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THE DISTIBUTIONAL IMPACT OF PRIVATIZATION IN DEVELOPING COUNTRIES: THE ROLE OF DEMOCRATIC INSTITUTIONS

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The Distibutional Impact of Privatization in Developing Countries: The Role of Democratic Institutions *

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Abstract

Focusing on developing countries which have recently experienced political and economic transitions, we study the relation between privatization and income inequality in the light of the democratization process. We find that privatization is negatively and significantly correlated with the inequality in the income distribution when, thanks to the newly introduced democratic institutions, the protection of the civil liberties and the guarantee of the political rights guaranteed to all citizens are beyond a specific threshold. Then, our evidence suggests an interesting policy implication for developing countries: only after having established well representative political institutions, privatization can be implemented without producing a negative distributional impact.

Keywords: Gastil index, civil liberties, political rights, Gini index
JEL Classification: D30, O15, P16, P35, P36, P50

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1 Introduction

Starting in Britain in the early 1980s, privatization has then became a common trend both in developed and developing countries, although with national variations in terms of relevance, timing and methods. According to the theoretical literature, there are different reasons that can help to explain this privatization spread around the world. First of all, thanks to divestiture programs governments can (i) reduce the national budget deficits and the stock of national debt, (ii) develop the financial markets, and (iii) increase the level of firms' efficiency. Moreover, focusing on developing countries, (iv) the relevant role of international financial institutions, i.e. IMF and World Bank, especially due to conditionality requirements for disbursement, can not be negleted. Following Brune *et al.* (2003), during the 1980s and the 1990s, on average, developing countries show each year outstanding obligations from IMF and World Bank of respectively 3.1 and 9.2 percent of GDP. These loans from these international institutions are very useful to these countries to finance their development programs. At the same time, they are often related to the credible commitment on the part of receiving countries to implement specific market friendly reforms, generally starting from privatization of State owned enterprises.[1] In turn, this credibility generates investor confidence in national divestitures and then privatization becomes beneficial to these economies by attracting investments. From 1988 to 1993, the value of privatization in developing countries represented between one-third and one-half of the world total (Cook and Kirkpatrick, 1997).

However, even if privatization can contribute to improve efficiency and financial performance[2] and to help developing countries to implement their development strategies, its distributional impact is relevant too. On this last issue, the general complaint refers to the fact that privatization reduces equity in the distribution of wealth and income. This is supported by different situations that often follow a divestiture program, such as, for example, unemployment increase and the raise in prices for essential services (see Birdsall and Nellis, 2003, and Opper, 2004). This negative distributional impact, that makes privatization increasingly unpopular, is a very relevant problem especially for developing countries in which, due to government or policy failures or to historical reasons, income and wealth are generally more concentrated than in developed countries (Kuznets, 1963). Summarizing, on one hand privatization allows developing countries to receive loans from international institutions which are often mainly essential for starting their development programs. On the other hand, however, privatization impact on income distribution risks to be negative and to lead to an increase in the already high income inequality levels. Is

[1] See Williamson (1993) for the inclusion of privatization among the policies in the "Washington consensus" between the US Treasury and the international financial institutions. And see Opper (2004) about the role of IMF and IBRD loans in explaining the progress in privatization.

[2] This is especially true when privatization is implemented together with deregulation or other increasing competition strategies (see Cavaliere and Scabrosetti (2008) for a survey of the literature on privatization and efficiency).

this tradeoff actually necessary? On the contrary, cannot the governments use a share of privatization revenue to implement redistributive public policies and to secure a more equal income distribution among the citizens?

To try to answer this question we think that the role of political institutions has to be taken into account. In fact, developing countries have recently experienced not only an economic, but also a democratic transition, although even in this case with some differences across countries due to their history, background, institutional, economic and social characteristics.[3] Following the recent work of Acemoglu and Robinson (2006), revolutionary threats by the citizens are at the origin of democratization process. Starting from a non-democracy, in which the elites have *de jure* political power, a revolutionary threat by the citizens will wring promises by the elites to future pro-citizens policies (i.e. redistribution programs). To make these concessions credible in a long time perspective, the elites have to transfer the *de jure* political power to the majority of citizens. This means that democratization has to occur, working as a commitment device to future redistribution. In other words, in a democracy, people are allowed to vote and express their preferences about public policies. Thus, democratization leads to an increase in the number of voters with relatively low income. This changes the position and the preferences of the median voter and moves public policies away from the preferences of the elites (Meltzer and Richard, 1981). As a consequence, the more unequal the existing income distribution the stronger will be the corresponding redistributive pressure. However, the related opposition by the rich which will have to pay higher (explicit or implicit) taxes has to be taken into account especially in young and not mature democracies. Moreover, in both representative and direct democracies, the prediction of the median voter theorem could be weakened, and the expected results about redistribution could not appear (Milanovich, 2000; Scervini, 2009).

Starting from this, the paper analyses the relation between privatization and income inequality adopting a new approach based on the interplay between privatization and democratization in developing countries. In particular, we ask if the existence of representative political institutions can help to soften or even reverse the negative impact of de-nationalization policies on income inequality. In other words, privatization make revenue available to the government. In presence of newly democratic political institutions redistributive pressures from the poor emerge. As a consequence, a share of privatization revenue could be used to redistribute income among citizens. In this way the opposition to redistribution on the part of the rich would reduce because increasing the level of (explicit or implicit) taxation would not be so necessary. And, at the same time, like in a virtuous circle, the reduction of income inequality would in turn contribute to the political stability and the consolidation of democratic institutions, and to the political sustainability (the credibility) of privatization in developing countries in the long run.

[3] The democratic transition is typically related to the economic one, as emphasized by a recent –and growing– literature (see, among the others, Giavazzi and Tabellini, 2005; Persson and Tabellini, 2007).

To find empirical evidence on this we focus on a sample of 33 developing and low-income countries of three geographical areas: Asia, Latin America and New EU Members in the 1988-2009 period. We collect data on yearly privatization revenue out of GDP and income inequality indices from different sources. In addition to these variables, we include democracy indicators. In particular we refer to the Gastil index from Freedom House and to its two components, i.e. the strength of political rights and the protection of civil liberties in a country, which are two relevant and distinct dimensions of a democracy (Dahl, 1971).[4] We investigate the link between privatization and income inequality using an empirical model based on cross-country pooled OLS regressions. Notice that we do not use country fixed effects, so omitted variable bias can emerge. However, cross-country variation is exactly what we want to study given our short time span. In fact, while there is some within-country variation in democracy indicators over this time period most of the variation is between-country variation. Within-country variation is more likely to pick up the true association, if there is one, between democratization, privatization and income inequality when countries are tracked over long time periods.

Our analysis delivers some interesting results. More specifically, we find that neither democracy, as measured by the Gastil index, nor the protection of civil liberties and the guarantee of political rights by themselves are never significantly correlated with the level of income inequality. Then, it seems there is no relation between the existence of representative political institutions and the fairness of the income distribution. This is in line with what found in previous studies underlying the role played by the rich interest group especially in young and not mature democracies and the fact that in both representative and direct democracies, the expected results of the median voter theorem on redistribution could not appear (Milanovich, 2000; Harms and Zink, 2003; Ross, 2005; Scervini, 2009). On the contrary, the amount of yearly revenue from privatization as a percentage of GDP is, in general, positively and significantly correlated with each of our three measures of income inequality, thus confirming the common popular complaint on the negative distributional impact of privatization programs. However, we find that the interaction between democracy, measured by Gastil, civil liberties or political rights indices respectively, and the yearly revenue from privatization out of GDP is always negatively and significantly correlated with our income inequality measures. All these findings lead us to identify a democracy threshold D^* below which the relationship between privatization and the inequality of the income distribution is positive. However, when democracy becomes more mature, i.e. the protection of civil liberties and the guarantee of political rights are above specific threshold values, the relationship between privatization and income inequality starts to become negative. Then, our empirical analysis delivers an interesting policy implication concerning income inequality and both democratization and privatization process in developing countries: a positive relationship between privatization revenue and the level of income inequality appears if and only if democratic institutions are not mature

[4] See the Data description and Data Appendix sections for details.

enough, i.e. the protection of civil liberties and the guarantee of political rights are not sufficiently high. In other words, even if the reverse causality problem is not solved, we find evidence suggesting that in developing countries privatization seems to better work at the distributive level the more democracy becomes consolidated.

The paper is organized as follows: the next section contains an overview of the related literature, section 3 provides a description of the data, while section 4 presents our econometric results. Finally, section 5 concludes.

2 Related literature

Our study fits into the existing theoretical and empirical literature on the economic and political determinants of income inequality, and on the link between political and economic liberalization.

Economic and political determinants of income inequality

According to the modernization theory, developing countries are expected to show higher level of social inequality than developed ones. In particular, many empirical studies have found an inverted U-shaped relationship between economic development and income inequality (see among the others Kuznets, 1963; Paukert, 1973; Ahluwalia, 1976). During intermediate stages of development income disparities would be relevant because the efficient use of scarse capital will lead to the concentration of wealth in the hands of few. However, once overcame this intermediate phase of development, economic growth would determine a decrease in income inequality by starting to benefit not only the elites, but a more and more significant number of people. On the other hand, dependency theory claims that the reliance on foreign capital increases income inequality levels of a country through for example underabsorption of labor and sectoral disparities due to the capital intensity of foreign investments (Evans and Timberlake, 1980; Timberlake, 1987). An inverted U-shaped relation seems also to concern the access to education and the level of income inequality. Simpson (1990) underlines that only when a large proportion of the population starts to have access to mandatory and free education some income equalization happens. Moreover, among the politics to reduce income inequality and poverty which are advocated by international institutions such as the United Nations (UNRISD, 2010 and Millennium Goal Strategies) the improvement of the access to education, but also to health care and other social services appears to play a central role.

Among the contributions which focus on the relationship between privatization policies and income inequality, Birdsall and Nellis (2003) underline that first of all the ownership argument has to be considered. Privatization could determine a distributional loss due to the fact that the ownership of the involved firms tends to become more concentrated. Former State assets go in the hands of few private shareholders which generally are the only to be able to capture the short-run efficiency gains of the divestiture strategy. Even in the case of vouchers, which are always labeled as the best way to equitably share the ownership of public firm among the population, the distributional impact of privatization programs has been disappointing (famous case are those of Russia and the Czech Republic), the actual returns having generally been much lower than the promised ones and having often concerned a very small number of people. According to this, Nellis (2006) says that privatization enrichs the already rich and powerful at the expense of the poor. Second, to assess the distributional impact of privatization the effects on labor have to be taken into account. In a survey of more than 300 privatized firms, Chong and Lopez-de-Silanes (2002) find that the number of employees declined in about 78% of cases, while the same does not change or eventually increases only in remaining 22% of cases. In terms of prices and access, a lot of studies, especially focusing on Latin American privatized firms, show that after privatization the urban poor population starts to have access to the service thanks to the network expansion. This increase in access leads to a real gain for the poor if the prices of these services do not significantly increase (see, for instance, Florio and Poggi, 2010). However, higher prices for accessing a just privatized service are often related to the elimination of the illegal connections that normally characterized lower income users thus determining an increase in inequity. Moreover, thanks to privatization, the government not only can stop to transfer funds to inefficient public firms but can also obtain more tax revenue from the newly higher productive private firms. This could indirectly lead to a rise in the level of equality of the income distribution. Furthermore, it is important to note that the distributional outcome of privatization also depends on the effects of the other reforms, involving for example market competition and regulatory regime, which are eventually carried out at the same time.[5]

Finally, a large literature has emphasized the role of democratic institutions in shaping income inequality. In his pioneering work Cutright (1967) claims that there is a negative relationship between democracy and income inequality. In fact in a democracy the poor and disadvantaged can express their preferences and this determines an increase in public policies oriented to income equalization. Moreover, contrary to what happens in autocracies, democratic institutions guarantee the free flow of information. As a consequence, the free circulation of information about the condition of the poor may be embarrassing to the government which does not take into account their needs (Sen, 1981 and 1999). Third, democracies tend to provide more public goods than non-democracies and thus to be especially beneficial for the poor. All these arguments are also in line with what found by Meltzer and Richard (1981). In a democracy people are allowed to vote and express their preferences about public policies. Thus, democratization leads to an increase in the number of voters with relatively low income. This changes the position and the preferences of the median voter and moves public policies away from the preferences of the elites. As a consequence, the more unequal the existing income distribution the stronger will be the corresponding redistributive pressure. Other contributions on the political mechanism

[5] For example, in the European Community, the privatization strategy accounts the following steps: privatization, regulation, vertical disintegration, and liberalization (Ceriani and Florio, 2011).

through which greater income inequality leads to greater redistribution can be found in Perotti (1996), Alesina e Perotti (1994), Alesina e Rodrik (1994). More recently, Acemoglu and Robinson (2006) theorize about democratization as a commitment device to future redistribution from the rich (the elites) to the poor (the citizens). Empirical studies have typically confirmed these theories. Boix (2003) suggests that a significant share of the public sector actually depends on the political (democratic) regime in place, which also interacts with the distribution of income, citizens' preferences and economic conditions. Along these lines, Aidt *et al.* (2006) find a significant relation between the extension of the voting franchise and the size of government. Profeta and Scabrosetti (2010) find that democracy and civil rights protection are positively correlated with the level of tax revenue and the amount of direct taxes. However the consensus on the positive relation between democratization and redistribution is not unanimous. Following Harms and Zink (2003), limits to redistribution can characterize both direct and representative democracies. In direct democracies, a limited participation in the elections and a broader set of redistributive policies to be voted upon can respectively prevent the poor from being a majority at the pools and lead other policies to beat an equalization of incomes under majority voting process. On the other hand, in representative democracies, electoral competition may refrain politicians from radical redistribution and voters' rational ignorance may shift the actual political power from the electorate to specific interest groups. And the rich are generally a more politically effective interest group than the poor since (i) they can devote time and resources to lobbying activities; and (ii) they can easier overcome the free-rider problem given that they represent a relatively small group. In this way they can oppose the increase in (explicit or implicit) taxes to implement a large degree of redistribution. Moreover, according to Milanovich (2000) even if the process of redistribution is positively associated with initial income inequality, the evidence that redistribution takes place through the median voter channel is weaker. This could happen for a variety of reasons: the decisive voter is at a higher level than the median voter; middle class gains from redistribution only in the long instead of in the short run; collective decisions are made with institutions of representative democracy rather than direct democracy. The median voter hypothesis applied to voters does not seem to describe the collective decision-making rule. Also Scervini (2009) casts some doubt on the real effectiveness of the median voter theorem in explaining redistribution process in democratic countries, while Ross (2005) shows that the impact of democratic institutions on improving the condition of the poor appears not too significant.

Democratization and privatization

A large and growing literature (Biglaiser and Danis, 2002; Opper, 2004; Bortolotti and Pinotti, 2005) argues that democratic and economic transitions may be strictly related. Although it is difficult to establish the true direction of a causal relationship, there may be positive feedback effects between economic and political reforms (Giavazzi and Tabellini, 2005). In many areas of the world, the economic transition goes hand in hand with a political transition towards a modern concept and organization of democracy. On one hand a higher level of economic well-being –which entails higher rates of literacy, education, urbanization, and also a larger middle class– would be necessary, though not sufficient, for democracy to be widely supported and then introduced (Lipset, 1959; Boix, 2003; Acemoglu and Robinson, 2006). On the other hand, stable democracies are likely to promote economic liberalizations and reforms, which in turn would have a positive effect on the overall economic performance (Persson and Tabellini, 2007). Recent contributions have emphasized this two-way relation between democratic regimes and economic outcomes, with a particular focus on growth as the major goal of economic policies.[6]

Anyways, as underlined in Opper (2004), the aim to reach higher efficiency and productivity standards alone cannot explain the privatization process which involves first of all a change in the societal distribution of resources. Hence, some literature has specifically concentrated on the relation between privatization and the type of political regime in one country. Some believe that authoritarian regimes are more likely to implement unpopular reforms such as privatization, since they do not care about public support (see Biglaiser and Denis, 2002 for a review). Others, instead, (Biglaiser and Danis, 2002; Bortolotti *et al.*, 2003) believe that democracies are more suitable to privatize, since they enjoy by definition the support and the cooperation by their citizens. Biglaiser and Danis (2002), for example, analyzing privatizations occurred in 76 developing countries from 1987 to 1994, found indeed that higher privatization sales occurs more in wealthier democratic developing countries. This result is driven by different reasons. First of all, the more wealthy a country, the more likely is that potential buyers would be domestic, reducing therefore nationalistic fears. Second, under a democratic regimes, State owned enterprises are not ruled by military, as in autocratic regimes (which, instead, place military in high-paying positions in order to reduce counter-coup attempts). Hence, there is a less capacity to oppose privatization by the managing positions. On the demand-side, moreover, buyers are concern about the enforcement of property rights, capital and trade liberalization policies, and other policies such as those against corruption and fraud: democracies are more inclined to implement such policies. Bortolotti *et al.* (2003) found similar results in their study over 34 countries in the period 1977-1999. Moreover, they show that privatizations occur more frequently in (i) wealthy democracies; (ii) ruled by right-wing politicians, who are more credible to be market-oriented (see also Bortolotti and Pinotti, 2003); (iii) affected by high public debt; (iv) with a common-law tradition (as opposed to french and german civil law); and (iv) endowed with more liquid stock market, which allows the government to sell higher stakes.

3 Data description

Our study focuses on the impact of privatization on income inequality in the light of democratization process with reference to 33 developing countries belonging to three areas

[6]See, among the others, Persson and Tabellini (2007), Papaioannou and Siourounis (2008), Rodrik and Wacziarg (2005), and the criticisms of Barro (1996) and Fernandez and Rodrik (1991).

of the world (Asia, Latin America, New EU members) in the period 1988-2009.[7]

Our dependent variable is a measure of income inequality. For robustness checks we actually use three different measures of inequality, namely the *Gini index*, the ratio of the income share of the richest 10 percent and the poorest 10 percent of population (*p10_p90*) and the ratio of the share of income belonging to the richest and the poorest 20 percent of the population (*p20_p80*). The Gini index was first introduced by Gini (1912) and it is a measure of variability which takes value 0 when all incomes in the distribution are the same, and value 1 if all income is owned by one individual alone. While the Gini index weights more incomes around the median, the other two indices are instead more influenced by incomes at the tails of the distribution and therefore allow to focus on the share of income going to the poorest individuals. We retrieve data on inequality from the *World Bank's Open Data* and from *Eurostat* for the Gini index of the New EU member states.

Moving to the set of independent variables, we measure the privatization process as the share of yearly privatization revenue out of GDP. Data on privatization come from the *World Bank's Privatization Database* source. This data covers the transactions of at least one million dollars in developing countries, which generate proceeds or monetary receipts to the government resulting from partial or full divestitures, concessions, management contracts, and leases. We use as dependent variable the sum of all privatization revenue from transactions occurring in each year, in each country, in all the five sectors covered by the dataset (Energy, Financial, Infrastructure, Manufacturing and services, and Primary).

Second, we need a democracy index. There is a general agreement in identify Democracy with the existence of specific institutions, which guarantee free and fair elections, the accountability of politicians to the electorate and free entry in politics, as in the definition proposed by Schumpeter (1942):

> "[...] democracy is the institutional arrangement for arriving at political decisions in which individuals acquire the power to decide by means of a competitive struggle for the people's vote"

However, there is no consensus on how to measure these institutional conditions. [8] We

[7] In particular, our sample of countries for the Asian region includes Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. Given the magnitude of the Asian continent, these countries are well representative of its three main regions: Far East, South and East and Indian sub-continent. For the Latin American region we consider Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Finally, we include all countries that joined the European Union in 2004 (with the exception of Cyprus and Malta, due to lack of data), which represent more mature, though quite recent, democracies.

[8] See Vanhanen (2000), Munck and Verkuilen (2002) and Plümper and Neumayer (2010) for a discussion on the pros and cons of all the existing different measures of democracy.

decided here[9] to adopt as democracy indicator the *Gastil democracy index* from Freedom House, which is a measure of the guarantee of political rights and the protection of civil liberties to all citizens. This index is the unweighed average of two other indices: the *political rights index* and the *civil liberties index*. The first one refers to the rights that enable people to participate freely in the political process: indeed, the measure deals with the existence of free and fair elections, the right to organize, the existence of a credible opposition and the avoidance of corruption. The second one is instead a measure of the degree of freedom of expression, assembly, association and religion guaranteed to individuals. Differently from the political rights index, the civil liberties index is then meant to measure the broader set of *liberties* guaranteed to individuals within their polity. These Freedom House indices are constructed on a one-to-seven scale. To make their interpretation more intuitive, we invert the scale,[10] so that a Gastil index of 1 represents the lowest degree of civil liberties and political rights, and 7 the highest. Hence, countries with a rating of 7 are generally characterized by an established and equitable rule of law with free economic activity, free and fair elections, political competition and citizens enjoying a full range of civil liberties and autonomy. On the other side of the spectrum, a rating of 1 indicates virtually no freedom, real restrictions on liberty caused by non-governmental terror, and the absence of political rights due to oppressive regime, civil war and violence.[11] By using this index we thus acknowledge that democracy is a multi-dimensional concept. This idea goes back to Dahl (1971) which distinguished three varying dimensions of democracy: public contestation, right to participate and civil liberties. At least two of these Dahl's dimensions are well considered by the index of democracy we choose. Moreover, following Berlin (1969) these two components of the Gastil index capture the difference between positive and negative liberty. Positive freedom, in its political form, is the liberty that can be achieved through participation in the political process. On the contrary, negative freedom concerns the degree to which individuals or groups suffer some kind of interference from external bodies. In other words, this concept of liberty is related to the absence of obstacles, barriers or constraints to individual actions. As a consequence, a democratic country is free to the extent that its citizens actively participate in the decision making. From this point of view, the political rights indicator can thus be considered as a proxy for

[9]Other studies using the same index of democracy are Burkhart and Lewis-Beck (1994), Borooah and Paldam (2006), and Paldam and Gundlach (2008).

[10]Therefore, in the followings, what we refer to as Gastil index is in fact the inverted-scale version of the same index, and this applies as well to the civil liberties and the political rights indices.

[11]To determine each country's civil liberties and political rights indices, researchers answer a series of survey questions classified in different categories. For the civil liberties index they are: (i) freedom of expression and belief; (ii) association and organizational rights; rule of law; (iv) personal autonomy and individual rights. For the political rights questions are related to the electoral process, the political pluralism and participation, and the functioning of government: Notice that Freedom House distinguishes between constitutional guarantees of rights, i.e. the formal aspect thereof, and the degree with which those rights are *de facto* protected. Therefore, the real-world rights and freedoms enjoyed by individuals are influenced by the interplay of a variety of actors, both governmental and non-governmental.

Berlin's concept of positive freedom, while the civil liberties index can be related to the one of negative freedom.

In the Data Appendix we also describe all our control variables which are independent variables commonly used in the empirical studies on the determinants of income inequality, i.e. the gross domestic product per capita (*GDP_per capita*), the share of foreign direct investment out of GDP (*FDI*), and the amount of public spending on social protection (*sp_pergdp*), education (*edu_pergdp*) and health (*health_pergdp*) as percentage of GDP.

We report the summary statistics of all relevant variables for the 1988-2009 period in Table 1.

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Gini	286	43.04	11.55	19.4	62.99
p10_p90	242	29.5	26.68	3.26	262.88
p20_p80	242	13.65	8	2.61	45.23
gastil_index	704	5.17	1.36	1	7
civ_inverted	704	4.99	1.27	1	7
pol_rights_inverted	704	5.36	1.54	1	7
totpriv_gdp	360	1.23	2.12	0	19.62
GDP_percapita	718	3300.89	2365.6	210.38	13788.81
FDI	696	3.22	3.68	-12.21	51.06
sp_pergdp	378	3.42	4.05	0	19.74
edu_pergdp	378	3.02	2.97	0	21.21
health_pergdp	378	1.53	1.76	1.10E-008	11.8

4 Results

We estimate a pooled OLS regression described by the following equation:

$$Y_{it} = \alpha_t + \beta DEMOC_{it-1} + \gamma PRIV_{it-1} + \delta PRIV_{it-1} * DEMOC_{it-1} + \bar{\zeta} controls_{it-1} + \epsilon_{it} \quad (1)$$

where Y_{it} is the inequality index in country i in year t, $DEMOC_{it-1}$ is the Gastil index of democracy (or one of its two components, i.e. civil liberties or political rights index) in country i in year $t-1$, $PRIV_{it-1}$ is the yearly revenue from privatization as a percentage of GDP in country i in year $t-1$, $PRIV_{it-1} * DEMOC_{it-1}$ is the interaction term between privatization and democratization in country i in year $t-1$, α_t is a year fixed effect, $controls_{it-1}$ are control variables, and ϵ_{it} is the error term. We assume that the effects of our independent variables on the income inequality are not instantaneous and so we decide to include their lagged values.[12] On the contrary, we do not use country fixed effects because cross-country variation is exactly what we want to investigate given that over our time span most of the variation in democracy indices is between-country variation.

Our results are shown in Tables 2, 3 and 4. They refer respectively to our three indices of democracy from Freedom House: the Gastil index, and its two components, i.e. civil liberties and political rights, used one by one. In fact, we choose to run also separate regressions for each of the these two components to be able to disentangle their separate relationship with income inequality. Moreover, in Tables 2a, 3a and 4a income inequality is measured by the Gini index, while in tables 2b, 3b and 4b, and 2c, 3c and 4c we use the ratio of the income share of the richest 10 percent and the poorest 10 percent of the population (*p10_p90*), and the ratio of the share of income belonging to the richest and the poorest 20 percent of the population (*p20_p80*).

Tables 2, 3 and 4 are organized in the following way: in each column we stack the regression output by enlarging step by step the set of controls. In the first (unconditional) specification we only consider our democracy measure together with the total amount of privatization out of GDP and our interaction variable, in the second specification we simply control for GDP per capita, and in the third one we add the share of FDI out of GDP. Finally in the last three columns we include the level of social protection, education and health spending as percentage of GDP respectively.

Since the error term might be serially correlated within countries and thus wrongly inflate the precision of our estimates, for all specifications we cluster the standard errors at the country level (see Bertrand *et al.*, 2004).[13] The corresponding standard error is displayed below each coefficient.

Whichever the specification of the econometric model, we find that the level of democracy alone does not have any significant relation with the concentration of income. Then, it seems there is no relation between the existence of representative political institutions which increase the protection of civil liberties and the guarantee of political rights to all citizens and the fairness of the income distribution. This is in line with what found in previous studies underlying the role played by the rich interest group especially in young and not mature democracies and the fact that in both representative and direct democracies, the expected results of the median voter theorem on redistribution could not appear (Milanovich, 2000; Harms and Zink, 2003; Ross, 2005; Scervini, 2009). On the other hand, privatization is, in general, significantly and positively correlated with income inequality, thus confirming the common popular complaint on the negative distributional impact of privatization programs. Moreover, the interaction term ($PRIV_{it-1} * DEMOC_{it-1}$) always shows a significant and negative correlation with income inequality. This suggests that: (i) a relationship between democracy and the distribution of income inside a country appears

[12]The use of lagged variables is a way to mitigate the possible presence of reverse causality problems in our estimates.

[13]The clusterization of the standard errors acts, in a broad sense, as an implicit form of random effect model.

when the privatization process takes place; and (ii) there is a non-monothonic relation between democracy, privatization and inequality. Starting from the estimated model:

$$\hat{Y}_{it} = \hat{\alpha}_t + \hat{\beta} DEMOC_{it-1} + \hat{\gamma} PRIV_{it-1} + \hat{\delta} PRIV_{it-1} * DEMOC_{it-1} + \hat{\zeta} controls_{it-1} \quad (2)$$

we want to study the sign of a marginal increase in privatization on the level of inequality:

$$\frac{\partial Y_{it}}{\partial PRIV_{it-1}} = \hat{\gamma} - \hat{\delta} DEMOC_{it-1} < 0 \quad (3)$$

Notice that the interaction term is always negatively and significantly correlated with income inequality, from which the sign minus in front of $\hat{\delta}$. Therefore, a negative relationship between income inequality and a marginal increase in privatization revenue appears only when the following condition is satisfied:

$$DEMOC_{it-1} > \frac{\hat{\gamma}}{\hat{\delta}} \quad (4)$$

In other words, only if democracy index is higher than a given threshold value $D^* = \frac{\hat{\gamma}}{\hat{\delta}}$, privatization and income inequality are significantly and negatively related. From the empirical analysis, we find that this cut-off level D^* takes values around 5 on an increasing one-to-seven scale (on average, 4.86 if we measure democracy with the *Gastil index*, 4.63 using the *civil liberties index*, and 5.15 using the *political rights index*). The complete series of values for our different indices of democracy and econometric specifications are summarized in table 6.

Finally, looking at our control variables we find that both GDP per capita and the share of FDI out of GDP are never significantly correlated with our different inequality indices. So, in line with previous studies (Crenshaw, 1992), our analysis does not show that foreign capital inflows contribute to income inequality, that is we do not find support for dependency theory (Alderson and Nielsen, 1999; Beer, 1999; Reuveny and Li, 2003). Moreover, social protection expenditure is negatively and significantly correlated with the income inequality, but only when this is measured by Gini index.[14]

Summing up, our results suggest that a positive relationship between privatization revenue and the level of income inequality of a country appears if and only if democratic institutions are not mature enough. As a consequence, even if the reverse causality problem is not solved, we find evidence suggesting that in developing countries privatization seems to better work at the distributive level the more democracy becomes consolidated.

5 Conclusions

Our analysis is a first attempt to explore whether representative political institutions may contribute to explain the relation between privatization and income inequality. In partic-

[14] Notice that when inequality is measured by p10_p90 and p20_p80 the number of observations in our dataset reduces.

ular, we have enriched previous empirical analyses on the link between privatization and income distribution in developing countries by focusing on the interaction between privatization and democratization processes. For this aim, we have gathered a new dataset for 33 developing and low income countries of three areas –Asia, Latin America and New EU Members–, recently influenced by democratic and economic transition.

Our results show that privatization is positively correlated with income inequality only in countries where representative political institutions are not fully developed. Even if the reverse causality problem is not solved, we thus find evidence suggesting an interesting policy implication concerning the timing of democratization and privatization in developing countries. If we care about the impact of political and economic liberalizations on income distribution, it seems to be better to start with a political transformation through which raise the protection of civil liberties and the guarantee of political rights to all citizens. Only when this democratization process starts to become mature, i.e. the protection of civil liberties and the guarantee of political rights start to become relevant, privatization can be implemented. In this way, the popular complaint on divestiture programs will disappear because the relation between privatization and income inequality will be negative. Moreover, like in a virtuous circle, a more equal income distribution may in turn help the political sustainability of privatization in the long run and the government in a democratic country to be supported by the citizens.

Possible extensions of our analysis are: (i) the inclusion of countries from the African continent in which democratization and privatization took place over the period under examination; (ii) the clarification *via* a theoretical political economy model of the relationship between privatization and income inequality through the democratic decision process.

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A Appendix: Data Description

List of all variables and their sources:

Table 2: Description of the variables used in the empirical application

Variable	**Description**	**Source**

gini	inequality measure, continuous variable $[0,1]$, where 0 equals min inequality and 1 max inequality	The World Bank. World Bank Open Data.
		`http://data.worldbank.org`
		Eurostat.
		`http://epp.eurostat.ec.europa.eu`

p10_p90	inequality measure, continuous variable $[0,1]$, where 0 equals min inequality and 1 max inequality	The World Bank. World Bank Open Data. `http://data.worldbank.org`
p20_p80	inequality measure, continuous variable $[0,1]$, where 0 equals min inequality and 1 max inequality	The World Bank. World Bank Open Data. `http://data.worldbank.org`
gastil_index	democracy measure, discrete variable, where 1 represents the min democracy, and 7 the max	Freedom House. Freedom of the World: The Annual Survey of Political Rights and Civil Liberties. Washington, D.C. and New York: Rowman & Littlefield Publishers, Inc. `http://www.freedomhouse.org`
civ_inverted	civil liberties protection measure, discrete variable, where 1 represents the min protection, and 7 the max	Freedom House. Freedom of the World: The Annual Survey of Political Rights and Civil Liberties. Washington, D.C. and New York: Rowman & Littlefield Publishers, Inc. `http://www.freedomhouse.org`
pol_rights_inverted	political rights guarantee measure, discrete variable, where 1 represents the min guarantee, and 7 the max	Freedom House. Freedom of the World: The Annual Survey of Political Rights and Civil Liberties. Washington, D.C. and New York: Rowman & Littlefield Publishers, Inc. `http://www.freedomhouse.org`

Variable	Description	Source
totpriv_gdp	share of privatization revenue to GDP	The World Bank. World Bank's Privatization Database. http://rru.worldbank.org/Privatization
GDP_percapita	GDP per capita (constant 2000 US$)	The World Bank. World Bank's Privatization Database. http://rru.worldbank.org/Privatization
FDI	Foreign direct investment, net inflows (as % of GDP)	The World Bank. World Bank Open Data. http://www.ifpri.org/book-39/ourwork/ programs/priorities-public-investment/speed-database
sp_pergdp	Social Protection expenditures on services and transfers to individuals and household and on services provided on a collective basis	IFPRI. Statistics of Public Expenditure for Economic Development (SPEED). http://www.ifpri.org/book-39/ourwork/programs/ priorities-public-investment/speed-database
edu_pergdp	Education expenditures on services provided to individual pupils and students and expenditures on services provided on a collective basis	IFPRI. Statistics of Public Expenditure for Economic Development (SPEED). http://www.ifpri.org/book-39/ourwork/programs/ priorities-public-investment/speed-database
health_pergdp	Healthcare expenditures on services provided to individual persons and services provided on a collective basis	IFPRI. Statistics of Public Expenditure for Economic Development (SPEED). http://www.ifpri.org/book-39/ourwork/programs/ -public-investment/speed-database

B Appendix: Econometric Analysis

Table 3a: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	gini	gini	gini	gini	gini	gini
L.gastil_index	-0.892	-0.840	-0.687	-0.00128	0.0764	-0.190
	(1.884)	(1.929)	(1.913)	(2.908)	(3.002)	(3.003)
L.totpriv_gdp	9.927**	9.924**	9.688***	10.88***	10.93***	11.07***
	(3.638)	(3.672)	(3.453)	(3.293)	(3.339)	(3.326)
L.interaction	-2.091***	-2.090***	-2.004***	-1.964***	-1.979***	-1.993***
	(0.634)	(0.642)	(0.599)	(0.567)	(0.580)	(0.578)
L.GDP_percapita	-	-6.70e-05	-4.75e-05	0.000986	0.000974	0.00105
		(0.000703)	(0.000697)	(0.000629)	(0.000643)	(0.000662)
L.FDI	-	-	-0.482	-0.435	-0.409	-0.453
			(0.573)	(0.793)	(0.784)	(0.854)
L.sp_pergdp	-	-	-	-0.935*	-0.930*	-0.972*
				(0.497)	(0.491)	(0.521)
L.edu_pergdp	-	-	-	-	-0.172	-0.306
					(0.655)	(0.759)
L.health_pergdp	-	-	-	-	-	0.752
						(1.043)
Observations	140	140	140	93	93	93
R-squared	0.383	0.383	0.391	0.533	0.534	0.539

Notes: standard errors clustered at country level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 3b: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	p10_p90	p10_p90	p10_p90	p10_p90	p10_p90	p10_p90
L.gastil_index	3.945	5.420	4.656	-1.597	-1.143	-0.305
	(2.811)	(3.650)	(3.377)	(5.596)	(5.519)	(4.880)
L.totpriv_gdp	19.74**	20.36***	21.01***	18.12*	18.97*	19.47*
	(7.339)	(7.013)	(6.861)	(10.47)	(10.38)	(10.30)
L.interaction	-4.401***	-4.503***	-4.816***	-4.318**	-4.520**	-4.639**
	(1.150)	(1.130)	(1.175)	(1.684)	(1.764)	(1.890)
L.GDP_percapita	-	-0.00194	-0.00189	-0.000733	-0.000854	-0.00107
		(0.00241)	(0.00229)	(0.00292)	(0.00294)	(0.00334)
L.FDI	-	-	2.230	5.454	5.615	5.642
			(2.884)	(5.496)	(5.645)	(5.673)
L.sp_pergdp	-	-	-	-0.745	-0.663	-0.537
				(1.247)	(1.239)	(1.333)
L.edu_pergdp	-	-	-	-	-0.881	-0.620
					(2.432)	(2.412)
L.health_pergdp	-	-	-	-	-	-1.600
						(4.374)
Observations	123	123	123	81	81	81
R-squared	0.220	0.231	0.256	0.328	0.331	0.334

Notes: standard errors clustered at country level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 3c: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1) p20_p80	(2) p20_p80	(3) p20_p80	(4) p20_p80	(5) p20_p80	(6) p20_p80
L.gastil_index	1.450	1.532	1.517	0.279	0.422	0.355
	(1.140)	(1.224)	(1.222)	(1.864)	(1.947)	(1.828)
L.totpriv_gdp	10.24***	10.28***	10.29***	10.40***	10.67***	10.63***
	(3.066)	(3.056)	(3.038)	(3.034)	(3.189)	(3.290)
L.interaction	-2.090***	-2.096***	-2.102***	-1.954***	-2.018***	-2.009***
	(0.558)	(0.558)	(0.546)	(0.546)	(0.585)	(0.629)
L.GDP_percapita	-	-0.000108	-0.000107	0.000571	0.000533	0.000551
		(0.000589)	(0.000586)	(0.000616)	(0.000616)	(0.000693)
L.FDI	-	-	0.0453	0.604	0.655	0.652
			(0.645)	(1.112)	(1.127)	(1.156)
L.sp_pergdp	-	-	-	-0.463	-0.437	-0.447
				(0.404)	(0.376)	(0.416)
L.edu_pergdp	-	-	-	-	-0.277	-0.298
					(0.732)	(0.761)
L.health_pergdp	-	-	-	-	-	0.128
						(1.174)
Observations	123	123	123	81	81	81
R-squared	0.276	0.277	0.277	0.432	0.437	0.437

Notes: standard errors clustered at country level in brackets
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 4a: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	gini	gini	gini	gini	gini	gini
L.civ_inverted	-1.524	-1.608	-1.473	-0.456	-0.366	-0.813
	(1.938)	(2.018)	(1.992)	(2.783)	(2.943)	(2.836)
L.totpriv_gdp	8.879**	8.874**	8.630**	8.881***	8.911***	9.031***
	(3.354)	(3.346)	(3.283)	(2.659)	(2.676)	(2.675)
L.interaction	-1.996***	-1.996***	-1.924***	-1.746***	-1.756***	-1.768***
	(0.609)	(0.609)	(0.599)	(0.484)	(0.490)	(0.491)
L.GDP_percapita	-	9.87e-05	9.38e-05	0.00105	0.00104	0.00115*
		(0.000736)	(0.000735)	(0.000618)	(0.000644)	(0.000645)
L.FDI	-	-	-0.296	-0.379	-0.360	-0.400
			(0.552)	(0.819)	(0.807)	(0.875)
L.sp_pergdp	-	-	-	-0.900*	-0.900*	-0.930
				(0.513)	(0.516)	(0.546)
L.edu_pergdp	-	-	-	-	-0.140	-0.279
					(0.667)	(0.755)
L.health_pergdp	-	-	-	-	-	0.852
						(0.961)
Observations	140	140	140	93	93	93
R-squared	0.403	0.403	0.406	0.531	0.531	0.538

Notes: standard errors clustered at country level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 4b: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	p10_p90	p10_p90	p10_p90	p10_p90	p10_p90	p10_p90
L.civ_inverted	2.386	3.824	2.655	-4.875	-4.383	-3.679
	(3.311)	(3.625)	(3.884)	(8.113)	(7.962)	(6.630)
L.totpriv_gdp	18.81*	19.79*	22.59***	16.33	16.99	17.41
	(10.99)	(10.05)	(7.574)	(11.12)	(10.89)	(10.48)
L.interaction	-4.518**	-4.699***	-5.491***	-4.451**	-4.620**	-4.715**
	(1.786)	(1.632)	(1.231)	(1.817)	(1.833)	(1.921)
L.GDP_percapita	-	-0.00167	-0.00150	-0.000135	-0.000262	-0.000435
		(0.00226)	(0.00209)	(0.00247)	(0.00248)	(0.00284)
L.FDI	-	-	2.721	6.049	6.164	6.161
			(3.016)	(5.794)	(5.913)	(5.915)
L.sp_pergdp	-	-	-	-0.378	-0.328	-0.275
				(1.325)	(1.330)	(1.413)
L.edu_pergdp	-	-	-	-	-0.710	-0.570
					(2.324)	(2.330)
L.health_pergdp	-	-	-	-	-	-0.952
						(3.688)
Observations	123	123	123	81	81	81
R-squared	0.221	0.229	0.264	0.340	0.342	0.343

Notes: standard errors clustered at country level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 4c: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	p20_p80	p20_p80	p20_p80	p20_p80	p20_p80	p20_p80
L.civ_inverted	1.230	1.281	1.180	-0.155	0.0230	-0.123
	(1.253)	(1.394)	(1.410)	(2.175)	(2.253)	(1.949)
L.totpriv_gdp	11.32***	11.35***	11.59***	10.09***	10.33***	10.24***
	(2.589)	(2.487)	(2.351)	(2.855)	(2.909)	(2.979)
L.interaction	-2.443***	-2.450***	-2.518***	-2.089***	-2.150***	-2.130***
	(0.499)	(0.484)	(0.469)	(0.572)	(0.589)	(0.635)
L.GDP_percapita	-	-5.93e-05	-4.47e-05	0.000642	0.000596	0.000631
		(0.000612)	(0.000601)	(0.000566)	(0.000569)	(0.000624)
L.FDI	-	-	0.234	0.729	0.771	0.772
			(0.640)	(1.151)	(1.165)	(1.183)
L.sp_pergdp	-	-	-	-0.401	-0.383	-0.394
				(0.412)	(0.393)	(0.428)
L.edu_pergdp	-	-	-	-	-0.257	-0.286
					(0.727)	(0.750)
L.health_pergdp	-	-	-	-	-	0.197
						(1.023)
Observations	123	123	123	81	81	81
R-squared	0.300	0.300	0.303	0.440	0.443	0.444

Notes: standard errors clustered at country level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 5a: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	gini	gini	gini	gini	gini	gini
L.pol_rights_inverted	-0.281	-0.0886	0.0285	0.493	0.536	0.435
	(1.616)	(1.613)	(1.615)	(2.485)	(2.541)	(2.568)
L.totpriv_gdp	8.971**	8.912*	8.966**	12.03**	12.07**	12.29**
	(4.391)	(4.462)	(4.080)	(4.305)	(4.389)	(4.331)
L.interaction	-1.858**	-1.843**	-1.789**	-2.019***	-2.034**	-2.060***
	(0.718)	(0.729)	(0.658)	(0.696)	(0.716)	(0.709)
L.GDP_percapita	-	-0.000330	-0.000259	0.000921	0.000915	0.000960
		(0.000696)	(0.000682)	(0.000667)	(0.000675)	(0.000700)
L.FDI	-	-	-0.661	-0.549	-0.516	-0.567
			(0.605)	(0.770)	(0.761)	(0.836)
L.sp_pergdp	-	-	-	-0.978*	-0.969**	-1.017*
				(0.468)	(0.455)	(0.491)
L.edu_pergdp	-	-	-	-	-0.195	-0.320
					(0.648)	(0.764)
L.health_pergdp	-	-	-	-	-	0.672
						(1.129)
Observations	140	140	140	93	93	93
R-squared	0.351	0.353	0.369	0.531	0.532	0.536

Notes: standard errors clustered at country level in brackets

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

Table 5b: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	p10_p90	p10_p90	p10_p90	p10_p90	p10_p90	p10_p90
L.pol_rights_inverted	4.390	5.463	5.056	1.299	1.558	1.995
	(2.751)	(3.476)	(3.158)	(3.763)	(3.900)	(4.071)
L.totpriv_gdp	17.32**	17.30**	16.68**	20.29*	21.02*	20.96*
	(6.640)	(6.763)	(7.526)	(10.50)	(10.85)	(10.99)
L.interaction	-3.727***	-3.710***	-3.774***	-4.304**	-4.478**	-4.504**
	(1.155)	(1.161)	(1.277)	(1.813)	(1.959)	(1.995)
L.GDP_percapita	-	-0.00201	-0.00207	-0.00116	-0.00125	-0.00141
		(0.00238)	(0.00236)	(0.00329)	(0.00332)	(0.00361)
L.FDI	-	-	1.995	4.904	5.104	5.190
			(2.849)	(5.162)	(5.337)	(5.459)
L.sp_pergdp	-	-	-	-0.971	-0.866	-0.689
				(1.202)	(1.178)	(1.290)
L.edu_pergdp	-	-	-	-	-0.958	-0.635
					(2.446)	(2.415)
L.health_pergdp	-	-	-	-	-	-1.845
						(4.675)
Observations	123	123	123	81	81	81
R-squared	0.219	0.231	0.252	0.322	0.326	0.329

Notes: standard errors clustered at country level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 5c: Income inequality, privatization and democracy, pooled OLS estimates, 1988-2009

	(1)	(2)	(3)	(4)	(5)	(6)
	p20_p80	p20_p80	p20_p80	p20_p80	p20_p80	p20_p80
L.pol_rights_inverted	1.365	1.443	1.456	0.606	0.681	0.655
	(1.004)	(1.034)	(1.038)	(1.473)	(1.539)	(1.555)
L.totpriv_gdp	7.897**	7.895**	7.915**	10.34**	10.55**	10.56**
	(3.461)	(3.506)	(3.558)	(3.787)	(3.975)	(3.992)
L.interaction	-1.566**	-1.565**	-1.563**	-1.786***	-1.837**	-1.835**
	(0.575)	(0.582)	(0.574)	(0.615)	(0.659)	(0.675)
L.GDP_percapita	-	-0.000145	-0.000143	0.000528	0.000501	0.000511
		(0.000561)	(0.000574)	(0.000670)	(0.000670)	(0.000737)
L.FDI	-	-	-0.0634	0.485	0.544	0.538
			(0.666)	(1.065)	(1.082)	(1.130)
L.sp_pergdp	-	-	-	-0.507	-0.476	-0.487
				(0.386)	(0.352)	(0.399)
L.edu_pergdp	-	-	-	-	-0.280	-0.300
					(0.725)	(0.762)
L.health_pergdp	-	-	-	-	-	0.112
						(1.269)
Observations	123	123	123	81	81	81
R-squared	0.253	0.253	0.254	0.424	0.429	0.429

Notes: standard errors clustered at country level in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Estimated Democracy threshold D^*

	Gastil index	Civil Liberties index	Political Rights index
Gini_1	4.747	4.448	4.828
Gini_2	4.748	4.446	4.836
Gini_3	4.834	4.485	5.012
Gini_4	5.540	5.086	5.958
Gini_5	5.523	5.075	5.934
Gini_6	5.554	5.108	5.966
p10_p90_1	4.485	4.163	4.647
p10_p90_2	4.521	4.212	4.663
p10_p90_3	4.363	4.114	4.420
p10_p90_4	4.196	-	4.714
p10_p90_5	4.197	-	4.694
p10_p90_6	4.197	-	4.654
p20_p80_1	4.900	4.634	5.043
p20_p80_2	4.905	4.633	5.045
p20_p80_3	4.895	4.603	5.064
p20_p80_4	5.322	4.830	5.789
p20_p80_5	5.287	4.805	5.743
p20_p80_6	5.291	4.808	5.755