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Tax revenues and social protection financing in African and Latin American countries

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***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 article 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

Social protection can be defined as all measures enabling universal access to social security, healthcare and income security and that ensure dignity and rights for all (ILO,2014). It plays an important role in the improvement of an individual’s living conditions and contributes to development. (ILO,2011; WB,2012; ILO, 2014; ILO, 2017). The main purpose of social protection is to facilitate income smoothing over time, in order to support domestic consumption, human capital and productivity support. It thus reduces poverty and insecurity risks. Hence, it is highlighted in the Sustainable Development Goals (SDGs), as it plays a transversal role in the achievement of SDGs 1,3,5,8 and 10. However, currently 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 sub-Saharan Africa, where the rate is as low as 17.8% (ILO, 2014). It is therefore important to extend social protection coverage to a larger number of people and achieve universal coverage in social protection in the long term. As such, each country must be able to mobilize the resources needed to sustainably fund its social protection system.

To finance social protection systems, countries have at their disposal different types of financing, such as family or community support. Financing can also be done through social contributions to a health insurance organization, or to a pension system. Another way of financing social protection may be regular savings in an individual’s accounts during their working lives, in order to finance their retirement in the future.

Finally, when social protection beneficiaries do not contribute directly, countries can use government revenues. Public resources can be constituted through tariffs; direct taxes (income taxes, wealth tax); indirect taxes (bases, VAT, taxes on financial transactions), taxes linked to the exploitation of natural resources, international aid (Cichon,2004; Bastagli et al., 2013, Duran-Valverde et al, 2013, Brun et al., 2016).

One can wonder whether each of these types of financing is sustainable over time for achieving and maintaining universal coverage in social protection. This study answers the question by looking at the method of financing through direct and indirect tax revenues.

In the following sections, it is assumed that the greater the share of tax revenue in GDP is, the greater the resources available for social protection programs are. 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, especially not 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 analyze 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, it poses the risk of bias in the results, as the continuous evolution of public social protection expenditures was not considered. Other studies such as Anton et al. (2006) and Matus-Lopez et al. (2016) put an emphasis on the important role of tax revenues mobilization by using simulation methods. Zemmour (2012) also worked on the issue by using a descriptive analysis. Nonetheless, it is necessary to conduct a more rigorous study comprising as many factors influencing sustainable social protection financing as possible.

This article contributes to the existing economic literature as it is 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 was gathered from different databases and subsequently harmonized. Furthermore, in the second part of this 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 financing¹.

The remaining part of the article is organized as follows: II) Factors influencing financial sustainability of a social protection system, III) Presentation of data, IV) Presentation of the model, V) Econometric Analysis VI) Conclusion

Factors influencing the financial sustainability of a social protection system

Theoretical aspects of the financial sustainability of social protection system

The financial sustainability of a social protection can depend on the nature of the social protection system. In economics theory, there are two main models, both originating in Europe: the Beveridgian system and the Bismarckian system. (Beveridge,1942; Stolleis,2013; Cremer&Pestieau,2003). There is also a third model which combines elements of both models. The Beveridgian system, which is characterized by universal social protection coverage for all citizens regardless of their employment status, is financed through tax revenues. Hence, its financial sustainability depends on the efficiency of the tax system put in place. This implies having enough

¹In the study, social protection expenditures were chosen as a proxy for social protection financing. They comprise health insurance expenditures, unemployment benefits, pensions, safety nets.

resources collected and well managed to sustainably finance the social protection system. The financial sustainability of the Beveridgian system also depends on the number of taxpayers. The Bismarckian system, which is characterized by access to social protection coverage conditional to being employed, is financed through the social contributions of employees and employers. This implies that there are enough people in the labor force to have their contributions covering the benefits provided to employed and unemployed (retired persons, family members of contributors) beneficiaries and that the system is financially viable. As a result, the growing trend of population aging can be problematic for the long-term maintenance of this system.

The financial sustainability of the social protection system also depends on the type of welfare state established in the country. According to the nature of the welfare state, the administrative and financial management of the social protection system will be more or less ensured by the public authorities. In economics literature (Esping-Andersen, 1990; Vallet, 2002), three types of welfare states are defined according to three factors, namely de-commodification², the functioning of states as a system of stratification³ and the link between the market, the family and the state. The first type is the "liberal" welfare state, characterized by weak de-commodification. The second type is the "corporatist" welfare state, a conservative state characterized by a weak de-commodification but also by a strong social stratification. Lastly, the third type is the "social-democratic" welfare state, characterized by a strong de-commodification and the absence of social stratification. Depending on the type of welfare state adopted by each country, this results in the establishment of one of the social protection systems mentioned above.

Apart from the three aforementioned factors, the financial sustainability of a social protection system also depends of the country's economic situation (Banks et.al, 2000, Schmähl, 2001; Cichon, 2004), the situation of its labor market (Samuelson,1975, Banks et.al 2000, Schmähl, 2001; Cichon ,2004), its demographic situation (Keuschnigg et al., 2011), the governance of the social protection system (Schmähl, 2001;Cichon, 2004), and the political interests of the government in place (Samuelson 1975, Schmähl 2001, Cichon 2004).

In fact, when a country experiences a high rate of economic growth, this may enable it to release additional resources due to the increase in tax revenues collection. These resources can be allocated to the financing of social protection. In addition, if the economic growth is paired with lower unemployment rates, the labor force is likely to earn more income. This can help increase the share of the population that contributes to the financing of social protection coverage.

With regard to the labor market, the accessibility of employment and the nature of employment (formal, informal) have an impact on a number of aspects, such as: an individual's eligibility for the social protection program; the actual number of persons covered by the protection; the number of people who pay social security contributions and/or pay a tax to finance enrollment in a social protection program; and the amount of social benefits. (Banks et al. 2001, Schmäl, 2001, Cichon, 2004).

The demographic situation affects the number of persons present on the labor market and therefore the number of taxpayers, the number of beneficiaries of social protection programs, the average period of working to be eligible for the social protection program. (Viard, 2002; Keuschnigg et al., 2011; Hsu et al.,2015). Thus, if the mortality rate decreases and the fertility rate

²To what extent do social rights allow people to have living conditions without using the market?

³To what extent does the state grant social rights according to social classes?

also decreases, the population of elderly people will increase. However, the elderly are more vulnerable to health problems and often require more care. This leads to an increase in the level of health expenditure and in expenditure needed for social protection. A growing elderly population also means a larger number of pensioners, which results in a rise in pension benefits provision, and therefore in social protection expenditures.

With regard to governance, national laws on the different components of social protection can have an impact on financial sustainability. Examples include the law on the age of retirement, the law on the number of years of compulsory schooling, the law on the legal age of entry into the labor market, the quality of management and administration of the social protection system. (Banks et.al, 2000, Cichon 2004).

With respect to political interests, the incumbent government may have a tendency to adopt social protection financing policies that favor its electorate. This can be justified by its willingness to be re-elected at the next elections. As high-income households are those with significant financial resources to finance election campaigns, the state can put more emphasis on compulsory taxation as a form of social protection funding. For this type of funding to be sustainable over time, a significant number of taxpayers are needed. (Samuelson 1975; Schmä 2001; Zemmour 2012).

Empirical aspects of the financial sustainability of the social protection system

Few papers have made an econometric study of the causal relationship between public spending on social protection and tax revenues, especially in developing countries. This is emphasized in one of the most recent articles on this subject, which is a working paper written by Murshed, Badiuzzaman and Pulok in March 2017 and published by UNU-WIDER. The authors analyze the effect of fiscal capacity on social protection spending in 98 developing countries using data from the 2014 International Labor Office and the International Monetary Fund (IMF). By adopting the instrumental variables approach and the panel approach, the study finds a positive and significant effect of fiscal capacity on social protection expenditures. This effect is amplified when the country has a good democratic system.

Other studies that have also worked on the contribution of tax revenues to social protection financing have used simulation analyses or some other types of analysis. Anton et al. (2016) used the dynamic general equilibrium model of Byod and Ibarra (2006). The authors 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% for the VAT (excluding food and medication) and the removal of subsidies to the energy sector can increase the GDP of the country and thus create new resources for the state, which can then be invested in the financing of social protection.

Matus-López et al. (2016) also used simulation scenarios to assess the technical and political feasibility of 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 evaluate their political feasibility. By defining three scenarios, the authors find 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 scenario. The positive scenario is characterized by a future increase in GDP

equal to the one observed in 2009 and 2012; the negative scenario by an increase in GDP equal to the one observed two decades ago and the neutral scenario is characterized by an intermediate value from other studies. 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 of 1980-2007. 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. In this study, the evolution of social protection expenditure was differentiated according to the years of increase or decrease in expenditure. Based on data from the OECD and Eurostat databases, the author observed 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 expenditure can be explained by other factors that were not taken into account in the study such as the situation on the labor market and demographics. Hence, it is necessary to conduct an econometric analysis of the causal relationship between social protection expenditure and tax revenues. The study conducted by Zemmour can be considered as an econometric pre-study.

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. The authors gave the example of Bolivia, which since 2005 has had 32% of the "Renta Dignidad" universal pension scheme financed by the tax on the production of hydrocarbons. The study shows that resource tax revenues should not be neglected when it comes to finance social protection. Nevertheless, given the volatility of oil prices (or other natural resources) and the threat of 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 the present study, the total tax revenues were separated 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 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 types of analysis than econometric analysis show the significant role of different forms of tax revenue to sustainably finance social protection programs. Nevertheless, an econometric analysis should be performed to these results by including as many factors that may affect the dependent variable as possible.

Data presentation

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 considered⁴, the data sometimes had to be transformed in order to be better harmonized. Table 1 below summarizes the databases that were used in the study.

Table 1: 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 (Total, 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.

⁴There are databases that include total health expenditures and not just health insurance expenses

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.

Descriptive analysis of data

The total number of observations (Number of countries studied * Number of years for which data are available) varies according to the considered variable. Thus, for the explained variable, public expenditure, 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 over in the total population, the mortality rate of children under five years old, 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 value. This can be seen in the large gap between the minimum value of 0.01% of the GDP and the maximum value of 17.5% of the GDP.

For the total tax revenues, the average is 15.17% of the 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% of the GDP. The minimum value is 0 and concerns several countries that do not yet exploit 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 value. 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.

Presentation of the model

The construction of the econometric model of this study is based on the factors influencing the financial sustainability of social protection and highlighted in the economic theory, as well as in the empirical studies (see section II) that we considered the most relevant. It is also based on the model used in the study by J. Pan and G.G (2012)⁵ on the determinants of public health expenditure per capita of Chinese provinces.

⁵We 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

The following model is used:

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

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 (total, resource or non-resource) in% GDP; $\sum X(i,t)$ = The set of control variables, namely rural population share in the total population (Rur Pop), the level of corruption measured by the CPI score, the net amount of the ODA, the share of the population aged 65 and over in the total population (Pop 65+), the under five years old children mortality rate (U5MR); $u(i,t)$ the fixed effect country and $e(i,t)$ the term of the error.

Econometric analysis of the data

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 Ordinary Least Squared (OLS) model, the Least Squared Dummy Variable (LSDV) fixed effects model, the Within fixed effects model, and the random effects model. The same procedure was adopted for choosing the right model when tax revenues were disaggregated into resource and non-resource tax revenues. The fixed effects model was the final model chosen in all cases for further analyses.

Results and their interpretation

In model A (see Table 1), the R^2 Within is equal to 0.27 in terms of the overall significance of the model 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 statistics 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 the total tax revenues are not allocated in sufficient quantity to the financing of social protection. It is an indication that African and Latin American countries should allocate more of the collected tax revenue. 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 prevent frauds. The result observed may be explained also by the nature of the social protection system and to which extent the state plays a role in managing and financing the social protection system as mentioned in the literature review.

Rural population, Population aged 65 and over, and under-five mortality rate variables have a significant effect on the dependent variable (public expenditures on social protection). In fact, the rural population variable has a significant negative effect at the 5% level. For a 1% increase in the share of the rural population in the total population, there are 0.2 percentage points decrease in

GDP per capita, tax revenues and transfers, the age structure in the province, 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.

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; it is also a population mainly working in the informal sector.

The “population aged 65 and over” variable has a significant positive effect at the 1% level. For a 1% increase in the proportion of people aged 65 and over in the total population, there are 0,60 percentage points increase in public social protection expenditures as a percentage of GDP. The larger the part of the retired population, the higher the income needed (as 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 an aging population. One of the solutions is the increase in the share of tax revenues allocated to the financing of social protection in the presence of a population aged 65 and over increasingly important.

The variable "under-five years old children mortality rate", has a significant negative effect at the 5% level. For a 1% increase 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 results above, one can question whether the same result would be obtained when the total tax revenues in resource and non-resource tax revenues are disaggregated. In other words, do we observe the same effect in the case of tax revenues collected on the exploitation of mineral resources, or in the case of tax revenues that do not take into account this activity?

In model B, where total tax revenues are replaced by resource tax revenues, the regression of the dependent variable on this new explanatory variable shows a non-significance of the latter, although it has a positive effect. 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 revenue to the financing of social protection. The 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, which changes with 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 over”, and “under-five mortality rate” are the only variables that have a significant effect on public social protection expenditure

In model C, where public expenditure on social protection is explained through non-resource tax revenues, there is a positive and significant effect of the main explanatory variable. For a 1% increase in non-resource tax revenue as a percentage of GDP, there are 0,09 percentage points increase in public social protection expenditure as a percentage of GDP, all other things being equal. It can be concluded 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 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.

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 social contributions, donations and other types of resources in addition to taxes.

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

In Models A and B, the “rural population” variable has a positive 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 observed a negative 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 over” variable has a positive effect on the financing of social protection in the three models. The variable has a more significant effect in this study than in J. Pan et al. (2012).

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, it 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 of finding a rigorous instrument, such as 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 public expenditures on social protection on the lagged tax revenue variable at t-1, t-2, t-3; Models B.1, B.2, B.3 Public social protection expenditures on the lagged resource tax revenue variable at t-1, t-2, t-3 and models C.1, C.2, C.3 public expenditures on social protection on the lagged variable non-resource tax revenue at t-1, t-2, t-3.

In doing so, the new results (see Table 1 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 total tax revenue and non-resource tax revenue at t-3 variables have a positive and significant effect.

Table 1: Summary Table of all regressions carried out in the study

Data from WB-IMF-WHO-ILO-CEPAL-ICTD-UNDP-ISSA-Mansour data.NB.:1%;**:5%;***:10%.*

Variables	A	B	C	A.1	A.2	A.3	B.1	B.2	B.3	C.1	C.2	C.3
TR (%GDP)	0,2											
Res TR(%GDP)		0,12										
Non Res TR(%GDP)			0,09**									
TR t-1				0,12								
TR t-2					0,04							
TR t-3						0,16***						
Res TR t-1							-0,07					
Res TR t-2								0,06				
Res TR t-3									-0,09			
Non Res TR t-1										0,08		
Non Res TR t-2											0,14	
Non Res.TR t-3												0,28**
CPI score	0,47	0,63	-0,29	0,48	0,75	0,59	0,71***	0,84***	-0,09	0,48	0,65	0,60
CPIscore*TR/Res TR/Non Res TR	-0,05	-0,05	-0,04									
Rur pop(% totale)	-0,2*	-0,18*	-0,21*	-0,003	0,001	-0,04	0,05	0,01	0,03	0,01	-0,02	0,02
Pop 65+	0,6*	0,53**	0,54**	0,67*	0,63*	0,64*	0,66***	0,62*	0,31	0,71*	0,57*	0,52**
ODA	-5e-10	-3e-10	-4e-10	-3e-10	-2e-10	-3e-10	-4 e-10	-3e-10	-4 e-10	-3e-10	-3e-10	-4 e-10
USMR	-0,03*	-	-0,03**	-0,04	-0,03	-0,02	-0,05**	-0,03	-0,03	-0,04	-0,03	-0,02
		0,02***										
Constant	9,79**	6,90*	11,64*	0,35	0,22	0,22	-0,51	-0,25	-1,17	0,35	0,14	-1,27*
F-test(model)-pvalue=0	19,53	16,44	22,75	8,35	8,73	8,17	7,36	6,71	7,24	7,76	8,01	8,96
F-test (fixed effect) "	7,54	7,66	8,59	7,98	6,18	5,95	6,90	6,10	5,96	8,09	6,90	7,73
R ² Within	0,27	0,29	0,29	0,32	0,30	0,31	0,29	0,30	0,32	0,32	0,31	0,36
N	182	183	182	133	123	112	132	120	112	136	124	116

Thus, for a 1% increase in total tax revenue as a percentage of GDP, there are 0,16 percentage points increase in public spending on social protection, all other things being equal. For a 1% increase in non- resource tax revenues as a percentage of GDP, there are 0,28 percentage points increase in public spending on social protection as a percentage of %GDP, all things being equal. In the two models, another variable that has a significant effect is the variable "population aged 65 and over". For a 1% increase in this variable, there are 0,64 percentage points increase in public expenditure on social protection as a percentage of GDP, 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 a 1% increase in “population aged 65 years and older”, there are 0,52 percentage points increase in public spending on social protection as a percentage of GDP, all other things being equal. It can be deduced from this modeling that the non-resource tax revenue 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 in order to ensure the financial sustainability of social protection programs. The purpose of this article was to see if there is an empirical causal relationship between public social protection expenditures as a percentage of GDP (proxy for social protection financing) and tax revenues in African and Latin American countries. For this purpose, a panel econometric study on 30 countries over 10 years (2000-2010) was carried out. For the continuous studied period, the study is a valuable addition to the scarce existing literature on the financing of social protection in developing countries. It also contributes to literature through a disaggregated analysis of the effect of tax revenues on the financing of social protection.

The results 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 total tax revenues into resource and non-resource tax revenues, we found that the latter has a significant positive effect. For a 1% increase in non-resource tax revenues as a percentage of GDP, there are 0.09 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 and they should also manage resources available for this purpose more efficiently. 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 effects of the variables “rural population”, “population aged 65 and over”, and “mortality rates of children under 5 years of age”. Complementary measures should therefore be implemented, such as urbanization of the population, efficient care of the population over the age of 65, and the improvement of the health status for 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. This challenge was partially overcome by using different databases. The second limitation concerns the existence of a possible reverse causality due to the fact that public spending on social protection can in turn have an effect on tax revenues. This is why a lagged variable “total tax revenue / resource / non-resource at t-1, t-2, t-3” was introduced to avoid this problem.

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