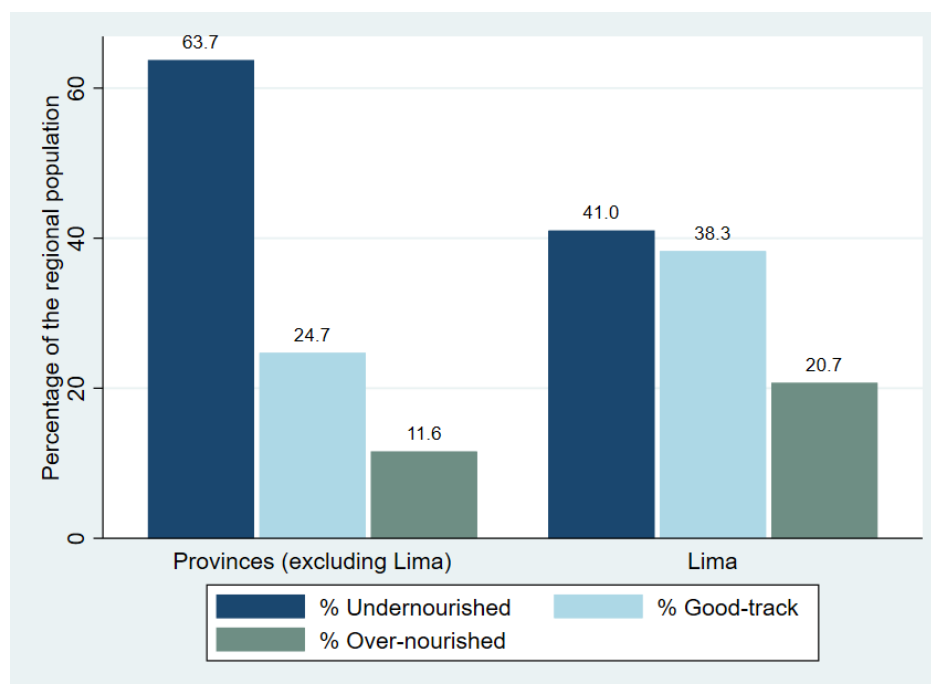
3.5.2. Regional convergence in food security

Our results suggest that decentralizing the PCA has a detrimental impact on households’ calorie consumption in Lima but a positive one in the rest of the provinces. Yet, food security is a multidimensional and complex issue that not only relates to undernourishment, but also to excessive food consumption issues (hereafter “over-nourishment”). Being “food secured” not only implies having access to adequate quantities of food, but also requires that the food is nutritious enough. Malnutrition – e.g. through over-consumption of calories, among other factors – can lead to overweight and obesity, which are other forms of food insecurity.

Since the main objective of the PCA is to provide food for the undernourished, our main dependent variable throughout this study has been calorie consumption relative to calorie needs. Nevertheless, this variable does not allow accounting for levels of over-consumption, which can also lead to other types of food insecurity. In what follows, we explore complementary measures of food security that capture the impact of decentralization in the prevalence of “undernourishment” (consumption below calorie needs), “good-track” and “over-nourishment” (consumption 50% or more above the calorie needs).

While undernourishment is the most important food security issue in the provinces (compared to Lima), over-consumption of calories is a major issue in the Province of Lima (relative to the other provinces). For instance, on average in the period 2001-2016, the prevalence of over-consumption in the Province of Lima was of 20.7%, around 9 percentage points above the levels in the rest of the country (Figure 3.6).

Figure 3.6. Prevalence of undernourishment and over-nourishment in the Provinces and in the districts of Lima, average 2001-2016

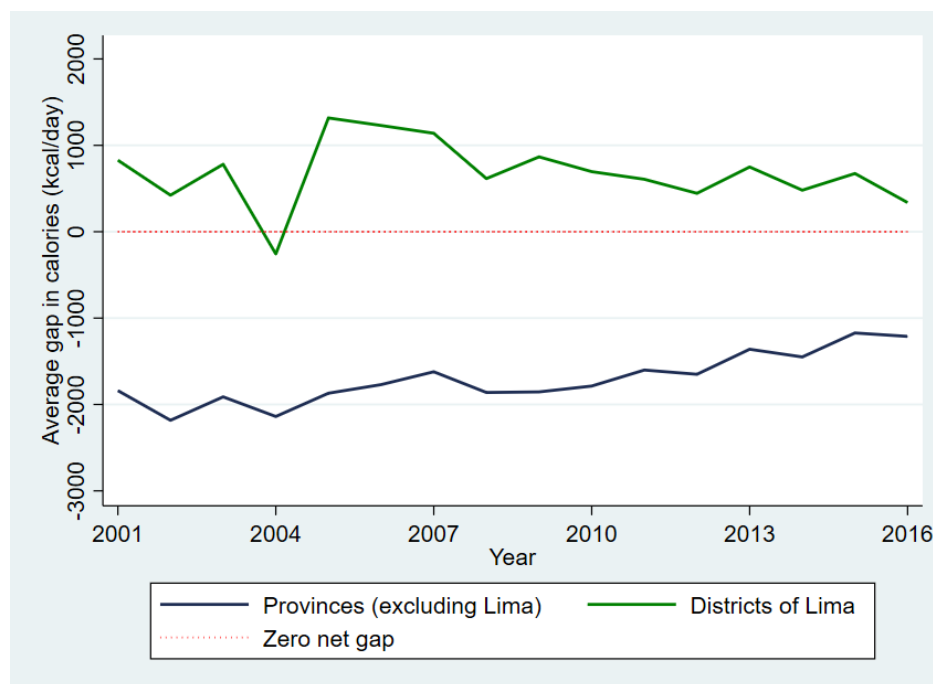


Source: Authors' calculations based on INEI's data.

If decentralization has led to more calorie consumption in the initially undernourished provinces (all provinces excluding Lima) and to a lower consumption in the over-nourished (i.e. Province of Lima), this would result in a regional convergence in calorie consumption and

lower risks of food insecurity across the country. Figure 3.7 suggests that regional convergence in food security is taking place in Peru. From 2001 to 2016, the provinces (excluding Lima) have reduced their deficit in calorie consumption by half, while in Lima the surplus in calorie consumption is decreasing.

Figure 3.7. Average gap in calories by group of local authorities, 2001-2016



Source: Authors' elaboration based on INEI's ENAHO data.

The impact of decentralization on other food security outcomes

To explore further the negative effects of decentralization within the Province of Lima, this section extends the analysis to complementary food security outcomes. Through linear probability regressions, we estimate the effect of decentralizing the program on different binary outcomes determined by the total household calorie consumption: 1) the probability of being undernourished, 2) the probability of being in good-track, and 3) the probability of being over-nourished.

To assess whether decentralization increases the chances for households to exit undernutrition or over-nutrition (to be in good-track), we estimate Equation 3.4, where $FS\ dummies_{hgt}$ are either $undernutrition_{hgt}$, $goodtrack_{hgt}$ or $overnutrition_{hgt}$. All the

other variables in the specification are identical to the ones described in the previous sections. Standard errors are robust and clustered at the province and district level.

$$FS\ dummies_{hgt} = D_{gt}\beta + Z_{mgb}A + X_{hgt}B + F_m + post2002_t + \varepsilon_{hgt} \quad 3.4$$

Our results suggest that in the provinces (excluding Lima), the decentralization of the PCA did not significantly decrease the probability of being undernourished (Table 3.5, columns 1 to 3); although it decreased the average deficit of calorie consumption (based in our previous results, see Table 3.2, column 2). In other words, decentralization improved households' calorie consumption in the provinces (excluding Lima), but not enough for them to exit undernourishment.

On the other hand, when looking at the impact of the policy in Lima, our results indicate that decentralizing the PCA significantly reduced the probability of being over-nourished (Table 3.5, column 6) without significantly raising the risks of falling into undernutrition (Table 3.5, column 4). It is worth noting that this improvement in food security in Lima might be unintentional, as the main objective of the PCA is to increase calorie intakes. The drop in capacity (after decentralization) to manage the PCA in Lima decreased local calorie intakes (see Table 3.2, column 3). The fall in average calorie consumption combined with Lima's initial levels of over-consumption, translated into lower risk of over-nourishment in Lima. We perform robustness checks using different thresholds to define an excessive calorie consumption; our findings remain stable when considering both a 120- and 200-threshold for over-nourishment (see Annex Table 3.A.1-Annex Table 3.A.2).

Overall, the decentralization of the PCA is contributing to the regional convergence in the consumption of calories – where provinces and districts converge slowly towards a zero-net gap in calories. After decentralization, the Peruvian population is consuming calories in a proportion closer to their energy needs. While provincial authorities managed to help increase the consumption of calories in the provinces (excluding Lima) that were suffering more from undernourishment, decentralization in Lima helped to reduce the excess in calorie consumption.

Table 3.5. The impact of decentralizing the PCA on households' probability of undernourishment and over-nourishment

	Provinces (excluding Lima)			Lima districts		
	(1)	(2)	(3)	(4)	(5)	(6)
	Undernutrition	Good-track	Over-nutrition	Undernutrition	Good-track	Over-nutrition
Decentralization policy	-0.0132 (0.0119)	0.0108 (0.0101)	0.00245 (0.00645)	0.0165 (0.00867)	0.0112 (0.00848)	-0.0276*** (0.00636)
<i>Local authority characteristics</i>						
The local authority is a capital	-0.0402*** (0.00251)	0.0361*** (0.00165)	0.00412** (0.00146)	0.0916*** (0.00424)	-0.0550*** (0.00464)	-0.0366*** (0.00367)
Population (in thousands)	-0.000391*** (0.00000527)	0.000224*** (0.00000324)	0.000167*** (0.00000282)	0.000104*** (0.00000573)	-0.0000429*** (0.00000499)	-0.0000608*** (0.00000410)
Government employees per 1 000 inhabitants	-0.0420*** (0.000484)	0.0302*** (0.000312)	0.0118*** (0.000271)	-0.000706 (0.000523)	0.00554*** (0.000477)	-0.00484*** (0.000434)
<i>Household characteristics</i>						
Gross equivalized income	-0.00384*** (0.000491)	0.00149*** (0.000283)	0.00235*** (0.000279)	0.000275 (0.000360)	-0.000351 (0.000280)	0.0000754 (0.000236)
(Gross equivalized income) ²	0.0000141*** (0.00000311)	-0.00000721*** (0.00000168)	-0.00000692*** (0.00000174)	-5.62e-08 (0.00000145)	-0.000000673 (0.000000912)	0.000000729 (0.00000103)
Household size	0.0248*** (0.00161)	0.000732 (0.00220)	-0.0255*** (0.00130)	0.0200*** (0.00293)	0.0234*** (0.00202)	-0.0434*** (0.00186)
Self-consumption	0.0000408*** (0.00000191)	-0.0000293*** (0.00000144)	-0.0000115*** (0.000000582)	0.0000521*** (0.00000365)	-0.0000361*** (0.00000249)	-0.0000160*** (0.00000138)
Main activity: agriculture	0.0863*** (0.00568)	-0.0597*** (0.00410)	-0.0266*** (0.00303)	-0.000912 (0.0347)	-0.0603 (0.0361)	0.0612 (0.0333)
Household head is a woman	-0.0226*** (0.00364)	-0.00111 (0.00271)	0.0237*** (0.00231)	-0.00593 (0.00894)	-0.0322*** (0.00682)	0.0381*** (0.00574)
Primary education	-0.00880* (0.00350)	0.00917*** (0.00271)	-0.000373 (0.00219)	0.0515*** (0.0106)	-0.0146 (0.00929)	-0.0369*** (0.00872)
Secondary education	-0.0170*** (0.00414)	0.0156*** (0.00292)	0.00143 (0.00283)	0.0399*** (0.00869)	-0.00465 (0.00945)	-0.0352*** (0.00822)
Tertiary education	-0.0510*** (0.00612)	0.0264*** (0.00517)	0.0246*** (0.00501)	0.0341** (0.0111)	-0.0196 (0.0121)	-0.0146 (0.00841)
N	239976	239976	239976	22466	22466	22466
R ²	0.180	0.088	0.082	0.040	0.025	0.055
Adjusted R ²	0.180	0.087	0.082	0.038	0.023	0.053
Province/Lima District FE	Yes	Yes	Yes	Yes	Yes	Yes
Post 2003 FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: A household is considered over-nourished if it consumes 150% or more of its calorie needs, while it is considered in good track if its calorie intakes are between 100 and 150% its minimum requirements. Robust standard errors in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001.

3.6. Conclusions

This paper evaluates the causal impact of the decentralization of the Peruvian Complementary Food Program on its effectiveness to bring the consumption of calories closer to the average needs of the population across the country.

Our results highlight a clear heterogeneous effect of decentralization between the districts composing the Province of Lima and the rest of the provinces. While households living in other provinces than Lima see their calorie intakes rise after decentralization, the ones residing in Lima experience a decrease in their average consumption. We explain these differentiated impacts by two opposite effects associated with the decentralization process: a positive

“proximity effect” coming from a better understanding of the local context by subnational authorities, and a negative “capacity effect” that reflects the weaker financial and institutional resources and skills in local authorities in comparison to the national government.

Using complementary measures of food security, we argue that regional convergence in calorie intakes in Peru is welfare improving. While decentralizing the PCA boosted the consumption of calories in provinces with initial high levels of undernourishment, the fall in calorie intake in the districts of Lima is mainly driven from a share of the population shifting from very high levels of calorie consumption (“over-nourished”) to more standard ones.

Our results support the use of bottom-up approaches in policymaking if complemented with the necessary local capacity, in particular in the context of decentralization. While there are gains in decentralization associated to the knowledge of subnational authorities about the local specificities and needs, the lack of capacity of local institutions can offset these positive gains. If decentralization occurs with the right capacity in place or is accompanied by capacity building, its positive effects can be ensured.

Annex 3.A. Robustness checks: different thresholds for over-nourishment

Annex Table 3.A.1. Robustness checks: using a 120-threshold

	Provinces (excluding Lima)			Lima districts		
	(1)	(2)	(3)	(4)	(5)	(6)
	Undernutrition	Good-track	Over-nutrition (≥120-threshold)	Undernutrition	Good-track	Over-nutrition (≥120-threshold)
Decentralization policy	-0.0132 (0.0119)	0.00552 (0.00679)	0.00772 (0.00962)	0.0165 (0.00867)	0.0135 (0.00688)	-0.0299* (0.00921)
<i>Local authority characteristics</i>						
The local authority is a capital	-0.0402*** (0.00251)	0.0208*** (0.00118)	0.0194*** (0.00210)			
Population (in thousands)	-0.000391*** (0.0000527)	0.0000783*** (0.00000209)	0.000313*** (0.00000467)	0.000104*** (0.00000573)	-0.0000902*** (0.00000360)	-0.0000135* (0.00000563)
Government employees per 1 000 inhabitants	-0.0420*** (0.000484)	0.00992*** (0.000215)	0.0321*** (0.000403)	-0.000706 (0.000523)	0.00112** (0.000396)	-0.000413 (0.000571)
<i>Household characteristics</i>						
Gross equivalized income	-0.00384*** (0.000491)	0.000293 (0.000158)	0.00355*** (0.000449)	0.000275 (0.000360)	-0.000261 (0.000203)	-0.0000140 (0.000264)
(Gross equivalized income) ²	0.0000141*** (0.00000311)	-0.00000173** (0.000000626)	-0.0000124*** (0.00000270)	-5.62e-08 (0.00000145)	0.000000294 (0.000000724)	-0.000000238 (0.00000104)
Household size	0.0248*** (0.00161)	0.00525*** (0.00140)	-0.0300*** (0.00119)	0.0200*** (0.00293)	0.0204*** (0.00149)	-0.0404*** (0.00262)
Self-consumption	0.0000408*** (0.00000191)	-0.0000141*** (0.000000673)	-0.0000267*** (0.00000134)	0.0000521*** (0.00000365)	-0.0000167*** (0.00000150)	-0.0000354*** (0.00000248)
Main activity: agriculture	0.0863*** (0.00568)	-0.0267*** (0.00275)	-0.0596*** (0.00471)	-0.000912 (0.0347)	-0.0314 (0.0315)	0.0323 (0.0354)
Household head is a woman	-0.0226*** (0.00364)	0.00141 (0.00182)	0.0212*** (0.00324)	-0.00593 (0.00894)	-0.00604 (0.00516)	0.0120 (0.00895)
Primary education	-0.00880* (0.00350)	0.00708*** (0.00198)	0.00172 (0.00314)	0.0515*** (0.0106)	0.00854 (0.00822)	-0.0600*** (0.0123)
Secondary education	-0.0170*** (0.00414)	0.00800*** (0.00238)	0.00899* (0.00404)	0.0399*** (0.00869)	0.0146* (0.00671)	-0.0545*** (0.0103)
Tertiary education	-0.0510*** (0.00612)	0.0118** (0.00366)	0.0392*** (0.00608)	0.0341** (0.0111)	0.00442 (0.00951)	-0.0385** (0.0120)
N	239976	239976	239976	22466	22466	22466
R ²	0.180	0.029	0.137	0.040	0.017	0.046
Adjusted R ²	0.180	0.028	0.137	0.038	0.015	0.044
Province/Lima District FE	Yes	Yes	Yes	Yes	Yes	Yes
Post 2003 FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: A household is considered over-nourished if it consumes 120% or more of its calorie needs, while it is considered in good track if its calorie intakes are between 100 and 120% its minimum requirements. Standard errors in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001.

Annex Table 3.A.2. Robustness checks: using a 200-threshold

	Provinces (excluding Lima)			Lima districts		
	(1)	(2)	(3)	(4)	(5)	(6)
	Undernutrition	Good-track	Over-nutrition (≥200-threshold)	Undernutrition	Good-track	Over-nutrition (≥200-threshold)
Decentralization policy	-0.0132 (0.0119)	0.00975 (0.0115)	0.00349 (0.00304)	0.0165 (0.00867)	0.00210 (0.00915)	-0.0186*** (0.00374)
<i>Local authority characteristics</i>						
The local authority is a capital	-0.0402*** (0.00251)	0.0435*** (0.00237)	-0.00327*** (0.000470)			
Population (in thousands)	-0.000391*** (0.00000527)	0.000358*** (0.00000466)	0.0000329*** (0.00000125)	0.000104*** (0.00000573)	-0.0000956*** (0.00000622)	-0.00000816*** (0.00000205)
Government employees per 1 000 inhabitants	-0.0420*** (0.000484)	0.0405*** (0.000454)	0.00151*** (0.000103)	-0.000706 (0.000523)	0.00567*** (0.000572)	-0.00497*** (0.000185)
<i>Household characteristics</i>						
Gross equivalized income	-0.00384*** (0.000491)	0.00317*** (0.000431)	0.000669*** (0.000141)	0.000275 (0.000360)	-0.000659* (0.000318)	0.000383** (0.000136)
(Gross equivalized income) ²	0.0000141*** (0.00000311)	-0.0000136*** (0.00000283)	-0.000000543 (0.00000145)	-5.62e-08 (0.00000145)	0.000000733 (0.00000124)	-0.000000677 (0.000000450)
Household size	0.0248*** (0.00161)	-0.0149*** (0.00191)	-0.00993*** (0.000628)	0.0200*** (0.00293)	0.00113 (0.00284)	-0.0212*** (0.000967)
Self-consumption	0.0000408*** (0.00000191)	-0.0000388*** (0.00000188)	-0.00000201*** (0.00000154)	0.0000521*** (0.00000365)	-0.0000488*** (0.00000338)	-0.00000330*** (0.000000456)
Main activity: agriculture	0.0863*** (0.00568)	-0.0829*** (0.00526)	-0.00340** (0.00117)	-0.000912 (0.0347)	-0.0213 (0.0418)	0.0222 (0.0214)
Household head is a woman	-0.0226*** (0.00364)	0.00503 (0.00403)	0.0176*** (0.00143)	-0.00593 (0.00894)	-0.0221* (0.00953)	0.0281*** (0.00298)
Primary education	-0.00880* (0.00350)	0.00963** (0.00311)	-0.000825 (0.00101)	0.0515*** (0.0106)	-0.0538*** (0.0115)	0.00230 (0.00571)
Secondary education	-0.0170*** (0.00414)	0.0197*** (0.00391)	-0.00269 (0.00138)	0.0399*** (0.00869)	-0.0347*** (0.00932)	-0.00520 (0.00388)
Tertiary education	-0.0510*** (0.00612)	0.0430*** (0.00554)	0.00799*** (0.00239)	0.0341** (0.0111)	-0.0337** (0.0117)	-0.000371 (0.00483)
N	239976	239976	239976	22466	22466	22466
R ²	0.180	0.154	0.035	0.040	0.029	0.045
Adjusted R ²	0.180	0.153	0.034	0.038	0.026	0.043
Province/Lima District FE	Yes	Yes	Yes	Yes	Yes	Yes
Post 2003 FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: A household is considered over-nourished if it consumes 200% or more of its calorie needs, while it is considered in good track if its calorie intakes are between 100 and 2000% its minimum requirements. Standard errors in parentheses; * p < 0.05, ** p < 0.01, *** p < 0.001.

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**Trois essais en économie du développement :
Politiques publiques et discontinuités
géographiques**

Marcos Aurelio Díaz Ramírez

Thèse dirigée par Sergeï Guriev, Professeur à Sciences Po Paris

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Résumé

Introduction

Fonder les politiques sur des preuves scientifiques est crucial pour maximiser le bien-être. Ces dernières années, gouvernements, organisations internationales et recherche académique (voir Sanderson, 2002 ; Roberts, 2005) ont généralisé la nécessité d'utiliser des données et des preuves pour la conception, la mise en place et l'évaluation des politiques publiques.

Le Prix Nobel d'Economie 2019 décerné à Duflo, Banerjee et Kremer est un autre exemple probant de la pertinence d'évaluer les politiques pour répondre aux défis de développement sur les scènes mondiale et locale. Tandis que les évaluations randomisées apparaissent comme l'un des moyens les plus précis pour identifier l'effet causal des politiques (Banerjee, Duflo et Kremer, 2016), de nombreux programmes gouvernementaux ne sont pas conçus de manière à permettre leur évaluation ex-post (Duflo et Kremer, 2003) – celle-ci peut s'avérer coûteuse et requiert souvent une capacité et des ressources humaines qui tendent à manquer particulièrement dans les pays et régions en développement. Pourtant, les décideurs publics ont besoin de preuves scientifiques pour ajuster les politiques, réallouer le budget et adapter leurs actions de sorte à maximiser le bien-être des populations tout en tenant compte des ressources disponibles.

Cette thèse présente trois cas où l'évaluation ex-post de politiques est possible, soit grâce à l'exploitation de discontinuités géographiques dans la mise en place de la politique (Chapitres 1 et 3), soit grâce à des discontinuités régionales créées par une réglementation attachée à la politique (Chapitre 2). Chaque chapitre se concentre sur des défis différents (mais très fortement reliés) de l'Agenda 2030 et des Objectifs de Développement Durable (ODD) (voir UN, 2017). Tandis que le Chapitre 1 évalue l'impact de la sécurité sociale universelle sur la mortalité maternelle et périnatale²³, le Chapitre 3 explore l'effet de la décentralisation sur des

²³ ODD 3 pour la Bonne santé et le bien-être : “3.1 D’ici à 2030, faire passer le taux mondial de mortalité maternelle au-dessous de 70 pour 100 000 naissances vivantes”, et “3.2 D’ici à 2030, éliminer les décès évitables de nouveau-nés et d’enfants [...]” (UN, 2017).

indicateurs liés à l'objectif mondial d'éradiquer la faim²⁴, dont celui sur la sécurité alimentaire relève. Le Chapitre 2 étudie comment les fonds d'aide stimulent la création d'entreprises et la productivité, ce qui fait partie de l'ODD pour la prospérité économique²⁵.

Chapitre 1 :

La Sécurité Sociale Universelle peut-elle réduire la mortalité périnatale et maternelle ? Le cas de Seguro Popular au Mexique

Ce chapitre quantifie l'impact de la politique de sécurité sociale universelle mexicaine – nommée Seguro Popular – sur la mortalité périnatale et la mortalité maternelle, et explore les canaux par lesquels l'effet du programme est principalement médié.

L'Organisation Mondiale de la Santé (OMS) estime que chaque année dans le monde, environ 300 000 femmes décèdent pendant leur grossesse ou leur accouchement et 5,3 millions de bébés sont mort-nés ou décèdent dans les 28 premiers jours de leur vie (WHO, 2018a). La plupart de ces décès peuvent pourtant être évités, dans la mesure où les interventions médicales nécessaires sont connues et existent. Cependant, l'inaccessibilité à des soins de santé de qualité pendant la grossesse, l'accouchement et les semaines qui suivent la naissance de l'enfant reste l'une des principales causes de fausses couches et de décès des mères dans les pays en développement et à moyen revenu.

Les agendas mondiaux pour le développement comme par exemple les Objectifs de Développement Durable (ODD) pensés par les Nations Unies, ont fixé l'objectif d'atteindre un ratio de mortalité maternelle de 7 décès ou moins pour 10 000 naissances vivantes, d'ici 2030 (UN, 2017). De la même manière, l'OMS mène actuellement plusieurs initiatives comme le

²⁴ ODD 2 pour la Faim "zéro" : "2.1 D'ici à 2030, éliminer la faim et faire en sorte que chacun, en particulier les pauvres et les personnes en situation vulnérable, y compris les nourrissons, ait accès tout au long de l'année à une alimentation saine, nutritive et suffisante" (UN, 2017).

²⁵ ODD 8 pour le Travail décent et la croissance économique : "8.3 Promouvoir des politiques axées sur le développement qui favorisent des activités productives, la création d'emplois décents, l'entrepreneuriat, la créativité et l'innovation et stimulent la croissance des microentreprises et des petites et moyennes entreprises et facilitent leur intégration dans le secteur formel, y compris par l'accès aux services financiers" (UN, 2017).

Plan d'Action pour Chaque Nouveau-Né qui suggère d'atteindre d'ici 2030 moins de 12 décès de bébés à la naissance pour 1 000 naissances (WHO, 2018b).

Au Mexique, entre 1995 et 2000, les taux de mortalité périnatale et maternelle culminaient considérablement au-dessus des niveaux suggérés par les ODD et l'OMS, avec environ 17,5 décès périnataux pour 1 000 naissances vivantes et 16,5 décès maternels pour 10 000 naissances vivantes – soit près de 46% et 136% au-delà de leur objectif respectif. Pourtant, après 2004, ces deux taux ont fortement chuté à des niveaux proches des 14 décès périnataux et 6 décès maternels pour 1 000 et 10 000 naissances vivantes, respectivement. Le programme de sécurité sociale universelle Seguro Popular (SP) créé en 2002 pour donner accès aux soins à la population non-assurée au Mexique – qui représentait près de 60% de la population totale entre 1995 et 2002 – a sans doute joué un rôle important dans la réduction de la mortalité périnatale et maternelle vers des taux plus proches de ceux suggérés par les organisations internationales.

Ce chapitre alimente la littérature qui étudie l'impact de la sécurité sociale universelle sur diverses variables de santé. Plus précisément, nous étudions ici l'impact du programme mexicain Seguro Popular sur la mortalité périnatale et maternelle. Tandis que les travaux précédents explorent l'impact de SP sur d'autres indicateurs de mortalité et pour la plupart se basent sur des données d'enquête et auto-déclaratives (voir Pfutze, 2015) ou des données agrégées au niveau municipal (voir Conti et Ginja, 2016), cette étude analyse l'effet du programme en utilisant les registres administratifs des naissances et décès détaillés au niveau individuel (plus de 30 millions d'observations pour la période 1995-2015), ce qui permet une meilleure quantification de l'effet du programme.

Pour identifier l'effet causal de la politique, nous exploitons les différences dans les dates de mise en place du programme entre les municipalités et estimons un modèle en doubles différences qui contrôle pour plusieurs caractéristiques au niveau individuel et au niveau des municipalités.

Entre 1995 et 2015, les taux de mortalité périnatale et maternelle ont respectivement diminué de 40 et 3,5 décès pour chaque 10 000 naissances vivantes. Nous trouvons que le programme Seguro Popular explique 50% et 40% de ces réductions respectivement, ce qui représente en moyenne une diminution de 3 200 décès périnataux et de 224 décès maternels chaque année. La plus grande partie de cet effet s'explique par une réduction des décès liée à

l'amélioration de la santé de la mère, plutôt que par une réduction des décès associés à des conditions congénitales ou héritées par le fœtus.

Le programme a encouragé les femmes enceintes à se déplacer vers les municipalités où les hôpitaux sont implantés. Tandis que ces déplacements, seuls, réduisent la probabilité d'une naissance réussie, l'effet négatif du déplacement est complètement annulé par l'effet positif du fait de pouvoir recevoir des soins médicaux professionnels dans un hôpital, via Seguro Popular. Le programme de sécurité universelle au Mexique a donc prouvé son efficacité à réduire la mortalité périnatale et la mortalité maternelle depuis sa récente mise en place.

Chapitre 2 :

Quel effet de la Politique de Cohésion Européenne sur la dynamique régionale des entreprises ?

Ce chapitre évalue dans quelle mesure les fonds alloués par la Politique de Cohésion de l'Union Européenne (UE) pendant la période budgétaire 2007-2013 ont affecté la dynamique des entreprises dans les régions européennes.

La Politique de Cohésion est un vaste système de transferts fiscaux représentant environ un tiers du budget total de l'UE (€347 milliards), distribués à travers trois fonds : le Fonds Européen de Développement Régional (FEDER), le Fonds Social Européen (FSE) et le Fonds de Cohésion (CF). Le principal objectif de la Politique de Cohésion est d'atteindre une cohésion économique, sociale et territoriale entre les régions de l'UE, en soutenant notamment la croissance dans les régions les moins développées, de sorte qu'elles puissent rattraper plus rapidement le niveau de développement moyen de l'UE – aussi connu sous le nom d'« objectif de convergence » (European Union, 2013).

Les travaux antérieurs sur le sujet ont démontré que la Politique de Cohésion impactait positivement la croissance du PIB par tête dans les régions bénéficiaires (voir Becker et al., 2010; Pellegrini et al., 2013). Cependant, nous en savons encore très peu sur les mécanismes exacts par lesquels ces fonds d'aide influencent la croissance économique régionale. Ce chapitre utilise de nouvelles données de démographie régionale des entreprises pour démontrer

que la dynamique des entreprises est un mécanisme important pour comprendre les effets économiques de la Politique de Cohésion.

Afin de quantifier l'impact de la Politique de Cohésion sur la dynamique des entreprises, nous mettons en place une stratégie de régression par discontinuité où la discontinuité est générée par la règle qui définit le droit d'obtenir un montant d'aide supérieur pour certaines régions : avoir un PIB par tête inférieur à 75% de la moyenne du PIB par tête de l'UE. Nous vérifions que les dépenses régionales des fonds européens sont clairement discontinues pour les régions positionnées au voisinage des 75% du PIB par tête européen (« seuil des 75% »). En moyenne, les régions figurant en-dessous du seuil des 75% dépensent environ 5,5 fois plus de ces fonds que ne le font les régions dont les niveaux de PIB par tête sont supérieurs au seuil des 75%. Plus on se rapproche du seuil des 75%, plus la discontinuité est marquée et exogène, ce qui nous permet d'estimer les effets des fonds par une stratégie de régression par discontinuité floue.

Nous commençons par quantifier l'impact direct groupé des trois fonds (fonds de Cohésion, fonds de Développement, et fonds Social) sur la création et sur la destruction d'entreprises au niveau régional, et vérifions si cet impact se reflète également dans les niveaux de productivité régionale de la main d'œuvre. Nous montrons que les régions qui reçoivent plus d'aide ont des taux de création d'entreprises plus grands et des taux de destruction d'entreprises plus faibles, ce qui se traduit par des taux de création nette d'entreprises plus importants et par une croissance positive de l'emploi. Nos résultats rapportent qu'une augmentation de €100 millions dans le montant annuel des fonds (environ 0,2% de la moyenne annuelle du budget de l'UE) est associée à une création nette de 241 nouvelles entreprises et 159 nouveaux emplois pour 10 000 entreprises et emplois existants, respectivement. D'autre part, nous observons que les régions qui reçoivent un montant d'aide plus important montrent des augmentations plus fortes dans leur valeur ajoutée brute par travailleur. Notre interprétation est qu'une création des entreprises plus rapide stimule la compétition et permet une réallocation plus efficace des compétences et des ressources entre les entreprises, générant ainsi des niveaux de productivité du travail plus élevés.

Dans un deuxième temps, nous cherchons à déterminer si les effets observés sur la dynamique régionale des entreprises diffèrent selon le fonds que l'on considère. Les résultats

suggèrent que bénéficier de manière plus importante des fonds FEDER et FSE par rapport au fonds CF est associé à une plus forte dynamique des entreprises et à des niveaux de productivité de la main d'œuvre plus élevés. De plus, l'impact du fait de recevoir relativement plus d'aide de la part du fonds FSE est plus grand et statistiquement plus significatif sur l'emploi et sur la productivité du travail que l'impact du fonds FEDER. Ces résultats paraissent être en adéquation avec les objectifs principaux pour lesquels chaque fonds a été créé. Tandis que les fonds FEDER et FSE sont dédiés respectivement à l'aide aux petites et moyennes entreprises et au soutien à l'emploi, le fonds CF se focalise essentiellement sur le financement de projets d'infrastructures de transport.

Enfin, nous évaluons comment la qualité de la gouvernance régionale modère l'effet des fonds. Il est largement reconnu que les institutions jouent un rôle essentiel dans le développement économique. La littérature a montré que l'efficacité des investissements publics dépendait grandement de la capacité institutionnelle des régions à gérer et allouer leurs ressources. En explorant le rôle que joue la gouvernance dans l'impact des fonds européens, nous trouvons que pour les régions du Sud de l'Europe qui ont des niveaux de corruption plus faibles, l'effet des fonds conduit à une plus grande création nette d'emplois mais n'a aucun impact significatif ni sur la création ni sur l'attrition des entreprises. Par conséquent pour ces régions, cela ne se traduit pas par une plus grande productivité. Ces résultats s'accordent avec notre argument : dans le champ de la démographie d'entreprises, le moteur principal vers la productivité est la création et l'attrition des entreprises. En l'absence d'une dynamique des entreprises, les niveaux de productivité ne sont pas voués à croître.

Chapitre 3 :

Décentraliser améliore-t-il l'efficacité des politiques publiques ? Le cas du Programme de Compléments Alimentaires au Pérou

Ce chapitre évalue l'impact qu'a eu la décentralisation du programme péruvien de Compléments Alimentaires (PCA) sur son efficacité, et explore les canaux par lesquels ce changement de gouvernance a amélioré la sécurité alimentaire dans les différentes régions du pays.

Depuis les années 1980, de nombreux pays à travers le monde ont initié des processus de décentralisation qui ont remodelé la manière dont les gouvernements répondent aux défis économiques et sociaux. Beaucoup d'auteurs ont dès lors étudié l'impact de la décentralisation sur une large gamme de sujets, comme par exemple sur les institutions, la croissance économique, la pauvreté et l'éducation (voir Basurto et al., 2018; Leer, 2016; Galasso and Ravallion, 2005); cependant, peu de recherches se sont penchées sur l'impact de la décentralisation sur la sécurité alimentaire. Ce chapitre cherche à combler ce manque dans la littérature en apportant des preuves empiriques des effets de la décentralisation sur la sécurité alimentaire.

Garantir la sécurité alimentaire ainsi qu'une bonne nutrition est, aujourd'hui encore, une problématique majeure et en constante évolution de manière globale. Dans le monde, une personne sur dix souffre de la faim et, contrairement à la croyance commune, l'insécurité alimentaire s'est remise à croître dernièrement principalement en Afrique et en Amérique du Sud, à cause des conflits, sécheresses et autres catastrophes engendrées par le changement climatique – le nombre de personnes en état de sous-nutrition s'est accru de 37 millions entre 2014 et 2017 (FAO et al., 2018).

Malgré des progrès remarquables ces dernières années, la sécurité alimentaire et la nutrition restent des sujets importants au Pérou. En 2000, environ un cinquième de la population péruvienne était sous-alimentée, conduisant le gouvernement à créer plusieurs programmes tel que le Programme de Compléments Alimentaires (PCA). Le PCA est l'un des plus anciens et plus importants programmes sociaux dédiés à l'aide alimentaire au Pérou. Son principal objectif est d'améliorer la consommation alimentaire des populations les plus pauvres et les plus vulnérables, en leur fournissant directement des compléments d'alimentation, distribués dans des centres sociaux administrés par des bénévoles des communautés locales. Depuis sa création en 1992, le PCA était entièrement géré par le gouvernement central. Mais, dans l'objectif d'en améliorer l'efficacité et de s'attaquer aux inégalités régionales en termes de sécurité alimentaire, le gouvernement a décidé de décentraliser le PCA. Entre 2003 et 2014, la gestion du programme a donc été progressivement transférée aux autorités locales du pays.

Afin d'évaluer l'impact causal de la décentralisation du PCA sur la sécurité alimentaire des ménages, nous utilisons un modèle de doubles différences qui s'adapte à la mise en place

graduelle de la décentralisation à travers les gouvernements locaux. Nous combinons des données très riches sur la consommation alimentaire des ménages (produits et quantités consommés) avec des données officielles sur les besoins en calories par groupes genre-âge, afin de construire un indicateur de sécurité alimentaire, nommé « l'écart en calories », qui mesure la différence entre la consommation calorique des ménages et leurs besoins en calories. La variable de l'écart en calories peut prendre soit une valeur négative (dans ce cas le ménage souffre d'un déficit alimentaire et est à risque de sous-nutrition), soit une valeur positive (le ménage consomme son minimum requis de calories, ou plus).

Nos résultats indiquent un impact général négatif de la décentralisation sur le surplus de consommation de calories des ménages par rapport au minimum requis. Cependant, l'impact de la décentralisation n'est pas homogène à travers le territoire ; nos estimations montrent que la consommation de calories diminue dans la Province de Lima alors qu'elle s'accroît dans les autres provinces du pays, menant donc à une convergence régionale dans les niveaux de sécurité alimentaire au Pérou. Nos résultats montrent que la décentralisation du PCA a généré en moyenne une diminution de la consommation en calories de 219 kcal par jour par rapport à l'apport minimum requis pour les habitants de la Province de Lima, alors qu'elle a fait augmenter la consommation en calories de 318 kcal par jour au-delà des besoins minimums requis pour les ménages résidant dans les autres provinces (hors Lima).

Nous expliquons ces résultats par l'existence de deux effets opposés provenant de la décentralisation – un « effet proximité » positif et un « effet capacité » négatif. Ces effets sont respectivement provoqués par le fait que d'un côté, les gouvernements locaux ont une meilleure compréhension des communautés locales et des spécificités régionales, relativement au gouvernement central ; tandis que de l'autre côté, ils tendent à bénéficier de ressources financières, techniques et humaines plus faibles.

Dans les provinces hors Lima, décentraliser le PCA est bénéfique pour la sécurité alimentaire de la population car l'ampleur de « l'effet proximité » positif surpasse celui de « l'effet capacité » négatif. Les avantages associés au transfert du programme aux autorités provinciales – qui sont par essence plus proches des populations locales que ne l'est le gouvernement national – sont plus importants que les potentiels inconvénients liés à une capacité institutionnelle et financière plus faible. De l'autre côté, la décentralisation a un effet

négalif sur la consommation en calories à Lima car l'ampleur de l'effet négatif de « capacité » dépasse celui de l'effet positif de « proximité ». La Province de Lima concentre sur son territoire à la fois l'administration centrale et les autorités locales de ses districts. Basés au même endroit, les fonctionnaires des autorités locales bénéficient de la même connaissance de la situation concernant Lima que les agents officiels du gouvernement central ; entraînant un gain proche de zéro dans l'effet de « proximité » à la suite de la décentralisation. En revanche, les autorités locales des districts de Lima ont une capacité technique et financière plus faible que le gouvernement central, ce qui génère un effet de « capacité » négatif après la décentralisation.

Finalement, en incorporant des indicateurs complémentaires de sécurité alimentaire, nous montrons que la convergence régionale dans la consommation de calories au Pérou améliore le bien-être général. Tandis que la décentralisation du PCA a renforcé la consommation de calories dans les provinces hors Lima qui enregistraient initialement de forts taux de sous-nutrition, la chute de la consommation en calories dans les districts de Lima est principalement tirée par les ménages montrant initialement de très hauts niveaux de consommation calorique (les « suralimentés ») et qui passent à des niveaux de consommation plus standards.

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