

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. We assume that the greater the share of tax revenues in GDP is, the greater resources would be available for social protection programs. This would allow better financial sustainability of these programs. Using a panel analysis, we found 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 individual living conditions and contributes to development. (ILO,2011; WB,2012; ILO, 2014; ILO, 2017). Actually, social protection has for main purpose to facilitate income smoothing overtime 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 SDG1,3,5,8 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 as it becomes 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. Therefore, 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, a pension system. 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, VAT, taxes on financial transactions), taxes linked to the exploitation of natural resources, international aid (Cichon,2004, Barrientos, 2007, UNRISD, 2008, Bachelet, 2010, 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).

We can wonder whether each of these types of financing is sustainable over time for achieving and maintaining universal coverage in social protection. In our study, we try to answer this question by looking at the method of financing by tax revenues (direct and indirect).

We assume that the greater the share of tax revenue 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. They analyze the effect of tax revenues on social protection expenditures in developing countries (98). However, their study presents some limits as they used only 5 points of observation for the dependent variable and they had to calculate averages on five years for explanatory variables. The main reason of applying this methodology was the lack of data but it has for consequence a 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 M et al. (2016) put an emphasis on the important role of tax revenues mobilization by using simulation methods; Zemmour (2012) worked also on the issue by using a descriptive analysis. However it is necessary to conduct a more rigorous study comprising as much as possible factors influencing sustainable social protection financing. It is the main motivation of our study.

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 us to better capture the effect of tax revenues on social protection financing and a more precise magnitude of it. For this purpose, we gathered data from different databases and harmonized them. Furthermore, in the second part of our study, we subdivided tax revenues in two parts (resource tax revenues and non resource tax revenues) in order to observe which of both precisely has a more important effect on social protection financing¹. We found a positive effect but non significant of total tax revenues and resource tax revenues. As for non resource tax revenues, they have a positive and significant effect as the control variables rural population, population aged 65 years and over, mortality rate of under five years old children.

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

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

II) Factors influencing financial sustainability of a social protection system:

A) Theoretical aspects of the financial sustainability of social protection system:

The financial sustainability of a social protection can depend of the nature of the social protection system. In the economic theory, there are two main models finding their origin 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 by tax revenues. Hence its financial sustainability depends on the efficiency of the tax system put in place. This implies having enough 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 by the social contributions of employees and employers. This implies that there are enough people in the labor force to have the contributions covering the benefits provided to employed and unpaid 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 of 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 the economic literature (Esping-Andersen, 1990; Vallet, 2002), three types of welfare state 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 "liberal" welfare state characterized by weak de-commodification; the "corporatist" welfare state, a conservative one characterized by a weak de-commodification but also by a strong social stratification and 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 two factors mentioned above, 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 on the labor market (Samuelson,1975, Banks et.al 2000, Schmähl, 2001, Cichon ,2004), the demographic situation (Banks et al., 2001, Schmähl 2001, Viard 2002, Joël ME. et al. 2002,Cichon, 2004, Attanasio et.al, 2010, Keuschnigg et al., 2011, Hsu et al., 2015), the governance of the social protection system (Schmähl, 2001, Cichon, 2004), 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, it may enable it to release additional resources due to the increase in tax revenues collected. These resources can be allocated to the financing of social protection. In addition, the labor force has more opportunities in terms

² To 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?

of work and is therefore 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 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, 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. (Banks et al., 2001, Schmähl ,2001, Viard ,2002, ME et al., 2002, Cichon ,2004, Attanasio et al., 2010, Keuschnigg et al., 2011, Hsu et al.,2015). Thus if the mortality rate decreases as well as the fertility rate, this results in an increase in the population of elderly people. However, they are more exposed to diseases and often require more and more monitoring. Hence an increase in the level of health expenditures and in expenditures on social protection. Due to the growing elderly population, there is also a larger number of pensioners resulting 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 such as the law on the age of retirement, the law on the number of years of compulsory schooling, the law on legal age of entry into the labor market, the quality of management and administration of the social protection system can have an impact on financial sustainability. (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, Schmäl ,2001, Zemmour ,2012).

B) 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 in developing (and also developed) 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. They analyze the effect of fiscal capacity on social protection spending in developing countries (98) using data from the 2014 International Labor Office and the IMF. By adopting the instrumental variables approach and the panel approach, they find 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 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 analyses or some other types of analysis. Anton et al. (2016) used in their article⁴ published in the Journal Economic Modeling, the dynamic general equilibrium model of Byod and Ibarra (2006). 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 invest in the financing of social protection.

Matus-López M 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% GDP. They also evaluate their political feasibility. They find 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 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 expenditure 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 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. 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 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 total 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 VAT

⁴ « Universal social insurance for Mexico: Modelling of a finance scheme ».

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 revenue 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.

III) 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, we had to collect data from several sources in order to build our database. Since public social protection expenditures do not necessarily have the same components according to the data source considered⁵, the data sometimes had to be transformed in order to better harmonize them. The following variables were used to define data on public social protection expenditures in percentage of GDP: "Public Social Protection Expenditure as a percentage of GDP, including Healthcare" from the ILOSTAT database of the ILO from 2005 to 2012;"Public Social Protection Expenditure as a percentage of GDP, excluding Healthcare" from the ILO's ILOSTAT database from 2005 to 2012; "Expenditure on social protection" variable from the IMF's "Governance Finance Statistics (GFS) database" – Expenditure by Functions of Government (table 7) from the year 2005 to the year 2015; "Gasto social público en seguridad y asistencia social como porcentaje del producto interno bruto" from the database of CEPAL for the countries of Latin America for the years 1991-1992,1993-1994,1995-1996,1997-1998,1999-2000,2001-2002,2003-2004,2005-2006,2007-2008,2009-2010,2011-2012; "Total Public SP expenditure as a percent of GDP" derived from the database of the report "world social protection 2014-2015" published by the ILO from 1990 to latest available year (percentage of GDP)"; "General Government Health Expenditure (GGHE) as % of Gross Domestic Product (GDP) from the WHO NHA Indicators database from 1990 to 2016.

Concerning the control variables, we used the following databases: The World Bank's World Development Indicators (WDI) database for total tax revenues (% GDP), rural population (% total population) covering the period 1990-2016;The Mansour database (WP IMF, July 2014) for the total tax revenues variable (% GDP) for 41 countries in sub-Saharan Africa for the period 1980-2010 as well as the resource and non-resource tax revenues variables; The ICTDGRD⁶ June 2016 database of ICTD (International Center for Tax and Development) for resource tax revenues and non-resource tax revenues variables ; The Sustainable Development Goals data extract database for the ODA Net Amount variable; The transparency database for the CPI variable score for the period 2000-2010; Reports on the UNDP Human Development Index (hdr) 2003,2004,2005,2006,2007-2008 for the variable Population aged 65 years and over; SSA reports "Social Security Programs Throughout the World": Africa 2003,2005,2007,2009,2011 and

⁵ There are databases that include total health expenditures and not just health insurance expenses

⁶ ICTD Government Revenue Dataset

Americas 2003,2005,2007,2009,2011 for the variable Population aged 65 and over; The WHO National Health Account (NHA) database for the Mortality rate for children under 5 years of age.

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

B) 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 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 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. It 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 15.17% 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.

IV) Presentation of the model:

The construction of the econometric model of our 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 (cf II) that we considered the most relevant. It is also based on the model used

by the study by J. Pan and G.G (2012)⁷ on the determinants of public health expenditure per capita of Chinese provinces.

We use the following model:

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

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.

V) 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 OLS model, the LSDV fixed effects model, the Within fixed effects model, the random effects model. 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 the final model chosen in all cases for further analyses.

A) Results and their interpretation:

In model A (see Table n°1, page 11), 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 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 the total tax revenues are not allocated in sufficient quantity to the financing of social protection. African and Latin American countries must therefore allocate more tax revenue 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 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, financing the social protection system as mentioned in the literature review.

⁷We 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, 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.

Rural population, Population aged 65 and over, 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 a 1% increase in the share of the rural population in the total population, there are 20 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; 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 61 percentage point increase in public social protection expenditures as a percentage of GDP. The more, there is a large part of the population retired, 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 in the presence of a population aged 65 and over increasingly important.

For the variable "under five years old children mortality rate", it has a significant negative effect at the 5% level. For a 1% increase in the share of the under-five mortality rate, there are 3 percentage points decrease in public social protection expenditure as a percentage of GDP.

Regarding the results above, we can wonder 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 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. 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 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 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 a 1% increase in non-resource tax revenue as a percentage of GDP, there are 24 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 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.

B) 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 Arturos Anton et al. (2016), Handley (2009) and Muñoz et al. (2003) highlighting the role of VAT in the financing of social protection.

In Model 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 observe 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 has a positive effect on the financing of social protection in the three models. Moreover, it is significant this time.

C) 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 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 n°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. Thus, for a 1% increase in total tax revenue as a percentage of GDP, there are

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

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
U5MR	-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

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

are 16 percentage points increase in public spending on social protection, all other things being equal. And for a 1% increase in non-resource tax revenues as a percentage of GDP, there are 28 percentage points increase in public spending on social protection(%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 the population aged 65 and over, there is an increase of 64 percentage points of public expenditure on social protection(%GDP) all other things being equal in the model taking into account the lagged variable of the total tax receipts at t-3. For the last model, for a 1% increase in the population aged 65 years and older, there are 52 percentage points increase in public spending on social protection(%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.

V) Conclusion:

Social protection plays an important role in reducing poverty, which makes it necessary for developing countries to ensure the financial sustainability of social protection programs. The purpose of this article was to see if empirically a causal relationship is observed between public social protection expenditures 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 article 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 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 24 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 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 the urbanization of the 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 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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