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Employment Protection and Income Inequality: Is there a role for the Informal Sector?

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1. Introduction

Recent decades have seen a rise in income inequality, an aspect of which, apart from the labour share and unemployment rate, refers to changes in the distribution of earnings (Checci and Garcia-Penalosa, 2005). More unequal wages imply increased demand for social security as a mean to maintain the standards of living and reduce uncertainty.

Government regulation in the labour market appears to be one prevalent policy to reduce the wage inequality (see e.g. Checci and Garcia-Penalosa, 2005; Piketty and Saez, 2006; Lemieux, 2008*).* Rama (2001a, 2003) claims that labor institutions are supposed to increase redistribution and specifically shows that social security programs help reduce income inequality in a stronger way than collective bargaining do. Saint-Paul (1994) investigates the effect of minimum wages and finds that they have a small or even adverse impact on income distribution relative to other protection policies.[1] According to Olson (1965), laws are shaped by the influence of interest groups which exert their power to redistribute income to themselves, increasing in this income inequality.

In this paper, we seek to examine the effect of employment protection legislation (EPL) on income inequality. Moreover, we investigate whether this relationship is affected by the magnitude of the informal sector within each country. To this end, we build a cross section dataset of 83 -developed and developing- countries where the dependent variable is income inequality and the key explanatory variable is alternative proxies of employment protection. In order to capture income inequality, we rely on two alternative inequality databases and we employ two alternative variables of income inequality. More precisely, we employ: (i) the Gini coefficient developed by the Texas University Inequality Project (2003) and (ii) the Gini coefficient developed by Solt (2009). Concerning the data on employment protection, we rely on the dataset developed by Botero et al. (2004). The basic advantage of the Botero et al. (2004) dataset is that it quantifies qualitative characteristics of the labour market's legislation for 85 -developed and developing- countries and therefore allows us to investigate the impact of employment protection in countries that differ substantially in terms of economic development and institutional quality.

Our results suggest that increased employment protection is negatively associated with income inequality. This relationship remains highly robust across several different specifications, data and estimation methods. Moreover, when we investigate the impact of unofficial economy on the above mentioned relationship,

[1] Rama (2001b) provide empirical evidence that doubling of minimum wages in real terms in Indonesia, over the early 1990s, in a period with roughly elasticity of average wages to minimum wages associated with a mild decline in total wage employment and an increase in unemployment substantial in small establishments.

our analysis provide evidence that in the presence of a large unofficial economy the negative impact of employment protection on inequality is crucially mitigated and in some extreme cases may also be reversed.

The rest of the paper proceeds as follows; in Section 2, we present the theoretical considerations upon which we base our empirical analysis on; in Section 3, we discuss the empirical methodology and the data; in Section 4 we present the empirical results. Finally, Section 5 concludes.

2. Theoretical Considerations

2.1. The effect of employment protection legislation on income inequality

The theoretical literature on labour market regulation and income inequality has been focused at the role the institutions and labour market policies (e.g. Emerson and Dramais, 1988; Rama, 2001a, 2003) such as the union coverage (e.g. Burniaux et al., 2006; Checci and Garcia-Penalosa, 2005) and the setting of the minimum wage (DiNardo et al., 1996; Lee, 1999; Dickens et al., 1999; Koeninger et al, 2007) , play in formatting the distribution of earnings.

From a theoretical point of view, the effect of changing employment protection legislation (EPL) on income inequality is ambiguous. This is because the overall effect is dependent on two contrasting channels: (i) the effect of EPL on the employment rate and (ii) the effect of EPL on the earnings inequality among the entire working age population (i.e. inequality between workers and non-workers or between full time and part-time workers).

The impact of changing EPL on the employment rate is difficult to be predicted theoretically since it depends crucially on the extent to which the extra cost can be shifted onto workers from employers. In addition, a decline in EPL may reduce the cost of employment adjustment (both hiring and firing) and as a result may lead to little change in the aggregate employment rate if both inflows to and outflows from employment tend to cancel each other out. A large number of empirical studies suggest that the effect of changing EPL has insignificant effect on employment rate (see e.g. Nicoletti and Scarpetta 2005; Bassanini and Duval, 2006) whereas others, highlight a negative and highly significant effect of changing specific forms of EPL on the employment rate (see e.g. Nickell, 1997; Layard et al. , 1991; OECD, 2011).

On the other hand, increased EPL tends to protect unskilled workers more than skilled workers due to a substantial fixed-cost component (Boeri et al., 2006). Thus, a weakening of employment protection, in particular the liberalisation of temporary contracts, is expected to contribute to higher wage inequality. Previous empirical studies examining the effect of EPL on the earnings inequality among the entire working age population conclude that weakening of

EPL leads to significantly higher earning inequality (see e.g. Koeninger et al., 2007; Visser and Cecchi, 2009; OECD, 2011).

Given that theoretical literature appears to be inconclusive concerning the overall effect of changing employment protection legislation (EPL) on income inequality, our analysis will proceed by placing the spotlight on the empirical aspects of this relationship and then "leave the data tell the story". This will be done by estimating a standard inequality equation in which we employ as key explanatory variables various alternative employment protection legislation measures. Summarizing the above described theoretical considerations we conclude that *stricter employment protection legislation (EPL) is expected to exert a positive impact on income inequality when the effect of EPL on wages dispersion prevails, whereas is expected to exert a negative impact when the corresponding effect on the unemployment rate appears to be larger*.

2.2. The impact of the informal sector on employment protection-income inequality nexus.

A substantial part of the economic activity, in both developing and developed countries, takes place in the informal sector.[2] The existence of unofficial economy generates malfunctions in the operation of the markets and distorts crucially the results of implemented policies (see e.g. Cuff et al., 2011; Almeida and Carneiro; 2007). In this paper, we focus on the relationship between employment protection legislation and income inequality and we seek to examine how the existence of informal sector within an economy may affect the above mentioned relationship.

The consequences of EPL on labour market outcomes are a constant source of controversy in the literature. As a result of increased protection, formal jobs become more expensive for the firms and this generates an incentive for the entrepreneurs to move to the informal sector (see e.g. Cuff et al., 2011; Dabla-Norris et al, 2008). The contraction of demand for labour in the formal sector and the corresponding increase in demand in the informal sector affects both the wage dispersion and the employment in the formal sector and therefore is expected also to affect the overall effect of EPL on income inequality.[3] Since the overall effect is dependent on several theoretical assumptions concerning the structure of the labour market as well as the form of labour demand on the formal and the informal sector, we choose to proceed by focusing on the empirical aspects of this

[2] Based on recent estimates of Schneider et al. (2010) informal economic activity –in most developing countries-exceeds the 50% of the total economic activity.

[3] Another strand of the literature underlines the importance of increased enforcement of mandated benefits on the willingness to be employed on the formal sector and therefore to labour supply in the formal sector (see e.g. Harris and Todaro, 1970; Fields 1975; Almeida and Carneiro, 2007).

relationship and by testing whether (and how) the above relationship is indeed affected by the presence of unofficial economy within a country.

Summarizing the above described theoretical considerations we conclude that: *the existence of unofficial economy affects both the wage dispersion and the employment in the formal sector and therefore is expected to affect the overall effect of EPL on income inequality.*

3. Empirical Model and Data

3.1 Econometric Model

The empirical model used to study the relationship employment protection and inequality is as follows:

$$Inequality_i = \alpha_0 + \beta_1 EmplProt_i + \beta_k controls_i + geographical\ dummies_i + u_i \qquad (1)$$

where income inequality in country *i*, is expressed as a function of employment protection, a set of control variables, geographical dummies and a stochastic term u_i. To estimate Eq. (1) we build a cross section dataset of 83 –developed and developing- countries. The dependent and explanatory variables are discussed below. Explicit definitions, descriptive statistics and sources for the variables employed are provided in Appendices A and B.

3.2. The data

3.2.1 Inequality measures

In order to capture income inequality, we rely on two alternative inequality databases and we employ two alternative proxies of income inequality. More precisely, we employ: (i) the Gini coefficient developed by the Texas University Inequality Project (2003) (denoted as *Tex_Gini*) and (ii) the Gini coefficient developed by Solt (2009) (denoted as *Gini_Solt).* Note that *Tex_Gini* is average over the period 1990-2002 whereas *Gini_Solt* is average over the period 1990-2005.

The Texas Gini coefficient measures the industrial wage inequality, its source of data is the University of Texas Inequality Project (UTIP) and covers the years from 1970 to 2002. It is based on manufacturing wage information compiled by UNIDO and is available for 156 countries. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. However, when focusing on a greater coverage across countries and over time using this dataset we have to pay the cost of a reduced comparability across observations. The Gini

coefficient developed by Solt (2009) refers to the Standardized World Income Inequality Database (SWIID) and overcomes this limitation.[4] The SWIID provides comparable Gini indices of gross and net income inequality for 153 countries for as many years as possible from 1960 to the present along with estimates of uncertainty in these statistics.

3.2.2 Employment Protection Legislation measures

In order to control for employment protection, we rely on the dataset developed by Botero et al. (2004). The basic advantage of the Botero et al. (2004) dataset is that it quantifies qualitative characteristics of the labour market's legislation for 85 different countries. The measures of labour regulation deal with three broad areas: (i) employment laws, (ii) collective relations laws and (iii) social security laws.

In this study we focus exclusively on the "Employment Laws" area and we examine how the employment protection legislation affects income inequality.[5] More precisely, we employ the general employment laws index developed by Botero et al. (2004) (denoted as *labour_index*) as key explanatory variable. We also employ the four sub-indices of *labour_index* summarizing different dimensions of such protection. Specifically, we employ: (i) the alternative employment contracts index (denoted as *altern_contract*) which measures the existence and cost of alternatives to the standard employment contract, (ii) the cost of increasing hours worked index (denoted as *cost_overtimen*) which measures the cost of increasing the number of hours worked, (iii) the cost of firing workers (*cost_firing*) which measures the cost of firing the 20 percent of the firm's workers and (iv) the dismissal procedures measure (*index_dism*) which measures the worker protection granted by law or mandatory collective agreements against dismissal.[6]

[4] It standardizes the United Nations University's World Income Inequality Database and other inequality data while minimizing reliance on problematic assumptions by using as much information as possible from proximate years within the same country; having the data collected by the Luxembourg Income Study as the standard. (Solt, 2009)

[5] The Botero et al. (2004) dataset contains also data related to the "Collective or industrial relations laws" that regulate the bargaining, adoption and enforcement of collective agreements, the organization of trade unions and the industrial action by workers and employers as well as data related to the "Social security laws" that contemplate the social response to quality-of-life conditions and requirements.

[6] For more details about the methodology employed by Botero et al. (2004) in order to construct these variables see Appendix A. For Summary Statistics of these variables see Appendix B.

3.2.3. Control variables

To ensure robust econometric identification, we use a number of control variables in the estimated equations. Our set of controls follows the empirical literature on income distribution (see e.g. Dreher and Gaston, 2006; Barro and Lee, 2000). More precisely, we include the level of GDP per capita (denoted as *gdppercap*) as a handy proxy for structural determinants correlated with levels of income, the government spending as a share of GDP (denoted as *govspend*) that includes all government consumption, investment but excludes transfer payments made by the state. In addition we include the primary school enrolment (*primschool*) as a share of the population of official primary education age, the secondary school enrolment (*secschool*) as a percentage of the population of official secondary education age and the tertiary school enrolment (*tertschool*) as a percentage of the population of official tertiary education age. Finally, we control for the effects of international market integration by including the ratio of imports plus exports to GDP (denoted as *openness*). Note that all data are obtained from the World Development Indicators Database (2010) and that our explanatory variables are averages over the period 1980-2004.

4. Estimation and Results

In the following subsections we discuss the results obtained by working as above. These are reported in Tables 1 to 5.

4.1 Testing the effect of employment protection on income inequality

We start by estimating equation (1) presented in section 3.1, using the data and the empirical methodology outlined in the previous section. The results are reported in Table 1.

[Table 1, here]

In columns (1) to (4), Table 1, *Tex_Gini* is regressed on *index_labour* as well as on a set of control variables (i.e. *gdppercap, publspend, primschool, secschool, tertschool, openness).* Note that we present *t*-statistics based on clustered standard errors. As can be seen, *index_labour* enters with a negative and highly significant coefficient which remains virtually unchanged in all four alternative specifications. This result indicates the negative effect of increased employment protection on income inequality. This finding appears to be in accordance with the theoretical priors driven from the literature which concludes that stricter employment protection laws increase employers' costs to hire or dismiss workers

and raise the reservation wage of the unemployed, eventually compressing the wage differential[7] (OECD, 2011) and that employment protection is significantly associated with the evolution of wage inequality, as a reduction of employment protection by one standard deviation is associated with a 19-20% higher wage differential (Koeninger et al., 2007).[8]

As far as the rest of the explanatory variables are concerned, we observe that all of them bear the expected -by the theory- sign. Specifically, *gdppercap* enters with a negative and statistically significant coefficient which remains intact to all alternative specifications. This finding reflects the tendency of a negative relationship between income inequality and GDP per capita. In addition, *govspend* bears a negative and highly significant coefficient in most of the specifications. This result is in accordance with previous studies and policy reports indicating that larger government spending tends to be associated with lower levels of income inequality (see e.g. Barr, 1992; Mahler and Jesuit, 2006; OECD, 2008). Finally, the coefficient of *primschool* is positive and significant at a level of 95 percent highlighting the positive impact of primary schooling on income inequality. This puzzling -at a first glance- result could be explained if we take into account the large number of developing countries in our sample. Since in most of these countries a large part of the population is totally illiterate, increased primary schooling widens the income gap between educated and totally illiterate population. On the other hand, *secschool, tertschooland* and *openness* appear to be non significant in most of the specifications.

In columns (5) to (8), Table 1, *Gini_Solt* is regressed on *index_labour* as well as on the same set of control variables. As can be verified, *index_labour* enters again with a negative coefficient which remains significant at a level of 99 percent in all the alternative specifications. Our finding suggests that the negative effect of increased employment protection on income inequality is robust to alternative income inequality measures. Moreover, our findings concerning the rest of the explanatory variables remain qualitatively intact.

[Table 2, here]

In Table 2, we inquire into the robustness of our baseline results by investigating whether the negative impact of increased employment protection on income inequality survives under alternative specifications and estimation techniques. To this end, in columns (2) and (6) we re-estimate our "benchmark" equations presented in columns (1) and (4) respectively by excluding the 10

[7] Under the hypothesis that the associated labour adjustment costs are relatively more important for unskilled workers.

[8] A simulation that calculates the percentage increase in the 90-10 differential which is correlated with one standard-deviation reduction in rigidity.

percent of the outliers from our sample. This allows us to investigate whether our findings are driven by some outlier observations.[9] In turn, in columns (3) and (7) we proceed by estimating the basic equations without the set of geographical dummies. This allows us to examine whether the inclusion of geographical dummies lie behind our empirical findings.

As can be easily verified, *index_labour* bears a negative and significant coefficient in all the specifications highlighting that the negative effect of increased employment protection on income inequality remains highly robust to several alternative specifications. As far as the rest of the explanatory variables are concerned, our empirical findings remain qualitatively intact.

Finally, in columns (4) and (8) we seek to tackle the potential reverse causality problem between employment protection and income inequality. Reverse causality may arise because higher income inequality provokes people to ask for more employment protection. According to this rationale, the direction of the causality may goes from income inequality to employment protection and not the other way round. In order to manage this, in columns (4) and (8) we employ an instrumental variables approach. Particularly, we use as instruments for employment protection: (i) the level of democracy (denoted as *democracy*), (ii) the political orientation the chief executive and the largest party in congress (denoted as *left_center_orient*) and (iii) a dummy capturing whether an economy is characterized by a common law legal system (denoted as *legor_uk*).

Our choice concerning the set of instruments employed has been based on empirical studies examining the determinants of labour regulations (see e.g. Botero et al., 2004). According to Botero et al. (2004), labour regulation across countries can be explained by: (i) efficiency considerations, (ii) political power theories, and (iii) legal theories. Efficiency theory focuses on a choice of a combination of regulations by an efficiency criterion (Demsetz, 1967; North, 1981). In this case government uses a set of labour market interventions to maximize social welfare by curing market failures. According to political power theories, institutions are designed to transfer resources from those out of political power to those in power (Olson, 1993). Concerning labour market, regulations protecting workers are introduced by socialist, social-democratic, and more generally leftist governments to benefit their political constituencies (Hicks, 1999). Legal theories suggest that the enforcement of the labour regulations is provided by the legal traditions of each country (Djankov et al., 2003b). In accordance with that, common law countries that tend to rely on markets and contracts should regulate labour market less.[10] Finally, dictatorships are less

[9] We assume that our "benchmark" equations are those presented in columns (1) and (4) of Table 2 which are identical to those reported in columns (4) and (8) of Table 1.

[10] Common law emerged in England and is mostly characterized by the importance of decisionmaking by juries, independent judges, and judicial discretion as opposed to codes.

constrained than democratically elected governments, and therefore will have more redistributive laws and institutions. Constitutions, legislative constraints, and other forms of checks and balances are all conducive to fewer regulations (Djankov et al., 2002).

Estimation method is two-stage least squares (2SLS) with geographical dummies and robust standard errors. First stage results are reported in the upper part of columns (4) and (8) whereas the results of the second stage are reported below. As can be verified our results concerning employment protection remain qualitatively identical to those presented in other columns. Moreover, we note that we have performed a Hausman test in order to compare the 2SLS with the simple OLS model. The Hausman test showed that there are no systematic differences between the two models and therefore we can proceed by keeping the simple OLS model as a basis in our analysis.[11]

[Table 3, here]

In Table 3, instead of the general employment protection variable *index_labour*, we employ interchangeably the four sub-indices of employment protection described in detail in Section 3.2.2. More precisely, in column (1) *Tex_Gini* is regressed on the dismissal procedures measure (*index_dism*) as well as on the standard set of controls following identical empirical methodology to that employed in Table1, whereas in columns (2) to (4) we include interchangeably the cost of increasing hours worked index (*cost_overtimen*) [column (2)], the cost of firing workers (*cost_firing)* [column (3)] and the alternative employment contracts index (*altern_contract*) [column (4)]. As can be easily verified, *index_dism* and *cost_overtimen* bear negative and highly significant coefficients whereas the coefficient on *cost_firing* although negative appears to be marginally insignificant. On the other hand, *altern_contract* enters with a positive coefficient which is significant at a level of 90 percent.

These empirical findings suggest that the negative impact of increased employment protection on income inequality verified in Table 1, is mainly driven by the employment protection legislation related to the dismissal procedures and the cost of increasing hours worked. As far as the rest of the controls are concerned, we observe that our results remain similar to those presented in Table 1. Both *gdppercap* and *govspend* enter again with a negative and significant coefficient in most of the specifications. The only remarkable difference is that in

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Common law was transmitted to the British colonies, including Australia, Canada, India, New Zealand, Pakistan, the United States, and a number of countries in the Caribbean, East Africa, and Southeast Asia. (Djankov et al, 2003)

[11] The results obtained from the Hausman test are available upon request.

Table 3 the *primschool* loses its significance and *tertschool* bears a negative and highly significant coefficient in all the specifications.

4.2 Examining the effect of informal sector on employment protection-income inequality nexus.

The existence of unofficial economy generates several malfunctions in the operation of the markets and distorts the results of implemented policies (see e.g. Cuff et al., 2011; Almeida and Carneiro; 2007).

A branch of the literature focuses on the effects of increased protection on the demand for labour in the formal sector (see e.g. Cuff et al., 2011; Dabla-Norris et al., 2008). According to this rationale formal jobs become more expensive for the firms and this generates an incentive for the entrepreneurs to move to the informal sector. The contraction of demand for labour in the formal sector and the corresponding increase in demand in the informal sector affects both the wage dispersion and the employment in the formal sector and therefore is also expected to affect the overall effect of EPL on income inequality. Concerning the labour supply side, Harris and Todaro (1970), Fields (1975) and Almeida and Carneiro (2007) underline the importance of increased enforcement of mandated benefits to the willingness to be employed in the formal sector and therefore to labour supply in the formal.

To determine whether the size of the informal sector affects the relationship between EPL and income inequality we follow the strategy of Dutt and Mitra (2002). Namely; we introduce in our basic specification interaction terms in order to examine whether the size of the shadow economy affects the impact of employment protection on income inequality. More precisely, we introduce the multiplicative variable *index_labour*shadow* where *shadow* is the size of the informal economy measure developed by Schneider et al. (2010). *Shadow* measures the size of the informal economy as a share of GDP and -in our sample- ranges from a minimum value of 0.08 (in the case of Switzerland) to a maximum of 0.67 (in the case of Bolivia).[12]

By introducing these interaction terms we allow the effect of *index_labour* to vary across countries characterized by different sizes of the informal sector. According to our theoretical priors, the coefficient of the interaction term has to be positive and significant. Moreover, standard calculus tells us that the turning point in the data is given by the coefficient of *index_labour* divided by the coefficient of the interaction term *index_labour*shadow*. This method allows us

[12] According to Schneider et al. (2010) shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities in order to avoid: 1) payment of income, value added or other taxes, 2) payment of social security contributions and 3) having to meet certain legal labour market standards.

to examine first whether a change in the sign of *index_labour* indeed exists and also to determine it endogenously.

[Table 4, here]

The results of this experiment are presented on Table 4. In columns (1) to (4) *Tex_Gini* is regressed on *index_labour, index_labour*shadow* and as well as on the standard set of controls whereas in columns (5) to (8) we follow the same strategy by employing *Gini_Solt* as dependent variable. As can be easily verified, the coefficient of *index_labour*shadow* is positive and significant in all of the specifications. These findings are in line with the implications driven by our theoretical priors. Namely; in countries characterized by large informal sector the negative effect of increased employment protection on income inequality is mitigated and in some cases may also be reversed.

What do these finding suggest about the effect of employment protection on income inequality in the real world? Focusing on the estimation presented in Column (4) of Table 4 we can calculate the estimated turning point on the effect of employment protection which is a value of *shadow* around 0.62.[13] As can easily be verified this value is very close to the maximum value of shadow in our sample which equals to 0.67. Therefore, we conclude that in the real world the turning point for the coefficient of *index_labour* is rarely met. However, our empirical findings suggest that the size of informal economy does play a crucial role on the magnitude of the effect of employment protection on income inequality. Specifically, in countries characterized by small informal sectors the negative effect of employment protection on inequality is larger whereas in countries characterized by large informal sectors this effect is crucially mitigated and- in some extreme cases- even reversed.

[Table 5, here]

In Table 5, we replicate the same experiment for the four sub-indices of employment protection (i.e. *index_dism*, *cost_overtimen*, *cost_firing*, *altern_contract*). Specifically, we construct four alternative interaction terms (one for each specific sub-component of employment protection) and then we regress *Tex_Gini* and *Gini_Solt* on the employment protection sub-indices as well as their corresponding interaction terms following identical estimation methodology to that employed in Table 4. As can be easily verified, all alternative interaction terms enter with a positive and significant coefficient in most of the specifications. These results are in line with the key message of Table 4. Namely,

[13] The turning point in the data is given by the coefficient of *index_labour* divided by the coefficient of the interaction term *index_labour*shadow*.

in countries characterized by large informal sector the negative effect of increased employment protection on income inequality is mitigated and in some cases may also be reversed.

What is more important with the empirical findings reported in Table 5, is that the predicted turning point on the effect of specific sub-categories of employment protection on income inequality, can be met in the real world. That is, our model suggests that in the presence of large informal sector, specific forms of employment protection may exert a positive impact on income inequality. This is the case -for example- for *cost_overtime* and *firing_cost.* Focusing on the estimation presented in column (2) we can calculate the estimated turning point on the effect of the cost of increasing hours worked index (*cost_overtimen*) which is a value of *shadow* around 0.5. Similarly, based on the results reported in columns (3) and (7), the estimated turning point on the effect of the cost of firing workers (*firing_cost*) is a value of *shadow* around 0.35-0.45. A value of *shadow* around 0.45 appears to be highly realistic for our group of countries. Thus, our model suggests that specific forms of employment protection may have a positive impact on income inequality, in countries characterized by large unofficial economies.

5. Conclusions

One of the questions we tried to address in this paper was whether employment protection legislation is an efficient way of narrowing the gap between the rich and the unfortunate ones. By employing employment protection data developed by Botero et al. (2004), along with two different measures of income inequality for a sample of 83 developed and developing countries, we concluded that employment protection legislation has a negative impact on income inequality. This relationship remained highly robust across several different specifications and estimation methods. Furthermore, our analysis proceeded with investigating how that relationship is affected by the extent of the informal economy. Our results suggested that in the presence of a large unofficial economy the negative effect of employment protection legislation on inequality is crucially mitigated and in some extreme cases may also be reversed.

Table 1: The Effect of Employment Protection on Income Inequality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tex_Gini	*Tex_Gini*	*Tex_Gini*	*Tex_Gini*	*Gini_Solt*	*Gini_Solt*	*Gini_Solt*	*Gini_Solt*
index_labour	-4.895**	-7.012***	-7.221***	-6.732***	-16.831***	-14.346***	-12.578***	-13.915***
	(-2.159)	(-3.001)	(-3.092)	(-2.727)	(-4.324)	(-3.686)	(-3.107)	(-3.592)
gdppercap	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001**	-0.001***
	(-6.528)	(-4.754)	(-2.880)	(-2.965)	(-6.507)	(-3.936)	(-2.407)	(-3.555)
govspend		-0.232***	-0.206***	-0.181***		-0.363***	-0.316***	-0.230***
		(-5.549)	(-4.996)	(-3.410)		(-4.610)	(-4.117)	(-2.866)
pimschool			0.098***	0.088**			0.205***	0.206***
			(2.999)	(2.588)			(2.793)	(2.774)
secschool			-0.039*	-0.028			-0.065	-0.108
			(-1.865)	(-0.900)			(-1.295)	(-1.537)
tertschool				-0.015				0.159
				(-0.264)				(1.492)
openness				-0.017				-0.043
				(-0.692)				(-1.374)
Geographical	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*

Dummies								
obs	70	65	64	64	83	77	76	76
$\mathbf{R^2}$	0.53	0.67	0.71	0.71	0.47	0.58	0.66	0.68

Notes: 1). *t-statistics* are reported below the estimated coefficient. **2)**. *,**,*** denote statistical significance at 10%, 5%, 1%.

Table 2: The Effect of Employment Protection on Income Inequality [Sensitivity Analysis]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tex_ Gini	*Tex_ Gini*	*Tex_ Gini*	*Tex_Gini*	*Gini_ Solt*	*Gini_ Solt*	*Gini_ Solt*	*Gini_Solt*
				First Stage Results				*First Stage Results*
left_center_orient				0.121*				0.067
				(1.91)				(1.21)
democracy				-0.006				-0.006
				(-1.02)				(-1.38)
legor_uk				-0.174***				-0.187***
				(-3.26)				(-3.95)
				Second Stage Results				*Second Stage Results*
index_labour	-6.732***	-7.301***	-6.038**	-11.598*	-13.915***	-13.130***	-11.152***	-28.965***
	(-2.727)	(-2.885)	(-2.334)	(-1.935)	(-3.592)	(-3.239)	(-2.697)	(-3.063)
gdppercap	-0.001***	-0.001***	-0.001***	-0.001**	-0.001***	-0.001***	-0.001***	-0.001***
	(-2.965)	(-3.272)	(-3.792)	(-2.547)	(-3.555)	(-3.149)	(-3.436)	(-2.879)
govspend	-0.181***	-0.184***	-0.091	-0.189***	-0.230***	-0.238***	-0.117	-0.222**
	(-3.410)	(-3.283)	(-1.485)	(-2.882)	(-2.866)	(-2.790)	(-1.562)	(-2.138)
pimschool	0.088**	0.076**	0.076*	0.100**	0.206***	0.265***	0.153*	0.268***
	(2.588)	(2.128)	(1.920)	(2.205)	(2.774)	(3.952)	(1.972)	(4.227)
secschool	-0.028	-0.027	-0.040	-0.029	-0.108	-0.148**	-0.134**	-0.110*
	(-0.900	(-0.851	(-1.29	(-0.859)	(-1.537	(-2.509	(-2.156	(-1.852)

	)	)	0)		)	)	)	
tertschool	-0.015	-0.013	-0.022	0.011	0.159	0.194*	0.053	0.238**
	(-0.264)	(-0.220)	(-0.554)	(0.165)	(1.492)	(1.951)	(0.611)	(2.091)
openness	-0.017	-0.036	-0.032	-0.012	-0.043	-0.056	-0.070**	-0.031
	(-0.692)	(-1.294)	(-1.335)	(-0.562)	(-1.374)	(-1.551)	(-2.218)	(-0.868)
Geographical Dummies	*yes*	*yes*	*no*	*yes*	*yes*	*yes*	*no*	*yes*
obs	64	60	64	64	76	69	76	74
$\mathbf{R^2}$	0.71	0.72	0.65	0.69	0.67	0.69	0.60	0.64

Notes: 1). *t-statistics* are reported below the estimated coefficient. **2)**. *,**,*** denote statistical significance at 10%, 5%, 1%. **3**). In Equations (2) and (6) we exclude 10 per cent of the outliers from the sample **4)** Equations (3) and (7) is estimated without geographical dummies. **5)** Equations (4) and (8) are estimated using two-stage least squares (2SLS). First stage results are reported in the upper part of each column, whereas the results of the second stage are presented below.

Table 3: The Effect of Employment Protection on Income Inequality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tex_ Gini	*Tex_ Gini*	*Tex_ Gini*	*Tex_ Gini*	*Gini_ Solt*	*Gini_ Solt*	*Gini_ Solt*	*Gini_ Solt*
index_dism	-4.187***				-8.317***			
	(-3.213)				(-3.196)			
cost_overtime		-3.721***				-7.507***		
		(-2.761)				(-3.892)		
firing_cost			-3.992				-2.967	
			(-1.560)				(-0.659)	
altern_contract				5.613*				6.306
				(1.716)				(1.422)
gdppercap	-0.001**	-0.001**	-0.001**	-0.001	-0.001**	-0.001*	-0.001**	-0.001*
	(-2.892)	(-2.303)	(-2.684)	(-1.863)	(-3.628)	(-2.363)	(-3.072)	(-2.488)
govspend	0.081**	0.078**	0.075**	0.043	0.209***	0.191***	0.211***	0.201***
	(2.460)	(2.532)	(2.470)	(1.246)	(2.919)	(2.687)	(3.001)	(2.976)
pimschool	-0.031	-0.025	-0.018	-0.013	-0.107	-0.106	-0.110	-0.103
	(-1.003)	(-0.810)	(-0.593)	(-0.461)	(-1.593)	(-1.511)	(-1.497)	(-1.433)
secschool	-0.039	-0.014	-0.049	-0.09	0.104	0.159	0.090	0.040

				5*				
	(-0.691)	(-0.216)	(-0.825)	(-1.694)	(1.025)	(1.519)	(0.867)	(0.401)
tertschool	-0.183***	-0.174***	-0.186***	-0.177***	-0.210***	-0.240***	-0.213**	-0.213***
	(-3.313)	(-3.315)	(-3.462)	(-3.185)	(-2.944)	(-2.782)	(-2.494)	(-2.659)
openness				-0.018	-0.065**			
	-0.025	-0.004	-0.023			-0.010	-0.050	-0.040
	(-1.063)	(-0.174)	(-0.937)	(-0.784)	(-2.092)	(-0.311)	(-1.447)	(-1.180)
Geographical Dummies	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
obs	64	64	64	64	76	76	76	76
$\mathbf{R^2}$	0.72	0.72	0.69	0.71	0.68	0.69	0.64	0.64

Notes: 1). *t-statistics* are reported below the estimated coefficient. **2)**. *,**,*** denote statistical significance at 10%, 5%, 1%.

Table 4: The Effect of Shadow Economy on Income Inequality, Employment Protection Nexus

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tex_ Gini	*Tex_ Gini*	*Tex_ Gini*	*Tex_ Gini*	*Gini_ Solt*	*Gini_ Solt*	*Gini_ Solt*	*Gini_ Solt*
index_labour	-18.292*** (-5.183)	-11.286*** (-3.496)	-10.997*** (-4.016)	-10.681*** (-3.798)	-33.394*** (-6.392)	-22.149*** (-4.269)	-21.587*** (-4.685)	-20.660*** (-4.307)
*index_labour*shadow*	43.047*** (5.754)	15.768* (1.716)	14.394* (1.765)	16.894** (2.458)	52.377*** (4.724)	26.020* (1.699)	31.489** (2.376)	26.397* (1.984)
gdppercap		-0.001** (-2.623)	-0.001 (-1.554)	-0.001 (-1.364)		-0.001* (-1.887)	-0.001 (-0.483)	-0.001 (-1.234)
govspend		-0.208*** (-5.585)	-0.184*** (-4.613)	-0.169*** (-3.264)		-0.315*** (-3.748)	-0.248*** (-2.874)	-0.198** (-2.303)
pimschool			0.092*** (2.987)	0.079** (2.547)			0.219*** (2.901)	0.214*** (2.808)
secschool			-0.040* (-1.916)	-0.016 (-0.567)			-0.082 (-1.580)	-0.097 (-1.429)
tertschool				-0.061 (-1.182)				0.078 (0.863)

openness				-0.014 (-0.605)				-0.034 (-1.192)
Geographical Dummies	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
obs	70	65	64	64	83	77	76	76
$\mathbf{R^2}$	0.50	0.69	0.72	0.73	0.46	0.60	0.69	0.70

Notes: 1). *t-statistics* are reported below the estimated coefficient. **2)**. *,**,*** denote statistical significance at 10%, 5%, 1%.

Table 5: The Effect of Shadow Economy on Income Inequality, Employment Protection Nexus

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Tex_ Gini	*Tex_ Gini*	*Tex_ Gini*	*Tex_ Gini*	*Gini_ Solt*	*Gini_ Solt*	*Gini_ Solt*	*Gini_ Solt*
index_dism	-8.837***				-16.965***			
	(-3.506)				(-4.100)			
*index_dism*shadow*	13.153**				25.050**			
	(2.331)				(2.491)			
cost_overtime		-7.373***				-9.818***		
		(-2.821)				(-3.673)		
*cost_overtime*shadow*		14.324*				7.973		
		(1.934)				(0.986)		
firing_cost			-8.391**				-10.636*	
			(-2.413)				(-1.670)	
*firing_cost*shadow*			16.641**				31.844**	
			(2.530)				(2.250)	
altern_contract				1.510				-3.275
				(0.408)				(-0.590)
*altern_contract*shadow*				12.364***				28.347***

				(3.150)				(2.766)
gdppercap	-0.001*	-0.001	-0.001	-0.001	-0.001**	-0.001	-0.001	-0.001
	(-1.927)	(-0.975)	(-1.549)	(-0.837)	(-2.003)	(-1.386)	(-1.125)	(-0.237)
govspend	0.076**	0.077**	0.067**	0.037	0.214***	0.198***	0.216***	0.203***
	(2.388)	(2.645)	(2.493)	(1.039)	(2.890)	(2.698)	(2.999)	(2.914)
pimschool				-0.003				
	-0.025	-0.020	-0.002		-0.100	-0.105	-0.086	-0.086
	(-0.861)	(-0.705)	(-0.086)	(-0.098)	(-1.556)	(-1.499)	(-1.219)	(-1.218)
secschool			-0.094*	-0.126**				
	-0.064	-0.048			0.042	0.136	-0.004	-0.039
	(-1.215)	(-0.834)	(-1.737)	(-2.172)	(0.480)	(1.275)	(-0.049)	(-0.425)
tertschool	-0.171***	-0.169***	-0.176***	-0.168***	-0.166**	-0.233**	-0.174**	-0.186**
	(-3.099)	(-3.400)	(-3.341)	(-3.110)	(-2.139)	(-2.613)	(-2.010)	(-2.306)
openness				-0.016	-0.061**			
	-0.023	-0.003	-0.018			-0.006	-0.039	-0.033
	(-1.019)	(-0.131)	(-0.792)	(-0.726)	(-2.127)	(-0.200)	(-1.224)	(-1.036)
Geographical Dummies	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*	*yes*
obs	64	64	64	64	76	76	76	76
$\mathbf{R^2}$	0.74	0.74	0.72	0.73	0.71	0.69	0.66	0.68

Notes: 1). *t-statistics* are reported below the estimated coefficient. **2)**. *,**,*** denote statistical significance at 10%, 5%, 1%.

Appendix A: *Variable descriptions*

Variables	Description of variables	Source
Tex_Gini	Gini coefficient developed by Texas University Inequality Project (2003)	Texas University Inequality Project (2003)
Gini_Solt	Gini coefficient developed by Solt (2009)	Solt (2009)
index_labour	***Employment laws index***; Measures the protection of labour and employment laws as the average of (1) Alternative employment contracts, (2) Cost of increasing hours worked, (3) Cost of firing workers and (4) Dismissal procedures.	Botero et al. (2004)
index_dism	***Dismissal procedures index***; Measures worker protection granted by law or mandatory collective agreements against dismissal. It is the average of the following seven dummy variables which equal one: (1) if the employer must notify a third party before dismissing more than one worker, (2) if the employer needs the approval of a third party prior to dismissing more than one worker, (3) if the employer must notify a third party before dismissing one redundant worker, (4) if the employer needs the approval of a third party to dismiss one redundant worker, (5) if the employer must provide relocation or retraining alternatives for redundant employees prior to dismissal, (6) if there are priority rules applying to dismissal or lay-offs, and (7) if there are priority rules applying to re-employment	Botero et al. (2004)
firing_cost	***Cost of firing workers;*** Measures the cost of firing 20 percent of the firm's workers (10% are fired for redundancy and 10% without cause). The cost of	Botero et al. (2004)

	firing a worker is calculated as the sum of the notice period, severance pay, and any mandatory penalties established by law or mandatory collective agreements for a worker with three years of tenure with the firm. If dismissal is illegal, we set the cost of firing equal to the annual wage. The new wage bill incorporates the normal wage of the remaining workers and the cost of firing workers. The cost of firing workers is computed as the ratio of the new wage bill to the old one.	
altern_contract	***Alternative employment contracts;*** Measures the existence and cost of alternatives to the standard employment contract, computed as the average of: (1) a dummy variable equal to one if part-time workers enjoy the mandatory benefits of full-time workers; (2) a dummy variable equal to one if terminating part-time workers is at least as costly as terminating full time workers; (3) a dummy variable equal to one if fixed-term contracts are only allowed for fixed-term tasks; and (4) the normalized maximum duration of fixed-term contracts.	Botero et al. (2004)
cost_overtime	***Cost of increasing hours worked***; It measures of the cost of increasing the number of hours worked are used by calculating the "maximum number of hours of work in a year before overtime" per year in each country (excluding overtime, vacations, holidays, etc.). A firm first increases the number of hours worked until it reaches the country's maximum normal hours of work, and then uses overtime. If existing employees are not allowed to increase the hours worked, perhaps because overtime is	Botero et al. (2004)

	capped, Botero et al assume the firm doubles its workforce, doubling the wage bill of the firm. The cost of increasing hours worked is computed as the ratio of the final wage bill to the initial one	
openness	Trade openness; the ratio of country's total trade, the sum of exports plus imports, to the country's gross domestic product, for the years 1980-2004.	World Bank Development Indicators (2010)
govspend	Government spending; the level of government expenditures as a percentage of GDP, for the years 1980-2004.	World Bank Development Indicators (2010)
primschool	Primary school enrollment as a percentage of the population of official primary education age.	World Bank Development Indicators (2010)
secschool	Secondary school enrollment as a percentage of the population of official secondary education age.	World Bank Development Indicators (2010)
tertschool	Tertiary school enrollment as a percentage of the population of official tertiary education age.	World Bank Development Indicators (2010)
ddppercap	GDP per capita (constant 2000 US$)	World Bank Development Indicators (2010)
shadow	Shadow Economy as a share of GDP	Schneider et al (2010)
democracy	Polity Democracy Index	Polity IV (2004) Database
left_center_orient	Chief executive and largest party in congress have left or center political orientation	Botero et al. (2004)
legor_uk	British Legal Origin	La Porta et al. (2008)

Appendix B*: Summary Statistics*

The means, standard errors, minimum observations, and maximum observations for the variables are summarized in the following table:

Variables	Observations	Mean	St. Deviation	Min	Max
Tex_Gini	70	41.35	5.606	28.48	53.27
Gini_Solt	83	37.91	9.480	22.50	61.57
index_labour	83	0.48	0.193	0.14	0.82
index_dism	83	0.43	0.281	0.00	0.85
firing_cost	83	0.46	0.211	0.00	1.00
altern_contract	83	0.60	0.187	0.00	0.96
cost_overtime	83	0.45	0.435	0.00	1.00
openness	83	58.19	40.302	15.07	293.33
govspend	77	28.96	10.685	8.77	56.38
primschool	82	99.69	15.306	33.63	138.61
secschool	82	72.43	30.919	5.04	149.73
tertschool	82	25.81	17.711	0.42	79.28
gdppercap	83	7251.535	8973.196	141.34	32321.34
shadow	83	0.31	0. 146	0. 08	0.67

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