UNITED NATIONS
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WIDER Development Conference

Public economics for development

5-6 July 2017 | Maputo, Mozambique

Natural Resources, Electoral Behaviour and Social Assistance in Latin America

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Abstract

This paper provides an analysis of the distributional effects of revenues from the natural resources via social spending. A primary concern is to establish whether the redistribution of income via social spending would not have taken place in the absence of natural resources. Another aspect of this relation is the political incentives that natural resource rents generate to the incumbent. Experimental and quasi-experimental studies suggest that social assistance programmes can produce electoral gains to the incumbent. Our working hypotheses are the following: H1) revenues from non-renewables have facilitated social spending in Latin America, and H2) natural resources have generated electoral gains to the incumbents in increasingly more competitive political systems. In order to test our propositions, we examine the economics of redistribution via revenues from natural resources, with a particular focus on the incentives that drive incumbent decisions on social spending. Second, we consider a model of income redistribution in which an incumbent can make allocation decisions of public funds in the presence of taxation. We expand the model by allowing revenues from natural resources facilitating social spending without affecting the disposable income of better-off households. We empirically test our hypotheses using fixed effects estimators with instrumental variables in three stages. The results indicate that the expansion of social spending in Latin America over the past two decades has been facilitated by natural resource rents; however, the electoral gains hypothesis is not supported by the empirical analysis.

JEL classification: D72, H23, I38.

Key words: Natural resources, Latin America, Redistribution, Social Spending.

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1. Introduction

Poverty and inequality still affect most Latin American countries. This region has been shaped by considerable heterogeneity of poverty figures that show significant improvements over the elapsed years of this century. The Gini coefficient has fallen in 13 out of 17 countries, especially in response to the implementation of massive transfer programmes targeted to the poor (Lustig et al., 2013). For instance, there has been a notable diffusion of social transfers, in the form of human development conditional cash transfers (CCTs) and, lately, the proliferation of social pension schemes (i.e. *ANSES* in Argentina, *Renta Dignidad* in Bolivia, *Colombia Mayor* in Colombia and *65 y mas* in Mexico). The introduction of transfer programmes in Latin America has evolved hand in hand with considerable increases in the contribution of revenues from non-renewable natural resources (NNR) to public budgets. According to the statistics by ECLAC (2015), while social spending (given by the provision of health, education, housing and social protection) averaged 9.5 percent of the GDP in the region over the 1990s, it reached a maximum of 13.8 percent by the end of the 2000s. Likewise, while the production of natural resources averaged three percent of the GDP in the 1990s, it reached an average of five percent in the late 2000s. To date, there is very little evidence relating the hike in socials spending and the increasing availability of revenues from natural resources. Indeed, the relation between social spending (as a driver of poverty reduction) and natural resources revenues in Latin America is still unclear.

This paper offers important insights into the redistribution of revenues from the extraction of NNR in Latin America through social spending. The key aspect of this relation is that the lessons of the Latin American experience can provide us with elements to understand the process through which NNR-rich countries redistribute their rents. In 2007 the Bolivian government enacted a decree allocating 30 percent of the revenues from the extraction of hydrocarbons to the funding of the largest social pension scheme in the region. This represented an abrupt increase in the participation of social spending as percentage of the GDP in more than one point (Mayorga 2008). The Bolivian example is not an isolated case in the region and some others can be identified. Economics and political factor have driven these policy changes. First, the increases in commodity prices and the adoption of better extraction technologies in the 2000s have boosted the production of NNR. Second, the proliferation of leftist governments in the region apparently has led to the prioritisation of transfer programmes with a relevant targeting focus on the poor. Governments can decide to redistribute via direct taxation, which poses higher challenges in terms of political opposition, accountability and paternalism on the use of the transfers by the poor (McGuirk 2013). Governments can skip accountability and opposition in the redistribution of income by allocating non-tax revenues from NNR to social spending. This relation is not always clear as Hinojosa et al. (2012) noted with a sample of African countries. Drawing the line between economic and political factors in this process is not an easy task as both claim their participation in the allocation of non-tax resources to social spending (Barrientos and Niño-Zarazúa, 2011). Therefore, a primary concern here is to establish whether the redistribution of income via social spending in the region had not taken place in absence of NNR. Our

hypothesis is that revenues from NNR did facilitate the increase in social spending in Latin America in response to electoral returns by the incumbent.

The objective of this paper is twofold. We first look into the economics of the redistribution of NNR with a particular spotlight on the motivations that can drive governments to increase social spending by the adoption of social transfer programmes. The existing evidence from impact evaluations of CCTs in Latin America and South East Asia shows that these programmes are highly profitable in electoral terms. The delivery of transfers, especially in cash, to the poor is associated with significant increases in electoral participation and favourable outcomes for the incumbent (Baez et al., 2012; De La O, 2013; Julia et al., 2014; Labonne, 2013). We thus consider an economic model of income redistribution developed by Dhami (2003) in which a leader decides the allocation of resources in the presence of taxation. We provide a further development of the model by allowing the interaction of revenues of NNR which facilitates spending but does not diminish the disposable income of the population. Second, we empirically test our hypothesis by specifying a fixed effects model with instrumental variables in three stages. Our econometric approach considers the cross-country electoral outcomes, social spending as percentage of the GDP in Latin America revenues from NNR on an equation system of endogenous variables. Our instruments are composed of international NNR prices and whether the countries in question are net NNR exporters. The results indicate that social spending has been possible in Latin America with the contribution of revenues of NNR over the period 1990-2009, but the electoral outcomes apparently are not clear in our specifications. Our estimations are robust to the presence political and socioeconomic controls.

This paper begins with a brief literature review on the economics of NNR redistribution with a strong emphasis on the dynamics of social spending in Latin America. It will then go on to the data description that will allow us to specify an econometric model. We present the results and, finally, we conclude and discuss the implications of our findings.

2. On the economics of natural resources redistribution

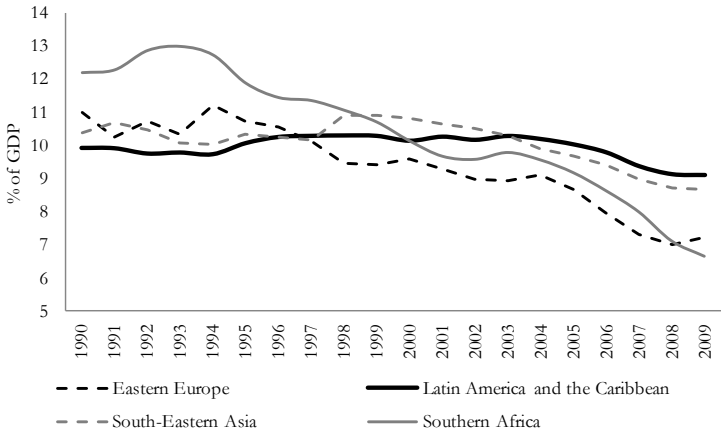
Understanding the underlying mechanisms that drive the redistribution decisions of the revenues from NNR is critical for the development trajectories of resource-rich developing countries. Several factors intervene in this process. Characteristics of a society or polity such as religion, history and culture are determinant in defining the tolerance for inequality and the preferences for redistribution. For instance, Alesina and Giuliano (2009) show for United States that African-Americans, women and youngsters have higher preferences for redistribution, in contrast with the rest of the population. These groups are prone to prefer redistribution because their self-interests, or own consumption, is directly affected by the outcomes of redistribution. Other groups subject to taxation are reluctant to support redistribution. The redistribution of NRR, like manna from heaven, may facilitate redistribution by benefitting disadvantaged groups while not facing opposition from taxable ones. As beneficiary groups compose a significant mass of voters, political ideology is also aligned with these preferences. Thus,

preferences for redistribution can be driven by self-interest and political ideology (Dixit and Londregan, 1998).

An illustration of the developments in this matter in Latin America is the fact that the Bolivian government enacted a decree that defined the features of a new universal non-contributory (social) pension scheme with notorious welfare effects, known as *Renta Dignidad* in 2007. By that time, only 11 percent of the population above 65 years of age received a retirement pension, while the remaining nearly 89 percent, mostly poor, were left unprotected to the life cycle contingences as a result of not having participated in the formal labour market. The situation was leaving millions in extreme poverty in old ages, especially when labour productivity and employability declines in a sharp manner. A solution in the long run would aim to improve the frictions of the Bolivian labour market but, instead, the government decided to respond in the short run by adopting a non-contributory pension scheme. *Renta Dignidad* is today the largest social pension in Latin America. It is fully funded with a 30 percent tax over the revenues from the production hydrocarbons that corresponds to a share of 1.1 percent of the country's GDP (Mayorga, 2008). No political or social opposition was registered in this process. Impact studies of this old pension scheme have shown that it has achieved important effects, especially on household income and consumption. For instance, using regression discontinuity methods Martinez et al. (2014) find that the programme reduced urban poverty by 18 percentage points.

Similar to many Latin American countries, in spite of the fact that the Bolivia had experienced a strong political and economic turmoil during the 1970s and the 1980s, current relative stability is founded on its NNR endowments that have provided the resources to redistribute resources through the implementation social protection programmes and the provision of basic services in health and education (Deacon and Mueller, 2004). While in the 1970s and 1980s the focus of Latin American countries was the use of NNR to subsidise the import-substituting industrialisation policy (known as ISI) (Ross, 1999), in the 2000s it seems that these resources have facilitated the implementation of social policies, including social protection systems. The latter has coincided with the emergence of left-wing governments whose speeches point towards a prioritisation of redistribution via social spending, although the relation between partisan politics and social spending is still ambiguous (Huber et al., 2008; Pena, 2014). Economic and political ingredients can be identified in this process and the line dividing both points of views is fuzzy in the sense that leftist and right-wing governments have increased the allocation of resources to social spending at the same level. Here we focus on the economics of the redistribution of NNR through social protection initiatives with a regional emphasis on Latin America.

Figure 1. Regional production of mining and quarrying as percentage of the GDP



Source: authors with data from http://data.un.org.
Note: GDP at 2005 prices.

Latin America is a global player in the production of NNR. Some countries are net exporters and other net importers, a fact that can determine the context of the redistribution of the revenues from NNR. The share of NNR production as percentage of the GDP has declined in Latin America but more slowly than in other regions (see Figure 1 above). For instance, in Chile, Peru and Venezuela the share of NNR exports is above 75 percent. If NNR have facilitated the increase of social spending, one might think that NNR have also contributed to the recent poverty reduction across the region. However, the apparent response of poverty rated to social spending is heterogeneous. Chile, with a social public spending that rounds 16 percent of its GDP, has recently achieved the high income country status with low poverty headcount rates and increasing industrial production (ECLAC, 2014; World Bank, 2012). Contrarily, Venezuela, with a daily production of 3 million barrels of crude oil and social public spending that rounds 21 percent of its GDP, is stagnant over low growth rates, food shortages, increasing poverty and considerable outbreak of violence (ECLAC, 2014; Lappi-Seppälä and Lehti, 2014). Clearly, the scope of the redistribution of NNR in Latin America is not linear: higher NNR revenues and the apparent resulting social spending do not necessarily translate into lower poverty rates.

NNR are comparable to any other productive assets, the difference is that they are not renewable, so their increase in stocks is not feasible (Solow, 1974). Given this nature, their abundance may affect the response of a polity to them, as tax redistribution and non-tax redistribution may face different political and economic dynamics (Baldwin, 1990). The use of tax revenues is subject to stronger pressures than non-tax revenues, especially when non-tax revenues are determined by a windfall of NNR. McGuirk (2013) finds that higher tax enforcement leads to higher demand for accountability, implying a negative relation between revenues from NNW and tax enforcement. Collier and Venables (2010) and Collier (2010) suggest that the reduction of accountability for the incumbent that results from the abundance of NNR leads to an increasing rent-seeking and patronage. Social spending, as a form of redistribution, is a profitable tool to

accomplish these objectives. To some extent, patronage or vote buying might be disguised as social spending within a social justice speech that seeks for lower pressures and opposition.

NNR make it more likely that the incumbent finds attractive to retain power, either by influencing elections or by being more autocratic. From a theoretical perspective, Caselli and Cunningham (2009) show that a windfall of NNR leads to higher incentives for the incumbent to remain in power and to lower probabilities of survival given a resulting higher competition for power. Support from a typical elector would be achieved through funding public services or directly buying votes. In fact, apart from the fact that elections can be affected by manipulating results, alternative policies can be implemented via social spending by redistributing the revenues from NNR to obtain similar electoral outcomes.

The fact that electoral incentives lead to redistribution of resources has been addressed by Robinson (2010). Redistribution may help politicians to generate support from voters and, hence, alter elections.[4] This is more realistic in the context of targeted redistribution towards the poor. NNR allow the incumbent to bypass the interdependent preferences problem, in the sense that levying taxes on high income segments of the population is not a key element in the delivery of income transfers to the poor (Currie and Gahvari, 2008). In fact, NNR can be an important input in redistribution policies, to the extent that NNR can buffer the pressures against redistribution when it is excessive for the wealthy (Benhabib and Przeworski, 2006). The abundance of NNR also allows the incumbent to skip opposition to the type of benefit transferred to the poor (in-kind or in cash). For instance, Caselli and Michaels (2009) find that a windfall of royalty transfers to Brazilian municipalities increased the executive budget directly allocated to social transfers. The windfall of royalties, in contrast to tax revenues, allowed the mayors to spend those resources without mayor discussions at the local level. This allocation otherwise would have been discussed mostly at city councils.

In contexts where taxes and, more importantly, transfers can be chosen through majority voting (Dalgaard and Hansen, 2013), the abundance of NNR weakens the discussion on who obtains the benefits from the redistribution and what is redistributed as the electoral gains are capture by the incumbent (Robinson et al., 2006). Most of the social spending in Latin America has been dominated by relevant targeting components; very few interventions are universally delivered in the region. Who benefits from social spending apparently obeys to an imposition rather than to a general consensus on social contract (Bénabou, 2000), as redistribution of resources via social spending in Latin America is made to the poor as well as some to the wealthy (Lindert et al., 2006). Incumbents would attempt to calculate the allocation of revenues from NNR in order to maximise their electoral chances. A theoretical setting by Lopez Rodriguez (2011) indicates that an incumbent would equalise the marginal contribution of transfers to his

[4] Deacon (2011) opposes to this idea with the argument that transfers to specific groups (e.g. the poor) are not attractive because the available resources are diluted by the size of the population. The latter might not be true in the presence of abundant NNR.

or her chances of winning or perpetuate in power. Thus, politicians opt for redistribution depending on the expected returns from targeted transfers.

Evidence of the electoral influence of social spending in Latin America has emerged in countries implementing conditional cash transfers (CCT) with considerable endowment of NNR. These countries are actually net NNR-exporters. For instance, Zucco (2009) attributes part of the triumph in Brazilian presidential re-election in 2006 to the aggressive expansion of the CCT, *Bolsa Familia*, with a reduced form regression analysis on municipal aggregated data. Likewise, in the period 1997-2000 the Mexican government introduced the *Progresa* programme (later renamed as *Oportunidades* and currently known as *Prospera*) with an experimental design for an impact evaluation. This setting was employed by De La O (2013) to detect the impacts of the CCT on the electoral results with special focus on the gains of the ruling party. The exercise compared the electoral outcomes of treated municipalities with the results from a random group of control municipalities. These findings showed that the programme increases electoral turnout in seven percentage points and the incumbent's share in 16 percentage points. These results are stronger when the length of exposure of treated municipalities to the programme increases, demonstrating that the electoral effects do not fade out over time. Quasi-experimental evidence in Colombia shows similar electoral responses from participants in the *Familias en Accion* programme. Baez et al. (2012) specify a regression discontinuity design in which the assignment variable is based on a proxy means test score that varies in the range 0-100 and cuts off on 11 in urban areas. They found that one standard deviation increase in the proportion of beneficiaries leads to a minimum of 1.6 percentage points increase in the likelihood of turnout and a 1.5 percentage points increase in the voting share for the Colombian officialist party. Heterogeneous effects show that these results are stronger for women, who are the main claimant of the transfer from *Familias en Accion*. Similar experimental electoral effects have been recently evidenced in Southeast Asia by Julia et al. (2014) on the Indonesian Family Hope Programme and by Labonne (2013) in the Philippines on the 4Ps cash transfer. Overall, the existing evidence suggests that this kind of social spending generates positive and significant electoral returns to the incumbent in NNR-rich countries.[5]

3. A NNR and electoral behaviour model

In this section we focus on the economics of redistribution based on a modified version of the theoretical model developd by Dhami (2003). In the model, left- and right-wing politicians interact with liberal and conservative voters. Over a two periods framework, voters have asymmetric information on the redistributive intentions of each candidate, though both of them, voters and politicians, have redistributive preferences. There are

[5] In contrast, the relation between CCT and voter behaviour is not clear in NNR net importer countries, such as Honduras. Findings from a randomised controlled trial at the municipality level showed that the PRAF programme (currently known as Bono10Mil) increased the voting share of the opposition party (Krishnaswamy, 2012). This result can be explained by the low institutional capacity for the implementation of the programme which resulted in irregular delivery of the transfers and social costs of the individual targeting method.

two rounds of elections: in the first round politicians can signal their tax policy, while the second round includes a re-election suffrage in which the winner incumbent will not have the same redistributive incentives like in the first period. In this case, the tax policy is modified by the presence of NNR that, as a windfall of manna from heaven, does not reduce voters' disposable income.

Formally, individual characteristics are given by a pair (w, δ) in which wealth, w, varies in the range $[\underline{w}, \overline{w}]$. The parameter δ is defined by two ideological types, namely, δ_c for conservatives who are more reluctant for redistribution and tax collection and δ_l for liberals who demonstrate higher preferences for taxes and redistribution. Thus $\delta_c < \delta_l$ with $\delta_c, \delta_l \epsilon [0,1]$. Information on w is public, while information on δ is private. Conversely, left and right individual candidates are denoted by (w_L, δ_j) and (w_R, δ_k), respectively, for which the right-wing candidate is wealthier than the left-wing candidate, $w_L < w_R$. Thus, right individuals will bear the brunt in a redistribution policy via taxes (at least more than left individuals) while none of them will be affected by redistribution via NNR.

The redistribution policy is given by a linear progressive income tax $T = \{\beta \cdot sst, t - (1-\beta) \cdot sst\}$ where $0 \leq t \leq 1$ is a constant marginal tax rate and $sst = sst(nnr(p^e))$, with $sst' > 0$ and $sst'' < 0$, are the per-capita lump-sum social spending transfers that the government obtains from NNR. nnr is a function of external and exogenous competitive prices, p^e, with $nnr' > 0$ and $nnr'' < 0$. The tax policy can use nnr to reduce the tax burden for individuals or to increase social spending transfers with the parameter $0 < \beta < 1$. Right wing candidates will exogenously choose β levels close to zero while leftist candidates will choose β levels close to one, $\beta_r < \beta_l$, if they are in office. The government constraint is thus given by $\beta \cdot sst = [t - (1-\beta) sst] \cdot \mu$, where μ is mean income.

An individual (w_i, δ_i) obtains utility, $V_{ij}(t - (1-\beta) sst)$ as follows:

$$V_{ij}(t - (1-\beta) sst) = \theta\big[c\big((1-t)w + t\mu; \beta \cdot sst\big)\big] - \frac{1}{2}\Big[[t - [(1-\beta) sst]\mu] - \delta_j \mu\Big]^2 \qquad (1)$$

Where $c(\cdot)$ is private consumption and θ is a parameter indicating the extent to which the individual value consumption over the tax policy. The second term in (1) indicates a quadratic preference for of the tax policy according the political orientation, δ_j. By differentiating (1) a preferred tax policy can be given by:

$$[t - (1-\beta) \cdot sst]^* = \delta_j - \theta\beta \cdot sst' + \frac{\theta(\mu - w_i)}{\mu^2} \qquad (2)$$

From (2) it can be inferred that the preferred tax policy is decreasing on the marginal rate of the per capita transfers that depend on NNR, ceteris paribus the external prices. It affects exogenously the results regardless the political affiliation of the incumbent in the first election. A (w_R, δ_k) candidate can manipulate a (w_l, δ_i) voter just by adjusting

the β parameter, with increasing taxation and increasing redistribution of NNR via social spending at the same time. Similarly, a (w_L, δ_k) candidate would manipulate a (w_c, δ_i) voter simply by reducing taxation and decreasing redistribution from NNR. In any case, the availability of NNR can be relevant in influencing a voter's behaviour through the allocation of social spending transfers.

In sum, there are two elements in this model that contribute of the understanding of the redistribution of NNR that can modify voting behaviour in an exogenous manner. The first one is the preference of the incumbent towards redistribution. The parameter β can be exogenously to adjust the voting behaviour of citizens by reducing tax burden on wealth or increasing the allocation of social spending transfers. The second are the natural resources depending on international prices. In this case we have taken prices as given but they can be relevant in determining a windfall of resources and the capacity of the incumbent to alter the voting behaviour through social spending. If we assume that sst has a logarithmic functional form, $sst = \ln(p^e)$, from (2) we can infer that international prices have a negative effect on the tax policy, whose consequences are similar for both ideological type of voters. Therefore, without NNR in this model, the incumbent is subject merely to voter characteristics and preferences with very few parameters to affect voting behaviour.

4. Data

To assess the relation between the use of natural resources and the spending on social protection, we have decided to minimise the number of data sources. This helps us mitigate potential contamination from measure errors and different methodologies that might confound our analysis. The fact that the focus on one single country poses an econometric challenge in terms of number of observations, the dataset for our empirical approach emerges from a cross-country compilation of information from Latin American countries over the past 20 years. In the previous theoretical analysis we have mentioned several variables that we take into consideration; in particular, we look into the social spending of Latin American countries, their reliability on natural resources and political factors. We first obtain our working dataset from the Economic Commission for Latin America and the Caribbean (ECLAC) and International Monetary Fund (IMF) from which we extract economic variables. For political variables, we rely on the worldwide Database of Political Institutions (DPI) from the World Bank (Beck et al., 2001). All of these sources are of public domain.

Table 1 below presents the description of the selected variables in our dataset and their sources. Our interest here focuses on social spending. As mentioned above, very little evidence is available in the literature relating social spending and natural resources, especially in developing countries. Social government spending and other variables are measured as percentage of the GDP, as the government priority in this field is better understood relative to domestic production (Molina-Morales et al., 2013). Similarly, the production of natural resources is given as percentage of the GDP. The latter includes oil, mineral and metals that are sold and consumed either on domestics and

international markets. Instead of focusing on the production of natural resources relative to the country's population as done by Caselli and Michaels (2009), here we look into the production of natural resources in relative terms to the GDP, which also accounts for the tendency of commodity-rich countries to suffer from the Dutch disease (Addison and Cornia, 2004). We also account for GDP per capita and population, since these two variables denote the income level and size of each country that might affect social spending, in the sense that richer countries would demand less spending on basic services (health or education) as well as on social protection.

The literature predicts that tax revenues and revenues from natural resources could compete (Céspedes and Velasco, 2014). We thus consider tax revenues as percentage of the GDP as an indicator of the public effort or laziness in the light of the absence or presence of natural resources. Given the fact that we are pooling data from Latin American countries, we must consider that some of them are not purely natural resources exporter. Some others have switched from being net exporter to net importer and vice versa. Our approach includes a dummy variable indicating whether countries are net exporters or not, which depends on several factors which we consider uncorrelated with social spending. Finally, we obtained from the IMF commodity prices information system the information on the behaviour of prices of natural resources. Dealing with the prices of the whole set of natural resources could be, to some extent, econometrically complicated. We have thus run a principal component analysis to summarise in one single scalar (in the scale 0 to 100) the variation of the natural resources prices over the 1990s and 2000s. The latter could be fair with countries producing more than one natural resource but unfair with countries relying on the production of one single natural resource.

We have also considered political variables from the DPI dataset. We account for these variables as an important component of our conceptual approach, to the extent that not including them into our empirical analysis could ignore the fact that political factors are decisive in the allocation of a government's budget. We have obtained four variables in this context. First, we have taken the number of years the chief executive has been in office; second, the party orientation of the incumbent is a key variable in our analysis, as part of the literature predicts that leftist governments are more likely to expand social spending while right-wing governments tend to cut it (Huber et al., 2008). The last two political variables have to do with elections occurring in the year in question. These two variables contain a dummy indicator taking value of 1 if a legislative or an executive election was held in order to account for possible increases in patronage strategies or vote buying via social spending.

Table 1. Variable definition

Variable and sources	Description
Variables from ECLAC	
Social spending as % of GDP	Total social government spending on health and education services, housing, social security and social assistance.
Natural resources production as % of GDP	Total value of the extraction of natural resources (oil, minerals and metals) as percentage of the GDP.
GDP per capita	Real GDP per capita in US $.

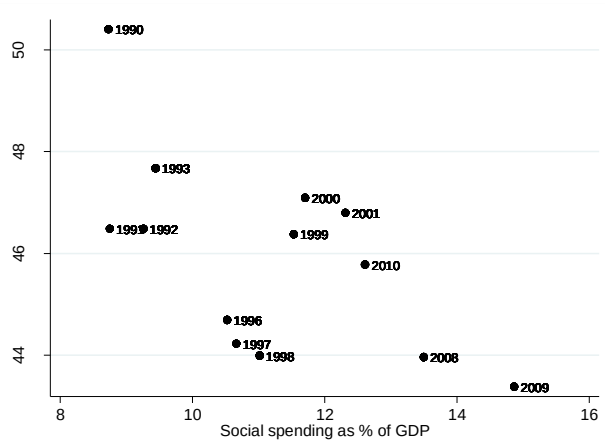
Population	Population records tracked by ECLAC.
Tax revenues by central government as % of the GDP	Total tax revenues by central governments as percentage of the GDP. Rules out tax revenues from sub-national governments.
Net natural resources exporter	Dummy variable indicating whether the country is a net natural resources exporter in the year in question.
Variables from IMF	
Oil, minerals and metal prices	This variable corresponds to the principal component that summarises the variation of natural resources prices on international markets. It includes prices of crude oil, coal, natural gas, aluminium, copper, iron, lead, nickel, steel, tin, zinc, gold, platinum and silver.
Variables from DPI	
Percentage of votes obtained by the president in the last election	The percentage of vote of the president obtained in the last election includes re-elected presidents. If elections were not held in the year in question, this variable takes the value corresponding to the last election.
Years the chief executive has been in office	Number of years of the chief executive of the country that has been in office.
Party orientation of the incumbent	Categorical variable indicating: 1 right; 2 center; 3 left; 0 no info. This variable is relevant for economic policy. Right are conservative parties; left are socialists, communists or social democratic; center are parties with centrist orientation.
Legislative elections in the year in question	Dummy variable indicating whether there were legislative elections in the year in question.
Executive election in the year in question	Dummy variable indicating whether there were executive elections in the year in question.

Source: authors with information from IMF (2015), ECLAC (2015) Beck et al. (2001).

From the data sources we pooled a panel dataset consisting of 18 Latin American countries over the period 1990-2009 (see Table A1). Social spending as percentage of the GDP averages 11.4. There are countries with social spending as high as 20 percent of the GDP (Argentina, Brazil, Uruguay and Costa Rica) and some others that allocate low resources to the spending on this field, in particular countries in Central America. Natural resources production averages nearly 4 percent of the GDP, with countries with observed production in the order of 30 percent (Venezuela in the mid-2000s). In this sense, our sample indicates that 46 percent of the countries are net exporters. There are countries that have never been net exporters (those in Central America and Uruguay), some that have been always net exporters (Argentina, Chile, Colombia, Ecuador, Mexico, Peru and Venezuela) and others switched from net exporters to net importers and vice versa (Brazil and Dominican Republic) In contrast, Central American countries are characterised for having low levels of natural resources production, with percentages of the GDP lower than 3%. As for political factors, 48 percent of Latin American governments are classified to be left-oriented, while 12 percent are classified to be right-oriented in the period of analysis. Legislative and executive elections are held in 27 and 23 percent of the countries over the 20 years of analysis.

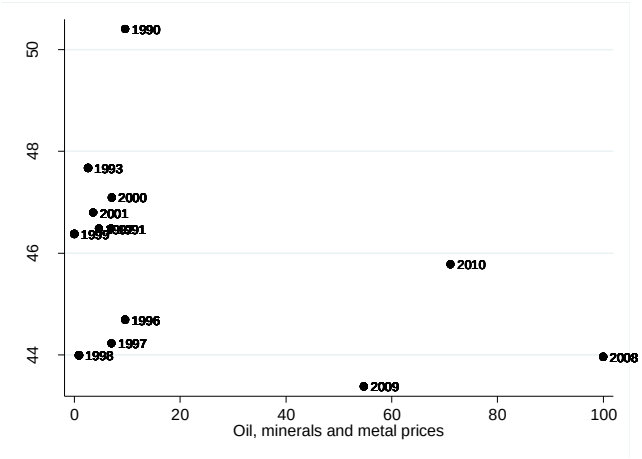
Figure 2 below shows the averages of votes obtained by the president in last elections and social spending as percentage of the GDP. Apparently there is a negative relation between these two variables, especially in the 2000s. Figure 3 shows the percentage of votes and oil, mineral and metal prices. These patterns are less clear but they also tend to show a negative relation.

Figure 2.Percentage of votes vs. social spending (averages)



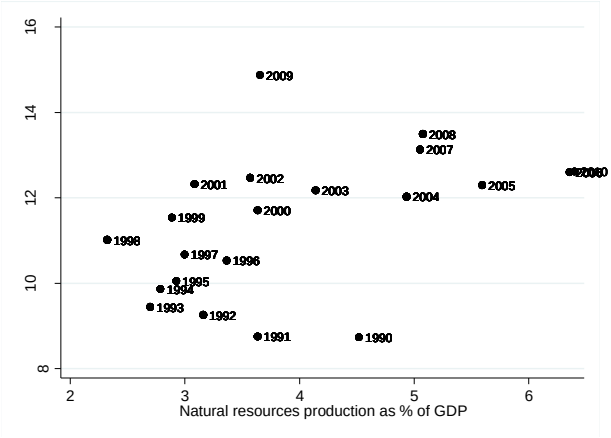
Source: authors with information from (Beck et al., 2001; ECLAC, 2015; IMF, 2015).

Figure 3. Percentage of votes vs. prices (averages)



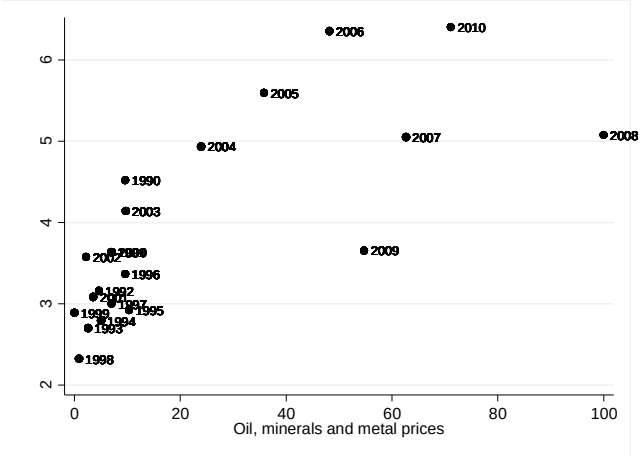
Source: authors with information from (Beck et al., 2001; ECLAC, 2015; IMF, 2015).

Figure 4. Social spending vs. natural resources (averages)



Source: authors with information from (Beck et al., 2001; ECLAC, 2015; IMF, 2015).

Figure 5. NNR vs. prices (averages)



Source: authors with information from (Beck et al., 2001; ECLAC, 2015; IMF, 2015).

A reason that can justify a negative relation between the percentages of votes obtained by the incumbent and social spending is that those presidents with low popularity in the region will tend to allocate more resources to social spending. In this case the incumbent respond to the voting preference in an intention to alter voting preferences. In contrast, Figure 4 above shows the averages of social spending and production of natural resources. There is a cluster of low social spending and natural resources in the 1990s and a positive trend dominated by observations in the 2000s. Figure 2 makes it difficult to ignore a relation between these two variables. Likewise, Figure 5 plots the production

of natural resources and the prices principal component. It reveals a similar story, in the sense that low prices are related to low production averages in the 1990s and high prices in the 2000s apparently boosted country-level production. Therefore, if there is a relation between social spending and commodity prices, the production of natural resources is mediating this relation.

5. Empirical approach

Our empirical approach is based on the search for evidence supporting our hypothesis that there is a redistributive policy of natural resources in Latin America. We are not directly interested in testing our theoretical approach, which focuses on the electoral motivations of social spending when natural resources are available as non-tax revenues. Instead, we narrow down our interest by finding evidence on the relation between political behaviour, social spending and the redistribution of revenues from NNR. As our theoretical approach predicts that social spending is used to alter voting behaviour, our interest here is to generate evidence that this phenomenon is facilitated by the availability of NNR.

To date various methods have been developed to assess the relation between three variables that, at least intuitively, are endogenously correlated. The structure of the data determines the methods that can be employed. In this case, the availability of a cross-country panel dataset allows us to focus on a longitudinal analysis by specifying a fixed effect model in three stages. We have strong reasons to believe that simultaneity can affect the relation between votes, social spending and natural resources revenues as percentage of the GDP. To the extent that the share of votes and increase the demand for social spending, social spending can boost the demand for non-tax resources as well as natural resources could boost social spending. Fixed effects models are useful in accounting for unobserved heterogeneity that might confound or analysis of the relation between social spending and revenues from natural resources. A major problem with fixed effects is, in fact, one of its strength, in the sense that accounting for unobserved heterogeneity does not deal with most of the simultaneity affecting in our specification, insofar that we have three endogenous variables. An instrumental variable (IV) approach with three stages might help us mitigate the confoundedness between our variables of interest, considering that the international prices of natural resources are not directly determined by producing countries from Latin America. Similarly, the fact that a country has become a net-exporter of natural resources is dependent on the geological endowment of each territory, which is completely orthogonal to prices and social spending. Prices and an indicator of net-export of natural resources are ideal instruments for our empirical approach, as we later test that they are random to the vote's share and social spending and can determine natural resource participation in the GDP. Therefore, we combine fixed effects models with IV in order to establish the relation between social spending and natural resources as a test for the existence of redistributive policy in Latin America in response to the voting behaviour of the population.

Given the fact that we have three basic elements of analysis, namely, percentage of votes, social spending, natural resources and prices, we are able to specify the following three stage equation system with country-level fixed effects:

$$percent_{it} = \beta_1 sst_{it} + \beta_2 X_{it} + u_i + v_{it} \quad (4)$$

$$sst_{it} = \alpha_1 natres_{it} + \alpha_2 X_{it} + u_i + v_{it} \quad (5)$$

$$natres_{it} = \delta_1 price_t + \delta_2 netx_{it} + \delta_3 X_{it} + u_i + v_{it} \quad (6)$$

Where for each country i in year t the dependent variable, $percent_{it}$, is the endogenous percentage of votes obtained by the president, sst_{it} denotes the endogenous social spending as percentage of the GDP, $natres_{it}$ are natural resources revenues as percentage of the GDP and $price_i$ are natural resources prices as described in the previous section. $netx_{it}$ is a dummy variable indicating whether the country is a net NNR exporter. X_{it} are socioeconomic and political factors that we account for in our analysis (see Table 1). The terms u_i and v_{it} are country-level fixed effects and idiosyncratic error terms, respectively. We estimate β's, α's and δ's simultaneously by three stage least squares and present the results in the next section.

6. Results

A set of fixed effects model were considered to estimate the parameters in (4), (5) and (6). Our main focus here is to look at the sign and significance of β_1 and α_1 and to check its robustness to different specifications and to the inclusion of political and socioeconomic factors. As we mentioned above, the estimation of (4) and (5) relies on an IV approach that considers prices and net natural resources exports as instruments to NNR, NNR as instrument to social spending and social spending as instrument to the percentage of votes. We first refer to the estimation of (6) by running the fixed effect model accounting for each instrument separately and then accounting for both together. Subsequently, we add socioeconomic and political controls and time trends to check whether the sign and significance of β_1 and α_1 vary. We also rely on the Sargan-Hansen over-identification test, which checks the specification our IV approach, that is, that our instruments are uncorrelated with v_{it} and are properly excluded from (4) and (5) (Baum et al., 2003).

Table 2 below provides the estimation results of our analysis. Starting from column 1, it displays the three stages least squares regression of percentage of votes obtained by the president on social spending, and the regression of social spending on the natural resources production instrumented with prices and without fixed effects. This estimation yields positive and significant results between social spending and NNR but the relation, despite negative, is not clear between votes and social spending. At this point we cannot reject that natural resources are redistributed via social spending, but we cannot state that there is an electoral relation. Column 2 repeats the exercise but under a fixed effect

setting. This result is consistent with the first regression in the sense that it shows positive and significant results between social spending and NNR. The magnitude of the coefficient apparently makes us believe that the specification in column 1 is overestimating the relation between social spending and natural resources. One major drawback with the specification in column 2 is that the Sargan-Hansen test did not show any significant level. Column 3 presents the estimation results accounting for economic and political controls. In this specification social spending has a significant negative impact on percentage of votes, confirming that low social spending is observed for highly popular presidents. Nonetheless the latter is not as robust as the relation between social spending and NNR. Column 4 shows the results of an IV setting considering the net-exporter indicator as an instrument. This result, despite negative, is significant. Apparently the fact that a country is a net-exporter affects negatively social spending though the production of natural resources due to a higher exposure to external shocks.

[*Table 2 about here*]

The specification in column 5 above presents the results of the estimation of (4), (5) and (6) under an IV setting accounting for both instruments. What is interesting from this result is that the coefficient α_1 is positive and significant and that the Sargan-Hansen test cannot be rejected at a 99 percent confidence level. Nonetheless, β_1 is still non-significant. The latter result implies that the redistribution of natural resources is better explained when we account for the two instruments at the same time. Columns 6-8 check the robustness of this result by adding additional covariates. The specification in column 9 contains all instruments and controls, from which we obtain a negative and significant result between the percentage of votes and social spending, but a positive relation between social spending and natural resources, even when accounting for political factors. The estimation outputs in 9 confirm that the hypothesis on the redistribution of NNR through social spending cannot be rejected and is persistently robust over the observed specifications. Social spending predicts a negative effect on the percentage of votes obtained by the president, but such relation is highly sensitive to different specifications.

These results confirm our main hypothesis: the availability of natural resources has made it possible the redistribution of government revenues through social spending, but the electoral motivations hypothesis remains weak. As a consequence, this suggests that for natural resources-rich countries, the availability of non-tax revenues has facilitated the investment in health, education, housing, social security and social assistance that otherwise had not occurred.

7. Conclusions

The present study was designed to determine the relation between the rising redistribution of income through social spending in Latin America and the availability of non-renewable natural resources (NNR). Two factors were analysed as mediators in

this dynamics. The first one had to do with the fact that NNR allow incumbents to skip the accountability that otherwise they would face by spending tax revenues on social transfer programmes. The second, the redistribution of revenues from NNR has been motivated by the incumbents' interest in obtaining electoral returns from the spending on social transfer programmes. The latter has been confirmed by a growing number of impact evaluations attributing changes in the electoral behaviour of beneficiaries of social spending to the implementation of CCTs. Thus, returning to our hypothesis posed at the beginning of this paper, it is now possible to state that revenues from NNR have been redistributed in Latin America through the implementation of social transfer programmes.

Theoretically, the results of this investigation show that political ideology and the availability of NNR can make possible the redistribution of revenues from NNR when incumbents want to remain in power and can manipulate voters' behaviour by spending more on social programmes without the opposition of ideological factions against redistribution. Therefore, the redistribution of revenues from NNR is motivated by an electoral interest of the incumbent who is also oriented towards the implementation of social transfers. We empirically explore the existence of this relation by testing whether electoral results, the availability of NNR and social spending would follow this prediction. Our main econometric specification consisted of an IV approach in three stages in which international NNR prices and the fact that countries are net-exporters of NNR were employed as instruments. In general, the results show that actually electoral outcomes are associated by social spending and, similarly that social spending has increased as a response to higher revenues from NNR.

An important practical implication of these findings is that Latin American countries have been able to reduce poverty an inequality with the implementation of social transfer programmes. These improvements have been possible to the availability of NNRs which, at the same time, have facilitated the compatibility of the reduction in poverty and inequality with the political ideology of ruling governments and the redistributive preference of the population. Our findings indicate that these dynamics would have not been in place without the abundance of NNR in some countries of the region.

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Table 2. Estimation results

Percentage of votes obtained by president	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Social spending as % of GDP	-0.822	-0.519	-1.369**	-1.827	-0.425	-0.770	-1.002	-1.495***	-1.653**
	(0.707)	(0.422)	(0.580)	(1.913)	(0.413)	(0.590)	(0.765)	(0.561)	(0.715)
Natural resources production as % of GDP	1.149**	1.014***	3.330**	-0.902*	0.919***	1.001***	0.769**	0.940***	0.842**
	(0.574)	(0.137)	(1.685)	(0.462)	(0.126)	(0.343)	(0.306)	(0.341)	(0.332)
Instruments									
Oil, minerals and metal prices	0.030***	0.040***	0.028**		0.042***	0.074***	0.081***	0.073***	0.078***
	(0.010)	(0.004)	(0.014)		(0.004)	(0.011)	(0.012)	(0.011)	(0.012)
Net natural resources exporter				-1.497**	-0.118	-0.091	-0.541	-0.113	-0.518
				(0.608)	(0.420)	(0.499)	(0.563)	(0.533)	(0.594)
Observations	356	356	356	356	356	356	356	356	356
R-squared	0.024	0.025	0.502	0.429	0.384	0.402	0.420	0.497	0.498
Number of countries	18	18	18	18	18	18	18	18	18
Fixed effects	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls									
Socioeconomic controls	No	No	Yes	Yes	No	No	Yes	No	Yes
Political controls	No	No	Yes	Yes	No	No	No	Yes	Yes
Time trends	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Sargan-Hansen	-	0.000	0.000	0.000	3.182	1.767	0.074	1.787	1.182
P-value	-	0.000	0.000	0.000	0.074	0.184	0.786	0.181	0.274

Source: authors with information from IMF (2015), ECLAC (2015) Beck et al. (2001). Notes: (a) Three stage least squares. (b) Standard errors in parenthesis. (c) Inference: *** p¡0.01, ** p¡0.05, * p¡0.1

Appendix

Table A1. Descriptive statistics of selected variables.

Variables		Mean	Std. Dev.	Min	Max	Observations
Percentage of votes obtained by president	overall	46.02	11.26	19.60	74.00	N = 356
	between		6.984	30.84	52.95	n = 18
	within		9.008	23.79	73.59	T = 20
Social spending as % of GDP	overall	11.40	5.646	2.900	27.80	N = 356
	between		5.414	4.967	20.96	n = 18
	within		2.002	5.119	18.25	T = 20
Natural resources production as % of GDP	overall	3.910	5.146	0.100	30.30	N = 346
	between		4.869	0.100	18.81	n = 18
	within		2.337	0.100	15.40	T = 20
Oil, minerals and metal prices	overall	21.32	26.75	0.000	100.0	N = 356
	between		2.844	11.02	23.90	n = 18
	within		26.63	0.000	100.0	T = 20
Years the chief executive has been in office	overall	3.267	2.119	1.000	12.00	N = 356
	between		0.766	2.154	4.857	n = 18
	within		1.984	0.000	10.87	T = 20
Party orientation of the incumbent (right)	overall	0.140	0.348	0.000	1.000	N = 356
	between		0.241	0.000	0.765	n = 18
	within		0.262	0.000	0.950	T = 20
Party orientation of the incumbent (left)	overall	0.480	0.500	0.000	1.000	N = 356
	between		0.308	0.000	1.000	n = 18
	within		0.400	0.000	1.290	T = 20
Legislative elections in the year in question	overall	0.272	0.446	0.000	1.000	N = 356
	between		0.079	0.190	0.500	n = 18
	within		0.439	0.000	1.082	T = 20
Executive election in the year in question	overall	0.233	0.423	0.000	1.000	N = 356
	between		0.035	0.190	0.286	n = 18
	within		0.422	0.000	1.043	T = 20
Current president re-elected	overall	0.2645631	0.4416366	0	1	N = 356
	between		0.3067337	0	1	n = 18
	within		0.3341009	0	1	T = 20
GDP per capita	overall	5.174	2.811	1.085	12.69	N = 356
	between		2.785	1.298	9.660	n = 18
	within		0.801	1.586	8.200	T = 20

Population	overall	27.66	42.64	2.490	193.5	N	=	356
	between		43.23	3.033	172.7	n	=	18
	within		4.172	4.610	48.44	T	=	20
Tax revenues by central government as % of the GDP	overall	11.84	2.817	4.900	19.20	N	=	355
	between		2.341	7.995	15.72	n	=	18
	within		1.693	6.991	16.84	T	=	20
Net natural resources exporter	overall	0.460	0.499	0.000	1.000	N	=	354
	between		0.480	0.000	1.000	n	=	18
	within		0.180	0.000	1.000	T	=	20

Source: authors with information from (Beck et al., 2001; ECLAC, 2015; IMF, 2015).