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Afrika Ndongezi-Nsabimana

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**ÉCOLE DOCTORALE SCIENCES ÉCONOMIQUES,  
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Ecole Doctorale des Sciences Economiques, Juridiques, Politiques et de gestion  
Centre d'Etudes et de Recherche sur le Développement International (CERDI)

Université Clermont Auvergne, CNRS, IRD, CERDI, F-63000 Clermont-Ferrand, France

# **4 ESSAIS SUR LA SOUTENABILITE FINANCIERE DES SYSTEMES DE PROTECTION SOCIALE DES PAYS AFRICAINS ET D'AMERIQUE LATINE**

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pour l'obtention du titre de Docteur en Sciences Economiques

par

**Afrika NDONGOZI-NSABIMANA**

sous la direction de Jean-François BRUN

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## Résumé de la thèse :

Notre thèse a pour objectif d'étudier les principaux facteurs pouvant agir sur le financement durable de la protection sociale. Elle s'inscrit dans un contexte de la volonté des pays développés comme en développement d'atteindre la protection sociale universelle- objectif souligné dans les Objectifs de Développement Durable- tout en ne mettant pas en péril l'équilibre budgétaire.

Dans la littérature, il y a des travaux qui ont été réalisés sur le sujet. Cependant, ils restent encore peu nombreux en ce qui concerne les pays en développement notamment sur les questions d'effets des recettes fiscales sur le financement de la protection sociale et des inégalités de genre. Notre thèse permet d'approfondir le sujet en se focalisant sur les pays africains et d'Amérique Latine, en utilisant des données plus récentes, en conduisant une analyse économétrique au niveau agrégé et désagrégé de certaines variables explicatives et en faisant des études de cas pays de l'Afrique du Sud, l'Uruguay et le Pérou.

La thèse est constituée de quatre chapitres. Les deux premiers traitent de l'effet des recettes fiscales sur le financement de la protection sociale approximé par les dépenses publiques en protection sociale. Le premier chapitre porte sur 30 pays d'Afrique et d'Amérique Latine sur la période 2000-2010 et le deuxième sur les 9 provinces de l'Afrique du Sud sur la période 2002-2017. Dans les deux cas, l'analyse économétrique en panel montre que les recettes fiscales agrégées n'ont pas un effet significatif sur les dépenses publiques en protection sociale. Les résultats obtenus dans le chapitre 1, montrent que ce sont les recettes fiscales « hors ressources » qui ont un effet positif significatif. Ceux obtenus dans le chapitre 2 montrent que ce sont les transferts nationaux aux provinces qui ont un effet significatif et positif. En particulier, il a été observé que c'est le composant Provincial Equity Share des transferts nationaux qui a un effet significatif et positif.

Le chapitre 3 porte sur l'effet de travailler dans le secteur informel sur l'accès aux principaux composants de la protection sociale en présence d'une mesure « Monotributo » en Uruguay pour l'année 2013. En utilisant le modèle de régression logistique, les résultats nous permettent de voir que malgré la mesure « Monotributo » mise en place, l'écart de couverture entre travailleurs du secteur informel et ceux du secteur formel reste non négligeable.

Le chapitre 4 est une analyse économique et de genre de la couverture en pension de retraite du Pérou, l'Afrique du Sud et l'Uruguay sur la période 2008-2018. Les résultats de cette analyse montrent qu'il y a effectivement des inégalités de genre en matière de participation aux cotisations à un système de pension de retraite. Cependant, il n'y a pas de lien systématique avec les inégalités de genre observées sur le marché du travail. Une analyse économétrique préliminaire utilisant les variables mentionnées dans l'analyse économique et des variables de contrôle telles que les inégalités de genre en termes d'espérance de vie, le taux de fécondité et la proportion de la population rurale, réalise le même constat.

A l'issue de ce travail, nous recommandons aux gouvernements des pays en développement d'accroître leurs efforts de mobilisation des ressources domestiques pour atteindre la soutenabilité financière des systèmes de protection sociale. Ils sont encouragés à poursuivre les réformes en cours du système fiscal pour le rendre plus efficient et procéder à l'allocation efficiente des recettes fiscales aux politiques de développement dont la protection sociale. Ils sont aussi encouragés à la réforme du système d'information pour améliorer le suivi de la collecte d'impôts et leur utilisation et la mise en place de mesures incitatives à payer l'impôt.

Comme le montre le cas de l'Afrique du Sud, il est nécessaire pour les gouvernements d'accroître les transferts nationaux vers les provinces qui devraient en outre obtenir plus de pouvoir de collecte d'impôt.

Les gouvernements sont enfin encouragés à mettre en place des politiques de protection sociale plus inclusives telles que les « Monotributo » déjà présents dans certains pays d'Amérique Latine dont l'Uruguay, les programmes de planification urbaine en cohérence avec la protection sociale, l'amélioration de la qualité d'éducation ainsi que des mesures favorisant la continuité du travail des femmes une fois qu'elles sont mariées et qu'elles deviennent mères.

*Mots clés : Protection Sociale Universelle, Financement de la protection sociale, soutenabilité financière, recettes fiscales, transferts nationaux, secteur informel, genre, Objectifs du Développement Durable, Pays en développement, Afrique, Amérique Latine, Afrique du Sud, Pérou, Uruguay.*

## Sommaire :

Abréviations :.....	12
Introduction générale :.....	16
Chapitre 1: Tax revenues and social protection financing in African and Latin American countries. ....	28
Introduction :.....	29
II)Background: .....	31
III) Literature review on the causal relationship between social protection financing and tax revenues:.....	37
IV) Data presentation:.....	40
A) Databases used by the study .....	40
B) Descriptive analysis of data: .....	42
V) Presentation of the model: .....	48
VI) Econometric analysis of the data:.....	50
A) Selection of the most relevant model: .....	50
B) Results and discussions on the chosen model.....	53
Conclusion: .....	59
Chapter 2: Tax revenues and social protection financing: Case study of South Africa .....	61
Introduction: .....	62
II)Background: .....	63
III)Econometric analysis:.....	72
Conclusion : .....	88



## Sommaire(suite) :

Chapter 3: Social protection and Informal Sector: Case Study of Uruguay. ....	89
Introduction: .....	91
II) Background: .....	93
III) Factors explaining the low coverage of informal sector workers: .....	99
IV) Data: .....	103
V) Econometric analysis: .....	108
Conclusion: .....	132
Chapter 4: Economic and gender analysis of the pension coverage financing: case study of Peru, South Africa, and Uruguay. ....	140
Introduction: .....	141
II) Background: .....	144
III) Factors explaining the gender difference in pension contribution: .....	148
IV) Economic and gender analysis of the financing of pension coverage: .....	155
V) Preliminary econometric analysis: .....	173
Conclusion: .....	180
General conclusion: .....	182
Bibliography: .....	189

## Liste des tableaux :

Table 1: Current social protection coverage and expenditures (aggregated and regionally disaggregated).....	34
Table 2: Tax revenues evolution by income groups and regions 2003-2015. ....	37
Table 3: Summary of database used in the study.....	41
Table 4: Summary table of statistical information.....	47
Table 5: Summary of OLS models, LSDV fixed effects, Within fixed effects. ....	52
Table 6: Summary of the Hausman test.....	53
Table 7: Summary table of the results of the three regressions.....	54
Table 8: Summary of the fixed effects model with delayed variable t-1, t-2, t-3: .....	58
Table 9: Evolution of the division of the nationally raised revenue between the national-provincial and local government 2002-2017. ....	66
Table 10: Evolution of the provincial equity share (% National revenue raised) =PES Weighted Average .....	67
Table 12: Summary of the sources of data used by the study. ....	73
Table 13: Summary of descriptive statistics. ....	74
Table 14: Regression of the fixed effects model and the random effects model. ....	77
Table 15: Hausman test. ....	78
Table 16: Regression with lagged variables. ....	80
Table 17: Results obtained with tax revenues and national transfers converted in unit per capita. ....	82
Table 18: Regression at the disaggregated level of provincial national transfers to provinces. ....	84
Table 19: Regression at the disaggregated level of provincial national transfers with lagged variables. ....	85
Table 20: Regression at the disaggregated level of provincial national transfers per capita with lagged variables.....	86
Table 21: Public social security expenditures (%GDP).....	97
Table 22: Number of registered monotax enterprises and insured members, Uruguay, 2006–2013. ....	99
Table 23: Distribution of the dependent variables.....	106
Table 24: Distribution of the type of labor occupied variable. ....	107

## Liste des tableaux (suite) :

Table 30: Results of the different regressions of the pension benefits variable. ....	110
Table 31: AIC test. ....	114
Table 32: Wald Test. ....	115
Table 33: AIC test. ....	118
Table 34: Results of the different regressions of the health and accident insurance benefits variable. ....	120
Table 35: AIC test. ....	123
Table 36: Results of the different regressions of the Unemployment benefit variable. ....	125
Table 37: AIC test. ....	128
Table 38: Results of the different regression of the Maternity benefit variable. ....	129
Table 25: Distribution of the workplace variable. ....	135
Table 26: Distribution of the education variable. ....	136
Table 27: Distribution of the age variable. ....	138
Table 28: Distribution of the gender variable. ....	138
Table 29: Distribution of the relationship to the household variable. ....	139
Table 39: Percentage of persons above statutory pensionable age receiving an old pension, by gender. ....	143
Table 40: Social protection components coverage(legal) by regions and gender (in percentage)	146
Table 41: Social protection components trends by gender of Peru, South Africa and Uruguay.	148
Table 42: Proportion (%) of men and women contribution to a pension fund. ....	157
Table 43: Labor force participation rate, male/female (% of male/female population ages 15-64) (modeled ILO estimate). ....	159
Table 44: Employment in senior and middle management share (%). ....	161
Table 45: Informal employment share (% of total non-agricultural employment). ....	163
Table 46: Self-employment share (% men/women employment). ....	165
Table 47: Part time employment, female (% of total part time employment). ....	167
Table 48: The share of family workers contributing to the family business. ....	168
Table 49: Employers share. ....	170
Table 50: Summary table of the results of the fixed effect and random effect models regressions. ....	174
Table 51: Summary of the Hausman test. ....	175
Table 52: Summary table of the results of the regressions with the disaggregated labor market variables: ....	177

NB : Les tableaux 25 à 29 apparaissent en décalage car ils sont inclus dans les annexes du chapitre 3.

## Liste des graphiques :

Graphique 1 : Taxonomie des instruments de la protection sociale.....	18
Graph 2: Evolution of public expenditures on social protection by country: .....	42
Graph 3: Distribution of the public social protection expenditures variable.....	43
Graph 4: Distribution of the aggregated tax revenues variable.....	43
Graph 5: Distribution of the “resource” tax revenues variable: .....	44
Graph 6: Distribution of the “non resource” tax revenues variable .....	44
Graph 7: Administrative organization chart of the South African public social protection system. .....	70
Graph 8: Social protection expenditures-consolidated government expenditures 2002-2017.....	71
Graph 9: Evolution of real social protection expenditures by province 2002-2017.....	75
Graph 10: Evolution of real tax revenues by province 2002-2017.....	75
Graph 11: Administrative organization of the Uruguayan Social protection system.....	94
Graph 12: The health system of Uruguay.....	96
Graph 13: Evolution of informal employment from 2006 to 2018. ....	98
Graph 14: Gender gap in contribution to a pension fund (percentage points).....	158
Graph 15: Gender gap in Labor force participation rate (percentage points). ....	160
Graph 16: Gender gap in employment in senior and middle management (percentage points)..	162
Graph 17: Gender gap in informal employment (percentage points.).....	164
Graph 18: Gender gap in self employment (percentage points).....	166
Graph 19: Gender gap in the share of family workers contributing to the family business (percentage points).....	169
Graph 20: Gender gap in the share of employers (percentage points). ....	171
Graph 21: Gender gap ratio in the contribution to a pension fund (percentage points). ....	171
Graph 22: Gender gap ratio in the informal employment (percentage points). ....	172
Graph 23: Gender gap ratio in the share of family workers(percentage points). ....	172

## Liste des encadrés :

Encadré 1 : Les objectifs de développement durable en lien avec la protection sociale. (UN 2015.A/RES/70/1). ....	17
Box 2: Examples of treaties on social protection.....	32
Box 3: Extract from the ILO recommendations for the implementation of the social protection floor.....	33
Box 5: National legislation and policy documents sent to the provincial treasury.....	64
Box 6: Main years of the progressive implementation of social protection measures to ensure the coverage of Peruvians.....	145

## Abréviations :

<b>AdB</b>	Asian development Bank
<b>AFAP</b>	Administradoras de fondos de ahorro previsional
<b>AFP</b>	Administración de Fondos de Pensiones
<b>ASSE</b>	Administración de Servicios de Salud del Estado
<b>AUS</b>	Aseguramiento Universal de Salud
<b>BCU</b>	Banco Central del Uruguay
<b>BHI</b>	Basic Health Insurance
<b>BID</b>	Banco Inter Americano
<b>BPJS</b>	Badan Penyelenggara Jaminan Sosial(Indonesian Social Security Agency for Health)
<b>BPS</b>	Banco de Previsión Social
<b>CASEN</b>	Caracterización Socio Económico Nacional
<b>CDG</b>	Care Dependency Grant
<b>CEPAL</b>	Comisión Económica Para América Latina y El Caribe
<b>CPI</b>	Corruption Perception Index
<b>CPS</b>	Current Population Surveys
<b>CSG</b>	Child Social Grant
<b>CTS</b>	Compensación por tiempo de servicio
<b>DG</b>	Disability Grant
<b>ELPS</b>	Encuesta Longitudinal de Protección Social

<b>EPS</b>	Entidades Prestadoras de Salud
<b>EPRE</b>	Estimates of Provincial Revenue and Expenditure
<b>Es Salud</b>	Seguro Social de Salud
<b>FCG</b>	Foster Care Grant
<b>FNR</b>	Fondo Nacional de Recursos
<b>FONASA</b>	Fondo Nacional de Salud
<b>FS</b>	Free State
<b>GDP(PIB)</b>	Gross Domestic Product
<b>GFS</b>	Governance Finance Statistics
<b>GGHE</b>	General Government Health Expenditures
<b>GIA</b>	Grant-in-Aid
<b>HDI</b>	Human Development Indicators
<b>HEX</b>	Health Expenditure
<b>IAMC</b>	Institución de Servicios de Salud del Estado
<b>ICTD</b>	International Center for Tax and Development
<b>IDD</b>	Indicador Desarrollo Departamental
<b>ILO(OIT)</b>	International Labor Organization
<b>IMAE</b>	Instituto de Medicina Altamente Especializada
<b>IMF</b>	International Monetary Fund

<b>ISSA</b>	International Social Security Association
<b>JUNASA</b>	Junta Nacional de Salud
<b>LSDV</b>	Least Square Dummy Variable
<b>MTSS</b>	Ministerio de Trabajo y Seguridad Social
<b>NEBS</b>	Newly Entitled Beneficiary Survey
<b>NC</b>	Northern Cape
<b>NHA</b>	National Health Account
<b>NHIS</b>	National Health Insurance System
<b>ODA</b>	Official Development Assistance
<b>OECD</b>	Organisation for Economic Cooperation and Development)
<b>OLS</b>	Ordinary Least Squares
<b>PES</b>	Provincial Equity Share
<b>QLFS</b>	Quarterly Labor Force Survey
<b>SASSA</b>	South African Social Security Agency
<b>SDGs</b>	Sustainable Development Goals
<b>SIS</b>	Seguro Integral de Salud
<b>SNP</b>	Sistema Nacional de Pensiones

<b>SNS</b>	Segura Nacional de Salud
<b>SOEP</b>	Socioeconomic Panel
<b>SPP</b>	Sistema Privado de Pensiones
<b>SPS</b>	Sistema de Pensiones Sociales
<b>SSA</b>	Social Security Association (The United States of)
<b>UNDP</b>	United Nations Development Programme
<b>UNICEF</b>	United Nations International Child Emergency Fund
<b>UNU-WIDER</b>	
<b>VAT</b>	Value Added Tax
<b>WC</b>	Western Cape
<b>WDI</b>	World Development Indicators
<b>WIEGO</b>	Women in the Informal Employment: Globalization and Organization
<b>WHO</b>	World Health Organization
<b>WVG</b>	War Veteran Grant

Source : Auteure.



## Introduction générale :

La soutenabilité financière des programmes de protection sociale est un sujet d'actualité que ce soit dans les pays développés ou dans les pays en développement. Etant donné une tendance à la hausse de la population vieillissante dans les pays développés et une partie des pays à revenu intermédiaire, ces derniers font face à des dépenses importantes en protection sociale. D'où ils doivent procéder à des réformes telles que l'augmentation de l'âge de départ à la retraite et la définition d'un mode de financement plus adapté au contexte actuel.

En ce qui concerne les pays en développement, la protection sociale est devenue une nouvelle priorité pour faire face aux effets négatifs de la pauvreté et de la paupérisation des populations qui ont été aggravés par des politiques d'ajustement structurel. A titre d'illustration, la Banque Mondiale<sup>1</sup> considère actuellement que les politiques macroéconomiques sont indispensables pour la réduction durable de la pauvreté, mais qu'elles restent souvent insuffisantes. Cette institution coopère notamment avec l'Organisation Internationale du Travail, pour la promotion dans les pays en développement, de la protection sociale en tant que droit essentiel de la personne reconnu par la Déclaration de Philadelphie<sup>2</sup>. Le défi pour les gouvernements de ces pays est de mobiliser de manière durable, des ressources pour financer les programmes de protection sociale existants mais aussi l'extension de la couverture à une plus grande partie de la population.

Par protection sociale, on peut comprendre un ensemble de mesures permettant l'accès de tous à la sécurité sociale, aux soins de santé et à un revenu minimum et le respect de la dignité et des droits de tous. (ILO, 2014). Elle remplit des fonctions d'assurance, de transfert de ressources sur le cycle de vie (lissage du revenu dans le temps), de redistribution et de solidarité générale. Elle soutient la consommation intérieure, renforce le capital humain des personnes les plus vulnérables et la productivité. Elle réduit ainsi les risques de pauvreté et d'insécurité.

Lorsque le système de protection sociale est assez peu développé dans un pays, cela est susceptible d'entraîner une augmentation des inégalités, de faibles investissements dans le capital humain et une faible demande en temps de crise. (ILO, 2014).

De manière plus désagrégée, la protection sociale joue un rôle spécifique pour les enfants et la famille, les travailleurs, les personnes invalides, les femmes enceintes, les personnes en âge de prendre la

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<sup>1</sup> Banque Mondiale, Stratégie en matière de travail et de protection sociale, 2001, 2012

<sup>2</sup> La Déclaration de Philadelphie adoptée le 10 mai 1944, redéfinit les buts et les objectifs de l'Organisation Internationale du Travail

retraite. Ainsi pour les enfants, elle permet la réalisation de leurs droits, de leur bien-être et de leur potentiel. Pour les travailleurs, elle leur garantit une stabilité de revenu en cas de chômage, d'accident de travail, d'invalidité, de maladie, d'accouchement. Quant aux femmes enceintes, la protection sociale leur permet de continuer à percevoir leur revenu pendant leur congé de maternité et d'avoir accès aux soins de santé maternels de qualité. (ILO, 2014).

La protection sociale joue aussi un rôle important pour les personnes en âge de partir à la retraite à travers leur droit à un revenu (pension) pendant la retraite (ILO, 2014). Enfin, la protection sociale permet la promotion de l'égalité hommes-femmes dans l'emploi et garantit un minimum de droits aux populations les plus pauvres.

Les composants principaux de la protection sociale sont l'assurance maladie, l'allocation chômage, la couverture contre les accidents de travail, l'allocation aux personnes handicapées, allocation maternité, allocations familiales, pension de retraite. (ILO, 2011 ; ILO, 2014; 2017b).

De par son rôle et son impact sur la réduction de la pauvreté, la protection sociale a été incluse dans les Objectifs de Développement Durable avec pour objectif d'atteindre la protection sociale universelle d'ici 2030. Elle est clairement soulignée dans les ODD 1, 3, 5, 8 et 10. (voir encadré 1, ci-dessous).

Encadré 1 : Les objectifs de développement durable en lien avec la protection sociale. (UN 2015.A/RES/70/1).

ODD1. Éliminer la pauvreté sous toutes ses formes et partout dans le monde.

**1.3 Mettre en place des systèmes et mesures de protection sociale pour tous, adaptés au contexte national, y compris des socles de protection sociale, et faire en sorte que, d'ici à 2030, une part importante des pauvres et des personnes vulnérables en bénéficient.**

ODD3. Permettre à tous de vivre en bonne santé et promouvoir le bien être de tous à tout âge

**3.8 Faire en sorte que chacun bénéficie d'une couverture sanitaire universelle, comprenant une protection contre les risques financiers et donnant accès à des services de santé essentiels de qualité et à des médicaments et vaccins essentiels sûrs, efficaces, de qualité et d'un coût abordable.**

ODD5. Parvenir à l'égalité des sexes et autonomiser toutes les femmes et les filles.

**5.4 Prendre en compte et valoriser les soins et travaux domestiques non rémunérés, par la mise en place de services publics, d'infrastructures et de politiques de protection sociale et par la promotion du partage des responsabilités dans le ménage et la famille, en fonction du contexte national.**

ODD8. Promouvoir une croissance économique soutenue, partagée et durable, le plein emploi productif et un travail décent pour tous.

**8.5 D'ici à 2030, parvenir au plein emploi productif et garantir à toutes les femmes et à tous les hommes, y compris les jeunes et les personnes handicapées, un travail décent et un salaire égal pour un travail de valeur égale.**

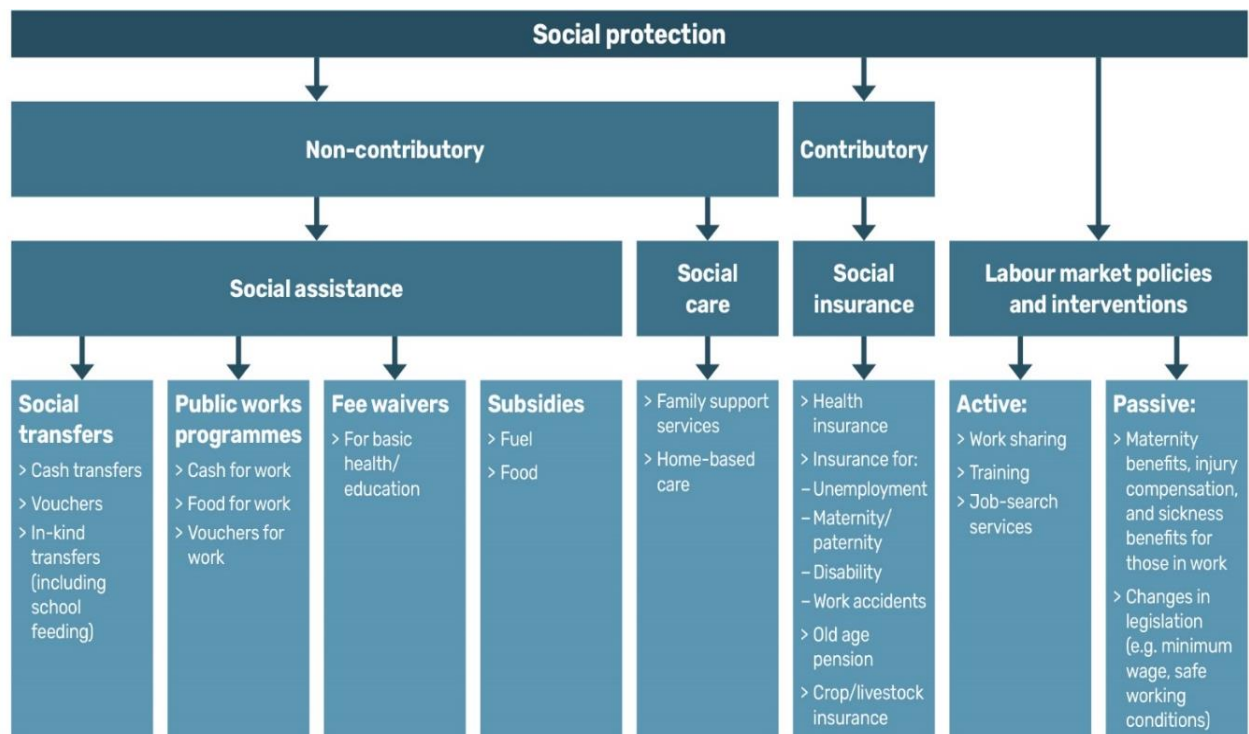
ODD10. Réduire les inégalités dans les pays et d'un pays à l'autre.

**10.4 Adopter des politiques, notamment sur les plans budgétaire, salarial et dans le domaine de la protection sociale, afin de parvenir progressivement à une plus grande égalité.**

Selon le type de financement de la protection sociale, on distingue un système contributif, un système non contributif, un système combinant les deux. Dans le système contributif, les individus cotisent pour en être bénéficiaires. Il peut s'agir des systèmes d'assurance sociale ou système par capitation. Dans le système non contributif, le financement est assuré par une tierce personne, souvent l'Etat. Il peut être universel ou être accessible sur certains critères comme le niveau de revenu, la présence d'enfants en bas âge dans le ménage. (ILO, 2011; ILO, 2014; ILO, 2015; ILO, 2017a; ILO, 2017b).

Le graphique 1 suivant extrait du site de GSDRC (Governance and Social Development Resource Centre) résume bien les différents composants de la protection sociale selon que le système soit contributif ou non contributif.

Graphique 1 : Taxonomie des instruments de la protection sociale.



Notes: (1) 'Non-contributory' schemes are defined by the International Labour Organisation (ILO) as those that, 'normally require no direct (financial) contribution from beneficiaries or their employers as a condition of entitlement to receive benefits' (ILO, 2017). Public works programmes are usually counted as 'non-contributory' even though the recipient contributes labour. (2) Social transfers may be conditional or unconditional. A conditional transfer requires the recipient to meet certain behaviours (such as ensuring school attendance) to receive the benefit. Source: Adapted from O'Brien et al. (2018): 6.

Source: [https://gsdrc.org/wp-content/uploads/2019/10/SPGuide\\_Fig1.jpg](https://gsdrc.org/wp-content/uploads/2019/10/SPGuide_Fig1.jpg) (consulté le 03/10/21).

De manière globale, des efforts ont été fournis par les gouvernements pendant les dernières décennies, pour la mise en place et/ou l'amélioration des systèmes de protection sociale, avec l'appui des partenaires techniques et financiers bilatéraux ou internationaux. Cependant, environ seulement 49,5% de la population mondiale ont accès à une forme de protection sociale. Ce taux est beaucoup

plus faible (17,8%) pour l'Afrique (ILO,2014). En procédant à une désagrégation par composante de la protection sociale, les enfants sont respectivement couverts à 34,5% au niveau mondial ; 15,9% en Afrique ; 66,2% dans les Amériques avec 78,5% en Amérique du Nord et 61,4% en Amérique Latine et les Caraïbes. Les femmes venant d'accoucher ont accès à l'allocation maternité à 41% au niveau mondial ; 15,8% au niveau de l'Afrique ; 68,6% dans les Amériques. En ce qui concerne l'allocation chômage, elle est accessible à 21,8% des personnes actives non employées au niveau mondial ; 5,6% en Afrique et 16,7% dans les Amériques (28,5% en Amérique du Nord et 12,2% en Amérique Latine et les Caraïbes). Enfin, 67,9% des personnes âgées sont bénéficiaires d'une pension de retraite au niveau mondial ; 29,6% en Afrique (22,7% en Afrique Subsaharienne) ; 86,2% dans les Amériques (100% en Amérique du Nord et 70,8% en Amérique Latine et les Caraïbes). (ILO, 2014 ; ILO, 2017b).

Il est donc important d'étendre la protection sociale à un plus grand nombre de personnes et de réaliser la couverture universelle à long terme. Par conséquent, chaque pays doit pouvoir mobiliser les ressources nécessaires pour assurer la soutenabilité financière son de système.

Par soutenabilité financière, nous entendons la capacité des gouvernements, des institutions chargées de la supervision des systèmes de protection sociale à les financer à long terme sans mettre en péril l'équilibre budgétaire du pays. Dans la lettre n°91 de la direction générale du trésor français, la soutenabilité financière (des finances) est définie comme étant "la capacité d'un État à respecter sa contrainte budgétaire inter-temporelle à un horizon infini, c'est-à-dire financer sa dette actuelle ainsi que l'ensemble de ses dépenses futures avec ses recettes futures, tout en maintenant une politique inchangée, c'est-à-dire sans recourir à de hausses d'impôts ou à des économies en dépenses". Dans le document de l'European Observatory on Health and Policies, Thomson et al. (2009) définissent quant à eux, la soutenabilité financière (des systèmes de santé) comme étant la capacité des gouvernements et autres à financer de manière adéquate les soins de santé dans un contexte de la pression engendrée par l'augmentation de coûts, du vieillissement de la population, de nouvelles technologies et des attentes du consommateur concernant la couverture en santé et la qualité.

Quels sont alors les facteurs pouvant agir sur la soutenabilité financière d'un système protection sociale?

La soutenabilité financière d'un système de protection sociale dépend tout d'abord de la nature même de ce système. Dans la théorie économique, on distingue deux principaux modèles qui trouvent leur origine en Europe à savoir le système beveridgien et le système bismarckien. (Beveridge, 1942 ; Stolleis, 2013 ; Cremer & Pestieau, 2003). Il y a également un troisième type de système de protection sociale qui combine des éléments des deux modèles. Il en résulte de cette distinction, différents modes

de financement et donc différents facteurs explicatifs de la soutenabilité financière du système de protection sociale.

Le système beveridgien est caractérisé par une couverture en protection sociale universelle pour tous les citoyens quelle que soit leur situation professionnelle. Il a comme mode de financement, l'impôt. D'où sa soutenabilité financière dépend de l'efficacité du système fiscal mis en place. Celle-ci est telle qu'il y ait assez de ressources collectées et qu'elles soient bien gérées pour financer de manière pérenne le système de protection sociale. La soutenabilité financière du système beveridgien dépend aussi du nombre de contribuables. Le système bismarckien quant à lui est caractérisé par l'accès à la couverture en protection sociale conditionnelle à une vie active. Ce système est financé par les cotisations sociales des salariés et employeurs. Il s'agit d'un système contributif. Cela implique qu'il y ait assez de personnes dans la vie active pour que les cotisations couvrent les prestations dispensées aux bénéficiaires salariés ou non et que le système soit viable financièrement. Il en résulte que la tendance croissante au vieillissement de la population peut être problématique pour le maintien à long terme de ce système.

La soutenabilité financière du système de protection sociale dépend aussi du type d'Etat providence mis en place dans le pays. En effet, selon la nature de cet Etat providence, la gestion administrative et financière du système de protection sociale sera plus ou moins assurée par les autorités publiques. Dans la littérature économique (Esping-Andersen, 1990; Vallet, 2002), trois types d'Etat providence sont définis selon trois facteurs à savoir « la capacité de démarchandisation » (decommodification) , le « fonctionnement des Etats en tant que système de stratification » et le lien entre le marché, la famille et l'Etat.

Il s'agit de l'Etat-providence « libéral » caractérisé par une faible démarchandisation ; de l'Etat-providence « corporatiste », conservateur caractérisé par une faible démarchandisation mais aussi par une forte stratification sociale et de l'Etat-providence « social-démocrate » caractérisé par une forte démarchandisation et l'absence de stratification sociale.

Selon le type d'Etat-providence adopté par chaque pays, il en résulte la mise en place de l'un des systèmes de protection sociale évoqués ci-dessus. En effet, dans le premier type d'Etat providence, les programmes de protection sociale sont financés par les individus eux-mêmes et gérés par le marché du fait de la faible intervention de l'Etat et de la faible présence des programmes d'assurance sociale. Dans ce cas, la soutenabilité financière dépend de la capacité des individus à payer leur couverture et par conséquent de leur situation professionnelle. Elle dépend aussi du nombre de personnes ayant souscrit aux programmes de protection sociale. Dans l'Etat-providence corporatiste, le système de protection sociale est de type bismarckien avec un plus grand rôle de l'Etat dans

l'économie et l'octroi de plus de droits sociaux mais qui est différencié selon l'appartenance à une classe. Comme évoqué ci-dessus, il s'agit d'un système contributif dépendant donc des cotisations sociales mais aussi du nombre d'adhérents et la structure d'âge de la population. Enfin, dans l'Etat-providence social-démocrate, le système de protection sociale est de type beveridgien puisque l'accès aux droits sociaux est accordé à tous les citoyens quel que soit leur catégorie sociale. La soutenabilité financière dépend en grande partie ici de la capacité de l'Etat à mobiliser des ressources suffisantes.

Mis à part les deux facteurs soulignés ci-dessus, la soutenabilité financière d'un système de protection sociale dépend également de la situation économique du pays (Banks et al., 2000 ; Schmähl, 2001; Cichon et al., 2004), de la situation sur le marché du travail (Samuelson, 1975; Banks et al., 2000; Schmähl, 2001; Cichon et al., 2004), de la situation démographique (Banks et al., 2001 ; Schmähl, 2001; Viard, 2002; Cichon et al., 2004 ; Attanasio et al., 2010; Keuschnigg et al., 2011 ; Hsu et al., 2015), de la gouvernance du système de protection sociale (Schmähl, 2001; Cichon et al., 2004), des intérêts politiques du gouvernement en place (Samuelson, 1975; Schmähl, 2001; Cichon et al., 2004).

En effet, lorsqu'un pays enregistre un fort taux de croissance économique, cela peut lui permettre de dégager des ressources supplémentaires du fait de l'augmentation des recettes fiscales perçues. Ces ressources peuvent être allouées au financement de la protection sociale. De plus, la population active a plus d'opportunités en termes de travail et est donc susceptible de gagner plus de revenus. Ce qui peut permettre d'augmenter la part de la population qui contribue au financement de la couverture en protection sociale.

En ce qui concerne le marché du travail, l'accessibilité à l'emploi et la nature de l'emploi (formel, informel) ont un impact sur l'éligibilité au programme de protection sociale, le nombre effectif des personnes couvertes par la protection sociale, le nombre de personnes qui versent les cotisations sociales et (ou) paient une taxe servant à financer l'adhésion à un programme de protection sociale, le montant d'allocations/avantages sociaux (Banks et al., 2001; Schmähl, 2001; Cichon et al., 2004).

La situation démographique affecte quant à elle le nombre de personnes actives sur le marché du travail et donc sur le nombre des contribuables, sur le nombre des bénéficiaires des programmes de protection sociale, la durée moyenne d'activité permettant d'être éligible au programme de protection sociale. (Banks et al., 2001 ; Schmähl, 2001 ; Dufour-Kippelen et al., 2002 ; Viard, 2002; Cichon et al., 2004 ; Attanasio et al., 2010 ; Keuschnigg et al., 2011 ; Hsu et al., 2015). Ainsi si le taux de mortalité diminue ainsi que le taux de fertilité cela se traduit par une augmentation de la population des personnes âgées. Or celle-ci est plus exposée aux maladies et nécessite souvent un suivi de plus en plus important. D'où une augmentation du niveau de dépenses en santé qui a pour conséquence une augmentation des dépenses en protection sociale. Du fait de l'augmentation de la population âgée, il

y a également un nombre de retraités plus important se traduisant par une augmentation des dépenses en pension de retraite et donc en protection sociale.

Pour ce qui est de la gouvernance, les lois nationales sur les différentes composantes de la protection sociale telles que la loi sur l'âge de départ à la retraite, la loi sur le nombre d'années minimum de scolarisation obligatoire, la loi sur l'âge légal d'entrée sur le marché du travail, la qualité de gestion et de l'administration du système de protection sociale peuvent avoir une influence sur la soutenabilité financière. (Banks et.al, 2000; Cichon et al., 2004).

Pour ce qui est des intérêts politiques, le gouvernement en place peut avoir tendance à adopter des politiques de financement de la protection sociale qui favorisent son électorat. Cela peut être justifié par sa volonté d'être réélu aux prochaines élections. Les ménages à revenu élevé étant ceux qui ont des ressources financières importantes pour financer les campagnes électorales, l'Etat peut mettre plus d'accent sur les prélèvements obligatoires comme forme de financement de la protection sociale. Pour que ce type de financement soit soutenable dans le temps, il faut un nombre important de contribuables. (Samuelson, 1975; Schmähl, 2001 ; Zemmour, 2012).

D'après l'Organisation Internationale du Travail, il existe huit modes de financement qui peuvent permettre d'assurer la soutenabilité financière entre autre des systèmes de protection sociale à savoir : 1) la réallocation des dépenses publiques, 2) l'augmentation des recettes fiscales, 3) l'accroissement de la couverture de la sécurité sociale et la participation des bénéficiaires par des prélèvements sur le revenu, 4) l'appel à l'aide internationale et aux transferts, 5) L'élimination des flux financiers illicites, 6) l'utilisation des réserves de change, 7) le recours à l'emprunt ou à la restructuration de la dette existante, et 8) l'adoption d'un cadre macroéconomique plus accommodant. (ILO, 2015; ILO, 2017a).

C'est dans ce cadre de réflexion sur la soutenabilité financière des systèmes de protection sociale que s'inscrit notre thèse articulée en quatre chapitres : i) Tax revenues and social protection financing in African and Latin American countries ; ii) Tax revenues and social protection : case study of South Africa; iii) Social protection and Informal Sector: Case Study of Uruguay; iv) Economic and gender analysis of the pension coverage financing: case study of Peru, South Africa and Uruguay.

Nous avons en effet choisi de nous focaliser sur les modes de financement 2) et 3) préconisés par l'OIT en travaillant sur les recettes fiscales, le secteur informel et le genre qui sont des facteurs non négligeables agissant sur le financement à long terme et l'accès universel en protection sociale. Les pays qui enregistrent de faibles taux de couverture à la suite d'un financement insuffisant sont souvent ceux qui mobilisent le moins leurs ressources propres ou les gèrent moins bien. (Cichon, et al., 2004 ; Bastagli et al., 2013 ; Duran- Valverde et al, 2013; ILO, 2015; Brun et al., 2016 ; ILO, 2017a). Ce sont ces pays également qui ont une part importante de travailleurs du secteur informel. (Canagarajah

et al., 2001; Maes, 2003; Pelissery et al., 2007; Chen, 2008; Mathauer et al., 2008 ; Sojo et al., 2015). Enfin, ces pays enregistrent une forte inégalité de genre en matière d'accès à la protection sociale notamment la pension de retraite.

Nous avons également choisi de nous focaliser sur les pays africains et d'Amérique Latine car nous nous intéressons de près aux questions liées au développement, à la santé et à la réalisation des Objectifs de Développement Durable. De plus, certains pays dont l'Afrique du Sud et l'Uruguay sont des exemples en matière d'extension de la couverture de la protection sociale à un plus grand nombre. Les résultats observés dans notre thèse pourront servir aux autres pays en développement pour l'amélioration de leur système de protection sociale et sa soutenabilité financière.

Nous avons choisi de travailler sur les quatre essais évoqués ci-dessus en guise de contribution à la littérature et aux travaux déjà réalisés par d'autres chercheurs en concentrant notre étude sur une période plus récente pour les pays africains et d'Amérique Latine. En effet, dans la littérature, des travaux tels que ceux de Murshed et al.(2017); Anton et al.(2006); Matus-Lopez et al.(2016); Zemmour(2012); Sojo et al.(2015); Mathauer et al.(2008); Bärnighansen et al.(2007); Dartanto(2020); Ginn(2003) ont été réalisés sur les différents thèmes abordés dans la thèse. Cependant, ces types de travaux sont peu nombreux en ce qui concerne les pays en développement notamment par rapport à la question de l'effet des recettes fiscales sur le financement de la protection sociale et la question des inégalités de genre. D'autres parts, certaines études présentent souvent des limites de par la méthodologie d'analyse choisie comme la non prise en compte de certains facteurs pouvant influencer la variable dépendante. De plus, les études de cas pays sont souvent centrées sur l'analyse de la capacité à payer des travailleurs du secteur informel, l'accès aux différents composants de la protection sociale. Il nous a donc semblé utile d'utiliser une autre approche pour continuer la réflexion sur ce sujet. Les résultats des études de Sojo et al. (2015) et de Rofman (2008) sur le secteur informel dans les pays d'Amérique Latine nous ont poussé à vouloir les approfondir avec une étude de cas.

Dans le premier chapitre, une analyse désagrégée de l'effet des recettes fiscales sur le financement de la protection sociale est réalisée à l'aide d'un modèle macroéconométrique en panel sur 30 pays d'Afrique et d'Amérique Latine sur la période 2000-2010. La base de données de l'étude a été construite avec les données issues de différentes institutions internationales telles que le Fonds Monétaire International, la Banque Mondiale, l'Organisation Mondiale de la Santé, « Comisión para América Latina y el Caribe », « International Centre for Tax and Development », « Transparency International », « International Social Security Association », et de la base de données de Mansour (2014).



Les régressions ont d'abord été effectuées avec les recettes fiscales, puis dans la deuxième partie de la modélisation, ces dernières ont été scindées en deux parties : les recettes fiscales « ressources » et les recettes fiscales « hors ressources ». Les recettes fiscales « ressources » sont les recettes fiscales collectées sur les activités d'extraction des ressources naturelles. Le reste des recettes fiscales est considéré comme recettes fiscales « hors ressources ». (Mansour,2014).

Le résultat révèle un effet positif significatif des recettes fiscales « hors ressources » sur les dépenses publiques en protection sociale. Pour une augmentation de 1% des recettes fiscales hors ressource en pourcentage de PIB, on observe une augmentation de 0,34 points de pourcentage des dépenses publiques en protection sociale toutes choses étant égales par ailleurs.

La régression met également en évidence un effet positif non significatif des recettes fiscales et des recettes fiscales « ressources ». Les variables de contrôle (population rurale, population âgée de 65 ans et plus, taux de mortalité des enfants âgés de moins de 5 ans) ont également un effet significatif.

Pour pallier un possible problème de causalité inverse, des valeurs retardées des recettes fiscales ont été introduites au niveau agrégé et désagrégé. L'effet des recettes fiscales devient significatif à t-3 : pour une augmentation de 1% des recettes fiscales en pourcentage de PIB, on observe une augmentation de 0,16 points de pourcentage des dépenses publiques en protection sociale toutes choses étant égales par ailleurs. L'effet des recettes fiscales « hors ressources » reste uniquement significatif à t-3 : pour une augmentation de 1% des recettes fiscales « hors ressources » en pourcentage de PIB, on observe une augmentation de 0,28 points de pourcentage des dépenses publiques en protection sociale toutes choses étant égales par ailleurs.

Dans le deuxième chapitre, une étude de cas pays de l'Afrique du Sud est effectuée avec une analyse macro comme dans le premier chapitre en utilisant le modèle en panel sur la période 2002-2017 et sur les neuf provinces du pays. Les données ont été collectées en consultant le site internet « the Statistics South Africa » de l'institut national de statistiques de l'Afrique du Sud et le site de la Trésorerie Nationale. L'Afrique du Sud a comme particularité d'être un Etat fédéral. Cette structure administrative a pour conséquence une organisation particulière des systèmes de protection sociale et fiscal. Dans ce chapitre, ce sont les transferts nationaux aux provinces et non les recettes fiscales qui sont désagrégés au niveau provincial dans la deuxième partie de l'analyse économétrique. Les transferts nationaux aux provinces sont une proportion des recettes fiscales collectées au niveau national et allouées aux provinces et aux municipalités. Ils sont composés de la « Provincial Equity Share » et de subventions conditionnelles. Ils constituent la plus grande part des ressources publiques des provinces en comparaison aux recettes fiscales collectées au niveau provincial. Cela s'explique par le faible potentiel fiscal des provinces.

Comme pour les résultats obtenus dans le premier chapitre, l'étude de cas de l'Afrique du Sud montre un effet non significatif des recettes fiscales non désagrégées (en pourcentage du PIB/par tête) sur les dépenses en protection sociale en pourcentage du PIB. Ce sont les transferts nationaux aux provinces qui ont un effet significatif et positif sur ces dernières. Pour une augmentation de 1% des transferts nationaux aux provinces en pourcentage de PIB, on observe une augmentation de 0,03 points de pourcentage des dépenses publiques en protection sociale toutes choses étant égales par ailleurs. Ce résultat est aussi observé pour les variables retardées des recettes fiscales.

Lorsque les variables transferts nationaux aux provinces et recettes fiscales provinciales sont exprimées en unités par tête, on observe que pour une augmentation de 1% des transferts nationaux aux provinces par tête (en milliers de rands), il y a une augmentation de 0.009/0.009/0.009/0.007 points de pourcentage des dépenses publiques en protection sociale respectivement à t, t-1, t-2, t-3 toutes choses étant égales par ailleurs.

La décomposition de la variable transferts nationaux aux provinces en « Provincial Equity share » et « Conditional grants » montre que c'est la composante « Provincial Equity Share » qui a un effet significatif sur les dépenses provinciales en protection sociale. Pour une augmentation de 1% de la « Provincial Equity Share » en pourcentage de PIB, on observe une augmentation de 0,04 points de pourcentage des dépenses publiques en protection sociale toutes choses étant égales par ailleurs. Pour une augmentation de 1% de la « Provincial Equity Share » en pourcentage de PIB retardée à t-1, t-2, on observe une augmentation de 0,02 points de pourcentage des dépenses publiques en protection sociale toutes choses étant égales par ailleurs. Ce résultat est en adéquation avec le fait que la PES constitue à peu près 80% des transferts nationaux sur la période étudiée.

Dans le chapitre 3, une analyse microéconométrique de l'effet d'être travailleur du secteur informel sur l'accès à une forme de protection sociale est réalisée en utilisant les données d'une enquête "Encuesta Longitudinal de Proteccion Social, Ola 1" conduite par l'institution " Banco de Previsión Social" en 2013 en Uruguay. L'idée principale de ce chapitre est de voir si en présence d'une mesure visant à étendre la protection sociale aux travailleurs du secteur informel « Monotributo », l'écart de couverture en protection sociale entre cette catégorie de travailleurs et les travailleurs du secteur formel est réduit ou s'il reste important. Par « monotributo », on entend une mesure ayant à la fois une dimension fiscale et de protection sociale car elle permet de collecter les cotisations de sécurité sociale et l'impôt des travailleurs indépendants. (ILO, 2014).

La base de données n'ayant pas une variable synthétisant toutes les dimensions de la couverture en protection sociale, nous avons réalisé l'analyse économétrique par composant de la protection sociale (pension de retraite, assurance maladie et accident, allocation chômage et allocation maternité.

Les résultats de cette analyse qui utilise le modèle logistique, montrent entre autres qu'être un travailleur à son propre compte, propriétaire ou non, avec ou sans capital, diminue la probabilité d'être bénéficiaire de la pension de retraite, de l'assurance maladie et accident, de l'allocation chômage, de l'allocation maternité. Ainsi, être un travailleur à son compte plutôt qu'être salarié diminue la probabilité d'avoir accès à une pension de retraite de 97% toutes choses étant égales par ailleurs. On observe le même effet pour le travailleur indépendant en ce qui concerne les trois premiers éléments de la protection sociale. Être un travailleur indépendant plutôt qu'un salarié diminue la probabilité d'avoir accès à une pension de retraite de 51% toutes choses étant égales par ailleurs. Ces résultats nous permettent de voir que malgré la mesure « Monotributo » mise en place, l'écart de couverture entre travailleurs du secteur informel et ceux du secteur formel reste non négligeable. Il convient de noter aussi l'effet significatif du niveau d'éducation, du lieu de résidence pour le travail, l'âge, le genre, la relation au chef du ménage.

Dans le quatrième chapitre, une analyse économique et de genre de la couverture en pension de retraite de deux pays d'Amérique Latine (Uruguay, Pérou) et un pays africain (Afrique du Sud) est réalisée sur une période de 2008-2018. Les données utilisées proviennent de la base de données de la CEPAL, de l'institut national de statistiques de l'Afrique du Sud, et de la base de données genre de la Banque mondiale. Il s'agit de voir si les écarts entre les hommes et les femmes en termes de cotisations à un système de pension de retraite reflètent ceux observés sur le marché du travail. L'écart a été défini comme la différence entre la proportion des hommes qui contribuent au financement d'un système de retraite et celle des femmes. Pour les caractéristiques du marché du travail, la même méthode a été appliquée. Une deuxième définition (division entre la proportion des femmes qui contribuent au financement d'un système de retraite et celle des hommes) a été utilisée à la fin de l'analyse pour vérifier si nous obtenons les mêmes résultats que ceux de la première mesure.

Les résultats de cette analyse montrent qu'il y a effectivement des inégalités de genre en matière de participation aux cotisations à un système de pension de retraite. Cependant, il n'y a pas de lien systématique avec les inégalités de genre observées sur le marché du travail

Ainsi l'Uruguay est le pays détenant l'écart de cotisation le plus faible sur la période étudiée. Cet écart est à peu près égal à deux points de pourcentage de 2008 à 2010 puis il se réduit à 1 point de pourcentage en 2011 avant de devenir négatif de 2012 à 2018. Pour l'Afrique du Sud, l'écart est compris entre 4,6 et 6,5 points de pourcentage. Quant au Pérou, il varie entre 4,9 et 6,7 points de pourcentage.

En revanche, l'Uruguay s'est révélé être le pays avec le plus grand écart hommes/femmes en termes de participation au marché du travail. Il est compris entre 14,53 et 18,83 points de pourcentage entre

2008 et 2018. Néanmoins, l'Uruguay est aussi le pays ayant l'écart hommes/femmes le plus faible pour ce qui concerne de la participation au secteur informel. En effet, l'écart est cette fois-ci inférieur à un point de pourcentage en valeur absolue pour les années 2008 à 2012 et les années 2014 à 2016 et il devient négatif à partir de 2015.

En réalisant une analyse économétrique préliminaire utilisant les variables mentionnées dans l'analyse économique et des variables de contrôle telles que les inégalités de genre en termes d'espérance de vie, le taux de fécondité et la proportion de la population rurale, nous avons le même constat.

Les résultats obtenus par les différentes analyses de la thèse nous ont permis de tirer des enseignements importants en matière de soutenabilité du financement de la protection sociale et qui sont évoqués en détails dans la conclusion générale

## Chapitre 1: Tax revenues and social protection financing in African and Latin American countries.

*Abstract: Social protection plays an important role in the achievement of development. Hence, it is highlighted in the Sustainable Development Goals (SDGs) 1,3,5,8 and 10. One of the solutions to achieve universal protection coverage, notably in African and Latin American countries, is sustainable financing. This chapter focuses on one type of financing, which is tax revenues and its possible effects on public social protection expenditures in percentage of Gross Domestic Product (GDP) as a proxy for social protection financing. It is assumed that the greater the share of tax revenues in GDP is, the greater the resources available for social protection programs are. This would allow better financial sustainability of these programs. Using a panel analysis, the study finds a positive but non-significant effect of total tax revenues and resource tax revenues. As for non-resource tax revenues, they have a positive and significant effect as well as the control variables “rural population”, “population aged 65 years and over”.*

*Key words: Tax revenues, Social protection, Social protection financing, SDGs, developing countries.*

## **Introduction :**

As already indicated in the general introduction, social protection plays an important role in the reduction of poverty (support for better education, better health, et.) and in the prevention and mitigation against potential risks (sickness, unemployment, work accidents etc.), occurring during the active life of individuals but also outside of it. (ILO, 2011; ILO,2014; ILO, 2015; ILO, 2017a; ILO 2017b).

To finance social protection systems, countries have different types of financing such as family or community support at their disposal. This is the case, for example, for elderly people who have reached the age of retirement and who are housed, fed, cared for by their children who have grown up. This is also the case for people who face a sudden severe illness and whose care will be financed by money from a tontine or any other form of community funding.

Financing can also be done through social contributions to a health insurance organization, a pension system. People contribute so that the costs of contracting a disease can be partially or totally refunded in the future. They also contribute to receive a retirement pension in the future. From a legal point of view, employers contribute part of a social charge and the remain part is paid by employees.

Another way of financing social protection may be regular savings in individual accounts during their working lives in order to finance their retirement in the future.

Finally, countries can use government revenues in the case where social protection beneficiaries do not contribute directly. Public resources can be constituted through tariffs; direct taxes (income taxes, wealth tax); indirect taxes (bases, Value Added Taxes, taxes on financial transactions), taxes linked to the exploitation of natural resources, international aid (Cichon et al., 2004; Barrientos, 2007; UNRISD, 2008; ILO, 2011; Barrientos, 2012; Bastagli et al., 2013; Duran-Valverde et al., 2013; Harris, 2013; Bastagli, 2015; ILO, 2015; Brun et al., 2016; Matus-Lopez M. et al., 2016; ILO,2017a).

One can wonder whether each of these types of financing is sustainable over time for achieving and maintaining universal coverage in social protection.

It is assumed that the greater the share of tax revenues in GDP is, the greater the resources would be available for social protection programs. This would allow better financial sustainability of these programs.

Other studies worked previously on the contribution of tax revenues for the financial sustainability of social protection programs. Nevertheless, they are not numerous notably in developing countries. One of the most recent studies has been carried out by Murshed et al. in March 2017 and published

by UNU-WIDER. The authors analyzed the effect of tax revenues on social protection expenditures in developing countries (98). However, their study presents some limitations, as they used only five points of observation for the dependent variable, and they had to calculate averages on five years for explanatory variables. The main reason for applying this methodology was the lack of data. However, there is a risk of bias in the results, as the continuous evolution of public social protection expenditures was not considered.

As for Anton et al. (2006) and Matus-Lopez et al. (2016), they put an emphasis on the important role of tax revenues mobilization by using simulation methods. Nevertheless, given that they use simulation methods with different scenarios (example: removal of subsidies for the energy sector, increase in Value Added Tax), some factors explaining public social protection expenditures may not be taken into account. Zemmour (2012) also worked on the issue by using an economic analysis. Nonetheless, it is necessary to conduct a more rigorous study comprising as many factors influencing sustainable social protection financing as possible. It is the main motivation of our study.

This chapter contributes to the existing economic literature as it comprises an econometric study carried out on a continuous period from 2000 to 2010 in developing countries. This enables a better capture of the effect of tax revenues on social protection financing and a more precise magnitude of this effect. Data were gathered from different databases and subsequently harmonized. Furthermore, in the second part of the econometric study, tax revenues are subdivided in two parts: “resource” tax revenues and “non resource” tax revenues. This was done in order to observe which of the two has a more important effect on social protection financing<sup>3</sup>.

We found a positive but non significant effect of tax revenues and “resource” tax revenues. As for non “resource” tax revenues, they have a positive and significant effect. The control variables rural population, population aged 65 years and over, mortality rate of under five years old children also have a significant effect on the variable of interest.

The remaining part of the chapter is organized as following: II) Background III) Literature review on the causal relationship between social protection financing and tax revenues, IV) Presentation of data, V) Presentation of the model, VI) Econometric Analysis, Conclusion.

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<sup>3</sup> In the study, social protection expenditures were chosen as a proxy for social protection financing. They comprise health insurance expenditures, unemployment benefits, pensions, safety nets.

## **II)Background:**

### *A) Brief presentation on social protection and its current trend in terms of coverage:*

There are different types of social protection components such as health insurance benefits, unemployment benefits, work injury benefits, disability benefits, maternity benefits, child and family benefits, pension benefits etc. (ILO, 2011; ILO,2014; ILO 2015; ILO ,2017a; ILO 2017b).

In order to achieve universal social protection, many treaties have been elaborated and been adopted by members of the International Labour Organization (ILO). Some of them are summarized in the following box 2. In 2010, a social protection floor defined as “an integrated set of social policies designed to guarantee income security and access to essential social services for all, paying particular attention to vulnerable groups and protecting and empowering people across the life cycle” was adopted.

It has for main aims “basic income security, in the form of various social transfers (in cash or in kind), such as pensions for the elderly and persons with disabilities, child benefits, income support benefits and/or employment guarantees and services for the unemployed and working poor; universal access to essential affordable social services in the areas of health, water and sanitation, education, food security, housing, and others defined according to national priorities”. (ILO,2011).

ILO (2011) recommended a certain number of measures to implement social protection floor in each country. (See box 3 below).

In practice, countries should still make efforts to achieve universal social protection as only 49.5% of the world's population has access to some form of social protection. When disaggregated at the regional level, this figure decreases even more for the African region as it becomes 17.4% (see table 1, below). The figures mentioned in the following table, show inequalities in coverage as regions with higher social protection expenditures register the highest level of social protection coverage. Thus, for all the social protection components, the European and Central Asian with 24% of GDP expenditures on social protection ranks first and the percentage of coverage is over 80% for children benefits (82.3%), maternity benefits (83.6%), Disability benefits (86.0%), Old Age benefits (96.7%). Regions with the lowest social protection expenditures (Africa-5.7% GDP, Arab states-7%GDP) have also the lowest children benefits (Africa,12.6%), maternity benefits (Africa,14.9%), unemployment benefits (Africa,5.3%), work injury benefits (Africa,18.4%), disability benefits (Arab



states,7.2%), old age benefits (Arab states,24%). Hence the importance of ensuring the financial sustainability of social protection systems to achieve universal social protection.

Box 2: Examples of treaties on social protection.

Main treaties on social protection:

>C102 - Social Security (Minimum Standards) Convention, 1952 (No. 102):

> R202 - Social Protection Floors Recommendation, 2012 (No. 202)

Other treaties:

>Universal Declaration of Human Rights,1948

°Article 22 ad 25 recognize the right to social security

>C118 - Equality of Treatment (Social Security) Convention, 1962 (No. 118)

>C121 - Employment Injury Benefits Convention, 1964 [Schedule I amended in 1980] (No. 121)

>UN International Convention on Economic, Social and Cultural rights,1966

°Article 9 commits governments to ensure social protection for all workers in the Informal Economy

>C128 - Invalidity, Old-Age and Survivors' Benefits Convention, 1967 (No. 128)

>C130 - Medical Care and Sickness Benefits Convention, 1969 (No. 130)

>C157 - Maintenance of Social Security Rights Convention, 1982 (No. 157)

>C168 - Employment Promotion and Protection against Unemployment Convention, 1988 (No. 168)

>C183 - Maternity Protection Convention, 2000 (No. 183)

>R198, Employment Relationship Recommendation, 2006(No.198)

> the Yaoundé Tripartite Declaration on the implementation of the Social Protection Floor, 2011

>African Union, Social Protection Plan for the Informal Economy and Rural workers 2011-2015

> The AU's Agenda 2063: The Africa We Want,2015

>ILO Recommendation 204, Transition from the Informal to the formal economy 2015

>SDGS,2015: SDG 1,3,5,8,10.

Source : ILO website-ILO standards and the USP 2030 website(USP=Universal Social protection).Consulted on 19/05/2021.

Box 3: Extract from the ILO recommendations for the implementation of the social protection floor.

“>Combining the objectives of preventing poverty and protecting against social risks, thus empowering individuals to seize opportunities for decent employment and entrepreneurship.

>A gradual and progressive phasing-in process, building on already existing schemes, according to national priorities and fiscal constraints.

>Coordination and coherence between social programmes. In particular, and within a perspective treating human development on a life cycle basis, the floor should address vulnerabilities affecting people of different ages and socioeconomic conditions, and should be regarded as a framework for coordinated interventions at the household level, addressing multidimensional causes of poverty and social exclusion and aiming to unlock productive capacity.

>Combining income transfers with educational, nutritional and health objectives, to promote human development.

>Combining income replacement functions with active labour market policies as well as assistance and incentives that promote participation in the formal labour market.

>Minimizing disincentives to labour market participation.

>Ensuring economic affordability and long-term fiscal sustainability, which should be anchored in predictable and sustainable domestic funding sources ; while noting that international solidarity in the form of cost-sharing may be needed to help to start the process in some low-income countries.

>Coherence between social, employment, environmental and macroeconomic policies as part of a long-term sustainable development strategy.

> Maintaining an effective legal and normative framework, so as to establish clear rights and responsibilities for all parties involved.

>An adequate institutional framework with sufficient budgetary resources, well trained professionals and effective governance rules with participation of the social partners and other stakeholders.

>Ensuring mechanisms to promote gender equality and support the empowerment of women.

>Effective health-financing systems to ensure access to needed health services of good quality.”

Source : ILO, 2011.

Table 1: Current social protection coverage and expenditures (aggregated and regionally disaggregated).

	World	Africa	Americas	Arab States	Asia&Pacific	Europe& Central Asia
Aggregates (exclu health)	46.9	17.4	64.3	40.0	44.1	83.9
Children benefits	26.4	12.6	57.4	15.4	18.0	82.3
Maternity benefits	44.9	14.9	51.9	12.2	45.9	83.6
Unemployment benefits	18.6	5.3	16.4	8.7	14.0	51.3
Work injury benefits	35.4	18.4	57.4	63.5	24.8	75.5
Disability benefits	33.5	9.3	71.8	7.2	21.6	86.0
Old Age benefits	77.5	27.1	88.1	24.0	73.5	96.7
Contributions to pension	53.7	13.4	64.9	29.2	54.7	84.3
Social protection expenditures	18.8	5.7	24.3	7	11.5	24
Healthcare	5.8	2	7.6	3.2	4.0	6.7
excl Healthcare	12.9	3.8	16.6	4.6	7.5	17.4

Source: Author with data found on <https://www.social-protection.org/gimi/WSPDB.action?id=19>

(consulted on: 06/07/2021).

## *B) Brief presentation on tax revenues:*

Tax revenues are mainly constituted of taxes on consumption and sales, corporate taxes, personal income taxes, inheritance taxes, property taxes, tariffs, tolls, natural resource extraction taxes. (ILO,2017a). They can be classified in three categories: direct taxes (personal income tax, corporate tax); indirect tax (Value Added Tax/VAT, excises, sale taxes) and trade taxes (tariffs on imported and exported goods). (Aguzzoni,2011).

In the context of scarce resources, of the necessity of ensuring the sustainable financing of public policies and becoming more financially independent, developing countries are increasingly encouraged to mobilize domestic resources.(Chambas, 2005; Brun et al.,2006; Aguzzoni,2011; Bastagli et al., 2013; Duran-Valverde et al, 2013; ILO, 2015; Brun et al., 2016; ILO,2017a).In fact, tax revenues are one of the eight recommendations of ILO and its partners to increase the fiscal space of countries in order to create more resources available to the sustainable financing of the SDGS including universal social protection by 2030. (See box 4, below). The fiscal space is defined by Heller (2005) as the “availability of budgetary room that allows a government to provide resources for a desired purpose without any prejudice to the sustainability of its financial position”. As for Roy and Henty (2009), they define it as “concrete policy actions for enhancing domestic resource mobilization and the reforms necessary to secure the enabling governance, Institutional and economic environment for these policy actions. (Aguzzoni,2011).

Despite the call for reforms of fiscal systems and the implementation of fiscal measures worldwide, in many developing countries, there are still bottlenecks to domestic resource mobilization through tax revenues and thus to the increase of the fiscal space that could serve to finance sustainably social protection. Low level of education, low level of income per capita, low proportion of national revenues allocated to salaries, high level of informal sector, inefficiencies in the functioning of fiscal system (complexities of tax policies, administrative burden, cost of collecting tax revenues), low level of trust in payment instruments, are among the main constraints faced by developing countries. (Chambas,2005; Bastagli et al.,2013).

Box 4: Extract from the eight recommendations of ILO and partners for the sustainable financing of social protection.

1. **“Re-allocating public expenditures:** this is the most orthodox option, which includes assessing on-going budget allocations through Public Expenditure Reviews (PERs) and other types of thematic budget analyses, replacing high-cost, low-impact investments with those with larger socio-economic impacts, eliminating spending inefficiencies and/or tackling corruption.
2. **Increasing tax revenue:** this is a main channel achieved by altering different types of tax rates – e.g. on consumption, corporate profits, financial activities, personal income, property, imports or exports, natural resource extraction, etc. – or by strengthening the efficiency of tax collection methods and overall compliance.
3. **Expanding social security coverage and contributory revenues:** in existing social security systems, increasing coverage and therefore collection of contributions is a reliable way to finance social protection, freeing fiscal space for other social expenditures; social protection benefits linked to employment-based contributions also encourage formalization of the informal economy.
4. **Lobbying for aid and transfers:** this requires either engaging with different donor governments or international organizations in order to ramp up North-South or South-South transfers.
5. **Eliminating illicit financial flows:** Given the vast amount of resources that illegally escape developing countries each year, estimated at ten times total aid received, policymakers should crack down on money laundering, bribery, tax evasion, trade mispricing and other financial crimes are illegal and deprive governments of revenues needed for social and economic development.
6. **Using fiscal and central bank foreign exchange reserves:** this includes drawing down fiscal savings and other state revenues stored in special funds, such as sovereign wealth funds, and/or using excess foreign exchange reserves in the central bank for domestic and regional development.
7. **Managing debt – borrowing or restructuring existing debt:** this involves active exploration of domestic and foreign borrowing options at low cost, including concessional, following a careful assessment of debt sustainability. For countries under high debt distress, restructuring existing debt may be possible and justifiable if the legitimacy of the debt is questionable and/or the opportunity cost in terms of worsening deprivations of vulnerable groups is high.
8. **Adopting a more accommodating macroeconomic framework:** this entails allowing for higher budget deficit paths and/or higher levels of inflation without jeopardizing macroeconomic stability.”

Source: ILO,2017a.

Table 2 below presents the evolution of the tax revenues over a nearly continuous period from 2003 to 2015 in the world. It shows differences in the level of tax revenues between regions and groups of countries by income. For example, in low middle countries, tax revenues varied between 12% GDP and almost 14% GDP while for high income countries, it varied most of the time between 14% GDP and 16% GDP.

Table 2: Tax revenues evolution by income groups and regions 2003-2015:

	2003	2005	2007	2008	2010	2011	2012	2013	2014	2015
World	n.a	14.36	14.94	14.49	13.58	13.96	14.06	14.32	14.59	15.22
LMIC	n.a	12.33	13.13	13.4	12.65	13.0	12.59	12.42	12.33	n.a
HIC	14.30	15.03	15.54	14.89	13.91	14.3	14.57	14.98	15.30	15.44
SSA	n.a	16.19	16.96	17.52	14.89	15.19	15.7	15.8	n.a	n.a
LAC	14.46	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	13.52
Europe &Central Asia	18.79	19.3	19.83	19.49	18.83	19.03	19.24	19.38	19.34	n.a
South Asia	n.a	10.06	11.63	10.74	10.33	10.04	10.65	10.89	n.a	n.a
North Americas	n.a	10.88	11.48	10.50	8.9	9.79	10.00	10.67	11.09	n.a

Source: Author with data from the World Development Indicators Report-World Bank.2017.

### **III) Literature review on the causal relationship between social protection financing and tax revenues:**

Few papers have been devoted to the econometric study of the causal relationship between public spending on social protection and tax revenues in developing (and even in developed) countries. This is emphasized in one of the most recent articles on this subject which is a working paper written by Murshed et al. in March 2017 and published by UNU-WIDER. They analyze the effect of fiscal capacity on social protection spending in developing countries (98) by using data from the 2014

International Labor Office and the IMF. They use other explanatory variables that are among others democracy, the quality of government, inequalities. The dependent variable includes social security payments (pension benefits, unemployment benefits, work injury coverage) and public health expenditures and the main explanatory variable includes taxes, social security contributions, donations and other types of resources.

By adopting the instrumental variables approach and the panel approach, they found a positive and significant effect of fiscal capacity on social protection expenditures. This effect is amplified when the country has a good democratic system. But as we have already pointed out in the introduction, this study presents some limits because it used only 5 observation points for the dependent variable and had to make averages over 5 years each time for the explanatory variables. This is justified by the lack of data; nevertheless, this can lead to a bias in the results as the continuous evolution of public expenditure on social protection is not taken into account.

Other studies that have also worked on the contribution of tax revenues to social protection financing have used simulations or some other types of analysis. Anton et al. (2016) used in their article<sup>4</sup> published in the Journal Economic Modeling, the dynamic general equilibrium model of Byod and Ibarra (2006). They simulated scenarios with the GAMS software. The objective of the article was to evaluate the economic effects of the VAT increase and/or the abolition of subsidies to the energy sector in the context of universal social insurance coverage (health, disability, retirement).

In their model, they took into account 12 sectors of production, 9 consumer goods, 4 categories of households (decile1-2, deciles 3-4-5, deciles 6-7-8, deciles 9-10), foreign sector, government. They found that universal social insurance can be financed by increasing VAT and removing subsidies to the energy sector even in the absence of social security contributions. An increase of 1% VAT (excluding food-drugs) and the removal of subsidies to the energy sector can increase the GDP of the country and thus create new resources for the State that can be invested in the financing of social protection.

Matus-López M et al. (2016) also used simulation scenarios to assess the technical and political feasibility of the six sources of fiscal space in Peru in order to achieve the goal of increasing public health expenditures (component of the health insurance) to reach 6% of the GDP. They also evaluated their political feasibility. They found by defining 3 scenarios that economic growth can allow an increase in fiscal space of 1.03 percentage points of GDP in the positive scenario; 0.56 percentage points of GDP in the neutral scenario and -1.05 percentage points of GDP in the negative

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<sup>4</sup> « Universal social insurance for Mexico: Modelling of a finance scheme »

scenario. As for taxes on rent and companies, there remains a gap of 4% GDP compared to those of the OECD. This available fiscal space could be exploited to generate more tax revenues. The political feasibility of this source of fiscal space is medium. As for the tobacco tax, it can create a fiscal space up to 0.02% of GDP. This source of fiscal space has a high political feasibility.

Zemmour (2012) has for his part carried out an analysis of the evolution of the financing of social protection in Europe over the period 1980-2007 in an article published in the journal *European Journal of Economic and Social Systems*. He used the quantitative analysis methodology with social protection expenditures being divided into social protection expenditure known as budgetary and those financed by social contributions and the evolution being differentiated according to the years of increase or reduction of the expenditure. He observed from the OECD and Eurostat databases that in 12 countries, changes in social protection expenditure as a percentage of GDP can be explained by changes in budget expenditures. However, it should be noted that the evolution of social protection expenditures can be explained by other factors that were not taken into account in the study. Hence, it is necessary to conduct an econometric analysis of the causal relationship between social protection expenditure and tax revenue.

Hujo et al. (2012) showed through an economic analysis, the role of tax revenues from the exploitation of natural resources in the financing of social protection including pensions. They gave the example of Bolivia, which has 32% of the "Renta Dignidad" universal pension scheme financed by the tax on the production of hydrocarbons since 2005. Through this study, we can understand that we must not neglect resource tax revenues in the context of financing social protection. Nevertheless, given the volatility of oil prices (or other natural resources) and the threat of the Dutch disease, tax revenues may not be collected efficiently, and it may not fully contribute to social protection financing. Hence, in the second part of our study, we separated tax revenues into "resource" and "non-resource" tax revenues to obtain the respective contribution of each to the financing of social protection.

Handley (2009) and Muñoz, et al. (2003), for their part, addressed the issue of the link between taxation and social protection financing, by highlighting the use of additional revenue from the VAT to finance the health insurance system in Ghana and social protection in the future in Ethiopia. Handley (2009) found that the increase of VAT from 12.5% to 15% in 2004 resulted in a rise in fiscal space and hence in Ghana's tax revenues of more than 1 percentage point of GDP per year. This gain was allocated to financing the country's social protection.



These studies using simulation methods or other type of analysis than econometric analysis show the significant role of different forms of tax revenues to sustainably finance social protection programs. Nevertheless, an econometric analysis should be performed to these results by including as many factors as possible that may affect the dependent variable.

#### **IV) Data presentation:**

##### *A) Databases used by the study:*

Given the scarcity of data on public social protection expenditures, but also on the explanatory variables on African and Latin American countries, data were collected from several sources in order to build the database for this study. Since public social protection expenditures do not necessarily have the same components according to the data source considered, the data sometimes had to be transformed in order to be better harmonized. Table 3 below summarizes the databases that were used in the study.

By collecting data on the different variables, 30 countries were selected for the study for the period of 2000 to 2010: Angola, Argentina, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Chile, Colombia, Congo (Democratic Republic of), Costa Rica, Ivory Coast, Ethiopia, Egypt, Ghana, Guatemala, Honduras, Kenya, Madagascar, Namibia, Nicaragua, Peru, Senegal, South Africa, Tanzania (United Republic of), Tunisia, Uganda, Uruguay, Venezuela, Zambia.

Table 3: Summary of database used in the study

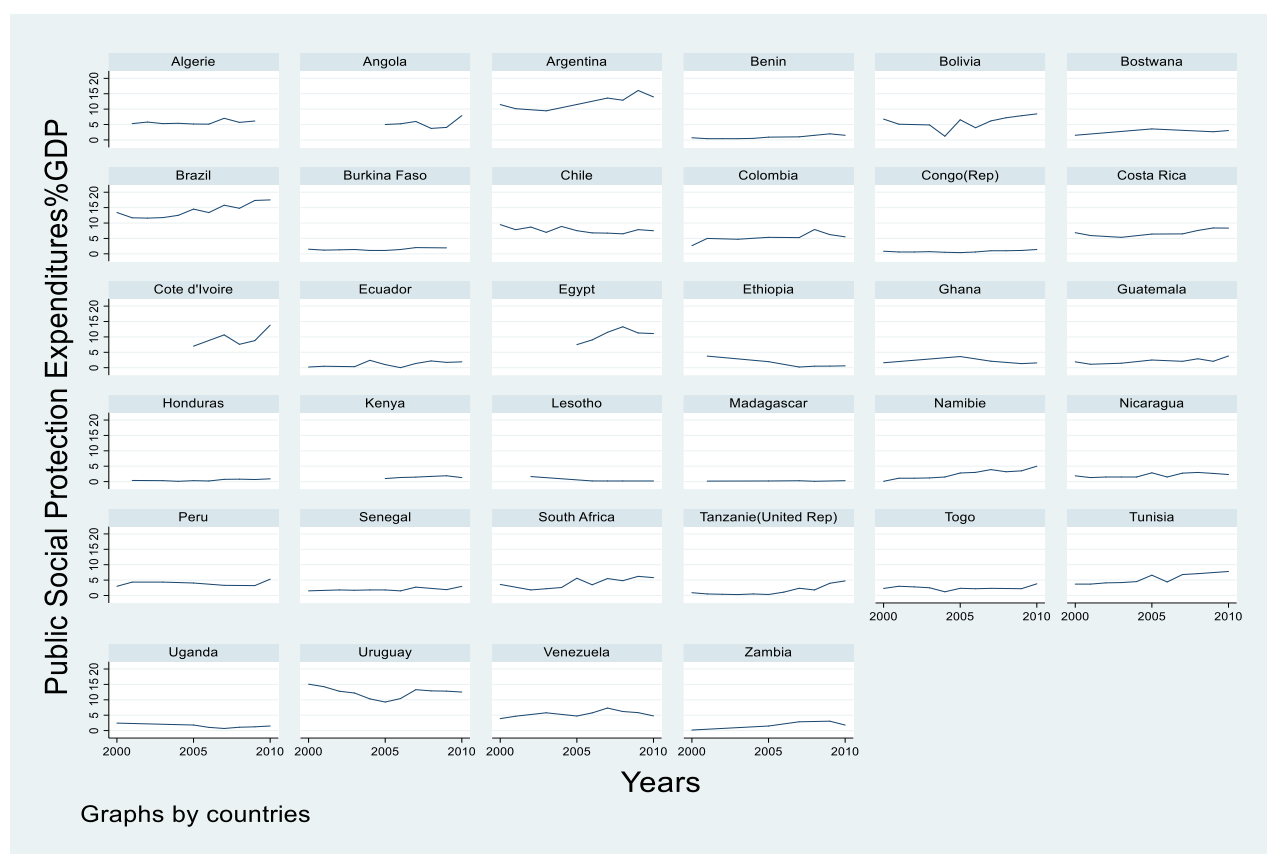
Variables	Database
Public social protection expenditures (%GDP)	"Public Social Protection Expenditure as a percentage of GDP, including/excluding Healthcare" from the ILOSTAT database of the International Labour Organization (ILO) from 2005 to 2012; "Expenditure on social protection" variable from IMF's "Governance Finance Statistics (GFS) database" – Expenditure by Functions of Government (table 7) 2005-2015; "Gasto social público en seguridad y asistencia social como porcentaje del producto interno bruto" from the database of the United Nations Economic Commission for Latin America and the Caribbean (CEPAL)1991-2012; "Total Public Social Protection expenditure as a percent of GDP" from the database of the report "world social protection 2014-2015"; "General Government Health Expenditure (GGHE) as % of Gross Domestic Product (GDP) from the World Health Organisation (WHO) National Health Account (NHA) Indicators database 1990 -2016.
Tax revenues (aggregated, resource, non-resource)	The World Bank's World Development Indicators (WDI) database; The Mansour database (WP IMF, July 2014); The ICTDGRD June 2016 database of the International Center for Tax and Development (ICTD)
CPI score	The transparency database 2000-2010
Net amount of the ODA	The Sustainable Development Goals data extract database
Population aged 65 and over	United Nations Development Programme (UNDP) Human Development Index (HDI) for 2003-2008; SSA reports "Social Security Programs Throughout the World": Africa 2003,2005,2007,2009,2011 and Americas 2003,2005,2007,2009,2011.
Under five mortality rate	The WHO National Health Account (NHA) database

Source: Author.

*B) Descriptive analysis of data:*

Over the period of 2000 to 2010, public expenditures on social protection evolved unevenly according to the country in question (see Graph 2, below). Argentina, Brazil, Uruguay have higher levels than the rest of the countries. In general, a large number of countries surveyed have a level of social protection expenditures of less than or equal to 5% of GDP. (See graph 3, below). This suggests that countries should make even greater efforts to mobilize financial resources to extend coverage to more people.

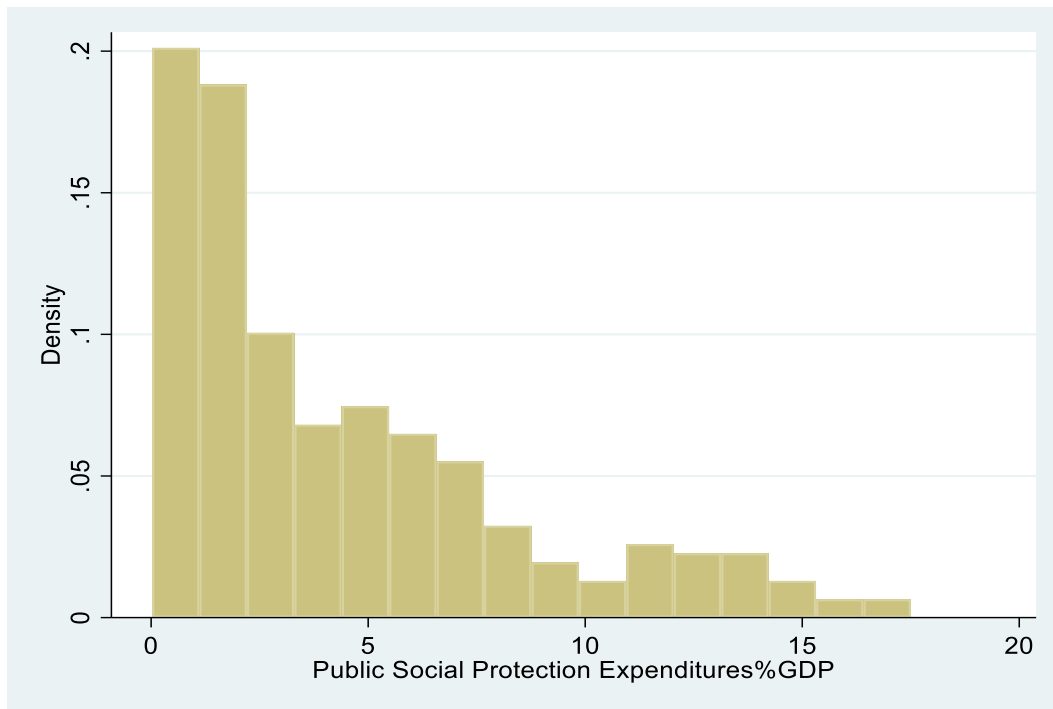
Graph 2: Evolution of public expenditures on social protection by country:



Source: Author.

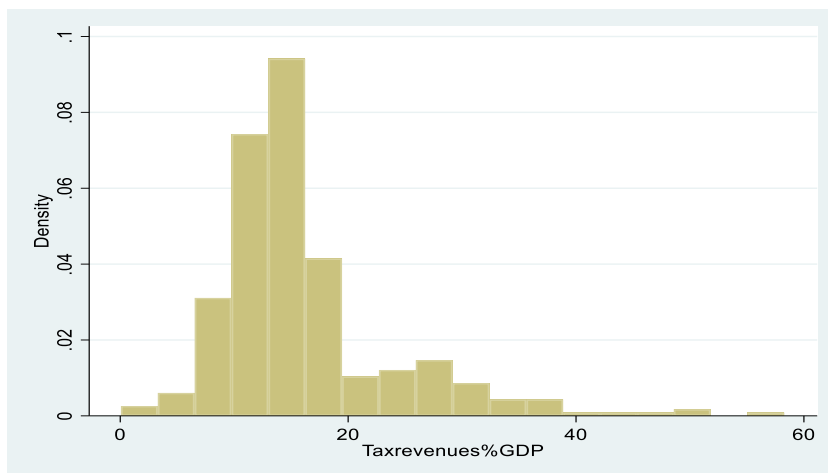
Regarding the evolution of the aggregated tax revenues, “resource” and “non-resource” tax revenues, differences can be observed. (See graphs 4-5-6), below). Aggregated and “non-resource” tax revenues are roughly similar in distribution for a large number of countries ranging from 0 to 20%. As for the “resource” tax revenues, there are many countries with a level close to 0%.

Graph 3: Distribution of the public social protection expenditures variable



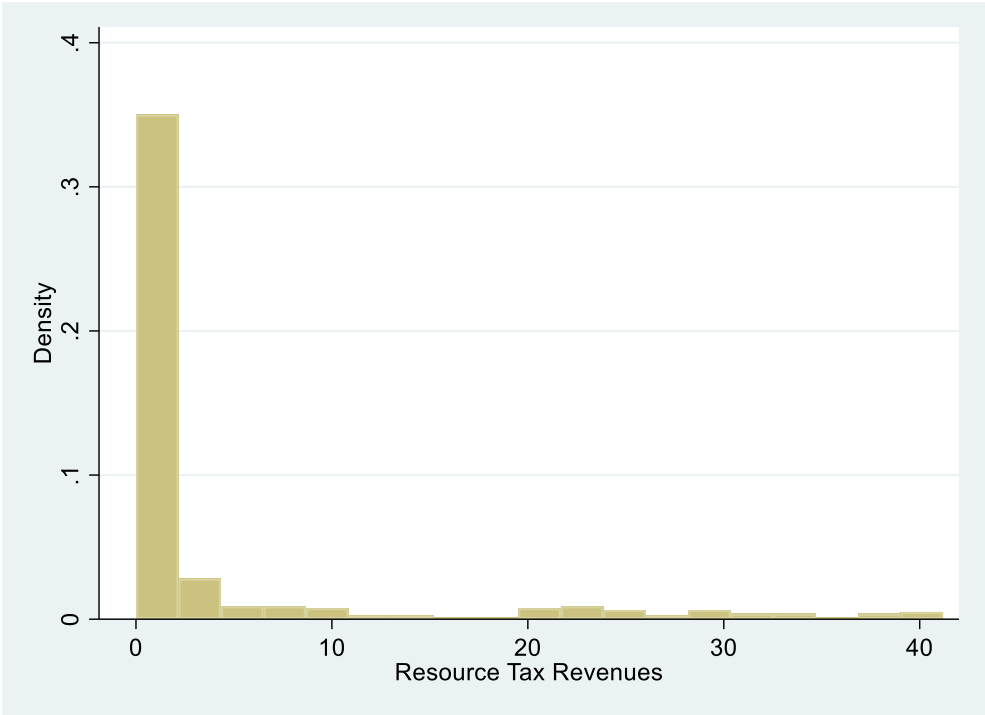
Source : Author.

Graph 4: Distribution of the aggregated tax revenues variable.



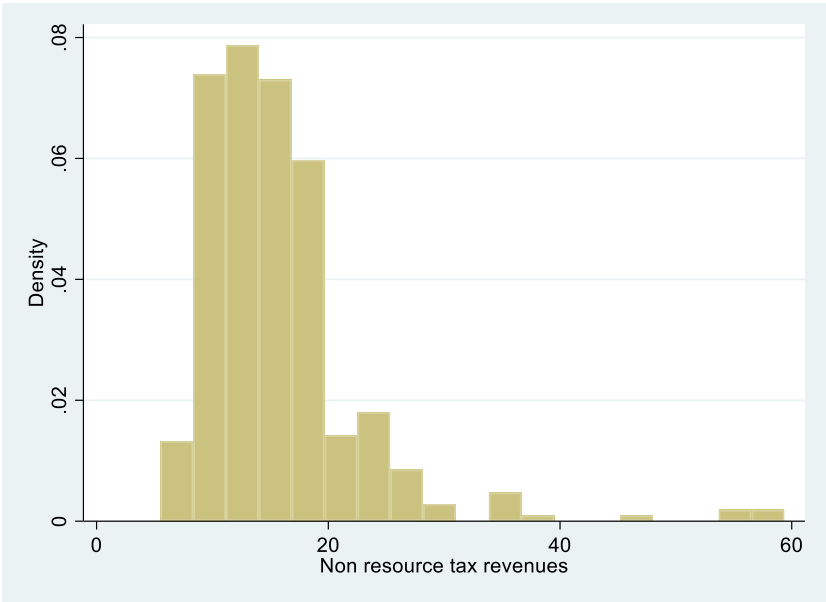
Source: Author.

Graph 5: Distribution of the “resource” tax revenues variable.



Source : Author.

Graph 6: Distribution of the “non resource” tax revenues variable.



Source: Author.

Table 4 summarizes the statistical information describing the data collected to carry out the study. It can be noted that the total number of observations (Number of countries studied \* Number of years for which data are available) varies according to the variable considered. Thus, for the explained variable, it is equal to 247. For the explanatory variables that is to say the total tax revenues, the resource tax revenues, the non-resource tax revenues, the cpi score, the share of the rural population in the total population, the net amount of international aid, the share of the population aged 65 and above in the total population, the mortality rate of children under five, it is respectively equal to 317, 321, 328, 302, 330, 330, 291, 314. As a result, the panel regression model for this study is unbalanced.

For the other statistical indicators, the level of public expenditures on social protection as a percentage of GDP is equal on average to 4.61% which remains low enough for the universal coverage of social protection of the population of African countries and Latin America. The total variance of this variable is 17.46, which indicates a non negligible dispersion of the values taken by the variable over the period studied around the mean. This can be seen in the large gap between the minimum value of 0.01% of GDP and the maximum value of 17.5% of GDP.

For the total tax revenues, the average is 15.7% of GDP and the variance is 32.63. There is therefore a strong dispersion of the values of this variable around the mean, thus indicating heterogeneity between the countries (and between the years considered). In general, the tax burden remains lower for the countries studied in comparison to developed countries, which exceeds 20%.

Concerning the resource tax revenues, the average is 3.45% GDP. The minimum value is 0 and concerns several countries that do not exploit (yet) natural resources. The maximum value is 41.2%. The variance is 72.22; which also indicates a strong dispersion of the values taken by the variable around the mean.

As for the variable “non-resource tax revenues”, it is on average equal to 15.14%. Non resource tax revenues are therefore relatively more important than resource tax revenues. This suggests that they may have more impact on the dependent variable. This variable is characterized by a high dispersion of its values around the mean since its variance is 23.74.

For the variable “CPI Score”, it is equal to 3.49 on average. The variance is 1.81; there is therefore a low dispersion of the values taken by the variable around the average for the countries studied.

For the rural population as a percentage of the total population, it is equal on average to 47.77%. The variance is 517.55; which shows a strong dispersion of values taken by the average around the

average reflecting the heterogeneity of African and Latin American countries in terms of urbanization

The variable “net amount of international aid”, meanwhile, is equal to  $6.34 \text{ e}^{08}$  on average. It is characterized by a strong dispersion of its values around the average since its variance is equal to  $3.76 \text{ e}^{17}$ .

Regarding the variable "Population aged 65 and above" expressed as a percentage of the total population, it is on average equal to 4.50% of the total population. Its variance is 6.54. There is therefore a non-negligible dispersion of the values taken by the variable around the mean.

The variable "Mortality rate of children under 5 years", has an average of 57.69 per 1000 live births. It is the variable with the highest variance (4919.23). This indicates a very high dispersion of values around the mean and therefore significant heterogeneity between countries. This can also be observed by the difference between the minimum value (1 per 1000 live births) recorded by Uruguay over the entire study period and the maximum value (413 per 1000 live births) achieved by Ethiopia in 2000.

Table 4: Summary table of statistical information.

Variable	Mean	Std.dev	Min	Max	Observation	Variance
Public Social protection Expenditure(%GDP)	4.61	4.18	0.01	17.50	247	17,46
Tax revenues(%GDP)	15.7	5.71	0.06	34.6	317	32.63
“Resource” tax revenues(%GDP)	3.45	8.50	0	41.2	321	72.22
« Non Resource » tax revenues (%GDP)	15.14	4.87	5.5	34	328	23.74
CPI score	3.49	1.35	1.7	7.5	302	1.81
Rural population(% total population)	47.77	22.75	5.59	87.92	330	517.55
Net ODA amount	6.34e <sup>08</sup>	6.13e <sup>08</sup>	23.9	3.82 e <sup>09</sup>	330	3.76 e <sup>17</sup>
Population aged 65 years old and above	4.50	2.56	2	19.3	291	6.54
Under Five mortality rate (per 1000 live births)	57.69	70.14	1	413	314	4919.23

Source: Author based on the different databases quoted in table 3.



## V) Presentation of the model:

The construction of the econometric model of our study is based on the literature review and on the model used by the study by J. Pan and G.G (2012)<sup>5</sup> on the determinants of public health expenditure per capita of Chinese provinces.

We use the following panel model equation:

$$G_{SP}(i,t) = a_i + TR(i,t) + \sum X(i,t) + u(i,t) + e(i,t)$$

With  $G_{SP}(i,t)$  = the level of public expenditures on social protection as a percentage of GDP for country  $i$  in year  $t$ ;  $a_i$  = the constant,  $TR(i,t)$  = Level of tax revenues (aggregated, “resource” or “non-resource”) in% GDP;  $\sum X(i,t)$  = The set of control variables namely rural population share in the total population, the level of corruption measured by the CPI score, the net amount of the ODA, the share of the population aged 65 and above in the total population, the under five years old children mortality rate ;  $u(i,t)$  the fixed effect country and  $e(i,t)$  the term of the error.

NB: We would have loved to use a more specific variable of international aid such as ODA attributed to the social protection sector. However, there is not yet such variable. On the OECD website, ODA is disaggregated in social infrastructures, economic infrastructure, debt cancellation, humanitarian aid<sup>6</sup>. Hence we used an aggregated variable.

As already pointed out in III, tax revenues are expected to have a positive effect on the financial sustainability of social protection approximated in our study by public social protection expenditures. Indeed, if a country has a significant level of tax revenues, this may generate

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<sup>5</sup> We used insights of this article to define our model as it studied the determinants of public health expenditures by provinces and public health expenditures are covered by health insurance (component of social protection). In addition, it involves rigorous econometric analysis. In this study by J. Pan and G.G (2012), the determinants include GDP per capita, tax revenues and transfers, the age structure in the province,

<sup>5</sup> local public health status, institutional quality of local health systems, health insurance coverage rate, urbanization, gender, education. The authors did an econometric panel analysis using data from 31 Chinese provinces and observed over the period 2002-2006 and found a contribution of the general government revenues per capita of the Chinese provinces to public health expenditures per capita of these provinces.

<sup>6</sup> Source: [data.oecd.org/fr/oda/apd-par-secteur.htm](http://data.oecd.org/fr/oda/apd-par-secteur.htm)

additional available resources that can be allocated to social protection system funding. By decomposing tax revenues into “resource” tax and “non-resource” tax revenues, “non resource” tax revenues are expected to have a greater impact: “Resource” tax revenues are more volatile than non-resource tax revenues. Thus, they may not necessarily translate into tax revenues and the financial sustainability of social protection systems.

The share of the rural population in the total population is likely to have a negative effect on social protection because this category of the population is often poor and therefore is barely able to meet their basic needs (food, clothing, housing). As a result, it cannot often afford financing enrollment at a social protection program (private or public). In addition, the rural population has for main economic activity, agriculture and usually works in the informal sector.. Hence, they are less likely to finance their coverage by a formal social protection system. Nevertheless, it should be emphasized that this variable can also have a positive effect on the dependent variable as this population is subject to the risks of natural and meteorological disasters and food insecurity as a consequence of being mainly constituted of farmers. This often leads to the implementation of social networks financed by the state and an increase in public spending on social protection.

With regard to the net amount of the ODA, this constitutes a part of the financing of social protection programs in developing countries (especially low-income countries) because of insufficient domestic resources at the moment. This variable is therefore expected to have a positive effect on public spending on social protection.

As for the level of corruption of the country expressed by the CPI (Corruption Perceptions Index) score which is a proxy for the institutional quality of the country, this variable was chosen to reflect the institutional quality of the country, particularly with regard to the management available resources. Indeed, if a country has a high level of corruption, it is expected that resources would not be allocated efficiently to the various development programs (education, health, infrastructure, social protection, etc.). As a result, there would be low public spending in these different development sectors and a low level of public spending on social protection. For further analysis of the effect of corruption on the financial sustainability of the social protection system, we have chosen to introduce the interaction of this variable with the main explanatory variable because in the presence of a high rate of corruption, there is the phenomenon of tax evasion, misappropriation of tax revenues collected for personal purposes. This will likely decrease the amount of tax revenues allocated to the financing of development programs. It is therefore expected to have a negative effect of tax revenues interaction and CPI score on public spending on social protection.

The variable, based on the population aged 65 and above in the total population, was selected because if there is a large proportion of this category of the population, this means that there will be higher demand for the retirement pension, and this will therefore result in an increase in public spending on social protection all other things being equal. In addition, a country that has a large share of the elderly population is more likely to face higher health expenditures as it is a fragile population exposed to diseases that often require intensive care. These expenditures are partly financed by the social security system (one of the components of social protection). It will have the effect of increasing public spending on social protection.

Finally, the variable under-five years old children mortality rate was chosen as a proxy for the health status of the population. If it is too high, it means that the country is in poor health. This may reflect low child protection coverage via cash transfers/family allowances but also low parental health insurance coverage. Therefore, public spending on social protection are expected to be low when the under-five mortality rate is high all other things being equal.

## **VI) Econometric analysis of the data:**

### *A) Selection of the most relevant model:*

In order to choose the most appropriate model to explain the sustainability of social protection funding, different regressions of the variable "public expenditure on social protection" on the independent variables were carried out by estimating the OLS model, the LSDV fixed effects model, the Within fixed effects model, the random effects model.

#### 1) OLS model versus LSDV fixed effects model versus Fixed effects model Within:

The OLS model (see table 5) assumes that the constant and the coefficient associated with each explanatory variable do not vary between countries. The model fits with the observed data since the pvalue associated with the Fisher's test statistic is below the 5% threshold. In addition, the  $R^2$  equals 69%, which means that the model accounts for 69% of the variation in public spending on social protection. Nevertheless, we can wonder if there are no specific effects for each country, particularly because of their level of development, level of tax revenues etc.

Hence the regression of the dependent variable on the explanatory variables using the LSDV fixed effects model. LSDV fixed effects model allows to have dummy variables ( $\pi_i$ ,  $i = 1, \dots, 30$ ) associated with each country. Thanks to these dummy variables, we obtained the deviation of the

individual constants with respect to a value (constant) of reference. The results from this regression show, as in the OLS model, that the model fits with the observed data. The Fisher statistic is slightly higher and the  $R^2$  has increased significantly since it is now at 93.59%. The coefficients associated with the dummy variables of the countries show a significant deviation from the reference point (variable dummy p14) 21,78 and are significantly different from zero for the most part. Consequently, there are individual effects induced by the specificities of each country, such as the type of tax system specific to each country. Hence, the need to use the fixed effects regression model Within or the random effects model. It is important to note that the tax revenues variable becomes insignificant although its coefficient remains positive as in the OLS model.

The within fixed effects model allows us to observe the effect of the explanatory variables on public expenditure on social protection without using dummy variables as in the LSDV method. The same results are observed as in the LSDV model in terms of the effect of tax revenues and other explanatory variables on public expenditure on social protection. However, the value of the constant is not the same nor is the Fisher statistic of the global model and the fixed-effect model. It is the same for the  $R^2$  Within.

## 2) Fixed effects model within versus Random effects model:

When we regress public expenditure on social protection using the random effects model, this time we obtain a positive and significant effect of tax revenues. In contrast, the variable under-five years old children mortality rate becomes insignificant and has a positive sign. In addition, the  $R^2$  within is less important than that of the fixed-effect model.

To be able to choose the most appropriate model between the fixed effects model and the random effects model, a Hausman test was performed. The null hypothesis of the test assumes that there is no correlation between individual effects and explanatory variables. If  $H_0$  is not rejected then the random effects model is preferred to the fixed effects model. In the opposite case, it is the fixed effects model which is preferred. Table 4 below shows that the pvalue (0.04) associated with the Hausman test statistic is less than 5%. We do not accept the null hypothesis. The fixed effects model is preferred over the random effects model.

Table 5: Summary of OLS models, LSDV fixed effects, Within fixed effects.

Variable	OLS	LSDV	FE	RE
Tax_revenues	0.47*	0.21	0.21	0.29**
CPI score	1.17**	0.47	0.47	0.57
Interaction Tax CPI	-0.1*	-0.05	-0.05	0.06**
Rural population (%)	-0.09*	-0.2***	-0.2*	-0.07*
ODA(net)	-6.53 e(-10)	-4.89 e(-10)	-4.89e(-10)	2.65e(-10)
Population aged 65+	0.82*	0.61**	0.61*	0.83*
U5Mortality rate	0.03*	-0.03**	-0.03**	0.001
p1		-4.52		
p2		-15.46*		
p3		-11.87*		
p4		-13.64*		
p5		-13.39***		
p6		-8.05		
p7		-6.16**		
....		....		
p14		(omitted)		
(reference)				
...		....		
p30		-8.32*		
_cons	-1.54	21.78*	9.79***	0.83
N	182	182	182	182
r2	0.69	0.94	0.27	0.22

Source: Author from WB-IMFWHO-ILO-CEPAL-ICTD-UNDP-ISSA-Mansour data.

NB: \*\*\*: 1%, \*\*: 5%, \*: 10%

Table 6: Summary of the Hausman test.

Null hypothesis	Ho: Difference in coefficients not systematic
Statistic Test	Chi2(6) =13.21
Pvalue	0.0397

Source: Author using data from BM-FMI-WHO-ILO-CEPAL-ICTD-UNDP-ISSA-Mansour.

The same procedure for choosing the right model was adopted when tax revenues were disaggregated into “resource” and “non-resource” tax revenues. The fixed effects model was also used in both cases.

*B) Results and discussions on the chosen model:*

1) Results and their interpretation:

The within fixed effects model (Model A in Table 7 below) is the model that has been selected. In terms of the overall significance of the model, the R<sup>2</sup> Within is equal to 0.27, which means that 27% of the variability of public spending on social protection is explained by the model.

The main explanatory variable, that is to say tax revenues expressed as percentage of GDP, has a non-significant positive effect on the financing of social protection approximated by public expenditures on social protection. Indeed, the p-value associated with the statistic of the significance test of the coefficient of the variable is equal to 0.15, which is above the thresholds of 1%, 5% and 10%. One of the possible reasons for the non-significance of the main explanatory variable is that tax revenues are not allocated in sufficient quantity to the financing of social protection. African and Latin American countries must therefore allocate more tax revenues collected. Another possible explanation is a less efficient use of tax revenues allocated to the social protection sector. In this case, the management system of available resources should be reformed to finance social protection and eliminate frauds. Last but not least, the non significance of aggregated tax revenues can be explained by the nature of the social protection system (bismarckian or beveridgian; cf. general introduction) in place.

Table 7: Summary table of the results of the three regressions.

Variable	Model A	Model B	Model C
Tax_revenues	0.21		
ressrev		0.13	
Nonressrev			0.34**
cpiscore	0.47	-0.29	0.63
taxcpi	-0.05		
Ress tax rev CPI		-0.03	
Non ress tax rev CPI			-0.05
Rural population(%)	-0.2***	-0.21***	-0.18**
ODA(net amount)	-4.89 e(-10)	-3.36e(-10)	-4.60e(-10)
Population 65+	0.61***	0.54***	0.53***
U5 Mortality rate	-0.03**	-0.03**	0.02***
_cons	9.79**	14.03***	6.9
N	182	181	183
R2	0.27	0.27	0.29

Source: Author from WB-IMF-WHO-ILO-CEPAL-ICTD-UNDP-ISSA-Mansour data.

NB: \*\*\* :1%, \*\*5%, \*10%.

Rural population, Population aged 65 and above, and under-five mortality rate variables have a significant effect. In fact, the rural population variable has a significant negative effect at the 5% level. For an increase of 1% in the share of the rural population in the total population, there are 0.2 percentage points decrease in public social protection expenditure as a percentage of GDP, all other things being equal. The more there is a large part of the population that is rural, the more social protection expenditures are going to be low. This can be explained by the fact that this population does not have enough resources to contribute to a form of social protection (public or private); it is also a population mainly working in the informal sector.

The population aged 65 and above variable has a significant positive effect at the 1% level. For an increase of 1% in the proportion of people aged 65 and above in the total population, there are 0.6

percentage points increase in public social protection expenditures as a percentage of GDP. The more, there is a large part of the population at retirement, the more it will need an income (paid in the form of retirement pension) to support themselves. In addition, this category of the population is characterized by episodes of illness related to old age, hence a higher level of expenditures on social protection. It is therefore necessary for the governments of the different countries to find solutions to finance in a sustainable way the social protection system in the presence of the aging of the population. One of the solutions is the increase in the share of tax revenues allocated to the financing of social protection.

For the variable "under five years old children mortality rate", it has a significant negative effect at the 5% level. For an increase of 1% in the share of the under-five mortality rate, there are 0.03 percentage points decrease in public social protection expenditure as a percentage of GDP.

Regarding the main explanatory variable, we can wonder whether the same result would be obtained when tax revenues are disaggregated in "resource" and "non-resource" tax revenues. In other words, do we observe the same effect in the case of tax revenues collected on the exploitation of natural resources or tax revenues that do not take into account this activity?

In model B, where aggregated tax revenues are replaced by "resource" tax revenues, the regression of the dependent variable on this new explanatory variable shows a positive but not significant effect the latter. One of the possible explanations for this result is the one provided for the result of the above model, namely an insufficient allocation of tax revenues to the financing of social protection. This result can also be interpreted as originating from the type of tax revenues considered. Indeed, they are volatile because they depend heavily on the price of natural resources that changes with the supply and demand. As a result of this volatility, these tax revenues cannot sustainably finance social protection programs on their own. Hence in this regression, we note a non-significant effect.

Control variables rural population, population aged 65 and above, and under-five mortality rate are the only variables that have a significant effect on public social protection expenditure. For an increase of 1% in the share of the rural population in the total population, there is a decrease of 0.21 percentage points of public expenditures on social protection as a percentage of GDP, all things being equal. For an increase of 1% in the proportion of people aged 65 and above in the total population, there are 0.54 percentage points increase in public expenditures on social protection as a percentage of GDP, all other things being equal. For an increase of 1% in the share



of the under-5 mortality rate, there are 0.03 percentage points decrease in public social protection expenditure as a percentage of GDP, all other things being equal.

In model C, where public expenditures on social protection are explained this time by “non-resource” tax revenues, there is a positive and significant effect of the main explanatory variable. For an increase of 1% in “non-resource” tax revenues as a percentage of GDP, there are 0.34 percentage points increase in public social protection expenditures as a percentage of GDP, all other things being equal. We can conclude that it is this type of tax revenues that should be favored the most as part of the financial sustainability of social protection programs.

As in the previous regression models, rural population, population aged 65 and over, and under-five child mortality rates variables have a significant effect on public spending on social protection. For a 1% increase in the share of the rural population in the total population, there is a decrease of 0.18 percentage points of public expenditure on social protection as a percentage of GDP, all other things being equal. For an increase of 1% in the share of people aged 65 and over in the total population, there are 0.53 percentage points increase in public spending on social protection as a percentage of GDP, all other things being equal. For an increase of 1% in the share of the under-5 mortality rate, there are 0.02 percentage points decrease in public social protection expenditures as a percentage of GDP, all things being equal.

It can be deduced from this modeling that the “non resource” tax revenues variable contributes the most to the financing of social protection, as already indicated above.

## 2. Discussion of the results:

The results of the model above have similarities and some differences with those of the studies highlighted in the literature review. They bring a novelty in the sense that they come from an econometric analysis on a continuous period of 10 years on developing countries. Moreover, they show that “non-resource” tax revenues have a significant effect on the financing of social protection.

In Model A, there is a positive effect of tax revenues on the financing of social protection as in the UNU WIDER study however it is insignificant unlike the result found by Murshed et al. (2017). This could be explained by a different measure adopted by these authors as they include in addition to taxes, social contributions, donations and other types of resources.

In Model C, we found a positive and significant effect of “non-resource” tax revenues. This corroborates or even completes the results found by Anton et al. (2016), Handley (2009) and Muñoz et al. (2003) and highlighting the role of VAT in the financing of social protection.

In Model A and B, the rural population variable has a negative and significant effect on the financing of social protection. This result is similar to the one found in the study by J. Pan and GG (2012) concerning the determinants of public health expenditures in the Chinese provinces since the authors observe a positive and significant effect of the urban population on the explained variable.

Finally, as in the J. Pan et al. (2012), the population aged 65 and above has a positive effect on the financing of social protection in the three models. Moreover, it is significant this time.

### 3. Problem of a possible reverse causality:

In this article, the direction of causality studied is the effect of tax revenues on public social protection spending used as a proxy for the financing of social protection. However, the direction of causality can be reversed because public spending on social protection can also have an impact on tax revenues. Indeed, depending on the level of the total costs of social protection coverage, the funding required to cover it will vary. This may result in a variation in the tax revenues earmarked for this purpose. Hence this can generate a problem of endogeneity.

To be able to solve this problem, a lagged variable t-1, t-2, t-3 of the main explanatory variable was used. This method was preferred to the instrumental variables method because of the difficulty to find a rigorous instrument such to have a direct effect on tax revenues but not on public expenditure on social protection. Models A.1, A.2, A.3 respectively represent the regression of the public expenditures on social protection on the lagged tax revenues variable at t-1, t-2, t-3; Models B.1, B.2, B.3, the regressions of the public social protection expenditures on the lagged “resource” tax revenues variable at t-1, t-2, t-3 and models C.1, C.2, C.3, the regressions of the public expenditures on social protection on the lagged variable “non-resource” tax revenues at t-1, t-2, t-3.

In doing so, the new results (see Table 8 below) show a positive but not significant effect for all the different tax revenues variants delayed at t-1 and t-2 and for the variable "resource" tax revenues" delayed at t-3.

The tax revenues and “non-resource” tax revenues variables have a positive and significant effect at t-3. Thus, for an increase of 1% in tax revenues as a percentage of GDP, there are 0.16 percentage points increase in public spendings on social protection, all other things being equal. This new result can be interpreted as it may take time for tax revenues to have an effect on the financing of social protection. And for an increase of 1% in non-resource tax revenue as a percentage of GDP, there are 0.28 percentage points increase in public spending on social protection, all other things being equal.

Table 8: Summary of the fixed effects model with delayed variable t-1, t-2, t-3:

Variable	A1	A2	A3	B1	B2	B3	C1	C2	C3
Tax_revenues									
t-1	0.12								
t-2		0.04							
t-3			0.16*						
Ressrev									
t-1				-0.07					
t-2					0.06				
t-3						-0.09			
Nonressrev							0.08		
t-1								0.14	
t-2									0.28***
t-3									
CPI score	0.48	0.75	0.59	0.71*	0.84*	0.79	0.46	0.65	0.60
Rural	-0.003	0.002	-0.04	0.05	0.01	0.03	0.01	-0.02	-0.04
population(%)									
ODA(net	-2.82e-10	-2.28e(-	-3.30e(-	-4.71e(-	-3.05e(-	-4.24e(-	-2.85e(-	-3.36e(-	-4.07e(-
amount)		10)	10)	10)	10)	10)	10)	10)	10)
Population	0.67***	0.63**	0.64***	0.66***	0.62*	0.8***	0.71*	0.57***	0.52**
65+									
_cons	0.35	0.22	0.22	-0.51	-0.25	-1.18	-0.92	-0.07	-1.27
N	133	123	112	132	120	112	136	124	116
R2	0.33	0.30	0.32		0.30		0.32	0.32	0.36
				0.30		0.32			

Source: Author using WB-IMF-WHO-ILO-CEPAL-ICTD-UNPD-ISSA-Mansour data.<sup>7</sup>

<sup>7</sup> NB: \*\*\* :1%, \*\* : 5% ,\* :10%.

In the two models, another variable that has a significant effect is the variable "population aged 65 and above" delayed at t-3. For an increase of 1% in the population aged 65 and over, there is an increase of 0.64 percentage points of public expenditure on social protection all other things being equal in the model and taking into account the lagged variable of the total tax receipts at t-3. For the last model, for an increase of 1% in the population aged 65 years and older, there are 0.52 percentage points increase in public spending on social protection, all other things being equal.

It can be deduced from this modeling that the “non-resource” tax revenues variable contributes the most to the financing of social protection as already indicated above.

### **Conclusion:**

Social protection plays an important role in reducing poverty, which makes it necessary for developing countries to ensure the financial sustainability of programs in this area. The purpose of this article was to see if empirically a causal relationship is observed between public social protection expenditure as a percentage of GDP (proxy for social protection financing) and tax revenues in African and Latin American countries. Hence a panel econometric study taking into account 30 countries and 10 years (2000-2010) was carried out. Through the continuous period studied, this article contributes to the existing literature on the financing of social protection in developing countries because there are very few papers working as a panel on this topic. This chapter also contributes to literature through a disaggregated analysis of the effect of tax revenues on the financing of social protection.

The results of the study show that aggregated tax revenues have a positive but not significant effect on public spending on social protection (proxy for social protection funding). By disaggregating tax revenues into “resource” and “non resource” tax revenues, we found that the latter has a significant positive effect. For an increase of 1% in “non-resource” tax revenues as a percentage of GDP, there are 0.34 percentage points increase in public social protection expenditures expressed as a percentage of GDP all other things being equal.

Both results suggest that African and Latin American governments should allocate a larger share of tax revenues to social protection funding. They should also manage more efficiently resources

available for this purpose. More emphasis should be placed on tax revenues that are not derived from the exploitation of natural resources because they are less volatile and therefore a source of sustainable funding for social protection.

The results of the econometric study also show significant effect of the variables rural population, population aged 65 and over, and mortality rate of children under 5 years of age. Complementary measures should therefore be implemented, such as development policies for the rural population, the efficient care of the population over the age of 65, and the improvement of the health status of children under 5 years of age and of the rest of the population to maximize the contribution of tax revenues to financial sustainability.

The study has some limitations. The first is the difficulty of finding available data for the entire 2000-2010 period for all the countries studied. We have tried to overcome this problem by using different databases. The second limitation concerns the existence of a possible reverse causality due to the fact that public spendings on social protection can in turn have an effect on tax revenues. This is why a lagged variable of tax revenues / “resource” tax revenues/ “non-resource” tax revenues at t-1, t-2, t-3 was introduced to avoid this problem.

## Chapter 2: Tax revenues and social protection financing: Case study of South Africa

*Abstract: This chapter is a follow up of the previous chapter with an aim to verify if the results obtained in the chapter 1 were also observed within a country. It is a case study of the nine provinces of South Africa which is a federal state. We found that aggregated tax revenues did not have either a significant effect on public social protection expenditures as in chapter one. Nevertheless, national transfers to provinces had a higher and significant effect on the variable of interest. For an increase of 1% in national transfers, there were 0.03 points of percentage in social protection expenditures other things being equal. At the disaggregated level of national transfers, the Provincial Equity Share had a significant positive effect contrary to conditional grants. For an increase of 1% in provincial equity share, there were 0.04 points of percentage in social protection expenditures other things being equal. The control variables real GDP per capita (in thousands rands), the proxy of the rural population had also a significant effect at the aggregated and disaggregated levels. The variable “population aged 65 and above” was also significant at the disaggregated level.*

*Key words: Tax revenues, national transfers, Social protection, Social protection financing, SDGs, South Africa.*

## **Introduction:**

Social protection plays an important role in enabling to keep receiving an income during an unexpected event and retirement. As we have seen with the current pandemic covid19, it is necessary that all persons have access to it to better mitigate risks (sickness, loss of employment, partial unemployment, bankruptcy of own business, death of a family member) and their consequences without financial hardship.

In countries where social protection systems were present and efficient, this has enabled them to put in place more rapidly measures to compensate the pandemic consequences and lockdown. The measures comprised support to companies, coverage of infected persons, unemployment benefits, cash transfers plus to families in need, in-kind transfers etc. (socialprotection.org,2020; ILO, 2020; ILO,2021). However, in countries where social protection was not comprehensive, they met difficulties to cope with the pandemic. Hence, it is important to make social protection systems available for all and financially sustainable. It is within this context, that this study was carried out.

The study examined the causal relationship between social protection financing proxied by social protection expenditures and tax revenues in nine provinces of South Africa from 2002 to 2017. It is a case study following a previous study (Ndongozi-Nsabimana, 2020) which dealt with the same subject but on a more aggregated level as it was realized on a national level and included 30 countries from Africa and Latin America. Ndongozi-Nsabimana (2020) established a positive but non-significant effect of tax revenues and “resource” tax revenues. As for “non-resource” tax revenues, they had a positive and significant effect.

The aim of this new study is to further the econometric analysis done by Ndongozi-Nsabimana. (2020) and verify if the results observed previously remain the same at a provincial level. It is also a continuous study with enough data available for the period studied. We chose South Africa as it has a well developed system of information on its social protection system. This country is also an interesting case notably for its well developed social grants programs.

Using a panel analysis, we found a non significant effect of the tax revenues on public social protection expenditures as a proxy of social protection financing. Nevertheless, national transfers

to provinces which constitute a larger proportion of provincial revenues have a positive and significant effect in most of the time. For example, for an increase of 1% in national transfers, there were 0.03 points of percentage in social protection expenditures other things being equal.

The remaining part of the chapter is organized as following: II) Background; III) Econometric analysis; IV) Conclusion.<sup>8</sup>

## **II)Background:**

South Africa is a federal state composed of nine provinces (Western Cape, Northern Cape, Eastern Cape, Free State, North West, Gauteng, Limpopo, Mpumalanga, Kwazulu-Natal) and has for administrative capital Pretoria. (the Commonwealth, 2021; Statistics South Africa and National treasury websites). This administrative structure has for consequence a particular organization of the social protection system and the fiscal system. Therefore, the impact of tax revenues is expected also to be specific on the financing of social protection system.

### *A) Brief presentation of the fiscal system of South Africa:*

Tax revenues are collected at the three spheres (national, provincial, and municipal). The institutions in charge of collecting tax revenues and managing them are the national treasury, the provincial treasury and the municipal treasury. The provincial treasury is autonomous towards the national treasury. It has for tasks the preparation of the provincial budget; the monitoring of the implementation of the provincial budget; the promotion and enforcement of transparency and effective management in respect of revenue, expenditure, assets and liabilities of provincial government institutions and public entities; and the development and implementation of fiscal policies in the province that are consistent with national goals.(Limpopo EPRE Full document 2014).The provincial treasure has a legislative mandate which entitles it to receive information about national legislation and policy documents. (See box 5, below).

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<sup>8</sup> We used the same literature review mentioned in the chapter one so we decided not to include a section about it.



Box 5: National legislation and policy documents sent to the provincial treasury.

- \*The Annual Division of Revenue Act;
- \*The Basic Conditions of Employment Act 1997 (Act 75 of 1997);
- \*The Borrowing Powers of Provincial Governments Act 1996 (Act 48 of 1996);
- \*The Constitution of RSA (No. 108 of 1996);
- \*The Employment Equity Act, 1998(Act55 of 1998);
- \*The Intergovernmental Fiscal Relations Act;
- \*The Labour Relations Act, 1995(Act 66 of 1995);
- \*The Preferential Procurement Policy Framework Act,2000 (Act5 of 2000);
- \*The Provincial Tax Regulation Process Act,2001 (Act 53 of 2001);
- \*The Public Finance Management Act, 1999 (Act of 1999) (PFMA);
- \*The Public Service Act 1994 (Act103 of 1994);

Source: Limpopo EPRE Full document 2014.

The national government has the highest taxation power. In fact, it is responsible for collecting income taxes, value-added tax, fuel levies and custom and excise duties. As for provincial governments, they have the lowest taxation power as their tax revenues comprise mainly license for vehicles and gambling. Local governments have a higher revenue raising power than provinces through the collection of property rates (1% GDP), user charges, fees. (National treasury,2020).

Once collected, the national raised revenue is then redistributed between the three spheres by considering their needs in terms of public services. In fact, Provinces and local governments are responsible of the Provision of basic services: Education, health, social development, housing, roads, electricity, water, municipal infrastructure. The specific services provided by municipalities are free basic water, electricity, sanitation, and waste management services to poor households. (National treasury,2020).

The division of the revenue is mentioned in the South African constitution, section 214 (1): there is an obligation of an annually definition of the revenue Act which enables an equitable division of the nationally raised revenue between the national, provincial, and local government. Provinces and local governments are autonomous in the management of their total revenue in adequacy with

the national development goals. (National Treasury,2020). The share of revenue distributed to provinces and local governments is called national transfers and is composed of an equitable share and conditional grants.

The Provincial Equity Share (PES) is stipulated in the section 227 of the constitution of South Africa: “Local government and each province is a) entitled to an equitable share of revenue raised nationally to enable it to provide basic services and perform the functions allocated to it”. (Roos, E.L. ,2019). The PES is such funds are allocated by taking into account the national interest, the needs at the national/provincial/local level, fiscal capacity and efficiency at the provincial and local level, demographic and economic profiles, services (primary health care, welfare, school education) provided. (Mpumalanga Provincial Treasury,2003; Roos, E.L. ,2019). The criteria used to define the PES are grouped together in 5 components: education, health, basic, institutional, poverty, and economic output . (Roos, E.L. 2019).

As for direct conditional grants to provinces, in 2020, they were constituted of comprehensive agricultural support programme ; Ilima/Letsema projects; Community library services; Education infrastructure; National school nutrition programme ; HIV, TB, Malaria and community outreach ; Health facility revitalization ; Statutory human resources, Training and development ; National tertiary services ; Human settlements development; Informal settlements upgrading partnership; Provincial roads maintenance; Public transport operations; Other direct grants. (National treasury,2020).

In terms of the evolution of the division of the nationally raised revenue, the national transfers to provinces did not vary sharply as they were comprised between 42% and almost 44% over the period 2002-2017. For local governments, it dramatically increased between 2002 and 2007 before stagnating around 8-9%. (See table 9, below).

As for the PES for each province, it did not vary much either as the provincial national transfers share. (See table 10, below). For example, for the province Eastern Cap, the predicted share was roughly equal to 15% from 2009 to 2012 and then roughly to 14% from 2013 to 2017. The same trend is observed when the PES per province is disaggregated into its five components except for the education and institution components for the years 2009-2010. In fact, the share of education decreased respectively from 51% in 2009 to 48% in 2010 and the share of the institution component increased from 1% in 2009 to 5% in 2010. (See table 11, below).

Table 9: Evolution of the division of the nationally raised revenue between the national-provincial and local government 2002-2017:

	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
National	52.8%	52.5%	52.6%	52.6%	50.3%	49.1%
Provincial	43.9%	43.4%	43.1%	42.8%	43.3%	43.0%
ES(% <sub>prov</sub> )				86.36%	83.14%	81.34%
CG(% <sub>prov</sub> )				13.64%	16.86%	18.66%
Local	3.3%	4.1%	4.3%	4.6%	6.3%	7.9%
<b>Year</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
National	49.7%	50.0%	48.1%	47.9	47.9%	47.9%
Provincial	42.4%	42.5%	43.6%	43.7%	43.4%	43.4%
ES	81.75%	80.80%	82.13%	81.40%	81.57%	81.96%
CG	18.25%	19.20%	17.87%	18.60%	18.43%	18.04%
Local	7.8%	7.5%	8.2%	8.4%	8.7%	8.7%
<b>Year</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>		
National	48.2%	48.9%	48.0%	48.0%		
Provincial	43.2%	42.2%	43.2%	43.1%		
ES	81.89%	81.99%	82.08%	82.01%		
CG	18.11%	18.01%	17.92%	17.99%		
Local	8.6%	8.8%	8.9%	8.9		

Source : Author with data from the budget reports of the KZN province 2006 to 2018.

Table 10: Evolution of the provincial equity share (% National revenue raised) =PES Weighted Average

<b>Provinces/ Year forecasted</b>	<b>2009</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
Eastern Cape	15.2%	15.1%	15%	14.2%	14%	14%	14%	14%
Free State	6%	6%	5.9%	5.6%	5.6%	5.6%	5.6%	5.6%
Gauteng T	17.4%	17.8%	17.9%	19.4%	19.5%	19.5%	19.7%	19.8%
Kwazulu-Natal	21.5%	21.9%	22%	21.3%	21.3%	21.3%	21.2%	21.1%
Limpopo	12.8%	12.3%	12.5%	11.8%	11.8%	11.8%	11.8%	11.7%
Mpumalanga	8.2%	8.0%	8%	8.2%	8.2%	8.2%	8.2%	8.1%
Northern Cape	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.6%	2.7%
North West	7.1%	6.8%	6.7%	6.9%	6.9%	6.9%	6.9%	6.9%
Western Cape	9.2%	9.4%	9.4%	10.0%	10.0%	10.1%	10.1%	10.1%

Source: Author with data from the budget reports of the KZN province 2005 to 2018.

Table 11: Evolution of the PES by component 2009-2017:

Sector/ Year forecasted	2009	2011	2012	2013	2014	2015	2016	2017
Education	51%	48%	48%	48%	48%	48%	48%	48%
Health	26%	27%	27%	27%	27%	27%	27%	27%
Basic	14%	16%	16%	16%	16%	16%	16%	16%
Poverty	5%	3%	3%	3%	3%	3%	3%	3%
Economic Activity	3%	1%	1%	1%	1%	1%	1%	1%
Institutional	1%	5%	5%	5%	5%	5%	5%	5%

Source: Author with data from the budget reports of the Kwa Zulu Natal province 2005 to 2018.

### *B) Brief presentation of the South African social protection system:*

#### 1) Social protection system:

Access to social protection is a human right as stipulated by the article 27(1)(c) of the South African constitution of 1996: “Everyone has a right to have access to social security including if they are unable to support themselves and their dependents, appropriate social assistance”. (Presidency and other government officials,2014).

The main components of social protection in South Africa are health insurance, pension benefits ,unemployment benefits, maternity benefits, disability benefits, child benefits, family support work ,road injuries benefits, work programs, and social relief.(Presidency and other government officials,2014;National Treasury,2011).These benefits are provided through contributory schemes and non-contributory schemes(social grants<sup>9</sup>).(National Treasury,2011;Presidency and other government officials,2014; SSA&ISSA, Africa 2017; UNICEF SA,2018).

Concerning the pension system, the non-contributory scheme (Social assistance) is constituted of old age grants which are accessible for “needy resident citizens and permanent residents in South

<sup>9</sup> Old Age Grant (OAG), Child Support Grant (CSG), Foster Care Grant (FCG), Care Dependency Grant (CDG), Disability Grant (DG), War Veteran Grant (WVG), Grant-in-Aid (GIA). (ODI,2011)

Africa and refugees residing in South Africa” aged 60 years old and more.<sup>10</sup>(SSA et al. 2017). This non- contributory pension system is financed by the government. As for the contributory scheme (social insurance), they are accessible for “employed persons working more than twenty-four hours a month, including household and seasonal workers”.<sup>11</sup>The contributory scheme is financed by employees, employers, self-employed persons, and the government. (Presidency and other government officials,2014; SSA et al. 2017). Persons working in the public sector have a specific pension system.

As for the health insurance system, there is a universal scheme (medical benefits) for all South African citizens; a social insurance scheme (cash sickness, maternity, adoption benefits) as in the pension system, an employer liability scheme for “employed persons working more than 24 hours a month including civil servants, trainees, household and seasonal workers and foreigners working under a contract” and a social assistance scheme for low income citizens. (SSA et al., 2017).

For the unemployment benefit, it is a contributory system covering “employed persons working more than twenty-four hours a month, including household and seasonal workers”<sup>3</sup>. Contributions are managed by the Unemployment Insurance Fund. As for the pension system, civil servants have a specific pension system. (SSA et al., 2017).

The institution responsible for the supervision of public social protection is the South African Social Security Agency (SASSA). There are several legislative and other mandates that stipulate its legitimacy and define its role:

- the Constitution of the Republic of South Africa, 1996 (Act 108 of 1996);
- the South African social security agency act, (Sassa act 9 of 2004): “The SASSA Act (2004) provides for the establishment of SASSA with the objective of ensuring effective and efficient administration, management and payment of social assistance; providing for the prospective administration and payment of social security, including provision of services related thereto; and providing for matters connected therewith”;
- the Social assistance act (act 13 of 2004, as amended);
- the White paper on social development (1998).

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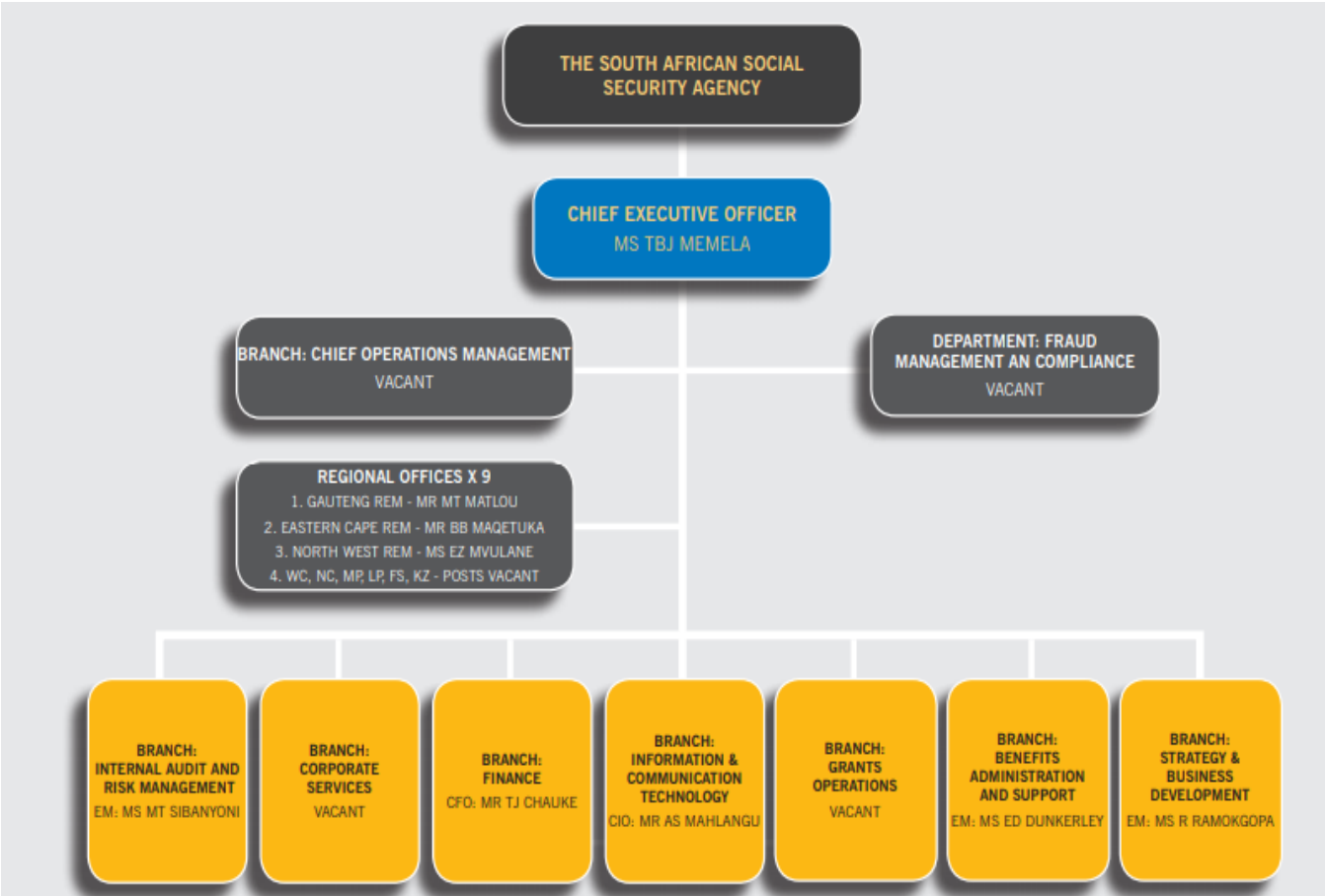
<sup>10</sup> Persons taken in care by state facilities are not beneficiary of OAG.

<sup>11</sup> Civil servants, trainees, foreigners working under a grant, person receiving a work injury or occupational disease benefits” are not beneficiaries of the social insurance scheme for old age.

The graph 7 below shows the administrative organization of the South African public social protection system.

In terms of coverage, South Africa has globally a coverage above the average of the African region that is 49.3% compared to 16.7% in Africa. The same goes for children benefits coverage (76.6% compared to 11.4% in Africa); Old age benefits coverage (81.4% versus 25.1%); Disability benefits coverage (66.5% versus 8.5%). However, in terms of maternity benefits coverage, South Africa is still behind the average coverage in Africa (14.9% versus 7.6%); as well as for the health care coverage (16.2% versus 23.7%); (ILO | social protection platform, 2021).

Graph 7: Administrative organization chart of the South African public social protection system.



Source: 2019 | 2020 Annual Report SASSA.p20/136.

## 2. The Public social protection financing:

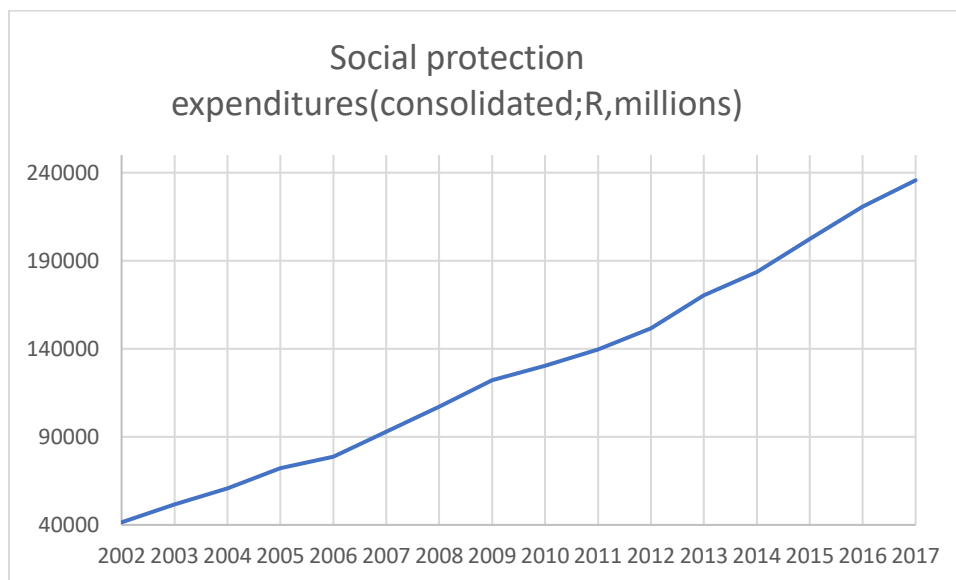
The consolidated government budget is allocated to social services, general public services, to economic affairs, to Defense, to Public order and safety and to contingency reserves. (National Treasury,2011).

The social services consolidated budget comprises the social protection consolidated budget in addition to the education, health and housing and amenities budgets.

The public social protection budget is managed at the national level in the national social development department and the provincial level in the provincial social development department. (National Treasury,2011). It finances the social grants (old age grant, child support grant, disability grant, other grants), the provincial welfare services, the policy oversight and grants and benefits administration. (National Treasury,2011).

Over the period 2002-2017, the consolidated government social protection expenditures increased steadily from 41 466.6 million of rands in 2002 to 235 702.1 million of rands in 2017.

Graph 8: Social protection expenditures-consolidated government expenditures 2002-2017.



Source: Author with data from the National Treasury Budget Review reports.



### III) Econometric analysis :

#### *A) Data:*

To carry out this study, we collected information from different sources (see table 12, below). We chose for each year, the most recent value of the variables “Social protection expenditures”, “tax revenues” and “national transfers”. The three variables were in nominal value as well as the GDP variable and they were transformed in real value using the CPI database.

For the provinces Free State and Northern Cape, there seemed to be some inconsistency<sup>12</sup> in the reporting of data for the years 2003(NC,FS), 2004(FS); the value was not the same in the oldest reports and the most recent one mentioning these years so we reported the observations (FS,2002,2003),(NC,2002) as missing values to harmonize the observations of the following years and to avoid having biased effect on the results of the econometric analysis.

NB: The variable mining value added by the province in % is equal to the mining value added by the province in volume divided by the total mining volume of South Africa.

We used a proxy of the variable rural population as we didn't enough find information on it at the provincial level in the different reports related to the South African population and published on the Statistics South Africa website. As the rural population in Africa tends to use very often wood for cooking rather than electricity, we chose a proxy of the rural population by dividing the number of households using wood for cooking by the number of households using electricity for cooking in each province.

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<sup>12</sup> There was a decrease in the total budget which affected only the social protection expenditures.

Table 12: Summary of the sources of data used by the study.

<b>Variables</b>	<b>Sources of data</b>
Real Social protection expenditures Real Tax revenues Real National transfers Provincial Equity Share Conditional Grants	>Provincial government budget reports (Budget Statement, budget overview, of the nine provinces published on the National treasury website) >CPI History document: CPI headline index numbers (Dec2016=100) published on the Statistics South Africa website.
Real GDP Mining and quarrying, value added by province (%)	>GDP published on the Statistics South Africa website -Quarterly and regional table 1/2019 -Quarterly and regional table 1-38 Nov2017 >CPI History document: CPI headline index numbers (Dec2016=100) published on the Statistics South Africa website.
Proportion of the population aged 65 years and more	Provincial projection by sex and age 2002-2019 published on the Statistics South Africa website.
Proxy of the proportion of the rural population (ratio)	Main source of energy for cooking (Wood versus electricity) Source: General Households Survey (GHS) reports 2002-2017 published on the Statistics South Africa website.

Source: Author.

### *B) Descriptive analysis:*

On average, the real social protection expenditures were equal to 1.43 e(9) with the minimum value registered in Northern Cape in 2003 and the maximum value in Gauteng in 2017(See table 13, below). There is a high dispersion of the observations from the mean as the standard deviation is very high (8.35 e(08)). Nevertheless, the trend of this variable is the same for all provinces despite not registering the same volume. (See graph 9, below).

On average, the real tax revenues were equal to 1.06 e(9) with the minimum value registered in Northern Cape in 2003 (See table 13, below). As for social protection expenditures, there is a high dispersion of the observations from the mean as the standard deviation is very high (1.5

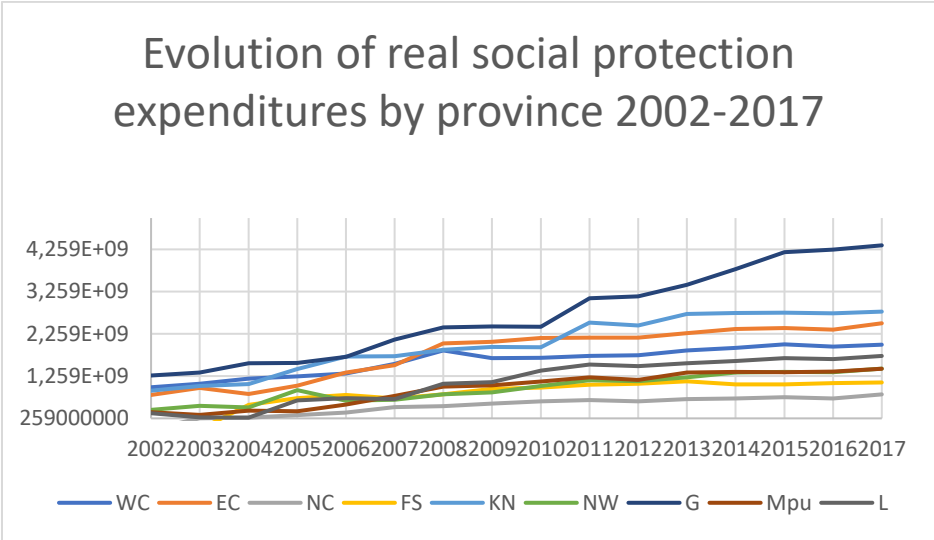
e(08)). Contrary to the trend of the social protection expenditures, the trend of tax revenues is not the same for all provinces.

Table 13: Summary of descriptive statistics.

<b>Variables</b>	<b>Observations</b>	<b>Mean</b>	<b>Std.dev</b>	<b>Minimum</b>	<b>Maximum</b>
Real Social protection expenditures	141	1.43 e+09	8.35 e+08	2.59e+08	4.35e+09
Real tax revenues	144	1.06e+09	1.05 e+09	1.21 e+08	4.35 e+09
Real national transfers	144	4.48 e+10	2.58 e+10	5.89e+09	1.07e+11
Mining value added by province (%)	144	11.11	9.27	0.15	27.65
Real GDP	144	4.05 e+11	3.43e+11	5.50e+10	1.51e+12
Population aged 65 years old and more	144	5.4	0.80	3.99	7.66
Proxy of the rural population	144	29.94	41.45	0.45	205.36

Source: Author with the data from different sources mentioned in table 12.

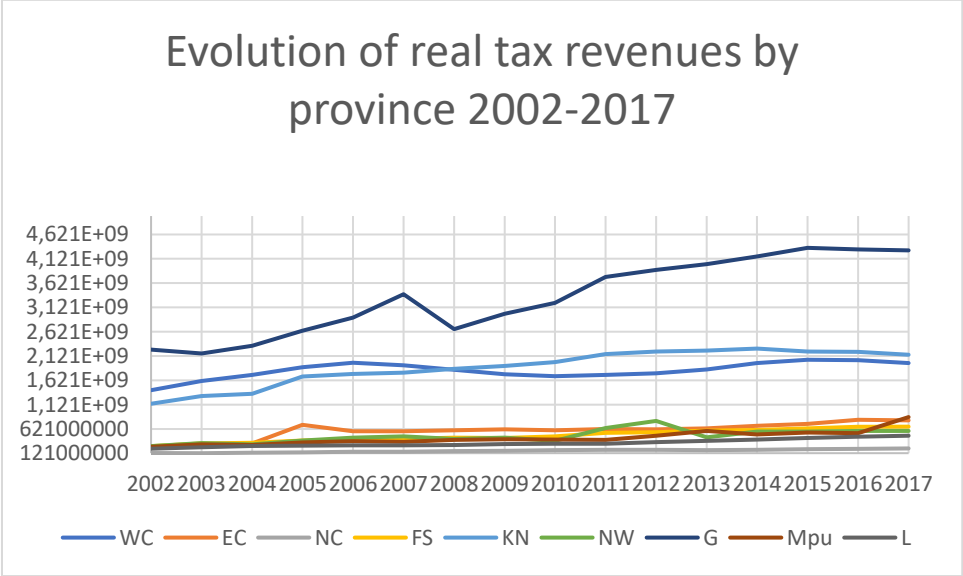
Graph 9: Evolution of real social protection expenditures by province 2002-2017.



Source: Author with the data from different sources mentioned in table 12.

The province WC has the highest values of tax revenues. (See graph 10, below).

Graph 10: Evolution of real tax revenues by province 2002-2017.



Source: Author with the data from different sources mentioned in table 12.

### *C) Econometric model:*

The study used the same econometric model as Ndongozi-Nsabimana (2020) with provinces replacing the countries and the period of study becoming 2002 to 2017. There have been also changes in the previous variables used by Ndongozi-Nsabimana (2020).

$$GSProv(i,t) = a_i + TR(i,t) + \sum X(i,t) + u(i,t) + e(i,t)$$

With  $GSProv(i, t)$  = the level of public expenditures on social protection for Province  $i$  in year  $t$ ;  $a_i$  = the constant,  $TR(i, t)$  = Level of tax revenues % GDP or real tax revenues per capita;  $\sum X(i, t)$  = The set of control variables, namely aggregated /disaggregated national transfers to provinces %GDP or real national transfers to provinces per capita, the real GDP per capita; the share of the population aged 65 and over in the total population; the rural population share in the total population proxied by the ratio of households using woods versus those using electricity as the main source of energy for cooking, the mining and quarrying valued added by province  $i$ ;  $u(i,t)$  the fixed effect country and  $e(i,t)$  the term of the error.

We expect tax revenues to have a positive impact on social protection expenditures. An increase in tax revenues is likely to lead to more available resources that could be allocated to the financing of social protection. The same goes for national transfers to provinces. We expect real GDP to also have a positive effect as higher level of GDP usually results in higher level of individual income. Consequently, households will be more able to contribute for their social protection coverage. A higher level of GDP can also enable the government to generate more resources that could benefit the social protection system.

As for the proportion of the population aged 65 years old and more, we expect the variable to have a positive impact on social protection expenditures as older persons tend to need more healthcare. They also need to have access to an income replacing their earnings as they reach the age of retirement. Hence, they need to be more covered by the health insurance, the pension scheme resulting in more social protection expenditures.

Concerning the proxy of the rural population, the more there are households using wood than those using electricity for cooking, the more the population is rural, and this can have a negative impact on social protection expenditures as resources are usually scarce in rural areas hence they are less likely to contribute to social protection schemes (public or private). There is also a prevalence of informal workers who are less likely to contribute to social protection schemes.

Finally, for the mining value added by the province, a positive effect on the dependent variable is expected. The more a province is participating in a mining activity, the more it will generate resources that could be allocated to the financing of social protection.

*D) Regressions:*

1. Regression at the aggregated level of provincial national transfers:

Regressions were realized with the fixed effects model and the random effects model (see table 14 below) and then the Hausman test model was performed (see table 15, below). The probability associated with the Hausman statistic test was equal to zero so the null hypothesis according to which difference in coefficients was not systematic, was accepted. Thus, the random effect analysis was used for the remaining part of the econometric analysis.

Table 14: Regression of the fixed effects model and the random effects model.

<b>Variables</b>	<b>Fixed effects Model</b>	<b>Random effects Model</b>
Provincial Tax revenues(%GDP)	0.05	-0.005
Provincial National transfers (%GDP)	0.03***	0.03***
Real GDP per capita (thousand rands)	0.002***	0.002***
Population 65 years old and above	0.01	0.02
Proxy Rural Population(ratio)	-0.002***	-0.002***
Mining valued added by province (%)	0.001	0.001
Constant	-0.18	-0.20*
Number of observations (group)	141(9)	141(9)
R <sup>2</sup> Within	0.81	0,80

Source: Author with the data from different sources mentioned in table 12

NB:\*\*\*significantly different from zero at 1%.\* significantly different from zero at 10%.

Table 15: Haussman test.

Null hypothesis	Ho: Difference in coefficients not systematic
Statistic Test	Chi2(6) =2.62
Pvalue	0.8553

Source: Author with data from different sources mentioned in table 12

## 2. Interpretation of results:

The pvalue associated with the Wald Chi 2 statistic is equal to zero. Globally, the model fits with the observed data.  $R^2$  Within is equal to 0.80 which means that 80% of the variability of social protection expenditures is explained by the model.

The coefficient associated with tax revenues in the random effects model is negative and not significantly different from zero. This may be explained by the low level of provincial tax revenues and a low efficiency in the allocation and management of the collected tax revenues. As for the national transfers variable, the coefficient is positive and significantly different from zero. For an increase of 1% in national transfers, there are 0.03 points of percentage in social protection expenditures other things being equal. The expected effect of national transfers is observed with this result.

The expected effect of the remaining control variables is also realized, and the coefficients associated with the variables real GDP per capita, and proxy of rural population are significantly different from zero. For an increase of 1% in real GDP per capita (in thousand rands), there are 0.002 percentage points increase in social protection expenditures. For an increase of 1% in the number of households using wood relatively to those using electricity for cooking, there is a decrease of 0.002 percentage points of social protection expenditures.

### 3. Possible reverse causality:

As mentioned in Ndongezi-Nsabimana (2020), there is a potential reverse causality explained by the fact that social protection expenditures can also influence tax revenues. For example, if there is an increase in public social protection expenditures, this can result in an increase of overall public expenditures and can have for consequence higher taxes and thus higher tax revenues. This problem can be solved by using lagged variable of the tax revenues.

We found the same effect for the tax revenues delayed at t-1, t-2 as in the random effects model without lagged variables. The coefficient associated with the tax revenues variable delayed at t-3 became positive and significantly different from zero. For an increase of 1% in tax revenues, there are 0.29 points of percentage in social protection expenditures other things being equal. Concerning the national transfers variable, there was no change in comparison to the model without lagged variables. As for the GDP variable, the same results were observed for the models with the tax revenues variable delayed at t-1, t-2.

For the third model with the tax revenues variable delayed at t-3, the coefficient associated with the GDP variable, became not significantly different from zero. For the coefficient associated with the population aged 65 years old and above variable, it became significantly different from zero and its value increased. For an increase of 1% in the proportion of the population aged 65 and above, there are 0.04 (0.05) points of percentage in social protection expenditures with the tax revenues variable delayed at t-1 and t-2 (t-3) other things being equal.

No changes were observed for the proxy of the rural population. Finally, the mining value added by each province remained not significantly different of zero.



Table 16: Regression with lagged variables.

<b>Variables</b>	<b>Random effects Model t-1</b>	<b>Random effects Model t-2</b>	<b>Random effects Model t-3</b>
Provincial tax revenues t-1(%GDP)	-0.20		
Provincial tax revenues t-2(%GDP)		-0.008	
Provincial tax revenues t-3(%GDP)			0.29**
Provincial national transfers (%GDP)	0.03***	0.03***	0.03***
Real GDP per capita (thousand Rands)	0.002***	0.002**	0.001
Population aged 65 and more (%/total population)	0.04**	0.04**	0.05***
Proxy Rural Population(ratio)	-0.002***	-0.002**	-0.002***
Mining valued added by province (%)	-0.00007	0.001	-0.002
Constant	-0.23**	-0.29***	-0.37***
Number of observations (group)	134(9)	126(9)	117(9)
R <sup>2</sup> Within	0.79	0.78	0.72

Source: Author with data from different sources mentioned in table12

NB: \*\*\*: Significantly different from zero at 1%; \*\*: significantly different from zero at 5%.

#### 4. Results obtained with tax revenues and national transfers converted in unit per capita:

This new regression with tax revenues and national transfers being transformed in unit per capita led to more or less similar results. For the tax revenues per capita variable, the same effect was observed for  $t$ ,  $t-1$  and  $t-2$  and it was significant at  $t-1$ . For an increase of 1% in real tax revenues per capita (in thousand rands) delayed at  $t-1$ , there are 0.50 percentage points decrease in social protection expenditures other things being equal. At  $t-3$ , the coefficient became positive but not significantly different from zero.

As for the national transfers per capita variable, it has the same effect though the amplitude is less important. For an increase of 1% in real national transfers per capita (in thousand rands) at  $t$ ,  $t-1$ ,  $t-2$ ,  $t-3$ , there are respectively 0.009/0.009/0.009/0.007 percentage points increase in social protection expenditures other things being equal.

For the real GDP per capita variable, it became not significantly different from zero. As for the remaining control variables (population aged 65 and above, proxy of rural population, mining value added by each province), they kept the same effect and the first two remained significantly different from zero. For an increase of 1% in the proportion of the population aged 65 years old and above at  $t$ ,  $t-1$ ,  $t-2$ ,  $t-3$ , there is respectively 0.14/0.14/0.14/0.13 percentage points increase in social protection expenditures other things being equal. For an increase of 1% in the proxy of rural population at  $t$ ,  $t-1$ ,  $t-2$ ,  $t-3$ , there is respectively 0.002/0.001/0.002/0.001 percentage points decrease in social protection expenditures other things being equal.

Table 17: Results obtained with tax revenues and national transfers converted in unit per capita.

<b>Variables</b>	<b>Random effects Model t</b>	<b>Random effects Model t-1</b>	<b>Random effects Model t-2</b>	<b>Random effects Model t-3</b>
Provincial tax revenues per capita	-0.29			
Provincial tax revenues per capita t-1		-0.50**		
Provincial tax revenues per capita t-2			-0.26	
Provincial tax revenues per capita t-3				0.18
Provincial national transfers per capita	0.009***	0.009***	0.009***	0.007***
Real GDP per capita	0.0002	0.0008	-0.0002	-0.0002
Population aged 65 and more (% total population)	0.14***	0.14***	0.14***	0.13***
Proxy Rural Population(ratio)	-0.002***	-0.002***	-0.001***	-0.001***
Mining valued added by province (%)	0.002	0.001	0.002	0.003
Constant	-0.37***	-0.37***	-0.34**	-0.25
Number of observations (group)	141(9)	134(9)	126(9)	117(9)
R <sup>2</sup> Within	0.65	0.61	0.57	0.45

Source: Author with data from different sources mentioned in table 12.

NB: \*: Significantly different from zero at 1%; \*\*: significantly different from zero at 5%.

## 5. Regression at the disaggregated level of provincial national transfers:

In the different regressions above, national transfers have a positive and significant effect on social protections expenditures all the time. And in the background section, it is highlighted that national transfers are a large proportion of provincial revenues. As they comprise Provincial Equity Share (PES) and conditional grants, we undertook a new econometrical analysis at a disaggregated level of national transfers to see which components has more effect on the social protection financing. The results of the new regression (See Table 18, below) shows that the component PES has a significant and positive impact on social protection expenditures while the conditional grant component effect is not significant. For an increase of 1% in provincial equity share, there are 0.04 points of percentage in social protection expenditures other things being equal.

As in the regression at the aggregated level, lagged variables were used at the disaggregated level for the variable PES to deal with potential reverse causality.

Table 18: Regression at the disaggregated level of provincial national transfers to provinces.

Variables (y=SP %GDP)	NT	PES	PCG
Provincial Tax revenues %GDP	-0.005	-0.006	-0.09
Provincial National transfers % GDP	0.03***		
Provincial Equity Share % GDP		<b>0.04***</b>	
Provincial Conditional Grant %GDP			0.008
Real GDP per capita (Thousand rands)	0.002***	0.003***	0.003***
Population aged 65 and more	0.02	0.04**	0.11***
Proxy of the Rural Population (ratio)	-0.002***	-0.002***	-0.002***
Mining valued added by province (%)	0.001	0.002	0.0008
Constant	-0.2*	-0.4***	-0.32***
Number of observations (group)	141(9)	141(9)	141(9)
R <sup>2</sup> Within	0.80	0.79	0.67

Source: Author with data from different sources mentioned in table 12.

NB: \*\*\*: Significantly different from zero at 1%; \*\*: significantly different from zero at 5%; \*: significantly different from zero at 10%.

Table 19: Regression at the disaggregated level of provincial national transfers with lagged variables.

Variables (y=SP %GDP)	t-1	t-2	t-3
Provincial Tax revenues %GDP	-0.04	0.005	-0.18
Provincial Equity Share % GDP t-1	<b>0.02***</b>		
Provincial Equity Share % GDP t-2		<b>0.02***</b>	
Provincial Equity Share %GDP t-3			-0.002
Real GDP per capita (Thousand rands)	0.001	0.009	-0.001
Population aged 65 and more	0.12***	0.12***	0.15***
Proxy of the Rural Population(ratio)	-0.002***	-0.002***	-0.001**
Mining valued added by province (%)	0.002	0.002	0.002
Constant	-0.46*	-0.42*	-0.27
Number of observations (group)	134(9)	126(9)	117(9)
R <sup>2</sup> Within	0.65	0.58	0.38

Source: Author with data from different sources mentioned in table 12

NB: \*\*\*: Significantly different from zero at 1%; \*\*: significantly different from zero at 5%;\*: significantly different from zero at 10%.

The table 19 above summarizes the findings. The coefficient associated with the variable PES remained positive and significantly different from zero at t-1 and t-2. For an increase of 1% in provincial equity share, there are 0.02 points of percentage in social protection expenditures at t-1, t-2 other things being equal. At t-3, the coefficient became not significantly different from zero.

6. Regression at the disaggregated level of provincial national transfers per capita with lagged variables:

Table 20: Regression at the disaggregated level of provincial national transfers per capita with lagged variables.

Variables	Random effects Model t	Random effects Model t-1	Random effects Model t-2	Random effects Model t-3
Provincial tax revenues per capita	0.04	-0.23	-0.23	
Provincial Equity share per capita	<b>0.07*</b>			
Provincial Equity share per capita t-1		<b>0.05*</b>		
Provincial Equity share per capita t-2			<b>0.05*</b>	
Provincial Equity share per capita t-3				<b>0.03*</b>
Real GDP per capita	-0.002*	- 0.001	0.001	-0.0008
Population aged 65 and more (% total population)	0.02	0.07*	0.07*	0.08*
Proxy Rural Population(ratio)	-0.001*	-0.001*	-0.001*	-0.0006
Mining valued added by province (%)	-0.0004	-0.002	-0.002	-0.002
Constant	0.05	-0.11	-0.04	-0.06
Number of observations (group)	141(9)	134(9)	126(9)	117(9)
R <sup>2</sup> Within	0.81	0.72	0.65	0.49

Source: Author with data from different sources mentioned in table 12.

NB: \*: Significantly different from zero at 1%; \*\*: significantly different from zero at 5%;\*\*\*: significantly different from zero at 10%.

By replacing tax revenues and PES variables by their equivalent in per capita (see table 20, above), the coefficient associated with the PES variable remained significantly different from zero and positive at t, t-1, t-2, t-3. For an increase of 1% in the provincial Equity share at t, t-1, t-2, t-3, there are respectively 0.07/0.05/0.05/0.03 percentage points decrease in social protection expenditures other things being equal.

#### *E) Discussion:*

Contrary to Ndongezi-Nsabimana (2020) findings, the study did not find in most of the regressions carried out, any significant effect of tax revenues on social protection financing proxied by social protection expenditures. Due to the lack of disaggregated data at the provincial level of tax revenues in “resource” and “non resource” tax revenues, the disaggregated analysis of the effect of tax revenues on social protection expenditures was not done unlike in Ndongezi-Nsabimana (2020) study. Nevertheless, national transfers to provinces that had a positive and significant effect on the variable of interest were disaggregated in provincial equity share and conditional grants in the second part of the econometric analysis. Also, in this study, national transfers which replaced ODA has not the same effect as these latter and this time, its coefficient is significantly different from zero contrary to ODA coefficient. National transfers to provinces may be better managed and better allocated than ODA.

Furthermore, the mining value added by province variable which was introduced in this analysis helped understand if there was any impact of the mining activity on social protection expenditures. In this new study, the GDP (real) was added as part of the control variables and had a positive and significant effect on social protection expenditures. Concerning the rural population variable, due to lack of data on the provincial level, it was proxied by the number of households using wood versus those using electricity and it had the same effect as in Ndongezi-Nsabimana (2020) study. As for the population aged 65 years old and more variable, it had the same effect as in Ndongezi-Nsabimana (2020) study.



## **Conclusion :**

This study was undertaken following the results obtained by Ndongezi-Nsabimana (2020) to examine the causal relationship between tax revenues and public social protection financing proxied by public social protection expenditures in South Africa at the provincial level over the period 2002-2017. The aim was to see if the results observed at the macro level were the same for one specific country especially at the provincial level. Using a panel analysis, the study did not find a significant effect of tax revenues on public social protection expenditures before and after introducing lagged variables to deal with potential reverse causality. But national transfers to provinces turned out to have a higher and significant effect on the variable of interest than tax revenues. These new findings may be explained by the fact that the level of provincial tax revenues is low contrary to national transfers to provinces. Therefore, a higher amount of provincial tax revenues should be raised to contribute more to the sustainable financing of social protection at the provincial level.

The econometric analysis also showed the impact of most of the control variables. Thus, governments are also encouraged to achieve strong economic growth, higher proportion of the urban population, better management of resources generated by the mining activity.

As mentioned in the data and discussion sections, due to lack of data on some variables, we could not use the same variables as in the Ndongezi-Nsabimana (2020) study, but we found variables that can be considered as their proxies when it was possible. There was inconsistency in some values of the dependent variable for some provinces, so we used missing values to avoid bias in the results.

## Chapter 3: Social protection and Informal Sector: Case Study of Uruguay.

*Abstract: Social protection plays an important role in the achievement of development. Hence, it is highlighted in the Sustainable Development Goals. However currently only 49.5% of the world's population has access to some form of social protection. (ILO, 2014). One possible explanation for the low coverage of social protection in developing countries is a strong presence of the informal sector.*

*The purpose of this chapter is to see if in the presence of a more inclusive policy of informal workers in the social protection “monotributo” in Uruguay, there is still a gap coverage between them and formal workers. It used the 2013 Uruguayan survey “Encuesta Longitudinal de Protección Social, Ola 1”. Using a logistic model analysis, we found that being a worker with own account possessing or not property or capital decreases the probability of being beneficiary of pension, health and accident insurance, unemployment, maternity coverage. It is also the case for being an independent worker for the pension, health and accident insurance and unemployment benefits.*

*Key words: Social protection, Informal sector, Uruguay, Sustainable Development Goals.*

Esta investigación utilizó información de la Encuesta Longitudinal de Protección Social (ELPS). El autor agradece al Banco de Previsión Social, propietario intelectual de la Encuesta, la autorización para usar la Base de Datos Innominada. Todos los resultados del estudio son de responsabilidad del autor y en nada comprometen a dicho organismo.

Muchísimas gracias a todo el equipo de ELPS por ser tan amable conmigo y por haberme dado acceso a la encuesta ELPS para mi estudio.

## Introduction:

As already seen in chapters one and two, many efforts remain to achieve universal social protection by 2030. There are still some bottlenecks to overcome such as a strong presence of the informal sector to the detriment of the formal sector. (Canagarajah et al., 2001; Maes, 2003; Pelissery et al., 2007; Chen, 2008; Mathauer et al., 2008; Sojo et al., 2015). Indeed, it varies between 20% and over 80% in non-agricultural employment in developing countries<sup>13</sup>. In 2011, Latin America registered globally an informality rate of 47.7% which is huge. This rate was even higher in some countries as it is the case of Honduras (70,7%), Peru (68.8%), Paraguay (65.9%). Uruguay, the country studied in this chapter, registered the lowest value, 25,5%. (Cetrangolo et al., 2014).

Informal sector can be defined as “all economic activities that remain outside the official framework” (Canagarajah et al., 2001; Pellissery et al, 2007; Mathauer et al., 2008). It is usually characterized by a lack of regulation and written contracts, insecure employment, low income, weak access to formal social protection systems (contributory pension systems, health insurance, unemployment insurance, disability benefits). (Canagarajah et al., 2001; Maes, 2003; Pelissery et al., 2007; Mathauer et al., 2008). Hence, a low coverage in social protection for developing countries as they register the highest levels of informal workers.

There are main categories of informal workers that can slightly differ according to authors treating the informal sector issue. For example, ILO<sup>14</sup> defines informal sector workers as « persons who in their main or secondary jobs were: Own-account workers, employers and members of producers’ cooperatives employed in their own informal sector enterprises; Own-account workers engaged in the production of goods exclusively for own final use by their household (e.g. subsistence farming or do-it-yourself construction of own dwellings); Contributing family workers, irrespective of whether they work in formal or informal sector enterprises; Employees holding informal jobs, whether employed by formal or informal sector enterprises, or as paid domestic workers by households”.

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[https://www.ilo.org/ilostat/faces/oracle/webcenter/portalapp/pagehierarchy/Page33.jspx?locale=EN&MBI\\_ID=540&\\_adf.ctrl-state=bet6wbagn\\_4&\\_afLoop=1367674393530154&\\_afWindowMode=0&\\_afWindowId=bet6wbagn\\_1#!%40%40%3F\\_afWindowId%3Dbet6wbagn\\_1%26locale%3DEN%26\\_afLoop%3D1367674393530154%26MBI\\_ID%3D540%26\\_afWindowMode%3D0%26\\_adf.ctrl-state%3D6absvekp0\\_4](https://www.ilo.org/ilostat/faces/oracle/webcenter/portalapp/pagehierarchy/Page33.jspx?locale=EN&MBI_ID=540&_adf.ctrl-state=bet6wbagn_4&_afLoop=1367674393530154&_afWindowMode=0&_afWindowId=bet6wbagn_1#!%40%40%3F_afWindowId%3Dbet6wbagn_1%26locale%3DEN%26_afLoop%3D1367674393530154%26MBI_ID%3D540%26_afWindowMode%3D0%26_adf.ctrl-state%3D6absvekp0_4)

<sup>14</sup> <https://ilostat.ilo.org/resources/methods/description-informality/>

Maes (2003) highlighted the existence of 7 criteria mentioned in the ILO Kenya report 1972 which are: “small scale of operation, unregulated and competitive markets, family ownership of resources, skills acquired outside the formal school system, labour intensive and adapted technology, ease of entry and reliance on indigenous resources”. She also indicated the reformulation of the Seven criteria by Canagarajah and Sethuraman (2001): “employment of no more than ten persons, no application of legal and administrative regulations, employment of family members, less than six years of schooling for workers, semi permanent character of the activity, no fixed working hours in a day etc.”

Although, there are more and more measures to include informal sector workers in the social protection system, such as monotaxes for the most part in Latin American countries, more efforts need to be done to achieve universal coverage in social protection.

This chapter aims to examine the link between working in the informal sector and the coverage rate in social protection. We want to see if in the presence of a more inclusive policy of informal workers in the social protection “monotributo” in Uruguay, there is still a gap coverage between them and formal workers.

The chapter comprises a microeconomic study using Uruguay data from the "Encuesta Longitudinal de Protección Social, Ola 1" survey conducted by " Banco de Previsión Social" in 2013.

Uruguay was chosen for the case study not only for the availability of data but also because it is an interesting country to take into account thanks to an important measure “Monotributo” that was put in place to extend social protection coverage to workers in the informal sector. This study contributes to the literature as it is a micro study that brings more precision on the effect of belonging to the informal sector on whether or not to join a social protection system. It also contributes to the literature through the use of a complete and fairly recent database that allows for a sample and a number of variables important enough for a more rigorous analysis.

This study will enable through the results obtained, to better help decision-making in the policies of universal coverage in social protection for Uruguay but also for the other countries of Latin America and Africa. The study used a logistic model analysis<sup>15</sup> and has selected as the dependent variable the different components of social protection that were considered most relevant. The

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<sup>15</sup> NB: We would have loved to do an experimental study with 2001-year of introduction of the monotributo program- being the year of reference but unfortunately, we didn't find enough information on the year 2001 to undertake it.

explanatory variables include the type of work held, the region of the workplace, level of education, gender, age, relationship to head of household.

Previously, authors like Mathauer et al. (2008) studied factors explaining the demand for social health insurance for informal sector workers in Kenya. Sojo et al. (2015) through their study on the determinants of joining the pension systems of private sector employees for five Latin American countries have examined the issue and found a link between the informal sector and social protection coverage.

The remaining parts of the article is organized as following: II) Background; III) Literature Review; IV) Data; V) Model; Conclusion.

## **II) Background:**

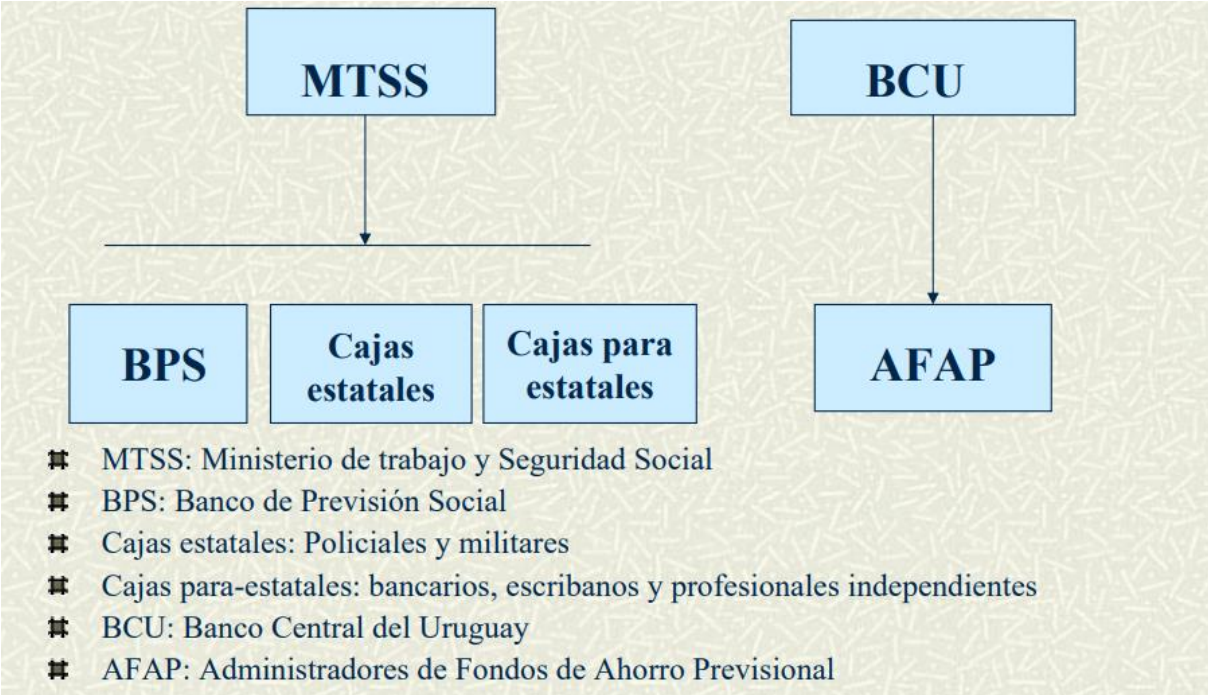
### *A) Brief presentation of the social protection situation in Uruguay:*

Uruguay is considered as one of the pioneers in the development of social protection in Latin America; the most ancient law about social protection was adopted in 1829 to offer pensions for incapacity, widowhood, orphanhood to military and their family members. (BPS,2017). The institution “Banco de Prevision Social” which was created in 1967, has for main purpose the coordination of the public social security services and the organization of the social security system. The Uruguayan social protection comprises contributory social security for salaried persons, universal social security system for Uruguayan residents, social assistance for indigent persons and private social security services. In 2013, the social protection benefits were old age pension, disability benefits, survivors’benefits, sickness and maternity insurance, work injury insurance, unemployment benefits, family allowances. (SSA et al., 2016).

There are different institutions (see graph 10, below) under the Ministry of Work and Social Security (Ministerio de Trabajo y Seguridad Social) that manage the existing social protection schemes: the Social Insurance Bank BPS (Banco Prevision Social), three parastatals banks (cajas paraestatales) for banks, notaries and university graduates; two state banks (cajas estatales) for services of retirement and pensions for military and police. Apart from these public institutions, there are also private institutions such as AFAP (Administradoras de Fondos de Ahorro Previsional) which are administrators of pension saving funds.(Lagomarsino, 2009).The BPS covers persons working in the industry and trade sector, civil servants except militaries and police,

persons working in the rural area, in the construction sector and persons providing house services.(Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social,2019).

Graph 11: Administrative organization of the Uruguayan Social protection system:



Source: Lagomarsino (2009).

Concerning the pension system, there is a mixed scheme as stipulated in the law related to social protection (Ley n°16713 of 1995<sup>16</sup>) and a social assistance scheme. The mixed scheme is constituted of a social insurance component (regimen de jubilacion por solidaridad intergeneracional) and an individual saving account component (regimen de jubilacion por ahorro individual obligatorio). (Registro Nacional de Leyes y Decretos,1995; SSA et al., 2014). It is compulsory for employed and self employed persons with an income superior to 31618 pesos and voluntary for those earning less than 31618 pesos.

The social insurance solely concerns employed and self-employed persons including rural and household workers and it functions such current active workers finance the pension of current

<sup>16</sup> There is also another law n°18395 that brought changes to the law 16713 from 2009 to make the social security system more flexible.

retired persons. (SSA et al., 2014; Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social, 2019; Ley 16713). As for the social assistance scheme, it is accessible for needy elderly and disabled persons and financed by the government. (SSA et al., 2014). The pension benefits are elderly benefits (common retirement, retirement for advanced age), disability benefits, survivors' benefits. (Registro Nacional de Leyes y Decretos, 1995; Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social, 2019).

As for the National Health Insurance system SNS (Seguro Nacional de Salud)<sup>17</sup>, it is a contributory system administrated by the National Health Brand JUNASA (Junta Nacional de Salud). The contributions of the subscribers constitute the Health National Fund FONASA (Fondo Nacional de Salud) and is managed by BPS. (Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social, 2019; SSA et al., 2014). Contributions are compulsory for workers and employers of both the public and private sector, one person company (patrones unipersonales), members of the monotax scheme (monotributista), retired persons, pensioners, their dependents. (Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social, 2019).

Apart from the medical benefits covering the categories mentioned above, cash sickness for all employed persons and cash maternity benefits are provided. Concerning public health services, they are provided for free for all residents in Uruguay and financed by the government (SSA et al., 2014). For military and police and bank employees, there are special schemes. Furthermore, persons working less than 13 days and with a wage inferior to 3248 pesos a month are not eligible for the medical benefits. (SSA et al., 2014).

The Unemployment benefit system was a social assistance system financed by the government in 2013 and covered private sector employees in industry and trade, rural workers, professional athletes, and household workers. For bank employees, there was a special scheme. The eligible beneficiaries had to work during a certain period and earn a certain amount of money before the unemployment period and this criteria varied according to the type of work occupied (regular urban work, irregular urban work, regular rural work, irregular rural work, registered housework, regular housework, irregular housework, daily paid work, monthly paid work). Self-employed workers were not covered by the unemployment benefit system. (SSA et al., 2014). The same goes for public workers, military, and police due to the nature of their work “inamovilidad del cargo”<sup>18</sup> but some

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<sup>17</sup> see graph 12 illustrating the functioning of the Uruguayan health system

<sup>18</sup> ≈irremovability=Someone who cannot be fired unless it is due to a serious mistake. (Wikipedia)

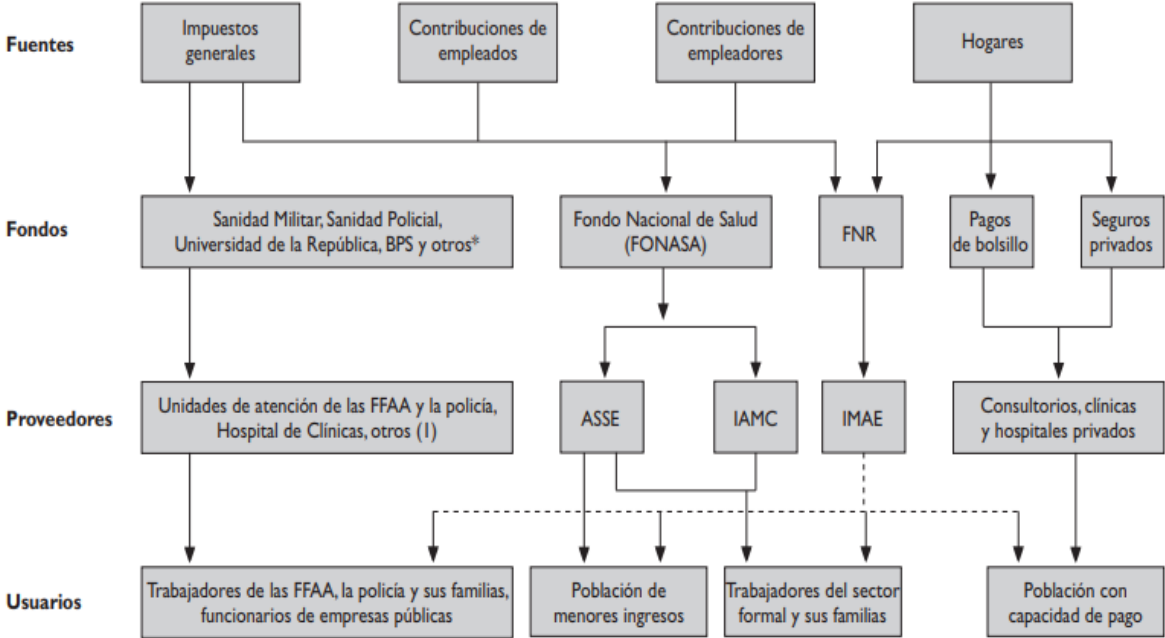


public private institutions are beneficiary of it. (Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social, 2019).

The work injury system is a contributory system financed by the employers and its beneficiaries are employed persons from the private sector, some public workers, apprentices. Self-employed persons, professional athletes and actors are not covered by the scheme. As for the health insurance systems, there is a special system for the military. (SSA et al.,2014; Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social, 2019).

Maternity benefits under the Family allowance schemes are accessible for needy private sector employees, household workers, persons beneficiary of unemployment benefits, newspaper vendors, small product vendors and pensioners. There are special systems for civil servants and self-employed persons are not eligible. (SSA et al., 2014). This scheme is a social assistance system financed by the government. (SSA et al., 2014; Asesoría en Políticas de Seguridad Social & Asesoría General en Seguridad Social,2019).

Graph 12: The health system of Uruguay.



\* Fondos de proveedores que serán objeto de los próximos avances del proceso de reforma  
 BPS: Banco de Previsión Social  
 FNR: Fondo Nacional de Recursos  
 ASSE: Administración de Servicios de Salud del Estado  
 IAMC: Instituciones de Asistencia Médica Colectiva  
 IMAE: Instituto de Medicina Altamente Especializada

Source : Aran D et al.,2013.

The coverage in social protection in Uruguay is one the highest in Latin America and it is superior to the average coverage in the region. In 2010, the health coverage was equal to 97.2% compared to 81.7% in the Latin America region. The old age pension effective coverage was equal to 76.5% in 2011 while the average value in the region was 56.1%. The number of unemployed persons who effectively received the unemployment benefits was 4.6% in 2013. (ILO,2014).

The same trend is observed for the social expenditures allocated to the financing of public social security over the period 1999-2011. Table 21 below shows variation of the value of public social security expenditures between 11% and 14% GDP with an increase for the year 2001-2002 and the year 2007-2008. The highest value (14.3% GDP) was reached for the year 2001-2002.

Table 21: Public social security expenditures (%GDP).

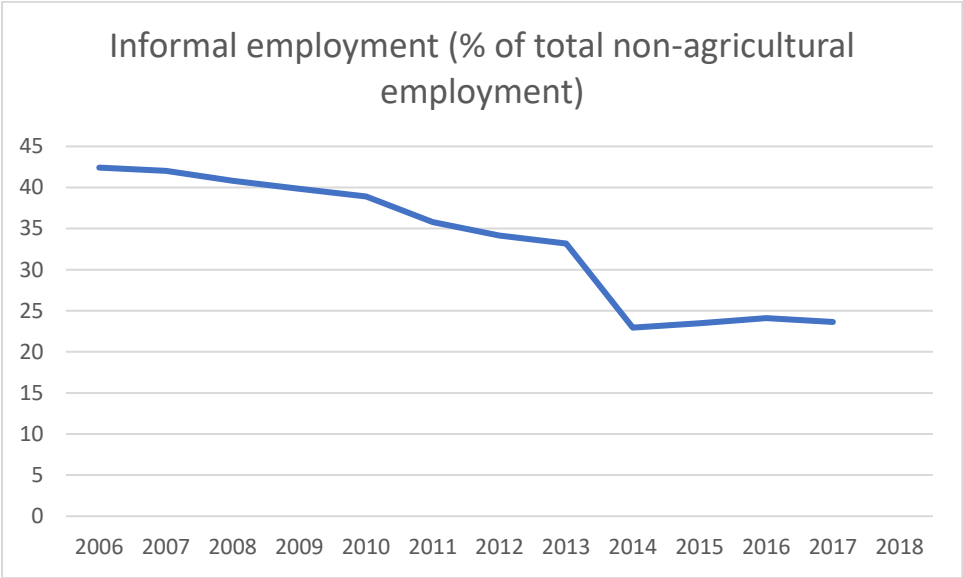
	99-00	01-02	03-04	05-06	07-08	09-10	10-11
Uruguay	13.1	14.3	12.2	11.71	12.3	12.1	11.1
Latina America	4.3	4.6	4.6	4.8	5.0	5.4	5.1

Source: CEPAL, 2013.

### *B) Brief presentation of the informal sector situation in Uruguay:*

Globally, the informal employment rate decreased from 2006 to 2017. In fact in 2006, Uruguay presented an informal employment rate of 42.42 % and in 2017 it was equal to 22.95%. It is worth noticing that there was a sharp drop in the informal employment over the period 2013-2014.

Graph 13: Evolution of informal employment from 2006 to 2018.



Source: Author with data from WDI database.

Concerning the informal sector coverage, a specific program has been implemented since 2001. This system “monotributo is a combined tax and social security contributions collection method for independent workers with limited turnover and with small commercial activities”. (ILO,2014). The criteria of eligibility are : unipersonal enterprise, non family owned enterprise composed of two persons with no employees, family owned enterprises with maximum three partners, enterprises with no salaried workers and a small income.

Furthermore, the number of members of the monotax system has been increasing since its creation especially since reforms were made to make the scheme more inclusive in 2006.The following table illustrates this trend: there is a constant increase of insured members from 2006 to 2013 which registered the highest number of 25319 insured members. (ILO, 2015).

One can wonder regarding this context and the efforts made by Uruguay to extend the coverage of social protection to all, if one can still observe a causal relationship between social protection coverage and informal sector for the year 2013.

Table 22: Number of registered monotax enterprises and insured members, Uruguay, 2006–2013.

	Monotax enterprises	Insured members
2006	2566	2925
2007	6217	6753
2008	10259	11320
2009	13061	14347
2010	15625	17356
2011	19108	21132
2012	21127	23319
2013	22968	25319

Source: Author with information from the ILO Report 2017-2019 and Sotelo (2014).

### **III) Factors explaining the low coverage of informal sector workers:**

As already mentioned in the introduction, the informal sector can be defined as “all economic activities that remain outside the official framework”. (Canagarajah et al., 2001; Pelissery et al., 2007; Mathauer et al., 2008). It is usually characterized by a lack of regulation and written contracts, insecure employment, low income, weak access to formal social protection systems (contributory pension systems, health insurance, unemployment insurance, disability benefits). (Canagarajah et al., 2001; Maes, 2003; Pelissery et al., 2007; Mathauer et al., 2008). It can be explained by the willingness of employers to decrease labor cost by avoiding the payment of social contributions, taxes; the low level of education of workers; the low level of qualified skills of workers; the increase in unemployment; gender inequalities; population that is in great part rural; imperfection of markets, low access to credit, low access to land, etc. (Canagarajah et al., 2001 ; Maes, 2003; Pelissery et al., 2007; Mathauer et al. 2008 ; Sojo et al., 2015).

Informal sector workers can be working on their own account in small size companies. They can be employees, independent workers, seasonal workers, members of informal producers' cooperatives. They also occupy tertiary services jobs. They can be family members working for free. (Canagarajah et al., 2001; Maes, 2003; ILO<sup>19</sup>;Ulrichs, 2016; AdB, 2016).

Due to the characteristics of informal workers, it is often difficult for government officials to track them down in order to collect taxes, social contributions to finance social protection. Hence, they are often excluded from formal social protection systems.

Some studies have tried to highlight the link between the informal sector and the low level of coverage in social protection. Bärnighausen et al. (2007) studied the willingness to pay for social health insurance among informal sector in Wuhan. They collected data through surveys during September 1999 and January 2000 on informal workers aged between 18 and 60 years old with no health insurance in Wuhan. Informal workers in this case were own-account workers, unpaid family workers, employers and employees working in establishments with less than 10%. They used the contingent valuation such the explained variable is equal to the maximum willingness to pay for Basic Health Insurance (BHI) and they chose age, gender, educational attainment, income, migrant, employ (permanent, temporary), HEX (average monthly health expenditure in the past year) as explanatory variables. They found that informal workers with a permanent job have a higher willingness to pay for BHI than informal workers with a temporary job (27.3% in the OLS model; 19.1% for BHI without deductible; 29% for BHI without coinsurance). They found also that income have a positive effect on the willingness to pay for BHI.

Dartanto et al. (2020) also studied the willingness of informal workers to join a health insurance scheme in three areas of Indonesia: Deli Seidang, Pandegleng, Kupang. Data were collected from the 2014 "LPEM FEB UP's Quantitative" survey on the "willingness to join of informal sector workers NHIS", from in depth interviews with new informants and from focus group discussions with stakeholders<sup>20</sup>.The authors used the Bourdieu concept for their study with the habitus dimension being the informant's social network; work and employment conditions, economic capital, sociodemographic characteristics; the field, effort to seek and access to healthcare.

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<sup>19</sup> <https://ilostat.ilo.org/resources/methods/description-informality/>

<sup>20</sup> BPJS Kesehatan officers, heads of villages, heads of communities, members of the Indonesian Ulama Council, academicians, members of a health agency, heads of community healthcare.

They found that on the 29 informants, 18 chose to be covered by the cheapest and most affordable form of health insurance. As informal workers have generally no fixed income, they tend to save money to finance healthcare. Those with previous work experiences (in the formal sector) where they had access to health insurance are more likely to be willing to join a health insurance scheme. The authors also found the important role of family ties, social communities in providing financial support in case of sickness and in making decisions to join or not health insurance schemes. Health officers also have an influence on joining the health insurance scheme.

As for Mathauer et al. (2008), in their work on “extending social health insurance to the informal sector in Kenya”, they examined the demand determinants<sup>21</sup> for health insurance which is a component of social protection. For this purpose, they interviewed 19 focus group discussions in which different types of informal workers<sup>22</sup> were classified. They then determined the factors affecting the demand for health insurance and qualified each factor by either “major”, “medium”, “minor”, “not at all” for each discussion group. They found that the ability to pay, knowing the existence of the National Health Insurance and understanding its functioning, among other has an impact on the demand for health insurance. As it is known, informal workers earn low, non regular income; have a low level of education; live in remote areas. Hence it results in a weak demand for health insurance from them.

Concerning Mohd (2013), he did an economic analysis of the old age protection for the informal workers in Kuala Lumpur in Malaysia. In his study, informal workers were service workers, shop and market sales workers, craft, and related trade workers, workers with elementary occupations. The author used data collected thanks to interviews on 400 individuals. He found that only 28.2% of them were enrolled in any age protection and the mean of adequacy of the old age protection benefits was equal to 2.84 out of 5. Informal workers relied more on saving to finance their retirement: 76.5% saved for old age. These results showed a low coverage of informal workers in old age.

Sojo et al. (2015) studied the determinants of affiliation to pension systems of wage earners in the private sector for five Latin American countries (Brazil, Chile, Colombia, Costa Rica, Uruguay). They chose personal characteristics of workers (age, sex, educational level, marital status), household size and head, variables related to workplace (occupational category, branch of activity,

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<sup>21</sup> Personal and household characteristics, community characteristics, health characteristics.

<sup>22</sup> Taxi, conductor associations, jaa kali association group, farmer groups, loan support groups, CBD groups, Self help groups, women’s self groups.

part-time work, type of labor market insertion, income from work quintile), location, race for independent variables. Using a probit model and households surveys data in 2002 and 2012, they found that being a part-time worker decreases the probability (20%) of being covered in comparison with being a fulltime worker. Furthermore, there is a positive effect of income, education level, living in urban areas, being the head of the household. However, this study presents some limits notably on the type of data used which has for consequence the difficulty to compare the results between the five countries studied.

Before this article, other studies on Latin American countries were carried out by CEPAL (2006), Rofman et al. (2008), Da Costa et al. (2011), Auerbach et al. (2007)<sup>23</sup>. CEPAL (2006) used a multivariate model to analyze the probability of contributing to social security of workers from 16 Latin American countries in 2005. On the one hand, they found a negative effect for workers with own accounts, workers in the domestic service, workers for companies with less than 5 employees. On the other hand, working in the public, professional, technical sector increased the probability of contributing to social security. This confirms the hypothesis according to which being an informal sector worker reduce the probability of paying social contributions and thus the probability of being covered. They also found a positive impact of age and education level on the probability of contributing to social security.

Concerning Rofman et al. (2008), they studied the correlation between pension coverage and a number of variables such as age, geographical areas (urban, rural), sector of employment (primary, secondary, tertiary), type of employer (public, private), level of education, gender, occupation, firm size (small, medium, large), income quintiles. They focused on 17 countries of Latin America over the period 1990-2004 and they used data from national surveys. They found for example a positive correlation between the coverage of wage earners and the size of the firm. Workers in large firms have a 60% higher coverage than workers in smaller firms. As it is already mentioned above, small firms are firms where the largest proportion of workers are informal workers. Thus, there is a lower pension coverage for informal workers in comparison to formal workers who are mostly employed in firms with larger sizes. Concerning the income variable, wage earners in the lowest quintile registered also the lowest or no pension coverage. Informal workers usually earn lower wages so their coverage in pension is likely to be lower.

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<sup>23</sup> These studies are mentioned in the study of Sojo et al.,2015.

As for Da Costa et al. (2011), they also found the same results for Brazil, Chile, Mexico over the period 1990-2006. Another study worth mentioning is by Auerbach et al. (2007) who analyzed the factors influencing the probability for workers to be affiliated to a pension system. They found the same results as Rofman et al. (2008) and Da Costa et al. (2011).

From this literature review, we can see there is a link between the informal sector and social protection. Our study main aim will be to further the reflection of authors mentioned above with a focus on one country from Latin America, Uruguay; the use of an microeconomic analysis; the inclusion of more than one component of social protection.

#### **IV) Data:**

##### *A) Data presentation:*

To carry out the study, data from the survey “Encuesta Longitudinal de Protección Social Uruguay 2012” provided by the institution “Banco de Previsión Social” were used. This database covers the period 2012-2013, the 19 departments of Uruguay and was produced thanks to the collaboration between the Ministry of Labor and social Security, Ministry of Social Development, Ministry of Economy and Finance, Banco de Previsión Social, National Statistical Institution of Uruguay.

The variables “type of labor occupied”, “workplace” (department), “pension benefit”, “unemployment benefit”, “maternity benefit”, “health and accident insurance benefit”, “education level”, “gender”, “age”, and “relationship to the Head Household” were used in the study.

The variable “type of labor occupied” was chosen to define it as the main explanatory variable as it comprises categories of work that characterized the informal sector. As it is already mentioned in the literature review, informal workers are less likely to be salaried workers, to work in big size companies. They are more likely to be self-employed without a huge capital, to do unpaid work for family. Hence, a hypothesis was made, based on the literature review and the definition of the informal sector that workers from categories 3, 5, 6, 7 and 9<sup>24</sup> are more likely to be part of the informal sector than workers from categories 1 and 2.

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<sup>24</sup> NB: The different categories of this variable (1 to 12) were reclassified in categories 1 for salaried workers (wage earners in the public and private sector); category 2 to member of a production cooperative; category 3 to independent worker; category 4 to employer; category 5 to self employed not possessing a property or a capital; category 6 self employed a property or a capital; category 7 to unpaid family member; category 8 to beneficiary of a work public program, paid or unpaid intern or apprentice and other works unpaid; category 9 to associate spouse.



The variables “pension benefit”, “unemployment benefit”, “maternity benefit”, “health and accident insurance benefit” were also chosen to define them successively as the dependent variable. In fact, in the survey used for the econometric analysis, there are no variable synthesizing all dimensions of social protection coverage so the effect of working in the informal sector on social protection coverage was undertaken separately on pension benefit, then on health and accident insurance, on unemployment benefit and on maternity benefit.

Finally, some sociodemographic characteristics of individuals were included in the econometric analysis such as the workplace, the education level, age, gender and the relationship to the head of the household as they are likely to have also an effect on the access to the different components of social protection. A positive relationship is expected to be observed between the education level and having access to social protection benefits. The higher the education level is the higher likelihood is to occupy a skilled and well paid job and be beneficiary of social protection benefits.

Concerning the workplace, working in urban areas, more developed cities is expected to decrease the probability of not being beneficiary of pension given that the other variables in the model are held constant. An article written by the newspaper El País<sup>25</sup> classified the 19 departments of Uruguay in 3 groups according to an indicator called “Indicador Desarrollo Departamental” (IDD) an equivalent of development indicator of a department. This indicator takes into account four dimensions: the citizen security and a trustworthy system of rights; inclusive, prepared and healthy society; a market of efficient, dynamic factors; physical and technological infrastructure. The first group with the highest IDD over the period 2007-2015 includes Colonia (5), Montevideo (1), Lavalleja (9), Soriano (17).

The second one comprises departments with a medium value of IDD: Canelones(3), Durazno(6), Flores(7), Florida(8), Maldonado(10), Paysandú(11), Rocha(14), Rio Negro (12), San José (16) and Treinta y Tres(19).The third group characterized by the lowest level of IDD is composed of Artigas(2), Cerro Largo(4), Rivera(13), Salto(15) and Tacuarembó (18).

Regarding this classification, people working in the last group are less likely to be beneficiaries of social protection benefits as they will likely earn low income, occupy more informal sector activities and thus will likely not be able to afford the affiliation to a social protection system.

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<sup>25</sup> <https://negocios.elpais.com.uy/noticias/contrastes-desarrollo-departamentos.html>

As for the gender, men are more likely to be covered than women due mainly to gender gap in achieving higher education, occupying formal, skilled, and well-paid jobs.

Concerning the age variable, a positive relationship with the dependent variable is expected.

Finally, as for the relationship to the head of the household, the effect of this variable might differ too according to the different categories. However, one expects that being the head of the household is more likely to increase the probability of having access to social protection benefits as usually the head of the household is the breadwinner.

### *B) Descriptive analysis of the study data:*

Of the 25,802 individuals who answered the question on whether or not to access the retirement pension, 73.39% were beneficiaries. (See table 23, below). There is significant access to this form of social protection. For the unemployment component, it is a contrary situation as only 2.26% persons interviewed are beneficiaries. As for health and accident insurance, 3.51% of the responders to the question were beneficiaries. Finally, for maternity benefits, women who were interviewed answered positively by 47.99%.

Concerning the type of labor variable (table 24, below), there are twelve categories where category 1 represents wage earners in the public sector; category 2, wage earners in the private sector; category 3, member of a production cooperative; category 4, independent worker; category 5, employer; category 6, self employed possessing a property or a capital; category 7, self employed not possessing a property or a capital; category 8, unpaid family member; category 9, beneficiary of a work public program; category 10, paid intern or apprentice; category 11 intern, apprentice or other works unpaid; category 12, associate spouse.

Categories 1(wage earners in the public sector), 2 (wage earners in the private sector), and 7 (self employed not possessing a property or a capital) register the highest number of persons. In fact, for the category 1, we can observe in table 24, below that it represents 16.80%; the category 2, 58.30% and the category 7, 9.69%.

Table 23: Distribution of the dependent variables.

		Frequency	Percentage
Pension benefit	1	18 936	73.39
	0	6 866	26.61
	Tot	25 802	100
Unemployment benefit	1	905	2.26
	0	39 184	97.74
	Tot	40 089	100
Health and accident insurance	1	1 406	3.51
	0	38 689	96.49
	Tot	40 095	100
Maternity benefit	1	813	47.99
	0	881	52.01
	Tot	1 694	100

Source: Author with data from ELPS 2012, Ola1.

Concerning the workplace (see table 25, Appendix 1), Montevideo, Canelones, Colonia, Maldonado and Salton register the highest number of individual working there. They represent respectively 43.82%, 13.58%, 3.77%, 3.86%.

As for the education variable (see table 26, Appendix 2), 34.91% of the responders went to primary school; 23.46% went to Middle school; 19.08% went to Highschool; 12.02% went to university.

On the 46463 individuals, 52.60% were aged between 25 and 59 years old; 17.35% between 14 and 24 years old; 30.05% 60 years old and more; 40.69% were men and 59.33% women. (See tables 27 and 28, Appendix 3).

Finally, on the 46207 individuals, 54.79% are the head of the households; 17.87% are the spouse of the head of the household; 5% are the partner of the Head of the household; 9.75% are children of both; 6.92% children of the head of the household. (See table 29, appendix 4).

Table 24: Distribution of the type of labor occupied variable.

Type of labor	Frequency	Percentage
1-Public salaried (Asalariado público)	4319	16.80
2-Private salaried (Asalariado privado)	14986	58.30
3-Member of a production cooperative (Miembro de cooperativa de producción)	112	0.44
4-Independent worker (Profesional independiente)	800	3.11
5-Employer (Patrón(con personal a cargo))	650	2.53
6- Self employed with-Property-Capital (Trabajador por cuenta propia con local o inversión)	1915	7.45
7- Self employed -without Property-Capital (Trabajador por cuenta propia sin local o sin inversión)	2491	9.69
8-Unpaid family member (Miembro del hogar no remunerado)	132	0.51
9- Beneficiary of a public employment program (Beneficiario de Programa Público de Empleo)	47	0.18
10- Paid intern/apprentice (Pasante/becario remunerado)	66	0.26
11-Unpaid intern/apprentice/other work (Pasante/becario/Otro trabajado no remunerado)	21	0.08
12-Associate spouse (Cónyuge colaborador)	165	0.64
Total	25704	100

Source: Author with database ELPS 2012, Ola1.

## V) Econometric analysis:

### A) Presentation of the model:

Based on the literature review and taking into account the data available in the database ELPS, we defined the following logit model equation:

$$\Pr(y=1 | \mathbf{X}_{kj}) = e^{(b_0 + \sum b_{kj} X_{kj})} / [1 + e^{(b_0 + \sum b_{kj} X_{kj})}]$$

With  $y=1$  being equivalent to having access to pension benefit, health and accident insurance benefit, unemployment benefit, maternity benefit.

$k$ =variable,  $j$ =Category of the variable  $k$ . with  $k$ =type of labor( $j=1;9$ ); place of labor/region( $j=1;20$ ); education group( $j=1;5$ ); gender ( $j=1; 2$ ), age group( $j=1;3$ ); head of the household( $j=1;13$ ).

We assume that the probability that  $y=1$  instead of  $y=0$  is likely to increase if the labor occupied by the individual is more formal (salaried worker); the workplace is located in urban areas notably in the capital (Montevideo); the individual is more educated; the individual is male; the individual is older; the individual is the head of the household. (See literature review).

NB: We would have loved to do an experimental study with 2001-year of introduction of the monotributo program-being the year of reference but unfortunately we didn't find enough information on the year 2001 to undertake it.

### B) Analysis of the Pension benefit variable:

#### 1. Selection of the most relevant model:

To select the most relevant model, we used the forward method regression that it is to say we added one explanatory variable after another (see table 30, below). We then calculated for each model the AIC such as we retained the model with the lowest value of AIC.

**\*Model 1:** We regressed the dependent variable pension benefit with the type of labor variable. We obtain the following results:

The probability associated with the statistic test of global significance of the model is inferior to 5% which means that we do not accept the null hypothesis according to which all of the coefficients associated with independent variables are simultaneously equal to zero. The Pseudo R<sup>2</sup> is equal to 0.20.

**\*Model 2** We regressed the dependent variable pension benefit with the type of labor variable, the workplace variable. The probability associated with the statistic test of global significance of the model is inferior to 5% which means that we do not accept the null hypothesis according to which all of the coefficients associated with independent variables are simultaneously equal to zero. The Pseudo R<sup>2</sup> has risen to 0.22 with the addition of the workplace variable.

**\* Model 3:** We regressed the dependent variable pension benefit with the type of labor variable, the workplace variable, the education level variable. The probability associated with the statistic test of global significance of the model is inferior to 5% which means that we do not accept the null hypothesis according to which all of the coefficients associated with independent variables are simultaneously equal to zero. The Pseudo R<sup>2</sup> has risen to 0.23 with the addition of the education variable.

**\*Model 4:** We regressed the dependent variable pension benefit with the type of labor variable, the workplace variable, the education level variable, the gender variable. The probability associated with the statistic test of global significance of the model is inferior to 5% which means that we do not accept the null hypothesis according to which all the coefficients associated with independent variables are simultaneously equal to zero. The Pseudo R<sup>2</sup> has risen to 0.24 with the addition of the gender variable.

**\*Model 5:** We regressed the dependent variable pension benefit with the type of labor variable, the workplace variable, the education level variable, the gender variable, the age variable. The probability associated with the statistic test of global significance of the model is inferior to 5% which means that we do not accept the null hypothesis according to which all of the coefficients associated with independent variables are simultaneously equal to zero. The Pseudo R<sup>2</sup> has risen to 0.26 with the addition of the age variable.

Table 30: Results of the different regressions of the pension benefits variable.

<b>VARIABLES</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
Membercooperative	0.37 (0.296)	1.03*** (0.394)	0.88** (0.398)	0.88** (0.398)	0.68* (0.398)
Independent worker	-0.44*** (0.0870)	-0.55*** (0.0889)	-0.61*** (0.113)	-0.61*** (0.112)	-0.72*** (0.113)
Employer	0.95*** (0.156)	0.98*** (0.157)	0.64*** (0.163)	0.61*** (0.163)	0.52*** (0.165)
Self employed with property	-1.65*** (0.0498)	-1.56*** (0.0513)	-1.67*** (0.0595)	-1.68*** (0.059)	-1.76*** (0.062)
Self employed without property	-3.46*** (0.0611)	-3.49*** (0.0621)	-3.44*** (0.0694)	-3.46*** (0.070)	-3.53*** (0.071)
Public Employment Programme Benef/Intern/	-1.72*** (0.178)	-1.77*** (0.182)	-1.84*** (0.195)	-1.83*** (0.196)	-1.49*** (0.201)
Apprentice	-1.86*** (0.158)	-1.85*** (0.162)	-1.83*** (0.165)	-1.77*** (0.165)	-1.85*** (0.167)
Associate spouse			0.31*** (0.049)	0.31*** (0.308)	0.28*** (0.050)
Middle School			-0.69** (0.005)	0.69*** (0.691)	0.66*** (0.054)
Highschool			-0.82*** (0.122)	0.82*** (0.308)	0.79*** (0.124)
Technical Training			-1.08*** (0.0671)	1.08*** (0.069)	1.05*** (0.067)
Higher Education				0.21*** (0.208)	0.32*** (0.040)
Man					1.09*** (0.052)
25-59 years old					0.43*** (0.073)
60+ years old					
Constant	1.65***	1.98***	1.53***	1.45***	0.62***
Pseudo R2	0.20	0.22	0.23	0.23	0.26
Observations	25,460	25,396	20454	20,454	20,454

NB: Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 30(continued):

<b>VARIABLES</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
Artigas		-0.79*** (0.108)	-0.77*** (0.120)	-0.80*** (0.120)	-0.82*** (0.124)
Cancones		-0.59*** (0.051)	-0.42*** (0.059)	-0.42*** (0.059)	-0.43*** (0.060)
Cerro Largo		-1.15*** (0.097)	-0.87*** (0.110)	-0.87*** (0.111)	-0.85*** (0.112)
Colonia		-0.41*** (0.075)	-0.06 (0.091)	-0.09 (0.091)	-0.15 (0.093)
Durazno		-1.04*** (0.117)	-0.94*** (0.124)	-0.96*** (0.125)	-0.95*** (0.126)
Flores		-0.31 (0.206)	0.13 (0.262)	0.11 (0.262)	0.26 (0.271)
Florida		-0.96*** (0.157)	-0.81*** (0.170)	-0.80*** (0.170)	-0.91*** (0.172)
Lavalleja		0.07 (0.142)	0.34** (0.161)	0.36** (0.162)	0.28* (0.162)
Maldorado		-0.36*** (0.085)	-0.27*** (0.100)	-0.29*** (0.100)	-0.28*** (0.100)
Paysandú		-0.45*** (0.108)	-0.14 (0.120)	-0.16 (0.121)	-0.15 (0.123)
Río Negro		-0.17 (0.114)	-0.100 (0.124)	-0.13 (0.124)	-0.16 (0.125)
Rivera		-0.79*** (0.086)	-0.47*** (0.100)	-0.47*** (0.100)	-0.52*** (0.101)
Rocha		-0.94*** (0.099)	-0.44*** (0.117)	-0.47*** (0.118)	-0.52*** (0.120)
Salto		-0.50*** (0.085)	-0.24** (0.0980)	-0.25*** (0.0980)	-0.32*** (0.100)
San José		-0.11 (0.116)	0.21 (0.131)	0.22* (0.131)	0.23* (0.134)
Soriano		-0.49*** (0.098)	-0.25** (0.113)	-0.2** (0.114)	-0.29** (0.117)
Tacuarembó		-0.16 (0.121)	0.34** (0.159)	0.34** (0.158)	0.30* (0.160)
Treinta y Tres		-0.48*** (0.152)	-0.60*** (0.161)	-0.63*** (0.161)	-0.79*** (0.162)
Exterior		-1.31*** (0.194)	-1.36*** (0.226)	-1.40*** (0.227)	-1.41*** (0.233)



Table 30(continued):

<b>VARIABLES</b>	<b>Model 6</b>	<b>Odds ratio of model 5</b>
Membercooperative	0.75*	1.98
Independent worker	-0.79***	0.49
Employer	0.44***	1.68
Self employed with property	-1.80***	0.17
Self employed withoutproperty	-3.58***	0.03
oUnpaid family member	-	1
Pogramme Benef/Intern/Appr entice	-1.47***	0.22
Associate spouse	-2.13***	0.16
Middle School	0.22***	1.33
Highschool	0.60***	1.93
Technical Training	0.75***	2.20
Higher Education	0.97***	2.86
Man	0.53***	1.38
25-59 years old60+ years old	0.80*** 0.08	2.97 1.53
Partner	0.54**	
Child of both	-0.21***	
Child of the head of the hhold	-0.51***	
Child of the spouse/partner	-0.79***	
Son/daughter-in-law	0.26	
Father-mother	0.44*	
Father/Mother-in- law	-1.38***	
Sister/Brother	-0.62***	
Grandson/daughter	-0.71***	
Other relative	-0.02	
Other non relative	-0.03	
Constant	0.82	
Pseudo R2	0.26	
Observations	20367	

Table 30(continued):

VARIABLES	Model 6	Odds ratio of model 5
Artigas	-0.73***	0.44
Cancones	-0.46***	0.65
Cerro Largo	-0.84***	0.43
Colonia	-0.20**	0.86
Durazno	-0.93***	0.39
Flores	0.16	1.29
Florida	-0.95***	0.40
Lavalleja	0.18	1.32
Maldorado	-0.33***	0.76
Paysandú	-0.17	0.86
Río Negro	-0.20	0.86
Rivera	-0.55***	0.60
Rocha	-0.516***	0.60
Salto	-0.30***	0.73
San José	0.19	1.26
Soriano	-0.37***	0.75
Tacuarembó	0.40**	1.35
Treinta y Tres	-0.85***	0.46
Exterior	-1.52***	0.24

Source: Author with data from database ELPS 2012, Ola1.

**\*Model 6:** We regressed the dependent variable pension benefit with the type of labor variable, the workplace variable, the education level variable, the gender variable, the age variable, the Head of the household. The probability associated with the statistic test of global significance of the model is inferior to 5% which means that we do not accept the null hypothesis according to which all of the coefficients associated with independent variables are simultaneously equal to zero. The Pseudo  $R^2$  has risen to 0.27 with the addition of the Head of the household variable.

From the results above we can assume that model 6 is the model that we should select for further analysis. But when we use the “estat ic” command to get the AIC for each model, we observe that the model 5 register the weakest AIC. (See table 31 below).

Table 31: AIC test.

	<b>Obs</b>	<b>ll(null)</b>	<b>ll(model)</b>	<b>dif</b>	<b>AIC</b>
Model 1	25460	-14540.01	-11638.68	8	23293.35
Model 2	25396	-14499.78	-11381.84	27	22817.67
Model 3	20457	-11393.64	-8733.06	31	17528.12
Model 4	20454	-11393.64	-8718.871	32	17501.74
Model 5	20454	-11393.64	-8479.647	34	17027.29
Model 6	203667	-11357.91	-8352.266	46	17160.93

Source: Author with database ELPS 2012, Ola1.

## 2. Wald Test and interpretation of the results:

### 2.1. Wald Test:

We carried out the Wald test to check if the coefficients of two variables are simultaneously equal to zero or not. In all cases where we combine each time two independent variables, we obtained a probability inferior to 5%. Hence the null hypothesis is rejected, and we can conclude that including each two independent variables enable a more statistically significant model.

Table 32: Wald Test.

<b>Test</b>	<b>Chi2</b>	<b>Prob</b>
Type_labor workplace	3298.51	0.0000
Type labor edudummy	3296.31	0.0000
Type labor agedummy	3327.92	0.0000
Type labor gender	3093.53	0.0000
Workplace edudummy	666.36	0.0000
Workplace agedummy	733.07	0.0000
Workplace gender	313.45	0.0000
Edudummy agedummy	817.34	0.0000
Edudummy gender	385.48	0.0000
Agedummy gender	516.39	0.0000

Source: Author with database ELPS 2012, Ola1.

## 2.2 Interpretation of results:

The coefficient associated with being a member of a productive cooperative is positive and significant at 10%. This means that being this type of worker rather than a salaried worker has a positive effect on the likelihood of being beneficiary of a pension benefit. This can be explained by the fact that usually cooperatives have a specific fund system where members contribute and receive an amount to cover their expenses. The probability of being a pension beneficiary increases by 98% when the person is a member of a productive cooperative rather than a salaried worker given that the other variables in the model are held constant.

The coefficient associated with being an employer is also positive and significant at 1%. This can be explained by the fact that being an employer with employees may increase the likelihood of having a stable revenue and of joining a social protection scheme during active years and be a pension beneficiary after retiring. Being an employer rather than a salaried worker increases by 68% the probability of being a pension beneficiary given that the other variables in the model are held constant.

The coefficient associated with being an independent worker, self employed and possessing or not property or capital is negative and significant. This fits with our hypothesis as the 3 categories of workers are more likely to be working in the informal sector than in the formal sector. Thus, they are less likely to have access to pension benefits relatively to salaried workers. Being an independent worker rather than a salaried worker decreases by 51% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being self employed and possessing property or capital decreases by 83% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being a self employed and possessing property or capital decreases by 97% the probability of being a pension beneficiary given that the other variables in the model are held constant.

As already mentioned in the data presentation, people working in departments linked with a lower value of IDD (Indicador Desarrollo Departamental) are less likely to have access to social protection benefits. However, the regression shows contrast results as the coefficient associated with working in San José, Flores is positive though these regions are in the second group (Medium IDD). A possible explanation of these results is the existence of social programs aiming to cover elderly persons who would not be beneficiaries of pensions in the absence of them. For the rest of the regions, the sign of the coefficient associated with them is coherent with the classification. Thus, working in Lavalleja rather than Montevideo increases by 32% the probability of being a pension beneficiary given that the other variables in the model are held constant. The coefficient associated with working in Artigas is negative and significant. Working in Artigas rather than Montevideo decreases by 56 % the probability of being a pension beneficiary given that the other variables in the model are held constant. Working in Florida rather than Montevideo decreases by 60% the probability of being a pension beneficiary given that the other variables in the model are held constant.

As for the education variable, all coefficients associated to the different categories of education are positive and significant. Having the Middle school level (common or special) rather than only the

primary and preschool education level increases by 33% the probability of being pension beneficiary given that the other variables in the model are held constant. Having the baccalaureate education level (general or technology) rather than only the primary and preschool education level increases by 93 % the probability of being a pension beneficiary given that the other variables in the model are held constant. Having attended technical training (without primary/with primary school level/with middle school /High school completed) increases by 120% the probability of being a pension beneficiary in comparison to having the primary and preschool level given that the other variables in the model are held constant. Having a higher education (training in teaching, tertiary specialization, university level, postgraduate level) increases by 186% the probability of a being pension beneficiary in comparison to having the primary and preschool level given that the other variables in the model are held constant.

As for the age variable, the coefficient associated with being aged between 25 and 59 years old and 60 years old and more is positive and significant. Being aged between 25 and 59 years old increases by 197% the probability of being a pension beneficiary in comparison to being aged between 14 and 24 years old given that the other variables in the model are held constant. Being aged between 60 and more increases by 53% the probability of being a pension beneficiary in comparison to being aged between 14 and 24 years old given that the other variables in the model are held constant.

Concerning the gender, being a male rather than a female increases the probability of being a beneficiary of a pension. In fact, men are more likely to have access to education than women in developing countries; they are more likely to earn more money and to tend to have a more regular income than women as they often occupy employment of the formal sector. Hence the result observed. Being a male rather than a female increases by 38% the probability of being a pension beneficiary given that the other variables in the model are held constant.

### *C) Analysis of the health and accident insurance variable:*

#### 1. Selection of the model and Wald Test:

We use the same methodology as in B) and after comparing the AIC (see table 33, below) of the models 1 to 6, we selected the last one as it presents the lowest value of AIC in addition to having the highest Pseudo R<sup>2</sup>. As for the analysis of the pension benefit variable, we carry out the Wald test also for the analysis of the health and accident insurance. The probability is inferior to 5%.

Hence the null hypothesis is rejected, and we can conclude that including each two independent variables enables a more statistically significant model.

Table 33: AIC test.

	<b>AIC</b>
Model 1	9563.074
Model 2	9393.507
Model 3	8036.76
Model 4	8038.106
Model 5	8015.266
Model 6	7938.856

Source: Author with database ELPS 2012, Ola1.

2. Interpretation of results :

The coefficient associated with being an independent worker, an employer, self employed and possessing or not property or capital is negative and significant. (See table 34, below). Being an independent worker rather than a salaried worker decreases by 94% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being an employer rather than a salaried worker increases by 40% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being self employed and possessing property or capital decreases by 76% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreases by 60% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant.

Concerning the workplace variable, the coefficient associated with working in Canelones is positive and significant though this region is in the second group. Working in Canelones rather than Montevideo increases by 22% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. For the rest of the regions, the sign

of the coefficient associated with them is coherent with the classification. Thus, working in Artigas rather than Montevideo decreases by 67% the probability of being a health and accident beneficiary given that the other variables in the model are held constant.

As for the education variable, the coefficient associated with having the Middle School level (common or special), High school education level, having attended technical training is positive and it is significant for the first category. However, the coefficient associated with having a higher education (training in teaching, tertiary specialization, university level, postgraduate level) is negative and significant! This can be explained by the fact that being highly educated does not necessarily translate in getting a good job in the formal sector and a high regular level of income, two factors playing a role in being eligible for formal health and accident insurance schemes. Having the Middle school level (common or special) rather than only the primary and preschool education level increases by 20 % the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Having a higher education (training in teaching, tertiary specialization, university level, postgraduate level) decreases by 39% the probability of being a health and accident insurance beneficiary in comparison to having the primary and preschool level given that the other variables in the model are held constant.

As for the age variable, the coefficient associated with being aged between 25 and 59 years old is positive and significant. Being aged between 25 and 59 years old increases by 50% the probability of being health and accident insurance beneficiary in comparison to being aged between 14 and 24 years old given that the other variables in the model are held constant. The coefficient associated with being aged 60 years old and more is negative but not significant. Concerning the gender, the coefficient associated with being a man is positive but not significant. Finally, the coefficient associated with being the spouse of the head of the household is negative but not significant. We expected that the head of the household is more likely to be a beneficiary of the health and accident insurance than the rest of the household members as usually they are the breadwinner of the household. However, the results show that apart from the spouse, children of the head of the household, other member of the household not related to the head of the household, the coefficient is positive. This may be explained by the fact that they benefit from a coverage independently from the head of the household. Being a child of the head of the household and his/her companion decreases by 21%, the probability of being a health and accident insurance beneficiary in comparison to being the head of the household. Being other member of the household not related to the head of the household decreases by 47% the probability of being a health and accident insurance beneficiary in comparison to being the head of the household.



Table 34: Results of the different regressions of the health and accident insurance benefits variable.

<b>VARIABLES</b>	<b>Model 6</b>	<b>Odds ratio</b>
Membercooperative	0.30 (0.375)	1.35
Independent worker	-2.74*** (0.710)	0.06
Employer	-0.51** (0.239)	0.6
Self employed with property	-1.42*** (0.225)	0.24
Self employed without property	-0.92*** (0.149)	0.4
o.Unpaid family member	-	1
o.Public Employment Programme Benef/Intern/Apprentice	-	1
o.Associatespouse	-	1
Middle School	0.18**	1.20
Highschool	0.008	1.01
Technical Training	0.26	1.30
Higher Education	-0.50***	0.61
Man	0.01	1.01
25-59 years old	0.40***	1.50
60+ years old	-0.15	0.86

Source: Author with database ELPS2012, Ola1.

NB: Standard errors in parentheses; \*\*\*: p<0.01; \*\*: p<0.05; \*: p<0.1

Table 34(continued):

<b>VARIABLES</b>	<b>Model 6</b>	<b>Odds ratio</b>
Spouse	-0.14	0.87
Partner	0.57***	1.78
Child of both	-0.23	0.79
Child of the Head of the household	0.12	1.12
Child of the Spouse or the partner	0.20	1.22
Son/daughter in-law	1.340***	3.82
Father-Mother	0.07	1.07
Father-Mother in-law	1.21***	3.35
Sister/Brother	0.89***	2.43
Grandson/ Granddaughter	0.35	1.43
Other relative	1.30***	3.67
Other non relative	-0.6	0.53

Table 34 (continued):

<b>VARIABLES</b>	<b>Model 6</b>	<b>Odds ratio</b>
Artigas	-1.1***	0.33
Cancones	0.20**	1.22
Cerro Largo	-0.002	1
Colonia	-0.44***	0.64
Durazno	-1.26**	0.28
Flores	-0.07	0.94
Florida	0.57	0.57
Lavalleja	0.64***	1.90
Maldorado	-0.89***	0.41
Paysandú	-0.66***	0.52
Río Negro	-0.85***	0.43
Rivera	-2.37***	0.69
Rocha	-0.54**	0.58
Salto	-0.92***	0.40
San José	-0.83***	0.44
Soriano	-0.54***	0.58
Tacuarembó	-0.52*	0.60
Trenta y Trés	-0.6*	0.55
Exterior	-	1
Observations	20,045	

*D) Unemployment benefit variable:*

1. Selection of the model and Wald Test:

We use the same methodology as in B) and C) and after comparing the AIC (see table 35 below) of the models 1 to 6, we selected the last one as it presents the lowest value of AIC in addition to having the highest Pseudo R<sup>2</sup>.

Table 35: AIC test.

	<b>AIC</b>
Model 1	5668.151
Model 2	5563.792
Model 3	4740.634
Model 4	4633.114
Model 5	4609.99
Model 6	4529.388

Source: Author with database ELPS 2012, Ola1.

As for the analysis of the pension benefit variable and the health and accident insurance variable, we carry out the Wald test also for the analysis of the unemployment benefit. The probability is inferior to 5%. Hence the null hypothesis is rejected, and we can conclude that including each two independent variables enable a more statistically significant model.

## 2. Interpretation of results :

The coefficient associated with being a member of a production cooperative, an independent worker, self employed and possessing or not property or capital, unpaid family member is negative. And it is significant for independent workers and self employed and possessing property or capital. Being an independent worker rather than a salaried worker decreases by % the probability of receiving an unemployment benefit given that the other variables in the model are held constant. Being self employed and possessing property or capital rather than a salaried worker decreases by 78% the probability of receiving an unemployment benefit given that the other variables in the model are held constant given that the other variables in the model are held constant.

Concerning the workplace variable, the coefficient associated with working in Artigas, Maldonado, Rocha is positive though these regions are in the second or third group. For the rest of the regions, the sign of the coefficient associated with them is coherent with the classification. Thus, working in Colonia rather than Montevideo increases by 64% the probability of receiving an unemployment benefit given that the other variables in the model are held constant. The coefficient associated with working in Artigas is positive and significant. Working in Artigas rather than Montevideo

increases by 22% the probability of receiving an unemployment benefit given that the other variables in the model are held constant.

As for the education variable, the coefficient associated with having the Middle School level (common or special), having attended technical training is positive but not significant. The coefficient associated with having a High school education level, higher education (training in teaching, tertiary specialization, university level, postgraduate level) is negative and significant! This can be explained by the fact that being highly educated translate necessarily in getting a good job in formal sector and a high regular level of income, two factors playing a role in being eligible for unemployment benefit. Or it could be explained by the fact there are fewer persons with high level of education who are unemployed. Having a high school level decreases by 33% the probability of receiving an unemployment benefit in comparison to having the primary and preschool level given that the other variables in the model are held constant. Having a higher education (training in teaching, in tertiary specialization, university level, postgraduate level) decreases by 47% the probability of receiving an unemployment benefit in comparison to having the primary and preschool level given that the other variables in the model are held constant.

Concerning the gender, the coefficient associated with being a man is positive and significant. Being a man rather than a woman increases the probability of receiving an unemployment benefit by 147%.

As for the age variable, the coefficient associated with being aged between 25 and 59 years old is positive and significant. Being aged between 25 and 59 years old increases by 40% the probability of receiving an unemployment benefit in comparison to being aged between 14 and 24 years old given that the other variables in the model are held constant. The coefficient associated with being aged 60 years old and more is negative and significant. Being aged 60 years old and more decreases by 40% the probability of receiving an unemployment benefit in comparison to being aged between 14 and 24 years old given that the other variables in the model are held constant.

Table 36: Results of the different regressions of the Unemployment benefit variable.

<b>VARIABLES</b>	<b>Model 6</b>	<b>Odds ratio</b>
Membercooperative	-0.26 (0.724)	0.77
Independent worker	-0.70* (0.391)	0.49
o.Employer	-	1
Self employed with property	-1.50*** (0.342)	0.22
Self employed without property	-0.07 (0.153)	0.93
Unpaid family member	-0.64 (1.023)	0.53
Public Employment Programme Benef/Intern/Apprentice	0.38	1.47
o..Associate spouse	-	1
Middle School	0.11	1.12
Highschool	0.39 ***	0.67
Technical Training	0.260	1.30
Higher Education	-0.63***	0.53
Man	0.91***	2.47
25-59 years old	0.11	1.12
60+ years old	-0.63***	0.53
Man	0.91***	2.47
Constant	-4.147***	
Observations	19,688	

NB: Standard errors in parentheses;\*\*\*: p<0.01; \*\*: p<0.05; \*: p<0.1.

Concerning the relationship to the household variable, the coefficient associated with all the categories is negative except for the child of both (head of the household and the spouse/partner), the child of only the spouse or the partner, the mother/father in law and other relative to head of the household. Being for example the spouse of the head of the household decreases by 52% the probability of receiving an unemployment relatively to being the head of the household given that

the other variables in the model are held constant. Being the child of both (head of the household and the spouse/partner increases by 66% the probability of receiving an unemployment relatively to being the head of the household given that the other variables in the model are held constant.

Table 36 (continued):

<b>VARIABLES</b>	<b>Model 6</b>	<b>Odds ratio</b>
Spouse/Partner	-0.73**	0.48
Child of both	0.51***	1.66
Child of the HHH	-0.51**	0.60
Child of the Spouse	0.24	1.27
Son/daughter	-1.84*	0.16
Son/daughter in-law	-0.002	1
o.Father-Mother	-	1
Father-Mother in-law	2.20***	9.04
Sister/Brother	-1.22	0.29
Grandson/ Granddaughter	-0.66	0.52
Other relative	1.61***	5.01
Other non relative	-1.10	0.33

Table 36 (Continued):

<b>VARIABLES</b>	<b>Model 6</b>	<b>Odds ratio</b>
Artigas	0.80***	2.22
Cancones	-0.88***	0.42
Cerro Largo	-0.48	0.62
Colonia	0.49***	1.64
Durazno	-1.21**	0.30
Flores	-1.05	0.35
Florida	-1.57	0.21
Lavalleja	0.27	1.31
Maldorado	0.79***	2.21
Paysandú	-0.01	0.99
Río Negro	-0.35	0.71
Rivera	-0.42	0.66
Rocha	0.73***	2.07
Salto	0.60***	1.82
San José	0.40	1.49
Soriano	0.39	1.47
Tacuarembó	-0.21	0.81
Treinta y Tres	-0.83	0.44
Exterior	1.17***	3.22

Source: Author with database ELPS 2012, Ola1.

*E) Maternity benefit variable:*

1. Selection of the model and Wald Test:

As this type of social protection concerns women only, the gender variable was dropped from the analysis. Apart from this change, we use the same methodology as in B), C), D) for the selection of the adequate model. The model 5 has the lowest AIC. However, it presented 7 omitted categories due to collinearity contrary to the models 4, 3. Hence, we chose the model 4 to continue the analysis.



Table 37: AIC test.

	<b>AIC</b>
Model 1	1537.587
Model 2	1478.72
Model 3	1329.814
Model 4	1328.742
Model 5	1289.523

Source: Author with database ELPS 2012, Ola1.

As for the analysis of the pension benefit variable and the maternity benefit variable, we carry out the Wald test also for the analysis of the maternity benefit. The probability inferior to 5%. Hence the null hypothesis is rejected and we can conclude that including each two independent variables enable a more statistically significant model.

## 2. Interpretation of results

The coefficient associated with being an employer, a self employed and possessing or not property or capital, an unpaid family member, is negative and significant except for the last category. (See table 38, below). Being an employer rather than a salaried worker decreases by 78% the probability of receiving a maternity benefit given that the other variables in the model are held constant. Being self employed and possessing property or capital decreases by 69% the probability of receiving a maternity benefit given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreases by 48% the probability of receiving a maternity benefit given that the other variables in the model are held constant.

Concerning the workplace variable, the coefficient associated with working in Maldonado is positive though this region is in the second group. For the rest of the regions, the sign of the coefficient associated with them is coherent with the classification. Thus, working in Canelones rather than Montevideo increases by 39% the probability of receiving a maternity benefit given that the other variables in the model are held constant. The coefficient associated with working in Tacuarembó is negative and significant. Working in Tacuarembó rather than Montevideo decreases

by 75% the probability of receiving a maternity benefit given that the other variables in the model are held constant.

Table 38: Results of the different regression of the Maternity benefit variable.

VARIABLES	Model 4	Odds ratio
Membercooperative	-	1
Independ worker	0.45 (0.655)	1.57
Employer	-1.52*** (0.529)	0.22
Self employed with property	-1.16*** (0.304)	0.31
Self employed without property	-0.65*** (0.278)	0.52
Unpaid family member	-1.13 (1.238)	0.32
Public Employment Programme	-1.82* (1.087)	0.16
Benef/Intern/Apprentice		
Associate Spouse	-0.64 (0.439)	0.53
Middle School	-0.03	0.97
Highschool	0.26	1.30
Technical Training	0.02	1.02
Higher Education/Other	0.67***	1.39
25-59 years old	0.34*	1.40
60+ years old	-	1

Source: Author with database ELPS 2012, Ola1.

NB: \*\*\* p<0.01, \*\* p<0.05, \*p<0.1

Table 38 (continued):

VARIABLES	Model 4	Odds ratio
Artigas	0.08	0.92
Cancones	-0.49**	0.61
Cerro Largo	-2.63**	0.07
Colonia	-0.21	0.81
Durazno	-3.51***	0.03
o.Flores	-	1
o.Florida	-	1
Lavalleja	-0.95**	0.39
Maldorado	0.28	1.33
Paysandú	-0.65	0.52
Río Negro	-0.62	0.54
Rivera	-0.53*	0.59
Rocha	-1.22***	0.29
Salto	-0.78	0.46
San José	-0.61*	0.54
Soriano	0.66*	1.94
Tacuarembó	-1.37*	0.25
Treinta y Tres	-2.61**	0.07
o.Exterior	-	1
Constant	0.35*	
Pseudo R2	0.10	
Observations	1,039	

Source: Author with database ELPS 2012, Ola1

NB:\*\*\* p<0.01, \*\* p<0.05, \*p<0.1

As for the education variable, the coefficient associated with having the High school education level, having attended technical training, having higher education (training in teaching profession, tertiary specialization, university level, postgraduate level) is positive and it is significant for the last category. However, the coefficient associated with having the Middle School level (common or special) is negative but not significant. Having higher education (training in teaching profession, tertiary specialization, university level, postgraduate level) rather than only the primary and preschool education level increases by 96% the probability of receiving a maternity benefit given that the other variables in the model are held constant.

As for the age variable, the coefficient associated with being aged between 25 and 59 years old is positive and significant. Being aged between 25 and 59 years old increases by 40% the probability of the probability of receiving a maternity benefit in comparison to being aged between 14 and 24 years old given that the other variables in the model are held constant.

#### *F) Discussion:*

The hypotheses formulated in the data section on the expected effect of the explanatory variables were observed most of the time. The proxy categories of the informal sector have a lower probability of having access to the different components of social protection (pension benefits, health and accident insurance benefits, unemployment benefits, maternity benefits). As in the studies of Rofman (2008), Sojo et al. (2015), we found a higher probability of being covered by a pension scheme for formal workers (salaried workers in the public and private sector here).

Concerning the area of residence, the relationship between being covered and working in an urban or rural areal area is not obvious contrary to Rofman (2008) and Sojo et al. (2015). In some departments, the expected effect is observed and, in some others, not. For the education variable, we found the same observations as Da Costa et al. (2011) and Sojo et al. (2015); individuals with higher education have a higher probability of being a pension beneficiary. As for the age variable, we observed slight difference with Rofman (2008) study as for the category 14-59 years old, the effect is positive and significant but also for the category 60 years old and more. Finally, for the gender variable, the relationship with the dependent variable was more obvious in this study than in Rofman (2008)'s.

In addition to the pension coverage, the study examines the relationship between the other components of social protection and the chosen explanatory variables. We found similarities in the effect of some explanatory variables and differences in others. For example, being an independent worker, self employed and possessing property or capital, self employed and not possessing property or capital decreases the probability of being beneficiary of any of the components of social protection and the associated coefficient is significant most of the time. The gender variable also has the same effect for all the components of the social protection. However, for the employer, member of production cooperative categories, the effect is not the same all the time. The same goes for the effect of the workplace, the education level, the age variables.

## **Conclusion:**

The current low level of coverage in social protection in developing countries can be explained by a persistent presence of the informal sector. This sector has for characteristics, a lack of regulation and written contracts, insecure employment, low income, weak access to formal social protection systems (contributory pension systems, health insurance, unemployment insurance, disability benefits). (WB, 2001; Maes, 2003; Mathauer et al., 2008; Adb, 2016). It results in low level of resources available to finance the coverage of informal sector workers; the existence of institutional constraints for them to be affiliated to formal social protection schemes.

The main purpose of our study was to test empirically the relationship between social protection and informal sector especially in the presence of a measure extending social protection to the informal sector. Using a logistic model, we found for example that being self employed and possessing or not property or capital decreases the probability of being beneficiary of pension, health and accident insurance, unemployment benefits, maternity coverage. It is also the case for being an independent worker for the pension, health and accident insurance and unemployment benefits. Being an independent worker rather than a salaried worker decreases by 51% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being self employed and possessing property or capital decreases by 83% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreases by 97% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being an independent worker rather than a salaried worker decreases by 94% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being an employer rather than a salaried worker decreases by 40% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being self employed and possessing property or capital decreases by 76% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreases by 60% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant.

Being self employed and not possessing property or capital decreases by 78% the probability of being an unemployment beneficiary given that the other variables in the model are held constant. Being self employed and possessing property or capital decreases by 69% the probability of receiving a maternity benefit given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreases by 48% the probability of receiving a maternity benefit given that the other variables in the model are held constant.

We can conclude from these observations that government officials in developing countries should find solutions to extend the social protection coverage to the informal sector to close the gap between them and formal sector workers. Uruguay has already implemented a program called *Monotributo* (monotax) in order to integrate informal sector workers in the social protection system. Regarding the results found in this study, efforts should be maintained in order to increase more and more the number of informal workers being covered by social protection systems.

In our study, we also found that the level of education, workplace, age, gender, the relationship to the head of the household, being a member of a cooperative organization, can have, a significant impact on the social protection coverage. For example, having the Middle school level (common or special) rather than only the primary and preschool education level increases by 33% the probability of being pension beneficiary given that the other variables in the model are held constant. Having the baccalaureate education level (general or technology) rather than only the primary and preschool education level increases by 93% the probability of being a pension beneficiary given that the other variables in the model are held constant. Having attended technical training (without primary/with primary school level/with middle school /High school completed) increases by 120% the probability of being pension beneficiary in comparison to having the primary and preschool level given that the other variables in the model are held constant.

Having higher education (training in teaching profession, tertiary specialization, university level, postgraduate level) increases by 186% the probability of being a pension beneficiary in comparison to having the primary and preschool level given that the other variables in the model are held constant. Having a higher education (training in teaching, in tertiary specialization, university level, postgraduate level) rather than only the primary and preschool education level increases by 96% the probability of receiving a maternity benefit given that the other variables in the model are held constant.

Having the Middle School level (common or special), High school education level, having attended technical training increases the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant.

Being a man rather than a woman increases by 38% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being for example the spouse of the head of the household decreases by 52% the probability of receiving an unemployment relatively to being the head of the household given that the other variables in the model are held constant. Working in Artigas rather than Montevideo decreases by 67% the probability of receiving a health and accident benefit given that the other variables in the model are held constant.

The probability of being a pension beneficiary increases by 98% when the person is a member of a productive cooperative rather than a salaried worker given that the other variables in the model are held constant.

Therefore, government officials should define complementary policies such as development policies for the rural population, improving the quality of education, technical training for young people and adults of working age, improving employment, promotion of informal sector organizations, women emancipation programs to produce efficient results of measures taken by them to extend the social protection to informal sector workers.

These policies are likely to increase the participation of the informal sector in the social protection system and improve the sustainability of its financing.

## Appendices :

### Appendix 1:

Table 25: Distribution of the workplace variable.

<b>Workplace</b>	<b>Frequency</b>	<b>Percentage</b>
1 (Montevideo)	11336	43.82
2 (Artigas)	544	2.10
3 (Canelones)	3512	13.58
4 (Cerro Largo)	633	2.45
5 (Colonia)	1423	5.50
6 (Durazno)	442	1.71
7 (Flores)	170	0.66
8 (Florida)	230	0.89
9 (Lavalleja)	442	1.71
10 (Maldonado)	974	3.77
11 (Paysandú)	626	2.42
12(Río Negro)	567	2.19
13 (Rivera)	939	3.63
14 (Rocha)	644	2.49
15 (Salto)	999	3.86
16 (San José)	633	2.45
17 (Soriano)	744	2.88
18 (Tacuarembó)	564	2.18
19 (Treinta y Tres)	309	1.19
20 (Exterior)	137	0.53
Total	25868	100

Source: Author with database ELPS 2012, Ola1.



## Appendix 2:

Table 26: Distribution of the education variable.

Education level	Frequency	Percentage
1(Preescholar/Preschool)	369	1.06
2(Primaria/Primary School)	12163	34.91
3(Liceo Ciclo Basico comun o especial-Liceo-UTU/Middle School)	8175	23.46
4(Bachillerato Secundaria/High School)	6649	19.08
5(Bachillerato tecnologico/Technological Highschool)	653	1.87
6 Enseñanza técnica- Requerimento:Ninguno/Technical Training-Prerequisite:None)	96	0.28
7 Enseñanza técnica- Requerimento:Primaria completa/Technical Training-Prerequisite:Primary school level completed)	286	0.82
8 (Enseñanza técnica- Requerimento: Liceo Ciclo Basico comun o especial-Liceo-UTU/Technical Training-Prerequisite: Middle School completed)	249	0.71

Source: Author with database ELPS 2012, Ola1.

Table 26 (continued):

<b>Education level</b>	<b>Frequency</b>	<b>Percentage</b>
9 Enseñanza técnica- Requerimento: Secundaria complete o Bachillerato)/Technical Training- Prerequisite: High School completed)	342	0.98
10 (Magisterio o profesorado/Teaching training)	1109	3.18
11 (Terciaria no universitaria- Militar, policial, Otros/Tertiary sector-specialisation)	427	1.23
12 (Universidad/University)	4190	12.02
13(Postgrado-especialización, diplomatura, maestría o doctorato/Postgraduate)	137	0.39
Total	34,845	100

### Appendix 3:

Table 27: Distribution of the age variable.

<b>Age category</b>	<b>Frequency</b>	<b>Percentage</b>
1 (14-24 years old)	8063	17.35
2 (25-59 years old)	24438	52.60
3 (60 years old and more)	13962	30.05
Total	46463	100

Source: Author with database ELPS 2012, Ola1.

Table 28: Distribution of the gender variable.

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
1 (Man)	18897	40.67
2(Woman)	27566	59.33
Total	46463	100

Source: Author with database ELPS 2012, Ola1.

#### Appendix 4:

Table 29: Distribution of the relationship to the household variable.

Education level	Frequency	Percentage
1(Jefe de hogar/Head of the household)	25315	54.79
2(Espos(a)/spouse)	8259	17.87
3(Compañero(a)/partner)	2309	5.00
4(Hijo de ambos-Jefe y cónyuge/Child of both)	4507	9.75
5(Hijo(a) sólo del jefe de hogar/Child of the head of the household)	3199	6.92
6 (Hijo(a) sólo del esposo (a) o Compañero(a)/Child of the spouse or partner)	386	0.84
7 (Yerno-Nuera/Son-in-law-Daughter-in-law)	194	0.42
8 (Padre-Madre/Father-Mother)	556	1.20
9 Suegro(a)/Father-Mother in law)	136	0.29
10 (Hermano(a)/Sister-Brother)	309	0.67
11 (Nieto(a)/Grandson-Granddaughter)	411	0.89
12 (Otro pariente/Other relative)	343	0.74
13(Otro no pariente/other non relative)	283	0.61
Total	46207	100

Source: Author with database ELPS 2012, Ola1.

## Chapter 4: Economic and gender analysis of the pension coverage financing: case study of Peru, South Africa, and Uruguay.

*Abstract: Despite the efforts made by governments all over the world to achieve universal social protection coverage, there are still inequalities notably gender gap in pension coverage due in great part to gender gap in pension contributions. The aim of this chapter is to study if the gender gap in the pension system financing is a reflection or not of the gender gap on the labor market. It is an economic and gender analysis of pension coverage financing in Peru, South Africa, and Uruguay over the period 2008-2018. The results of this analysis show that there are indeed gender inequalities in participation in contributions to a retirement pension system. However, there is no systematic link with the gender inequalities observed on the labor market. For example, Uruguay registered a lower level of the gender gap in contribution to a pension fund (roughly equal to two percentage points 2008-2010 and less from 2011 to 2018) in comparison to Peru and South Africa. However, the gender gap in labor market participation of Uruguay was the highest among the three countries studied as it was comprised between 14.53 (2018) and 18.84 percentage points (2008). We also carried out a preliminary econometric analysis taking into account the variables used by the economic analysis and other three variables (gender gap in life expectancy, fertility rate and rural population) and found no systematic positive relationship between the gender inequalities observed on the labor market and the gender gap in contributing to pension system.*

*Keys words: Universal Social Protection, Pension system financing, Pension contributions, Gender gap, South Africa, Peru, Uruguay.*

## Introduction:

As already mentioned in the previous chapters, though there have been improvements in the social protection coverage, there remain gaps between regions, countries, within countries and notably between men and women. For example, on the global level, 67.9% of older persons have access to old age pension but at the disaggregated level, the European and Central Asian and the American regions registered pension coverage rates above 80% (95.2% and 86.2%). As for Asia and the Pacific and Africa, the coverage rate was respectively equal to 55.2% and 26.9%. (ILO, 2017b). Another example of disparities between countries and between men and women can be observed in the following table 39. Botswana, Mauritius had 100% of the population (older men and women) covered by a pension plan. Armenia, Uruguay, Thailand presented a gender gap in pension coverage, but it is in favor of women. However, for the remaining countries (Burkina Faso, Burundi, Qatar, Mozambique, Mexico, Ecuador), women are less beneficiaries of an old pension than woman.

In the literature review, the gender gap in pension coverage can be explained by the gender gap in the labor market (lower participation in the labor market for women, lower labor proportion of women working in the formal sector, lower period of working, lower wage for women). This situation is mainly due to the existence of traditional gender roles with women doing more child/family care, men being more the breadwinner. As a result, women are more likely to have a lower contribution to pension schemes and be covered by them. (Pesando et al., 1991; Even et al., 1994; Barrientos, 1998; Ginn, 2003a; Ginn, 2003b; Ginn, 2003c; Arza, 2015; Nutz et al., 2021).

The gender gap can also be exacerbated by the pension schemes design such as the conditions of entitlements (eligibility criteria-universal, mean tested, pension tested, past contributions; years of contributions required; benefits type-right based, resource available), the pension rights for divorcees, the contribution credits for caregivers<sup>26</sup>(Arza, 2015). If the pension schemes are not gender equitable, women are less likely to be covered by them. Thus, in contributory state pension schemes financed by payroll taxes, the level of coverage of women is usually low. The same trend is observed for defined benefit schemes as the level of pension is defined as a function of previous earnings. The gender gap in pension coverage is usually lower in universal non contributory

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<sup>26</sup> Compensation for “the period of time spent out of the labor market caring for children”.

schemes where all individuals have access to an equal pension regardless of the work status, the working history (Arza,2015).

The purpose of this chapter is to focus on the gender gap in pension coverage proxied by proportions of men and women contribution to a pension system and to examine the possible factors explaining this gap mainly the labor market characteristics. We carried out an economic analysis using data from the gender world bank database, gender CEPAL data, and national surveys. We chose to focus on South Africa and Uruguay for reasons already highlighted in the chapters two and three. They have put in place interesting social protection measures (social grants, monotributo) to extend the coverage to a greater number of persons and are among the pioneers concerning the implementation of social protection. We also chose Peru to have a different perspective as its situation differs from Uruguay's.

This study contributes to the existing findings by other authors by realizing an In-depth literature review of the previous studies on the subject, and by doing a comparative analysis between three developing countries.

We found that there was a gender gap in contribution to pension fund for the three countries with Uruguay registering the lowest values (between -3.4 and 1.6 percentage points) and Peru the highest (between 14.52 and 18.84 percentage points). Nevertheless, it was not necessarily a translation of the gender gap observed on the labor market as in some cases. For example, Uruguay was the country with the highest gender gap in labor force participation.

Though we did not have enough data to undertake a complete and rigorous econometric analysis, we carried out a preliminary econometric analysis. We used the variables mentioned in the economic analysis and control variables such as gender gap in life expectancy, fertility rate and rural population. We found no systematic positive relationship between the gender inequalities observed on the labor market and the gender gap in contributing to pension system.

The remaining parts of the chapter are organized as following: II. Background, III. Literature review, IV. Economic and gender analysis of the contribution to a pension fund V) Preliminary econometric analysis, Conclusion.

Table 39: Percentage of persons above statutory pensionable age receiving an old pension, by gender.

<b>Countries</b>	<b>Men</b>	<b>women</b>
Burkina Faso	5%	1%
Burundi	7%	2%
Qatar	23%	8%
Mozambique	20%	16%
Mexico	35%	17%
Ecuador	56%	51%
Armenia	62%	73%
Costa Rica	65%	49%
Uruguay	75%	78%
Thailand	78%	85%
Jordan	82%	12%
Botswana	100%	100%
Mauritius	100%	100%
Germany	100%	100%
Bulgaria	100%	100%

Source: ILO 2017b.



## **II) Background:**

### *A) Brief presentation of social protection systems of Peru, South Africa and Uruguay:*

Uruguay and South African social protection systems have already been presented in chapters 2 and 3. In brief as a reminder, both countries have been among pioneers in implementing social protection schemes respectively in the Latin American region and in the African region. The main components of social protection are health insurance benefits, pension benefits, unemployment benefits, child, and family benefits. In South Africa, the pension system is composed of a contributory system (social insurance) and a non contributory scheme (old age grant). (National Treasury, 2011; Presidency and other government officials, 2014; SSA et al., 2017; UNICEF SA, 2018). In Uruguay, the pension system is mixed with one part being a public social insurance system (Sistema Nacional de Pensiones-SNP) and another individual account system (Sistema de cuentas individuales -SPP). (BID et al., 2015; SSA et al., 2013/2016)

As for Peru, its social protection system is characterized by a health insurance system (public and private, contributory and non contributory) constituted by four institutions: Seguro Integral de Salud non contributivo (SIS), Seguro Social de Salud (Es Salud), Sanidad de las Fuerzas Armadas y Policia Nacional, Seguro de Salud privado provista por las Entidades Prestadoras de Salud (EPS). (Lavigne, 2013; Lavigne, 2014; BID et al., 2015).

It also comprises a contributory unemployment scheme for formal workers “Compensacion por tiempo de servicio-CTS”. There are also three contributory schemes such two of them are compulsory for dependent workers and voluntary for independent workers. Two are public schemes “Sistema Nacional de Pensiones-SNP” and “Cedula Viva” and the other a private scheme “Sistema Privado de Administracion de Fondos de Pensiones-AFP”. “Pension Minima de vejez”, “Sistema de Pensiones Sociales-SPS” and “Pension 65” are the main non contributory pensions schemes that covers respectively vulnerable persons, microenterprises & workers not covered by any other pension schemes, older persons living in extreme poverty. (Lavigne, 2013; Lavigne, 2014; BID et al., 2015; SSA et al., 2016).

The Peruvian social protection system comprises also a conditional cash transfer scheme “Juntos” that covers persons living in poverty/extreme poverty, households with children younger than 14 years old, pregnant women, orphans, older persons. (Lavigne, 2013; Lavigne, 2014; BID et al., 2015).

The box 6 below summarizes some important years of the progressive implementation of social protection measures to ensure the coverage of Peruvians.

Box 6: Main years of the progressive implementation of social protection measures to ensure the coverage of Peruvians.

1973: Reforms on the former pension system created in 1850 with the constitution of three contributory systems: public scheme “Sistema Nacional de Pensions-SNP”, Cédula Viva and a private scheme “Sistema Privado de Pensiones”

1979: The constitution stipulated social security is a universal right.

1993: The new constitution stipulates the right to health in the article 7 and free access to health and pension through public and private heal institutions in the article 10

2001: Creation of the National Health system (SIS)

2001: Creation of a minimum pension scheme for vulnerable persons “Pension Minima de vejez”

2003: Ley PYME to include workers from small and medium enterprises in the health insurance and pension system

2005: Creation of a Condition Cash Transfers scheme “juntos”

2008: Creation of a non contributory pension system (Sistema de Pensiones Sociales-SPS)

2009: Reforms on the social security system to achieve universal health coverage (AUS-Aseguramiento Universal de Salud): creation of “Plan Esencial de Aseguramiento de Salud”-PEAS.

2011: Creation of another non contributory pension scheme “Pension Nacional de Asistencia Solidaria-Pension 65” for older people living in extreme poverty

Source: Author with information found in Lavigne, 2013; Lavigne, 2014; BID et al., 2015.

### *B) Global trends in social protection coverage for men and women:*

As already mentioned in the introduction and the previous chapters of our thesis, there has been progress in social protection coverage but there are still gaps between regions, countries, and within countries notably between men and women. The table 40 below summarizes the trends in coverage of the different components of social protection in the world and by regions and by gender.

As it can be observed, there is a gender gap in all social protection components coverage though its magnitude is different according to regions, the type of financing (contributory, contributory voluntary, non contributory).

Table 40: Social protection components coverage(legal) by regions and gender (in percentage).

Benefits/Regions	World		Africa		Americas		Arab States		Asia&Pacific		Europe&Central Asia	
	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men
Child & family	c	16.3	22.3	15.8	28.6	41	73.8	82			25.8	28.7
	nc	54.6	54.6	25.3	63	63.6			45.9	45.7	72.4	72
	cv											
Maternity	c	21.5		19.2	27.8		12		15.5		42.2	
	nc	7.2							10.9			
	cv	6.9							9.5		10.8	
Sickness	c	27	38.6	33.3	36.6	49.8	17	66.7	20.4	32.1	47.9	58.7
	nc								8	9.1		
	cv											
Unemployment	c	22.7	31.5	7.3	35.4	46.3	8.4	35.5	19.8	33.4	50.8	59.1
	cv										17.5	17.9
	nc											
Work injury	c	24.7	38.1	10.2	40.7	53.5	19.6	66.4	19.8	33.4	43	54.1
	nc			10.3								
	cv											
Disability	c	26.8	40.9	19.3	43.7	60.2	13.7	62	20	33.3	45.3	58.3
	nc	11.7	13.8	20.1	13.9	18.1			9.2	12.8	11	12.1
	cv	21.3	20.6	6.6	32.9	33			15.4	15.3	49.9	48.4
Old age	c	42.5	54.8	21	45	62	13.7	62	45.6	55.2	51.1	63.5
	nc	11	13.3	20.1	12.6	16.4			9.2	13.1	6.8	8.6
	cv	44.5	44.4	11.3	36	36.1			51.9	52	59.6	58.3

Source: Author with information found on the ILO Social protection Platform (August,2021).

NB: c=contributory; cv=contributory voluntary; nc=non contributory.

On the table above, we observe for example that the gender gap in child benefits coverage in contributory schemes in the Americas is the highest (12.4 percentage points) while Europe and Central Asia registers the lowest one (2.9 percentage points). Nevertheless, the gap narrows in non contributory schemes, as it becomes 0.6 percentage points for the Americas and -0.4 in Europe and Central Asia.

As for the sickness benefits in contributory schemes, the highest gender gap (49.7 percentage points) is attributed to the Arab States and the lowest to Africa (10.4 percentage points).

### *C) Trends in social protection coverage by gender in Peru, South Africa and Uruguay:*

At the country level (see table 41 below), the same trend is observed as the gender gap differs by the type of financing. For example, for the unemployment benefits, Peru has the highest gender gap in contributory schemes (14.5 percentage points) and Uruguay the lowest (9.1 percentage points). However, for the sickness benefits, in contributory schemes, Uruguay rather registers the highest gender gap (17.6 percentage points) and South Africa the lowest (7.7 percentage points). As for the old age pension, the gender gap in contributory schemes is equal to 14 percentage points in Peru and 18.4 percentage points in Uruguay. In non contributory schemes, the gender gap narrows respectively to 0.2 and 0.3 percentage points and it was equal to 1.7 percentage points in South Africa.

Concerning the pension benefits, the Arab States registers the highest gender gap (49.3) for contributory schemes and Asia the lowest (9.6 percentage points). In voluntary contributory schemes, Asia and Pacific has rather the highest gender gap (3.9 percentage points) in comparison to Africa, the Americas and Europe and Central Asia and the lowest gender gap is in Africa (-4.2). For non contributory schemes, the gender gap is reduced as in other social protection schemes as it is comprised between -1.3 and 0.1 percentage points. The highest value (0.1 percentage point) is attributed to Asia and the Americas and the lowest to Europe and Central Asia (-1.3).

From these observations, it can be concluded that the gender gap is higher for contributory schemes than for non contributory schemes. This can be explained by bottlenecks met by women to have access to contributory schemes such as lower participation in the labor market, gender division of the labor market, traditional gender role in the household and that will be highlighted more in detail in the remaining parts of the chapter.

Table 41: Social protection components trends by gender of Peru, South Africa and Uruguay.

Benefits/Regions		Peru		South Africa		Uruguay	
		Women	Men	Women	Men	Women	Men
Child & family	c	16.9	20.7			21.8	22.5
	nc	54.6	54.6	100	100		
	cv						
Maternity	c	27.3		30.2		52.6	
	nc						
	cv						
Sickness	c	39.1	52	30.2	37.9	51	68.6
	nc						
	cv						
Employment	c	67.9	82.4	34.6	46.2	37.7	46.8
	nc						
	cv						
Work injury	c	67.9	82.4	NA	NA	37.7	46.8
	nc						
	cv						
Disability	c	27.3	41.3	NA	NA	49.7	68.1
	nc	40.6	41.1	77.3	79	21.8	15.4
	cv	26.9	27.1			10.9	11.2
Old age	c	27.3	41.3			49.7	68.1
	nc	26.9	27.1	77.3	79	21.8	15.4
	cv	40.6	41.1			10.9	11.2

Source: Author with information found on the ILO Social protection Platform (August,2021).

NB: c=contributory; cv=contributory voluntary; nc=non contributory.

### III) Factors explaining the gender difference in pension contribution:

The literature review on the gender differences in pension contribution can be mainly classified into two groups. On the one hand, there are studies that explain these inequalities by gender gap on the labor market. On the other hand, there are studies that deepen the analysis by comparing women pension coverage/contribution to a pension scheme according to the age group, maternal and marital status aspect.

In the first group of literature, there is a study by Pesando et al. (1991) on the effect of the gender differences in mortality, longevity, and turnovers on the gender differences in defined benefit pension plans. The authors did a simulation analysis with two pensions plans with and without a subsidy for earlier retirement (before 65) and with different inflation rates (0%; 5%; 10%) at

different ages of retirement (35, 50, 60, 65). They also did another analysis where they added three scenarios (existence of a surviving spouse benefit with the married couple of the same age or a man marries a woman three years younger, no surviving spouse benefit).

They used data from statistics Canada 1998 and the Public Service Superannuation Fund and chose eight private sector pension plans and two public sector plans. The analysis was carried out on the basis of the notion of backloading: “As the worker ages, the date at which pensions payments commence is nearer, and new pension credits are more valuable on this account. As the worker acquires additional years of services, each year’s wage increase enhances the value of a large number of past service credits. If females have higher turnover rates, females will be penalized by the backloading of pension compensation.”

The authors found for example a negative effect of turnover on contribution rate. An increase by 50% in the turnover results in a decrease of the contribution rate by 9% if the inflation equals 0%; by 16% at 5% of inflation rate; 20% at 10% of inflation rate. Thus, women who have higher turnover than men will likely have a lower contribution rate and consequently lower pension benefits. The effect was amplified by the inflation rate. In the second analysis with the variable surviving spouse benefit added, gender differences are also observed in terms of the cost of pension benefits measured by the contribution rate. In the absence of surviving spouse benefit, gender differences were observed only at the highest inflation rate with or without subsidy for earlier retirement. In the presence of surviving benefit, gender differences were observed at the 5% and 10% of inflation rate with or without subsidy for earlier retirement.

Another example of work done in the first group of literature review is Even et al. (1994)’s. They studied the possible explanation for the gender gap in pension coverage for both employment and retired workers. The authors assumed that “gender differences in labor market attachment, earnings and the type of employer are all sources of the gap in coverage”. They used for their study, data from the 1982 Newly Entitled Beneficiary Survey (NEBS) and the 1979 & 1988 May Current Population Surveys (CPS). They carried out a separate probit model analysis for men and women and then a computed one. The dependent variable was defined by the pension coverage and benefits. The main explanatory variables were the worker characteristics such as final annual earnings (in 1982,\$), years of tenure<sup>27</sup>, occupation, industry, full time work status, dummies for the work sector (public/private), years of labor market experience by decade, total number of jobs held

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<sup>27</sup> (1-9;10-19;20+) for the coverage equation, (1-14;15-24;25+)

beyond 1950, race (black, white, other), age and categorical measures of years of education (8 or less,9-11,12,13-15, and 16 or more).

The authors found in the separate analysis a positive effect of income, tenure, full time work status and public sector employment as the longest job held, on the probability of receiving pension income. For example, working in the public sector rather than the private sector increased this probability by 33 percentage points for women and 35 percentage points for men. Working in the public sector rather than the private sector also increased the annual pension benefits by \$ 7843 for men and \$ 4037 for women.

Concerning the computed analysis<sup>28</sup>, the authors found that 81% of the gender gap in pension was explained by gender differences in observed characteristics when they controlled for income. The gender differences in income, tenure and full-time work status explained respectively 7.1; 7.0 and 1.1 percentage points of the gender gap in pension coverage. When they did not control for income, the gender gap in pension was explained by 69% in observed differences in labor characteristics.

As for the benefit variable, of the \$ 3260 gender differences in the average benefit, \$ 2289 can be explained by differences in the labor market with controlling for income. Without controlling for income, only \$ 736 of the \$ 3260 were attributed to differences in labor markets.

Barrientos (1998) also in the first group of the literature review, studied the determinants of personal pension plan contribution in Chile and their effects. Gender gap in pension coverage can be explained by gender differences on the labor market such as occupational hours and earnings differential: household division of labor (distribution period of inactivity, household responsibilities-child and family care, hours, and mobility constraints); by pension design (defined benefit, defined contribution plans, existence of a gender bias in affiliation incentives and benefits).

The author used data from a 1994 Chilean national survey CASEN (Caracterizacion Socio Economico Nacional) and a probit model analysis for his study. The dependent variable was defined as a dummy variable equal to one if the individual contributes to a personal pension plan, zero otherwise. The main explanatory variables were personal and job characteristics (married, age group<sup>29</sup>, schooling, head of the household, self-employed, temporary, home worker, ambulatory,

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<sup>28</sup> The author did separate regressions for men and women with their own characteristics and then regress for women with their characteristics being replaced by men characteristics, for men with their characteristics being replaced by women characteristics. He then calculated the gender gap percentage explained by differences in observed characteristics (labor, other).

<sup>29</sup> 16-24,25-44,45-55.

fixed term, piecework, seasonal, permanent, trade union member); occupation (manager, professional and technical, clerical, personal services, sales, agriculture, operatives, transport and communication); net monthly earnings<sup>30</sup>; hours of work<sup>31</sup>; health insurance program affiliation<sup>32</sup>; establishment size<sup>33</sup>; region<sup>34</sup>.

The author found that being married or in cohabitation have a positive effect on the probability of contributing to a private pension plan for men but a negative effect for women. This result is explained by the private pension plan design which requires a minimum of twenty years of contribution to have access to its benefits. Married women are less likely to not fulfil this requirement as they are more likely to spend time for child and other family members care than men. They found also that the effect of age is roughly the same for men and women.

As for the employment characteristic, being self-employed, temporary workers has a negative effect for men and women. Nevertheless, the magnitude of the effect of being a temporary worker is higher for men (coefficient equal to -0.16) than women (coefficient equal to 0.08). The effect of being a home worker is negative for both men and women and is higher for women (-0.15 versus -0.02). Having a permanent job has a positive and significant impact on the probability of contributing to a private pension plan for both men and women (coefficient equal respectively to 0.22 and 0.26).

Nutz et al. (2021) study on the link between employment and individual wealth at older ages in Eastern and Western Germany can also be categorized in the first group of literature review. The authors used a sequence and cluster analysis<sup>35</sup> and four clusters were constituted for men in Western Germany, five for men in Eastern Germany, six for women in Western Germany, five for women in Eastern Germany. They also used data from German Socio-economic Panel (SOEP) 2002, 2007, 2012, 2017. The dependent variable was the individual net wealth (real and financial assets, private pension plans, life insurance, business assets, tangible assets minus the individual debts and share of jointly owned wealth). The main explanatory variable was employment trajectories<sup>36</sup> and the

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<sup>30</sup> First to fourth quintile.

<sup>31</sup> Weekly hours-weekly hours squared.

<sup>32</sup> No health insurance, Fonasa , Isapre

<sup>33</sup> Size 2-5, size 6-9, size 10-49, size 50-199, size 200 and more.

<sup>34</sup> Region 1 to region 12.

<sup>35</sup> Identification and combination of employment trajectories of retired men and women aged 20-55 from Eastern and Western Germany. Then study of the link between the clusters a constituted and individual wealth at older age thanks to multivariate OLS regression models.

<sup>36</sup> Education/training, fulltime employment, part time employment, unemployment, homemaking, retirement, other.



control variables were age, age squared, years since retirement, educational status, individual inheritances, birth cohorts, mother/father education, birth cohorts of parents, number of siblings, region type during childhood, housing prices.

The authors found that a lower association between employment trajectories and individual wealth at old age for women in comparison to men. For example, in the western Germany, having a long-term absence from the labor market had a negative impact on wealth for men; being an early retiree rather than a full timers decreased IHS transformed by 88% (78% in Eastern Germany). For women, there was no statistically significant association between the two variables.

An author worth highlighting in the second group of the literature review is Ginn (2003a) who did an analytical study that dealt with gendered lifecourse and its consequence on the labor market and pension coverage in the European Union. The gendered lifecourse is characterized on the one hand by women doing more unpaid work as care workers (childcare, informal care for older family members) and no continuous full employment and on the other hand men being the breadwinners, continuous full time employed.

The author highlighted that the effect of motherhood on the labor market and pension coverage depended on the existence or not of social policies (“carefriendliness”) to help mothers/parents such as paid maternity and parental leave, implementation of daycare for children and after school care financed partially or fully by the government. She quoted a study by Harkness and Waldfogel (1999) according to which women without children are more full time employed than women with children: the proportion of full time employed was respectively 76% and 26% for childless women and women with children in Great Britain; 72% and 40% in Germany; 75% and 61% in Sweden; 79% and 66% in Finland.

The author in the analysis also found that women in countries where there are more carefriendliness of state pensions are more likely to have access to them than women living in countries with a predominance of private pensions. In fact, private pensions are designed such there is no compensation for periods of caring during which women tend to interrupt their labor activity or take part-time jobs.

Ginn (2003b) also studied the differences in private pension coverage between three cohorts of British women (young women, 20-39; middle age women, 40-59; older women, 65+). She used General Household Surveys 1994, 1995, 1996 for her logistic regression analysis with the forward

methods of addition of explanatory variables one by one. The dependent variable was the private pension coverage and the main explanatory variables: age group (20-24, 25-29, 30-34, 35-39); marital status (married, cohabiting, single, widowed and divorced/separated) and maternal status (childless, mother with no child under 16, mother with a youngest child aged 10-15 in the household, mother with the youngest child aged 0-9 in the household). The control variables were: educational level (degree/above, A level/O level/GCSE, Other qualifications, none, No data on qualification); socioeconomic group (Professional/large mgrs.; intermediary non manual/small mgrs., Routine non manual, Manual, Self-employed, FT Student/never worked).

The author found for the younger cohort, that being married (odds=1) increased the probability of being covered in comparison to cohabiting (odds=0.98), being single (odds=0.64), widowed (odds=0.93) or divorced (odds=0.55). Childless women (odds=1) have a higher probability than mothers with a child over 16 (odds=0.40), mothers with the youngest child aged 10-15 in the household (odds=0.37), mothers with the youngest child aged 0-9 in the household (0.24). Women having a higher degree of education rather than the other types of education level, women working in larger companies have a higher probability of being covered.

For the middle-aged cohort, cohabiting and being single rather than being married increased the probability of being covered but the coefficients were not significantly different from zero. As for the younger cohort, childless women have a higher probability of being covered. The odds associated with being a mother with a child over 16, a mother with the youngest child aged 10-15 in the household, a mother with the youngest child aged 0-9 in the household were respectively equal to 0.86, 0.50, 0.29; meaning a decrease of the probability of being covered by 14%  $((1-0.86) * 100)$ ; 50%  $((1-0.50) * 100)$ ; 71%  $((1-0.29) * 100)$ . For the older cohort, being single, widowed and divorced or separated rather than being married or cohabiting increased the probability of being covered. The odds associated with the three categories of the marital status variable were equal respectively to 6.03; 4.86; 1.55.

The results of this study are very interesting as they show that apart from the coverage gap between men and women, there is also one between women according to their marital and maternal status.

The same author (Ginn, 2003c) carried out a study published also in 2003 to examine an assumption according to which motherhood has a negative impact on employment and income and pensions membership. The author studied the relationship between women's lifecycle stage and their employment and private pension coverage according to their education level. She used

data from the General Health Survey from 1994 to 1996. The lifecycle was defined as a categorical variable comprising six categories: women younger than 35 years old and childless, women with the youngest child aged 0 to 4 years old, women with the youngest child aged 5 to 9 years old, women with the youngest child aged 10 to 15 years old, mother with no children younger than 16 years old, women older than 35 years old and childless. The education level was also a categorical variable with 5 categories: A level, O level, GSE, Other qualification, no qualification. The full time employment status was defined as working minimum 31 hours per week for employees and self-employed workers and the private pension membership was either occupational related or personal for the self-employed workers.

The author found a decrease in full time employment rate for all mothers regardless of their education level but the magnitude of the effect of being a mother varied according to it. The full time employment rate of Mid-skilled women with O levels/GSE, childless and younger than 35 years old was 79% and it was equal to 15% for the same category of women but with children younger than five years old. As for the graduates' women with no child, the full employment rate was 84% while graduates with children under five years old registered a full-time employment rate of 29%.

Concerning the earnings, motherhood was negatively correlated to them for all education levels but again the effect was not the same. The median earnings of mothers of children aged 5-9 were equal to 21% of childless women younger than 35 years old 's and 17% of the median earnings of men aged 20-59. For mothers with older children, the median earnings were equal to 41% of childless women younger than 35 years old 's.

Finally, the author found that women with a higher level of education were more likely to be covered by a private pension for each category of the lifecycle and childless women were more covered than women with children. Two third of graduates and childless women contributed to a private pension while 55% of mothers of young children did.

The results of this study enable to understand that having a higher level of education does not necessarily translate into being fully employed during all the life course of a woman. Once, women become mothers, they tend to be part time employees or unemployed to take care of their children. This has a negative impact on the level of income and the level of contributions to a private pension and consequently on the private pension coverage.

#### **IV) Economic and gender analysis of the financing of pension coverage:**

##### *A) Data and Methodology:*

For all the three countries, we used gender statistics from the world bank database (labor participation rate, the share of employment in senior and middle management, the share of informal employment, the share of self employment, the share of part time) and from the ILOSTAT explorer (the share of family workers contributing to the family business, the share of employers). For data from the ILOSTAT database, data were available in value, so we calculated respectively the proportion of men and women occupying the two categories of work (% total number of workers-men/women interviewed) from 2008 to 2018.

For the variable of interest, we used gender statistics from the CEPAL database for Peru and Uruguay and from the Quarterly Labor Force Survey (QLFS) for South Africa. In this last database, data were available by quarter and not in percentage, so we calculated respectively the proportion of men and women contributing to a pension fund (% total number of workers-men/women interviewed) and then the mean for each year from 2008 to 2018.

We would have liked to do an exhaustive econometric and gender analysis of the financing of pension coverage but due to the lack of data over a long period for the moment, we decided to do instead an economic analysis and a preliminary econometric analysis. The economic analysis consisted in doing a comparative analysis between men and women but also between three countries South Africa, Peru, and Uruguay. We focused our analysis on contribution to a pension scheme as it was observed in the background section that the gender gap was more important in contributory scheme, and for availability of data reasons.

We examined a possible correlation between this variable of interest and labor market characteristics such as the labor participation rate, the share of employment in senior and middle management, the share of informal employment, the share of self employment, the share of part time, the share of family workers contributing to the family business, the share of employers. As women spend more time to take care of their children and other family members, they are less likely to participate in the labor market, they are more likely to do part time jobs and less regulated/flexible jobs often found in the informal sector. Due to the gender division of the labor mentioned in the literature review, it is expected that more women are employed in family work than men. On the other hand, they are less likely to hold high position in the company where they

are employed. To carry out the analysis, we calculated the gender gap as the difference between the value of the variable for men and the value of the same variable for men. And also, by dividing the value of the variable for women by the value of the same variable for men.)

### *B) Results:*

Overall, Uruguay presents higher contribution rates from both men and women in comparison to Peru and South Africa. (See table 42 below). Over the period 2008-2018, contribution rates were superior to 60% while for South Africa, they were comprised between 42% and 52% and for Peru, between 12.2% and 22.8%.

Concerning the gender gap in contribution to a pension fund, Uruguay registered a lower level in comparison to Peru and South Africa over the period 2008-2018. From 2008 to 2010, the gender gap was roughly equal to two percentage points then it narrowed to less than one percentage point in 2011 and from 2012 to 2018, the gender gap became negative with women contributing more than men (-3.4 percentage points in 2018).

This trend for Uruguay indicates that it has likely a less gender bias. This could be explained by a lower gender gap on the labor market.

As for South Africa, the gender gap in contribution to a pension gap varied between 4.6 percentage points (2016) and 6.5 percentage points (2013). Contrary to Uruguay, the contribution of women remained inferior to men's one over the period 2008-2018. This suggests a possible persistent gender gap in the labor market.

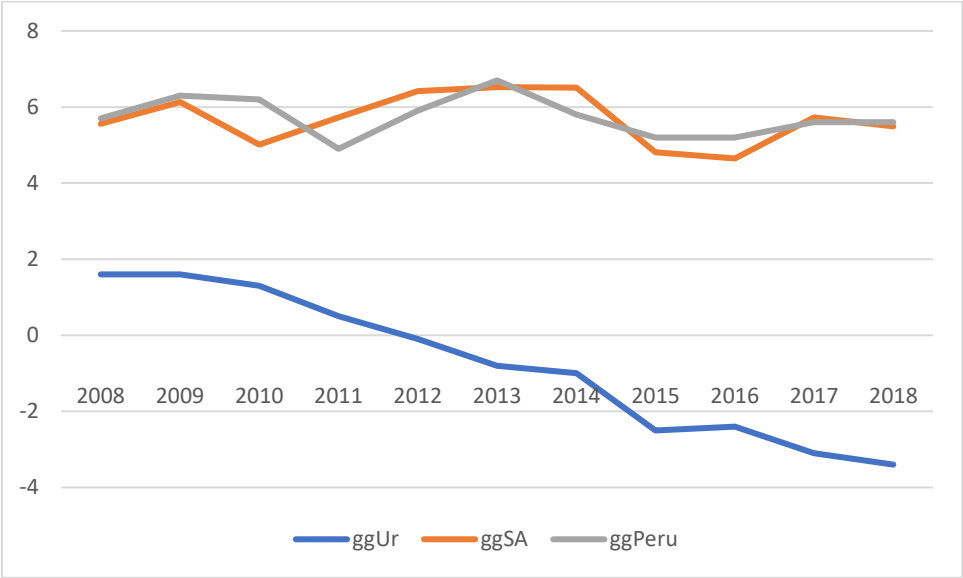
Concerning Peru, the gender gap is roughly the same as in South Africa as it fluctuated between 4.9 and 6.7 percentage points over the period studied. Nevertheless, overall Peru has the lowest contribution rates to a pension fund.

Table 42: Proportion (%) of men and women contribution to a pension fund.

	Peru		South Africa		Uruguay	
	Men	Women	Men	Women	Men	Women
2008	17.9	12.2	47.9	42.3	68.1	66.5
2009	19.6	13.3	49.1	43.0	69	67.4
2010	19.1	12.9	48.2	43.2	70	68.7
2011	19.5	14.6	50.4	44.7	72.6	72.1
2012	21.7	15.8	51.9	45.5	73.9	74
2013	22.5	15.8	51.0	44.4	74.6	75.4
2014	22.6	16.8	51.8	45.3	75.2	76.2
2015	22	16.8	48.2	43.4	75.7	78.2
2016	22.5	17.3	49.1	44.5	74.1	76.5
2017	22.8	17.2	50.6	44.8	74.3	77.4
2018	22.7	17.1	49.8	44.3	74.2	77.6

Source: Author with data from CEPAL data base and QLFS.

Graph 14: Gender gap in contribution to a pension fund (percentage points).



Source: Author with data from CEPAL data base and QLFS.

1. Analysis of the labor market characteristics at the aggregated level:

Though Uruguay has the lowest gender gap in contribution to a pension fund, the gender gap in the labor market is still important. In fact, the labor market participation rate was superior to 80% for men during the period studied while the labor participation rate for women fluctuated between 66 and 68%. Therefore, the gender gap in labor market participation was comprised between 14.53 percentage points (2018) and 18.84 percentage points (2008). This contrasting result with the magnitude of the gender gap in contribution to a pension fund in Uruguay may be explained by other factors such as the pension design which may facilitate the participation of women in pension scheme despite their lower participation in the labor market.

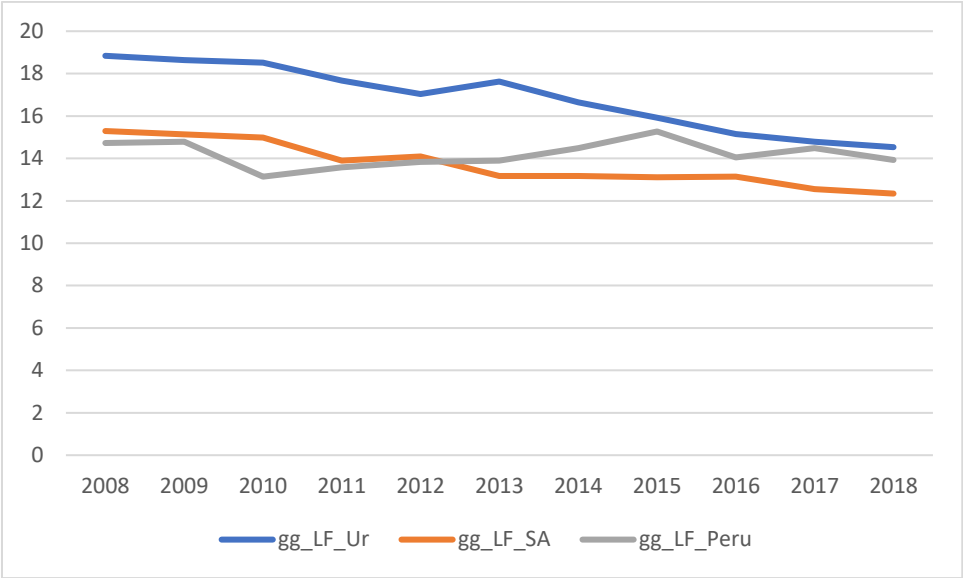
Table 43: Labor force participation rate, male/female (% of male/female population ages 15-64) (modeled ILO estimate).

	Peru		South Africa		Uruguay	
	Men	Women	Men	Women	Men	Women
2008	87.88	73.15	66.76	51.47	85.72	66.88
2009	88.47	73.68	65.04	49.91	85.86	67.22
2010	88.35	75.21	63.38	48.39	85.66	67.15
2011	88.24	74.66	63.02	49.12	85.64	67.97
2012	88.17	74.34	63.69	49.60	84.98	67.95
2013	87.83	73.94	63.91	50.73	84.85	67.22
2014	87.25	72.77	64.29	51.12	84.82	68.17
2015	86.4	71.13	65.71	52.60	84.06	68.14
2016	85.54	71.5	65.97	52.83	83.49	68.34
2017	87.57	73.09	66.46	53.91	82.98	68.19
2018	87.75	73.82	66.20	53.86	82.52	67.99

Source: Author with data from the gender statistics of the world bank database.



Graph 15: Gender gap in Labor force participation rate (percentage points).



Source: Author with data from the gender statistics of the world bank database.

As for South Africa, the gender gap in labor participation varied between 12.34 and 15.2 percentage points and it has steadily decreased. It is noteworthy to highlight that this gender gap is inferior to Uruguay’s but in terms of pension contribution South Africa gender gap was higher. This result may be again explained by other factors.

Concerning Peru, the gender gap in the labor force participation was comprised between 13.4 and 15.27 percentage points and was also surprisingly lower than Uruguay’s.

2. Analysis of the labor market characteristics at the disaggregated level:

When the labor force is disaggregated by employment sector, activity, one can see that there is a gendered division of the labor force which likely explains a higher proportion of women in part time, informal employment, self employment, family work and a lower proportion of women in higher job position. This gender gap is likely to be translated in gender gap in income, contribution to a pension plan and thus in access to a pension coverage.

Concerning the share of women employed in senior and middle management, the gender gap is very important for South Africa and Uruguay as it is at least equal to 25 percentage points over the period 2008-2018. In fact, the gender gap in Uruguay was even superior to 50 percentage points in 2008, 2009, 2010 before decreasing drastically to reach 37 percentage points in 2011. From 2010

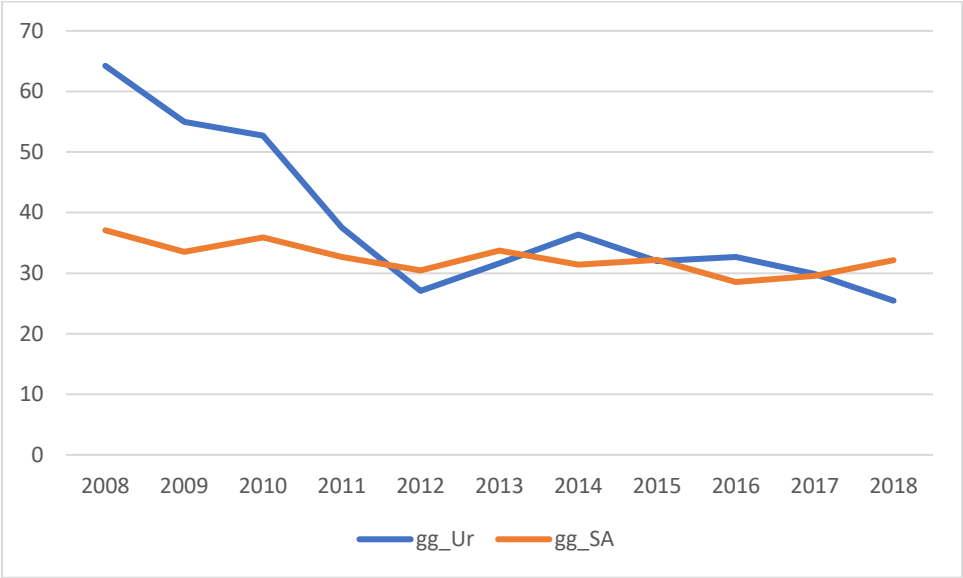
to 2018, it varied between 27 and 36 percentage points and the difference with South Africa was lower.

Table 44: Employment in senior and middle management share (%).

	Peru		South Africa		Uruguay	
	Men	Women	Men	Women	Men	Women
2008	N.A	N.A	68.54	31.46	82.12	17.88
2009	N.A	N.A	66.77	33.23	77.48	22.52
2010	N.A	N.A	67.95	32.05	76.35	23.65
2011	N.A	N.A	66.35	33.65	68.76	31.24
2012	N.A	N.A	65.23	34.77	63.53	36.47
2013	N.A	N.A	66.88	33.12	65.82	34.18
2014	N.A	N.A	65.71	34.29	68.20	31.80
2015	N.A	N.A	66.11	33.89	65.99	34.01
2016	N.A	N.A	64.27	35.73	66.33	33.67
2017	N.A	N.A	64.77	35.23	64.95	35.05
2018	N.A	N.A	66.07	33.93	62.73	37.27

Source: Author with data from the gender statistics of the world bank database.

Graph 16: Gender gap in employment in senior and middle management (percentage points).



Source: Author with data from the gender statistics of the world bank database.

For the informal sector variable, Uruguay registered the lowest gender gap as it was inferior to 1(-1) percentage point most of the time (2008, 2009, 2011, 2012, 2014, 2015, 2016) and the proportion of women working in the informal sector became even lower than men’s in 2012 and from 2015 to 2018. From this result, one can conclude there are nearly women as much as men working in the informal sector. So, women may be entitled to the same conditions of contributing to pension systems as men hence a lower gender gap in pension contribution in Uruguay.

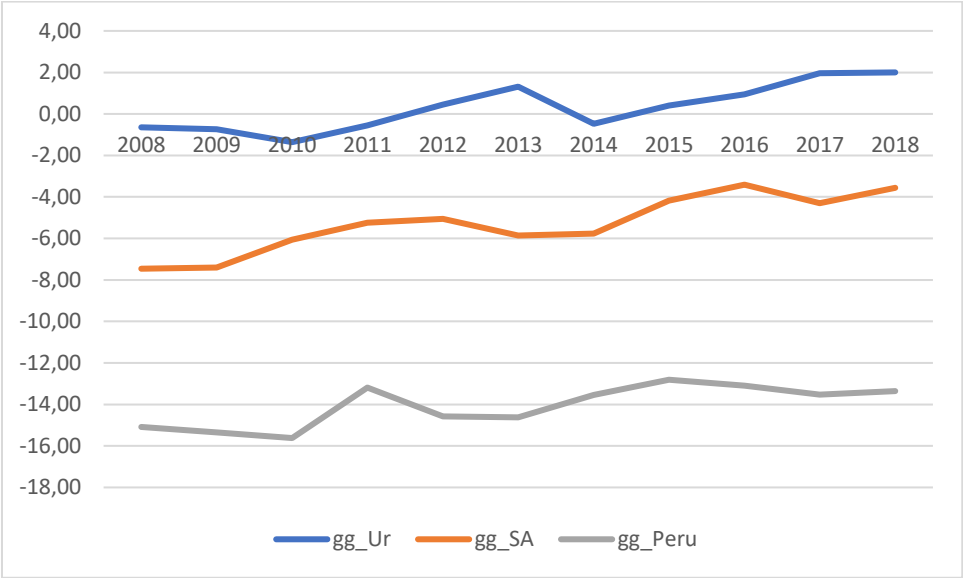
As for South Africa and Peru, the latter is the country registering the highest gender gap in informal employment as it varied between -15.2 percentage points and -12.81 percentage points over the period 2008-2018 while in South Africa, it fluctuated between -7.46 percentage points and -3.41 percentage points. Furthermore, the gender gap in informal employment in Peru remained steady though it slightly decreased in 2011 (-13.19 percentage points), 2014 (-13.54 percentage points), 2015(-12.8 percentage points).

Table 45: Informal employment share (% of total non-agricultural employment).

	Peru		South Africa		Uruguay	
	Men	Women	Men	Women	Men	Women
2008	64.72	79.80	31.87	39.33	40.49	41.13
2009	62.73	78.08	30.16	37.57	39.50	40.24
2010	62.68	78.30	31.23	37.29	38.26	39.62
2011	62.36	75.55	30.38	35.62	35.53	36.09
2012	55.34	69.92	29.46	34.52	34.37	33.92
2013	54.36	68.98	29.74	35.60	33.82	32.51
2014	53.34	66.88	29.75	35.52	22.72	23.20
2015	54.19	67.00	32.76	36.94	23.67	23.27
2016	52.41	65.51	32.74	36.15	24.53	23.59
2017	52.69	66.21	32.69	36.99	24.57	22.61
2018	53.43	66.79	33.56	37.12	24.42	22.42

Source: Author with data from the gender statistics of the World Bank database.

Graph 17: Gender gap in informal employment (percentage points).



Source: Author with data from the gender statistics of the World Bank database.

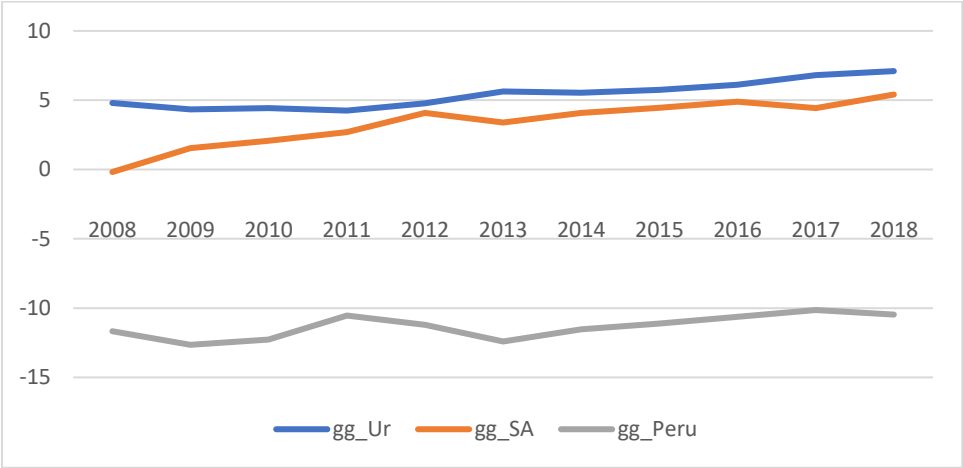
As for the self-employment, there are more women occupying this category of employment for Peru. This can be explained by the flexible nature of it and the existence of fewer barriers to have access to it for employment especially mothers, married women contrary to dependent employment. For the two other countries, men occupy more this category of employment. There are maybe specific characteristics for this unexpected result.

Table 46: Self-employment share (% men/women employment).

	Peru		South Africa		Uruguay	
	Men	Women	Men	Women	Men	Women
2008	51.21	62.87	15.81	15.99	31.56	26.77
2009	50.58	63.23	16.19	14.64	31.12	26.78
2010	51.09	63.37	16.73	14.65	30.42	25.99
2011	51.74	62.28	16.83	14.14	29.96	25.71
2012	50.22	61.43	17.17	13.08	29.21	24.43
2013	48.86	61.28	16.33	12.95	29.78	24.14
2014	49.61	61.15	15.90	11.82	29.24	23.69
2015	48.99	60.10	16.52	12.07	29.88	24.13
2016	49.73	60.35	17.24	12.34	30.58	24.46
2017	50.38	60.52	17.41	12.98	31.08	24.28
2018	50.38	60.86	17.95	12.54	31.35	24.25

Source: Author with data from the gender statistics of the World Bank database.

Graph 18: Gender gap in self employment (percentage points).



Source: Author with data from the gender statistics of the World Bank database.

For the part-time employment, the proportion of women is higher than for men's in Peru and South Africa. This can be explained by the same reasons highlighted for the informal sector in Peru.

Table 47: Part time employment, female (% of total part time employment).

	<b>Peru</b>	<b>South Africa</b>	<b>Uruguay</b>
2008	58.75	57.20	N.A
2009	58.43	58.34	N.A
2010	58.11	58.04	N.A
2011	58.81	57.86	N.A
2012	58.67	58.21	N.A
2013	59.29	57.72	N.A
2014	59.26	58.77	N.A
2015	59.69	58.94	N.A
2016	60.00	57.81	N.A
2017	59.01	58.21	N.A
2018	59.55	57.86	N.A

Source: Author with data from the gender statistics of the World Bank database.

For the family work contributing to the family business variable, all the three countries registered negative values of the gender gap. There are more women working for family work than men. Peru has the highest proportion of women working for the family relative to men as the gender gap fluctuated between -15.99 percentage points and -13.02 percentage points over the period 2008-2018. For South Africa, it fluctuated between -0.32 percentage points (2017) and -1.03 percentage points (2008) and Uruguay between -0.44 percentage points (2017) and -2.63 percentage points (2011). The results are in accordance with the expected trend as women tend to do more family work (very often unpaid) than men in line with their traditional role in the society. This will likely have a negative impact on their contribution to a pension fund. Peru which registered more women working for the family than men has also the highest gender gap in contribution to a pension fund.

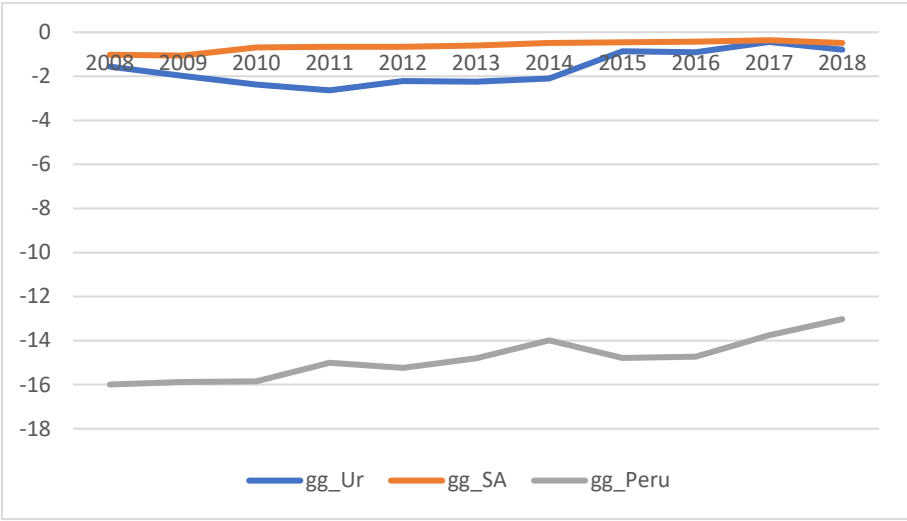


Table 48: The share of family workers contributing to the family business:

	Peru		South Africa		Uruguay	
	Men	Women	Men	Women	Men	Women
2008	9.10	25.09	0.41	1.44	0.88	2.43
2009	9.14	25.03	0.40	1.46	0.83	2.82
2010	8.85	24.70	0.56	1.24	0.70	3.07
2011	9.23	24.23	0.47	1.13	0.67	3.31
2012	8.24	23.48	0.38	1.03	0.69	2.90
2013	8.17	22.97	0.37	0.98	0.61	2.86
2014	8.49	22.48	0.35	0.82	0.58	2.68
2015	7.69	22.48	0.37	0.82	0.48	1.34
2016	7.56	22.29	0.30	0.73	0.44	1.34
2017	7.30	21.05	0.38	0.74	0.57	1.02
2018	7.74	20.77	0.31	0.80	0.42	1.21

Source: Author with data from the gender statistics of the ILOSTAT explorer.

Graph 19: Gender gap in the share of family workers contributing to the family business (percentage points).



Source: Author with data from the gender statistics of the ILOSTAT explorer.

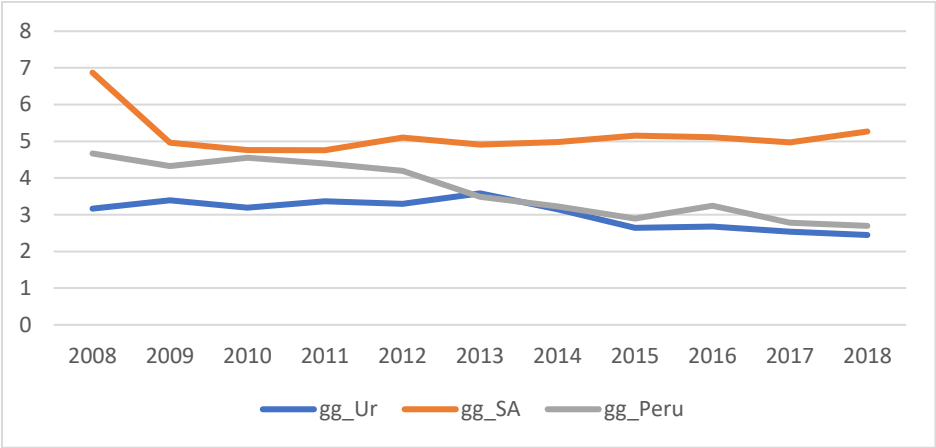
As for the share of employers on the labor market, the gender gap is positive for all the three countries. There are more men than women occupying this position. This trend can be explained by the traditional division of the labor such men are more likely to hold a high responsibility related work than women. South Africa has the highest gender gap with its value fluctuating between 4.76 percentage points and 6.87 percentage points.

Table 49: Employers share.

	Peru		South Africa		Uruguay	
	Men	Women	Men	Women	Men	Women
2008	7.38	2.72	9.98	3.11	6.31	3.14
2009	7.24	2.92	7.60	2.63	6.35	2.96
2010	7.58	3.02	7.60	2.84	6.27	3.07
2011	7.02	2.63	7.61	2.85	6.67	3.31
2012	7	2.80	7.54	2.44	6.19	2.90
2013	6.20	2.71	7.50	2.58	6.44	2.86
2014	5.66	2.43	7.48	2.50	5.83	2.68
2015	5.25	2.35	7.41	2.26	5.36	2.71
2016	5.55	2.30	7.75	2.64	5.32	2.64
2017	5.03	2.24	7.73	2.76	5.20	2.67
2018	5.04	2.34	7.57	2.29	4.85	2.40

Source: Author with data from the gender statistics of the ILOSTAT explorer.

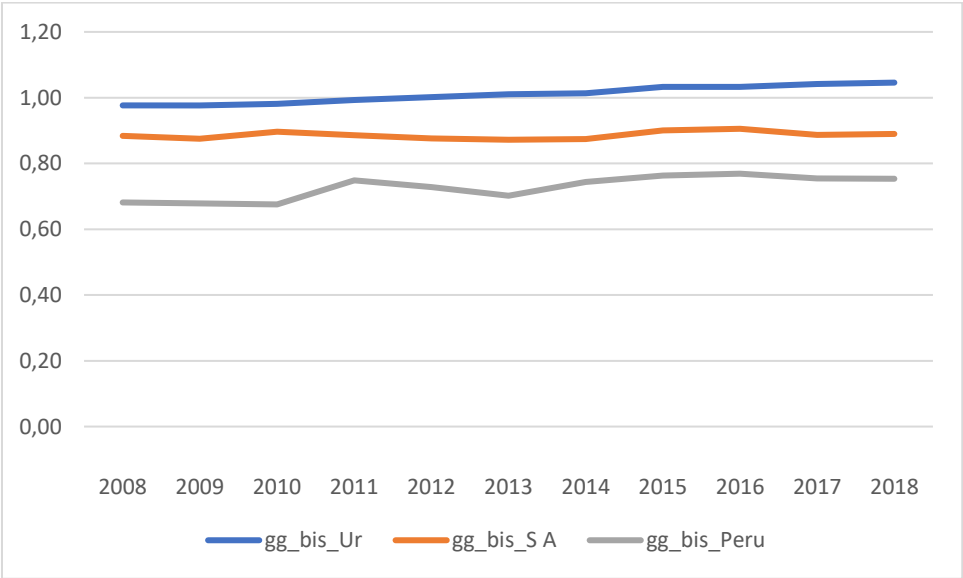
Graph 20: Gender gap in the share of employers (percentage points).



Source: Author with data from the gender statistics of the ILOSTAT explorer.

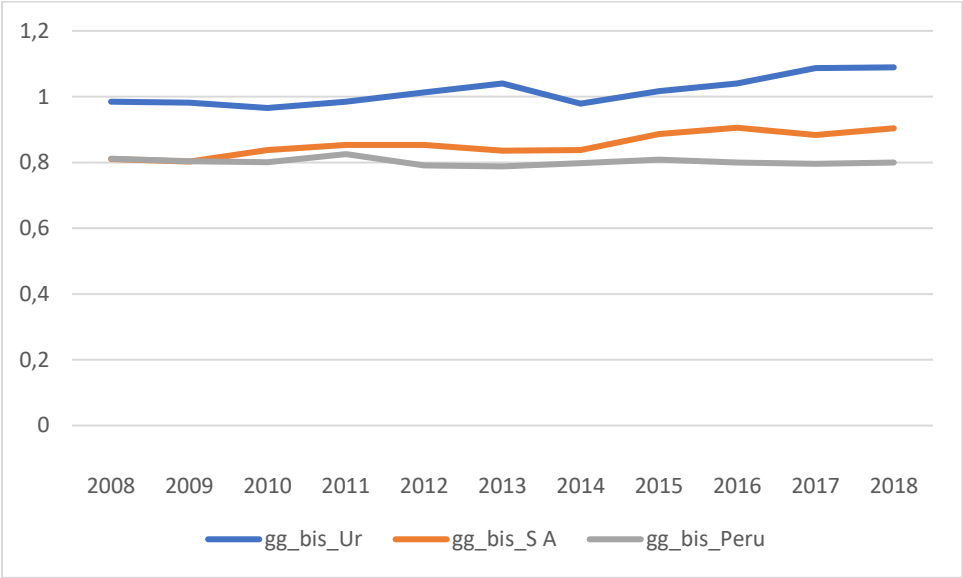
NB: When we used the second measure of the gender gap (gender gap ratio) by dividing the value of the variable for women by the value of the same variable for men over the period studied, we did not find any significant difference with the results above though the unit of measure is not the same. This can be seen in the following graphs constructed for some variables taken into account in the study.

Graph 21: Gender gap ratio in the contribution to a pension fund (percentage points)



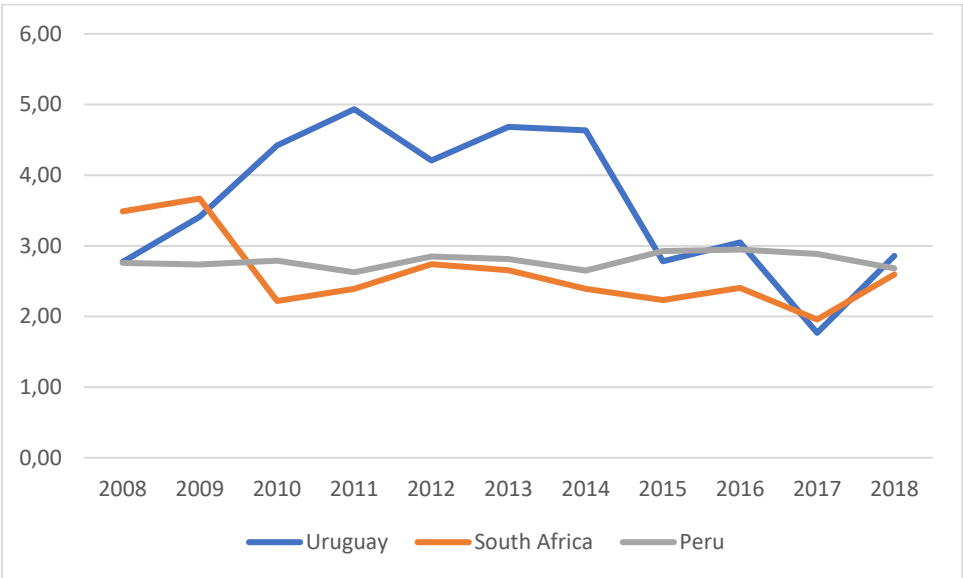
Source: Author with data from CEPAL data base and QLFS.

Graph 22: Gender gap ratio in the informal employment (percentage points).



Source: Author with data from the gender statistics of the World Bank database.

Graph 23: Gender gap ratio in the share of family workers (percentage points).



Source: Author with data from the gender statistics of the ILOSTAT explorer.

## V) Preliminary econometric analysis:

### *A) Presentation of the model:*

Based on the literature review done in the section III), we defined the following panel model equation for the preliminary econometric analysis:

$$GG_P(i,t) = a_i + W_{ggL}(i,t) + \sum X(i,t) + u(i,t) + e(i,t)$$

With  $GG_P$  = the gender gap in contribution to a pension fund;  $i = \{\text{Uruguay, South Africa, Peru}\}$   
 $t = \{2008, 2009; \dots; 2018\}$ ;  $a_i$  the constant;  $W_{ggL}$  = the gender gap on the labor market (labor participation rate, informal employment, self employment, family work contributing to a family business, employers);  $\sum X(i,t)$  = set of control variables namely the gender gap in life expectancy, the fertility rate, the proportion of the rural population;  $u(i,t)$  = the fixed effect country;  $e(i,t)$  = the term of the error.

NB: We chose to use the second measure of the gender gap. As it is a ratio obtained by dividing the value of the variable for women by the value of the same variable for men over the period studied, if it increases, it likely means that there are more and more women contributing to a pension fund; there are more and more women working in the informal sector/self employment, doing family work or being employers. There are more and more women having a higher life expectancy than men.

We used the same values of the variable of interest and the main explanatory variable of the economic analysis. The control variables fertility rate and life expectancy data were collected from the gender statistics of the World Bank data base and the rural population variable from the World Development Indicators database of the World Bank. We expect that the higher the fertility rate is the higher the gender gap in contributing to a pension fund is. As mentioned in the literature review, the more children women have, the less likely they occupy steady and well paid employment especially during the first years of their children as they spend more time to take care of them than men.

For the life expectancy variable, we expect it to decrease the gender gap in pension contribution: Women tend to live longer so to receive the same amount of pension as men, they may be incited to contribute more to a pension fund.

For the rural population variable, we expect it to increase the gender gap in pension contribution. The higher the proportion of the rural population is, the higher the probability to have a traditional division of the work is; with women doing more unpaid family work, taking care of the children and the elderly members of the household, doing part time jobs rather than being salaried, working in the formal sector. Thus, they are less likely in this case to contribute to a pension fund.

### B) Results:

We did a regression with the fixed effect model and another one with the random effect model with the main explanatory variable being the gender gap in labor participation rate. We then carried out a Hausman test. The p-value associated with the Hausman statistic test is inferior to 5%. Thus, the null hypothesis is not accepted, and the fixed effect model is preferred to the random effect model. (see tables 50 and 51 below).

Table 50: Summary table of the results of the fixed effect and random effect models regressions.

Variable	Fixed effect Model	Random Effect Model
Gender Gap ratio in labor participation rate	0.75**	-0.39
Gender gap ratio in life expectancy	-4.08**	4.95***
Fertility rate	-0.22***	-0.21***
Rural population(%)	-0.001	-0.001
_cons	5.25**	-3.68***
N	31	31
R2	0.64	0.71

Source: Author using data from CEPAL data base and QLFS, gender statistics of the World Bank database and of the ILOSTAT explorer, the WDI database.

NB: \*\*\*: significant at 1%; \*\*: significant at 5%; \*: significant at 10%.

Table 51: Summary of the Hausman test.

Null hypothesis	Ho: Difference in coefficients not systematic
Statistic Test	Chi2(4) =45.08
Pvalue	0.0000

Source: Author using data from CEPAL data base and QLFS, gender statistics of the World Bank database and of the ILOSTAT explorer, the WDI database.

NB: \*\*\*: significant at 1%; \*\*: significant at 5%; \*: significant at 10%.

In term of the overall significance, the  $R^2$  within is equal to 0.64 which means that 64% of the variability of the gender gap ratio in pension contribution is explained by the model.

The coefficient associated with the gender gap ratio in labor market is positive and significantly different from zero. This means that the more there are women in the labor participation, the more women will be contributing to the pension fund relatively to men. For 1% increase in the gender gap ratio in the labor participation rate, there is an increase of 0.75 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the gender gap ratio in life expectancy is negative and significantly different from zero. The result is not in accordance with what is expected as the more, women live longer than men the less, there are women contributing to a pension fund. This may be explained by the existence of compensating measures in place for the time spent taking care of the children, the elderly family members. For 1% increase in the gender gap ratio in the life expectancy, there is a decrease of 4.08 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the fertility rate variable is negative and significantly different from zero. The result is in accordance with what is expected as the higher the number of children a woman has, the less is she likely to contribute to a pension fund relative to a man. For 1% increase in the fertility rate, there is a decrease of 0.22 in the gender gap ratio in pension contribution all other things being equal.



The coefficient associated with the rural population variable is negative but not significantly different from zero. The sign of the coefficient is in accordance with what is expected as the higher the proportion of the rural population is, the higher the probability to have a traditional division of the work is. Hence a lower proportion of women contributing to a pension fund relatively to men.

We then did new regressions by replacing the gender gap in labor participation rate by the gender gap in informal employment, in self employment, in family work and finally in employers share. (See Table 52 below).

The model 2 differs from the previous model (model 1) by replacing the gender gap ratio in labor participation rate by the gender gap ratio in informal employment.

In term of the overall significance, the  $R^2$  within is equal to 0.75 which means that 75% of the variability of the gender gap ratio in pension contribution is explained by the model.

The coefficient associated with the gender gap ratio in informal employment is positive and significantly different from zero. This means that the more there are women in the informal employment, the more women will be contributing to the pension fund relatively to men. This result is contrary to what is expected. This result differs from the expected one. This may be explained by the fact that some women in the informal employment manage to earn enough money to finance their pension coverage. For 1% increase in the gender gap ratio in the informal employment, there is an increase of 0.37 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the gender gap ratio in life expectancy is negative but not significantly different from zero.

The coefficient associated with the fertility rate variable is negative and significantly different from zero as in the previous model. For 1% increase in the fertility rate, there is a decrease of 0.25 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the rural population variable is this time positive but not significantly different from zero.

Table 52: Summary table of the results of the regressions with the disaggregated labor market variables:

Variable	Model 2	Model 3	Model 4	Model 5
Gender Gap in informal employment	0.37***			
Gender Gap in self employment		-0.06***		
Gender gap in family work			-0.01*	
Gender gap in employers share				-0.02
Gender gap in life expectancy	-2.68	-4.73**	-4.70**	-4.87**
Fertility rate	-0.25***	-0.14**	-0.17***	-0.15*
Rural population(%)	0.005	-0.02**	-0.01	-0.02
_cons	3.93*	6.84***	6.66***	6.86***
N	31	31	31	31
R2	0.75	0.64	0.63	0.57

Source: Author using data from CEPAL data base and QLFS, gender statistics of the World Bank database and of the ILOSTAT explorer, the WDI database.

NB: \*\*\*: significant at 1%; \*\*: significant at 5%; \*: significant at 10%.

The model 3 differs from the model 1 by replacing the gender gap ratio in labor participation rate by the gender gap ratio in self employment.

In term of the overall significance, the  $R^2$  within is equal to 0.64 which means that 64% of the variability of the gender gap ratio in pension contribution is explained by the model.

The coefficient associated with the gender gap ratio in self employment is negative and significantly different from zero. This means that the more there are women in self employment, the less there will be women contributing to the pension fund relatively to men. This result is in accordance with what is expected. For 1% increase in the gender gap ratio in self employment, there is a decrease of 0.06 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the gender gap ratio in life expectancy is negative and significantly different from zero as in the model 1. For 1% increase in the gender gap ratio in the life expectancy, there is a decrease of 4.73 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the fertility rate variable is negative and significantly different from zero as in the model 1. For 1% increase in the fertility rate, there is a decrease of 0.14 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the rural population variable is negative and significantly different from zero. For 1% increase in the rural population proportion, there is a decrease of 0.02 in the gender gap ratio in pension contribution all other things being equal.

The model 4 differs from the model 1 by replacing the gender gap ratio in labor participation rate by the gender gap ratio in family work contributing to family business.

In term of the overall significance, the  $R^2$  within is equal to 0.63 which means that 63% of the variability of the gender gap ratio in pension contribution is explained by the model.

The coefficient associated with the gender gap ratio in family work is negative and significantly different from zero. This means that the more there are women working for the family, the less there will be women contributing to the pension fund relatively to men. This result is in accordance with what is expected. For 1% increase in the gender gap ratio in family work, there is a decrease of 0.01 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the gender gap ratio in life expectancy is negative and significantly different from zero as in the model 1. For 1% increase in the gender gap ratio in the life expectancy, there is a decrease of 4.70 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the fertility rate variable is negative and significantly different from zero as in the model 1. For 1% increase in the fertility rate, there is a decrease of 0.17 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the rural population variable is negative but not significantly different from zero.

The model 5 differs from the model 1 by replacing the gender gap ratio in labor participation rate by the gender gap ratio in employers share.

In term of the overall significance, the  $R^2$  within is equal to 0.57 which means that 57% of the variability of the gender gap ratio in pension contribution is explained by the model.

The coefficient associated with the gender gap ratio in the employers share is negative but not significantly different from zero. This result is not in accordance with what is expected.

The coefficient associated with the gender gap ratio in life expectancy is negative and significantly different from zero as in the model 1. For 1% increase in the gender gap ratio in the life expectancy, there is a decrease of 4.87 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the fertility rate variable is negative and significantly different from zero as in the model 1. For 1% increase in the fertility rate, there is a decrease of 0.15 in the gender gap ratio in pension contribution all other things being equal.

The coefficient associated with the rural population variable is negative but not significantly different from zero.

As in the economic analysis, this preliminary econometric analysis shows that the relationship between the gender gap ratio in pension contribution and the gender inequalities observed on the labor markets is not systematic.

## **Conclusion:**

This chapter has for aim to carry out an economic and gender analysis of the financing of pension coverage with a case study of Peru, South Africa, Uruguay over the period 2008-2018. The study was based on the hypothesis according to which the gender gap in contribution to a pension scheme can be explained by the gender gap on the labor markets such as a lower labor force participation of women, a higher proportion of women occupying traditional women related jobs (informal employment, self employment , part time job, family work), lower earnings.

Using data from the gender statistics of the world bank, of the ILOSTAT explorer, the WDI database and CEPAL databases and the Quarter Labor Force Survey of South Africa, we found that there was indeed a gender gap in contribution to a pension fund for all the three countries. Uruguay had the lowest values. By analyzing the labor market characteristics of each country, we found that there may not be a linear correlation between the gender gap observed in the labor market (aggregated and disaggregated level) and the gender gap in the contribution to a pension fund. In fact, Uruguay which registered the lowest gender gap in pension contribution had however the highest gender gap labor force participation and the lowest gender gap in informal employment.

Nevertheless, the results of this analysis enabled us to conclude that it is important that governments and other society actors keep on making efforts to reduce gender gap in the labor market by for example implementing carefriendly policies in order to encourage women to work more in the formal sector, to be full time employees, to fulfil higher position in the labor market even when they marry and become mothers. The pension schemes notably the contributory one should also be gender equitable by being more inclusive, flexible and erase barriers to have access to them for women whether they are married/mothers or not.

This study is an economic study so there are likely other factors explaining the gender gap in pension contribution that were not mentioned here. Hence, we carried out a preliminary econometric analysis. We used the variables mentioned in the economic analysis and control variables such as gender gap in life expectancy, fertility rate and rural population. We found no systematic positive relationship between the gender inequalities observed on the labor market and the gender gap in contributing to pension system. A more exhaustive econometric analysis in the future may be undertaken to complete the analysis.

Women constitute more than half of the population of the countries of Africa and Latin America. It is necessary to reduce the gap between men and women in social protection. Reducing this gap

will not only solve a human problem, but also increase their participation and guarantee the sustainability of the financing of social protection.

## General conclusion:

The purpose of our PhD thesis was to reflect on the factors influencing the financial sustainability of social protection systems in African and Latin American countries. The choice of the subject was motivated by the importance of achieving universal social protection in accordance with the SDGS 1.3, 3.8, 5.4, 8.5, 10.4 to cope with different types of risk (illness, unemployment, lack of income at older age and during maternity leave, death of the breadwinner, ect.) and to eradicate poverty, inequalities. We chose to focus on two of the eight recommendations made by the ILO that is to say mobilizing domestic resources, increasing social protection coverage by extending it to the population usually left behind such as informal workers, women.

Through this thesis, we wanted to contribute to the literature by focusing on the two regions, by using recent data, by carrying out analyses at both aggregated and disaggregated level of main explanatory variables, by realizing case studies.

The PhD thesis was organized in 4 chapters: chapter 1-Tax revenues and social protection financing in African and Latin American countries; chapter 2-Tax revenues and social protection financing: case study of South Africa; chapter 3-Social protection and informal sector: case study of Uruguay; chapter 4-Economic and gender analysis of the financing of pension coverage: case study of Peru, South Africa and Uruguay.

The aim of the chapter 1 was to study the effect of tax revenues on social protection financing. It was assumed that the more a country has available domestic resources, the more social protection systems will be financed.

Using a panel analysis on 30 countries, we found that tax revenues and “resource” tax revenues had a positive but not significant effect on public spending on social protection (proxy for social protection funding). As for “non resources” tax revenues, they had a significant positive effect.

For 1% increase in “non-resource” tax revenues as a percentage of GDP, there were 0,34 percentage points increase in public social protection expenditures as a percentage of GDP, all other things being equal.

The control variables (rural population, population aged 65 and over, and under-five mortality rate) were also significantly different from zero at the aggregate level as well as at the disaggregated level. On the aggregated level, we found that for 1% increase in the share of the rural population in the

total population, there were 0.2 percentage points decrease in public social protection expenditure as a percentage of GDP.

For 1% increase in the proportion of people aged 65 and over in the total population, there were 0.61 percentage points increase in public social protection expenditures as a percentage of GDP.

For 1% increase in the share of the under-five mortality rate, there were 0.03 percentage points decrease in public social protection expenditure as a percentage of GDP.

At the disaggregate level, in the model with “non resource” tax revenues, we had for 1% increase in the share of people aged 65 and over in the total population, there were 0.53 percentage points increase in public spending on social protection as a percentage of GDP, all other things being equal. For 1% increase in the share of the under-5 mortality rate, there were 0.02 percentage points decrease in public social protection expenditure as a percentage of GDP, all things being equal.

When we controlled for a potential reverse causality, the “non resource” tax revenues remained significant at t-3 and the three control variables at t-1, t-2, t-3.

The purpose of the chapter 2 was to keep on reflecting on the contribution of tax revenues to social protection financing by verifying if the results obtained in the chapter 1 were also observed within a country. Thus, we did a case study of the nine provinces of South Africa. We found that tax revenues did not have either a significant effect on public social protection expenditures as in chapter one. Nevertheless, national transfers to provinces had a higher and significant effect on the variable of interest. For an increase of 1% in national transfers, there were 0.03 percentage points in social protection expenditures other things being equal. At the disaggregated level, the Provincial Equity Share had a significant positive effect contrary to conditional grants. For an increase of 1% in provincial equity share, there were 0.04 percentage points in social protection expenditures other things being equal.

The control variables real GDP per capita (in thousands rands), the proxy of the rural population had also a significant effect at the aggregate level. For an increase of 1% in real GDP per capita, there were 0.002 percentage points increase in social protection expenditures. For an increase of 1% in the number of households using wood relatively to those using electricity for cooking, there were a decrease of 0.002 percentage points of social protection expenditures.

At the disaggregated level, in the model containing the PES, the two control variables remained significant and the variable “population aged 65 and above” was also significant: For an increase of 1% in real GDP per capita, there were 0.003 percentage points increase in social protection expenditures. For an increase of 1% in the number of households using wood relatively to those



using electricity for cooking, there were a decrease of 0.002 percentage points of social protection expenditures.

For an increase of 1% in population aged 65 and above, there were 0.04 percentage points increase in social protection expenditures.

The introduction of lagged variables did not alter the significant effect of national transfers at t-1, t-2, t-3. The value of the coefficient remained the same. As for the component PES, for an increase of 1% in provincial equity share, there were 0.02 points of percentage in social protection expenditures at t-1, t-2 other things being equal.

In the chapter 3, we wanted to see if in the presence of a more inclusive policy of informal workers in the social protection “monotributo” in Uruguay, there is still a coverage gap between them and formal workers.

We used a logistic regression analysis and we found that being self employed and possessing or not property or capital decreases the probability of being a beneficiary of pension, health and accident insurance, unemployment benefits, maternity coverage. It is also the case for being independent worker for the pension, health and accident insurance and unemployment benefits.

Being self employed and possessing property or capital decreased by 83% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreased by 97% the probability of being a pension beneficiary given that the other variables in the model are held constant.

Being an independent worker rather than a salaried worker decreased by 51% the probability of being a pension beneficiary given that the other variables in the model are held constant.

Being self employed and possessing property or capital decreased by 76% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreased by 60% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant. Being an independent worker rather than a salaried worker decreased by 94% the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant.

Being self employed and not possessing property or capital decreased by 78% the probability of being an unemployment beneficiary given that the other variables in the model are held constant.

Being self employed and possessing property or capital decreases by 69% the probability of receiving a maternity benefit given that the other variables in the model are held constant. Being self employed and not possessing property or capital decreases by 48% the probability of receiving a maternity benefit given that the other variables in the model are held constant.

We can conclude from these results that there is still a coverage gap between informal workers and formal in Uruguay despite the presence of “monotributo”

Apart from the results highlighted above, the level of education, the workplace, age, gender and the relationship to the head of the household had also a significant effect on the variable of interest most of the time. For example, having the Middle school level (common or special) rather than only the primary and preschool education level increases by 33% the probability of being pension beneficiary given that the other variables in the model are held constant. Having the baccalaureate education level (general or technology) rather than only the primary and preschool education level increases by 93% the probability of being a pension beneficiary given that the other variables in the model are held constant. Having attended technical training (without primary/with primary school level/with middle school /High school completed) increases by 120% the probability of being a pension beneficiary in comparison to having the primary and preschool level given that the other variables in the model are held constant.

Having higher education (training in teaching profession, tertiary specialization, university level, postgraduate level) increases by 186% the probability of being pension beneficiary in comparison to having the primary and preschool level given that the other variables in the model are held constant. Having a higher education (training in teaching, in tertiary specialization, university level, postgraduate level) rather than only the primary and preschool education level increases by 96% the probability of receiving a maternity benefit given that the other variables in the model are held constant.

Having the Middle School level (common or special), High school education level, having attended technical training increases the probability of being a health and accident insurance beneficiary given that the other variables in the model are held constant.

Being a man rather than a woman increases by 38% the probability of being a pension beneficiary given that the other variables in the model are held constant. Being for example the spouse of the head of the household decreases by 52% the probability of receiving an unemployment relatively to being the head of the household given that the other variables in the model are held constant.

Working in Artigas rather than Montevideo decreases by 67% the probability of receiving a health and accident benefit given that the other variables in the model are held constant.

Finally, the chapter 4 dealt with gender gap in contributions to a pension system in Peru, South Africa and Uruguay. The aim was to study if the gender gap observed in the pension system financing is a reflection or not of the gender gap on the labor market. We found that there was indeed a gender gap in pension contribution for Peru, South Africa and Uruguay though the magnitude was not the same and there was no systematic linear correlation with gender gap observed in the labor market at the aggregated and disaggregated level. For example, Uruguay registered a lower level in of the gender gap in contribution to a pension fund in comparison to Peru and South Africa over the period 2008-2018. From 2008 to 2010, the gender gap was roughly equal to two percentage points then it narrowed to less than one percentage point in 2011 and from 2012 to 2018, the gender gap became negative with women contributing more than men (-3.4 percentage points in 2018). However, the gender gap in labor market participation of Uruguay was the highest among the three countries studied as it was comprised between 14.53 (2018) and 18.84 percentage points (2008). Nevertheless, for the informal sector variable, Uruguay registered the lowest gender gap as it was inferior to 1 percentage point most of the time (2008, 2009, 2011, 2012, 2014, 2015, 2016) and the proportion of women working in the informal sector became even lower than men's in 2012 and from 2015 to 2018.

We carried out also a preliminary econometric analysis. We used the variables mentioned in the economic analysis and control variables such as gender gap in life expectancy, fertility rate and rural population. We found again no systematic positive relationship between the gender inequalities observed on the labor market and the gender gap in contributing to pension system. For example, the coefficient associated with the gender gap ratio<sup>37</sup> in labor participation rate was positive and significantly different from zero.. For 1% increase in the gender gap ratio in the labor participation rate, there was an increase of 0.75 in the gender gap ratio in pension contribution all other things being equal. The coefficient associated with the gender gap ratio in informal employment was positive and significantly different from zero. The coefficient associated with the gender gap ratio in self employment was negative and significantly different from zero. The coefficient associated

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<sup>37</sup> The gender a ratio was obtained by dividing the value of the variable for women by the value of the same variable for men over the period studied, if it increases, it likely means that there are more and more women contributing to a pension fund; there are more and more women working in the informal sector/self employment, doing family work or being employers. There are more and more women having a higher life expectancy than men.

with the gender gap ratio in family work was negative and significantly different from zero. The coefficient associated with the gender gap ratio in the employers share was negative but not significantly different from zero

The results obtained in this PhD thesis were interesting and enabled us to draw some recommendations that could be followed by developing countries.

From the results of Chapter one, we can recommend to governments to keep on making efforts to mobilize domestic resources, to allocate them efficiently to priority sectors of development notably the social protection sector. Therefore, they should reform their fiscal system and make it less complex for the population. They should make it progressive in order not to penalize poor households. They should also eliminate fiscal frauds. They should be taken accountable for how they use the available domestic resources. They should sensitize citizens about the importance of paying taxes to finance public services. They should also improve their information system to boost the monitoring of tax revenues collection, allocation, and their impact.

Even if the increase in tax revenues may not translate immediately into a strengthening of the sustainability of the financing of social protection, the results above show a positive effect in the medium term.

Regarding, the “non resource” tax revenues that have a significant positive effect on social protection, governments should put more emphasis on them as they are less volatile than their counterpart. In particular, African and Latin American governments should focus on mobilizing the Value Added Tax which is not yet widely applied. For countries exploiting natural resources, they should put at better use the resource tax revenues collected and avoid the rent capture phenomenon. Specifically, governments could adopt natural resource income smoothing mechanisms to cope with price volatility in global markets.

Concerning the results obtained with the introduction of lagged variables, one can conclude that it may take time to observe the positive effect of tax revenues. Thus, governments should bear that in mind when they put in place reforms.

The results of the chapter two suggest the importance of national transfers to provinces in a federal/decentralized government (here, South Africa). Hence, it should maintain them, increase them if possible and keep on using the equity share formula to allocate equitably the nationally raised revenue. Provincial governments should allocate a greater part of national transfers to the financing of social protection. The government could also put in place legislation which gives

provinces and local authorities greater powers in the collection of tax revenues as they are closer to the needs of the population.

Other lessons that could be drawn from the findings of our PhD thesis notably from those of the chapters 3 and 4 are that governments should make more flexible the social protection systems in order to be more inclusive and to achieve universal social protection. To promote the extension of social protection to informal workers, government should define complementary policies such as urban planning consistent with social protection, improving the quality of education, technical training for young people and adults of working age, improving employment, promotion of informal sector organizations, and women emancipation programs. They could also take example on Uruguay and other Latin American countries that have put in place monotaxes schemes. This scheme “is a combined tax and social security contributions collection method for independent workers with limited turnover and with small commercial activities”. (ILO, 2014). The criteria of eligibility are: unipersonal enterprise, non family owned enterprise composed of two persons with no employees, family owned enterprises with maximum three partners, enterprises with no salaried workers and a small income. If not yet present, they should have mixed social protection systems such there are contributory and compulsory schemes for individuals earning an income above a certain threshold and voluntary schemes for the rest of the population.

These policies are likely to increase the participation of the informal sector in the social protection system and improve the sustainability of its financing. It should also be noted that extending social protection to informal workers is a way to ease the transition from the informal economy to the formal economy.<sup>38</sup>

To decrease gender gap in participation to the contribution to pension systems, governments should implement carefriendliness policies as suggested by Ginn (2003) in order to encourage women to work more in the formal sector, to be full time employees, to fulfil higher position in the labor market even when they marry and become mothers. They could comprise the creation or the increase of childcare centers, the provision to working mothers of additional years of contribution per child, making the labor market more flexible for working mothers, raising the salary for women to achieve equal payment with their counterpart that have the same level of skills. Governments could also make part time jobs less precarious, put in place incentive measures towards companies that support gender equality and working mothers.

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<sup>38</sup> This remark was inspired by reading an article of WIEGO (2013) on the issue.

Finally, governments should place greater emphasis on girls' education at all levels and on all policies to empower women.

Women constitute more than half of the population of the countries of Africa and Latin America. It is necessary to reduce the gap between men and women in social protection. Reducing this gap will not only solve a human problem, but also increase their participation and guarantee the sustainability of the financing of social protection schemes.

As already mentioned in the chapter 4, the economic and gender analysis and the preliminary econometric analysis needs to be completed by a more exhaustive econometric analysis. We hope to continue this reflection in the future. This will be also motivated by the observed consequences of the current pandemic on women who are the most affected due in great part to a higher proportion occupying less protected jobs, lower social protection coverage.

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## Table des matières

Abréviations :.....	12
Introduction générale :.....	16
Chapitre 1: Tax revenues and social protection financing in African and Latin American countries. ....	28
Introduction :.....	29
II)Background:.....	31
A) Brief presentation on social protection and its current trend in terms of coverage: .....	31
B) Brief presentation on tax revenues:.....	35
III) Literature review on the causal relationship between social protection financing and tax revenues:.....	37
IV) Data presentation:.....	40
A) Databases used by the study: .....	40
B) Descriptive analysis of data: .....	42
V) Presentation of the model: .....	47
VI) Econometric analysis of the data:.....	50
A) Selection of the most relevant model: .....	50
B) Results and discussions on the chosen model.....	53
Conclusion:.....	59
Chapter 2: Tax revenues and social protection financing: Case study of South Africa .....	61
Introduction: .....	62
II)Background:.....	63
A) Brief presentation of the fiscal system of South Africa: .....	63
B) Brief presentation of the South African social protection system:.....	68
III)Econometric analysis:.....	72
A) Data: .....	72
B) Descriptive analysis:.....	73
C)Econometric model: .....	76

## Table des matières

D) Regressions:.....	77
E) Discussion:.....	87
Conclusion : .....	88
Chapter 3: Social protection and Informal Sector: Case Study of Uruguay. ....	89
Introduction: .....	91
II) Background: .....	93
A) Brief presentation of the social protection situation in Uruguay:.....	93
B) Brief presentation of the informal sector situation in Uruguay: .....	97
III)Factors explaining the low coverage of informal sector workers: .....	99
IV)Data: .....	103
A) Data presentation:.....	103
B) Descriptive analysis of the study data: .....	105
V) Econometric analysis:.....	108
A) Presentation of the model: .....	108
B) Analysis of the Pension benefit variable:.....	108
C)Analysis of the health and accident insurance variable: .....	117
D)Unemployment benefit variable: .....	122
E) Maternity benefit variable: .....	127
F) Discussion: .....	131
Conclusion:.....	132
General conclusion: .....	182
Bibliography: .....	189

