Globalization and the Working Poor

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Abstract

This paper analyses the effects of globalisation on the incidence of in-work poverty in advanced European countries. We make a distinction between North-South and North-North trade and apply a twofold empirical strategy: a fixed effect model and a multilevel model. Using the EU Statistics on Income and Living Conditions (EU-SILC) between 2005 and 2010 as well as macro-data from Eurostat and the CHELEM database (CEPII), we find a clear evidence of a distinct effect of globalization on working poverty that depends on the trade partners. As expected from the theoretical literature, we find that imports of manufacturing from emerging countries had a positive and significant effect on in-work poverty, whereas the effect of trade with developed countries was non-significant.

Key Words. Working poverty, Globalisation, Europe

JEL Classification. I32, F6, J2.

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1 Introduction

This paper analyses the impact of globalization on in-work poverty in European advanced countries.

The notion of working poverty appeared in the United States at the time of the Great Depression and it was renewed in the sixties (Harrington, 1962). In-work poverty has become a major concern and its analysis has been considerably developed since the early eighties with the growth in poverty observed in the US and the UK. In the European Union (EU), the working poor have become a key concern only since the nineties (Kalugina, 2012). In the thirty last years, growing in-work poverty has been diagnosed in a majority of advanced countries. According to Eurostat (2012) the working poor, i.e. persons who work and belong to a family situated under the poverty line, make up between 4.5% (Czech Republic) and 19.1% (Romania) of the employed population within the EU. Finally, within advanced economies, the development of poverty at work has been concomitant with the rise in income inequality. This concomitance is not surprising because, if inequality comes with lower gains at the bottom of income distribution, then the probability to become working poor increases with inequality.

Over the same period, the world economy has known a sizeable globalization process. Globalization is multidimensional. It firstly relates to trade openness, with an increase in international trade that has been particularly vigorous in emerging countries (‘the South’). The share of the South in international trade has substantially increased, principally for trade of manufacturing. Another trait is the acceleration of the multinationalization of firms, which can be measured by the huge increase in FDI (Foreign Direct Investments) and offshoring. The considerable increase in capital mobility, both physical and financial, participates in this multinationalization and is another key element of globalization. Finally, globalization has made the countries become increasingly interdependent in their policies and institutions. This is particularly the case amongst advanced countries (‘the North’) because the almost perfect capital mobility between northern countries generates tax and social competition between them.

An abundant literature has analysed the impact of globalization on poverty in developing countries (see, for example, the review by Winters et al., 2004). The analysis of the globalization-poverty relationship in advanced economies is far less developed. Finally, the analysis of the influence of globalization upon the working poor in developed countries is
even scarcer. In contrast, the impact of globalization upon inequality in advanced economies has given rise to a large number of works both theoretical and empirical (see the recent review by Chusseau and Dumont, 2013, and Chusseau et al., 2008).

Our study is based on the fact that the mechanisms that increase inequality by lowering the pay at the bottom of the income ladder are likely to increase in-work poverty. We shall therefore utilise the literature upon the globalization-inequality nexus so as to determine the impact of globalization upon in-work poverty.

Over the last thirty years, advanced economies have experienced a general increase in income inequality. Initiated in the US from the late 1970s/early 1980s, growing inequality has subsequently spread to all developed economies. In Europe, this now concerns all countries. Three main explanations have been given for the surge in inequality, namely, globalization (particularly North-South trade), technological change and institutional changes. If in the US technological change seems to have been the main driver, the impact of globalization, particularly offshoring to emerging countries of the unskilled-intensive segments of production, has played a key role in a number of European countries. In addition, globalization has come with a significant decrease in the corporate tax rates and in the marginal income tax rates, as well as with a regression in the Welfare state in most advanced economies. This typically increases the number of working poor by erasing redistribution and social transfers.

From the aforementioned stylised fact, one can reasonably suspect that globalization has had a non-negligible impact upon in-work poverty. There is thus room for the analysis and estimations of the relationship between the two phenomena. However, to our knowledge, few empirical investigations have been implemented on the subject (Cormier & Craypo, 2000, is an exception). This paper attempts to fill this gap.

Globalization may influence in-work poverty through its impacts upon the poverty line, the income and the reservation wage. In addition, globalization may act through its several dimensions, i.e., North-South trade, North-North trade, capital mobility and international financial liberalization, and their consequences in terms of tax and social competition between countries.

Based on the links between globalization and inequality identified in the theoretical literature on the subject and on the impacts of the different dimensions of globalization upon the poverty lines, we show that globalization should boost in-work poverty through (i) the impacts of North-South trade upon incomes and (ii) the impacts of capital mobility and financial liberalization upon redistribution and the reservation wage. On the other hand, the
same globalization characteristics tend to lower the poverty line expressed as a percentage of
the median income, and North-North trade could facilitate redistribution, which reduce in-
work poverty.

We use 6 rounds of the *European Statistics on Income and Living Conditions* (EU-SILC)
to estimate the impact of globalization upon the working poor in 16 advanced European
countries from 2005 to 2010. Two definitions of the poverty line are utilised, one at 60% of
the median income and the other at 50% of the average income. Globalization is divided in
two main components: trade of manufacturing with emerging countries (North-South trade)
and imports and exports with advanced countries (North-North trade).

We implement a twofold empirical strategy. Based on aggregate data by country, we firstly
analyse the determinants of the share of working poor in the working population. For this, we
take into account the unobserved heterogeneity at the country level by applying a two-way
fixed effects estimator. The second strategy follows a multilevel modelling which analyses the
individual probability to be working poor by considering both individual characteristics and
countries’ macro-contexts, in particular different dimensions of globalisation.

We find evidence of the specific effect of globalization on in-work poverty. As expected
and in line with the theoretical predictions, imports of manufacturing from emerging countries
have a positive and significant effect on in-work poverty whereas the effect of trade with
developed countries is non-significant. Moreover, the impact of globalization is clearly larger
when considering the poverty line based on the average income than that based on the median
income.

The paper is organised as follows. Section 2 provides an overview of the literature related
to the subject. Section 3 explores the different mechanisms by which globalization may
impact upon in-work poverty. The empirical strategy, the variables and the data are presented
in Section 4. Section 5 exposes and discusses our main results. We conclude in Section 6.

## 2 Literature

The article is based on the fact that, if income inequality is positively related to globalization,
and in-work poverty to inequality, then globalization should impact upon in-work poverty. Of
course, the sense of the relation is not inevitably positive because (i) globalization could act
upon in-work poverty through other channels than inequality, and (ii) the mechanisms that
bind inequality to globalization are diverse and sometimes conflicting, and thus the overall
impact depends on their weight as regards the determination of in-work poverty.
The following review focuses on the mechanisms by which globalization is inequality-enhancing at the bottom because the same mechanisms typically increase in-work poverty. As the works on the relation between globalization and in-work poverty are very limited, the reviewed literature on the working poor’s characteristics will be essentially used to reveal the control variables selected for our estimates.

2.1. Globalization, inequality and the working poor

Since the late eighties, an abundant theoretical and empirical literature has analysed the impact of globalization upon inequality within advanced economies (Chusseau and Dumont, 2013, and Chusseau et al., 2008, for recent reviews). A large part of this literature is centred on the impact of North-South trade.

Four strands of literature may be identified that explain how globalization may increase inequality within advanced economies. The first lies on the traditional comparative advantage approach to trade. The second analyses the impact of globalization within ‘new’ international economics theories, particularly Melitz’s approach. The third shows how globalization can encourage skill-biased technological change. The fourth studies globalization-driven changes in institutions.¹

Comparative advantage, trade and inequality

A simple way to generate wage inequality is to assume trade openness into a North-South Heckscher-Ohlin-Samuelson (henceforth NS-HOS) model with a skill-abundant North and an unskilled-abundant South. In each country, openness raises the price of the relatively abundant factor and decreases the price of the relatively scarce. In the North, the wage of the unskilled decrease, and the skill premium and inequality increase. However, if the NS-HOS model generates inequality in advanced countries, most of its predictions are at odds with observed facts, due to constraining and over-simplified hypotheses. A number of theoretical works have thus extended the model by adding more accurate assumptions. In particular, the HOS framework has been extended by assuming a minimum wage in one country (Davis, 1998), a fair wage hypothesis (Agell & Lundborg, 1995; Albert & Merckl, 2001; Kreickemeier & Nelson, 2006), differences in talent across workers and talent-capital complementarity (Haskel et al., 2012), etc. Hellier (2013) shows that the extension of the NS-HOS approach by relaxing its most simplifying assumptions allows finding most of the

¹ We do not present here the literature on globalization and job polarization (see the brief review by Dumont, 2013, pp.39-40). Gleicher and Stevans (2003) base their analysis of in-work poverty on a model of job polarization, but they do not take globalization into account.
observed developments and provides a rather reliable picture of the globalization-inequality-unemployment nexus. Other North-South approaches to trade based on comparative advantages have been utilised to study the rise in inequality. From a model with intermediate goods and three factors (skilled labour, unskilled labour and capital), Feenstra and Hanson (1996) show that higher openness results in the South producing new intermediate goods, which makes the North produce more skill intensive intermediate goods. This increases the skill premium and inequality in the North. This model provides a theoretical base to offshoring-related growing inequality. In fact, assuming capital-skill complementarity leads to an increase in the skill premium and inequality when globalization fosters capital utilization. Helpman and Itskhoki (2010) generate inequality and unemployment by introducing search and matching into a model that combines comparative advantage and increasing returns to scale.

The first stand of empirical works implemented in the early 1990s on the impact of trade upon the skill premium and inequality, came to the conclusion that trade had had a small or negligible impact, particularly for the US (Borjas et al, 1992; Katz and Murphy, 1992; Krugman and Lawrence, 1993; Lawrence and Slaughter, 1993). Challenged by Wood (1994), this first diagnosis has subsequently been revisited. A new set of empirical works has particularly studied the impact of offshoring to emerging countries, leading to the conclusion that this type of trade had significantly influenced the demand for skill and inequality in a number of advanced countries (Crino, 2009 for a survey). This diagnosis has been confirmed by works on the impact of FDI outflows from the North to the South. Krugman, who was initially a fervent defender of the negligible impact of globalization on inequality, explains this renewal of the North-South trade explanation by the fact that the size of the South has critically risen between the moment when the first works were implemented (based on data from the eighties) and the 2000s, with the advent of the BRICS as key actors of the globalized world (Krugman, 2008).

**Heterogeneous firms, trade and Inequality**

Another strand of literature is based on Melitz (2003) model that combines Dixit-Stiglitz monopolistic competition approach with firms’ heterogeneity in terms of productivity. In this model openness results in a distinction between domestic-oriented firms and exporting firms, the latter displaying higher profits. By inserting labour market imperfections into the model,

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2 Other models where offshoring increases inequality can be found in Gao (2002) and Glazer and Ranjan (2003). In contrast, offshoring reduces inequality in Arndt (1997), Venables (1999) and Jones and Kierzkowski (2001).

3 Brazil, Russia, India, China and South Africa.
several works found that openness fosters inequality. From a fair wage augmented Melitz model, Egger and Kreickemeier (2012) generate a multidimensional rise in inequality, i.e., more unemployment, higher inequality between managers and employees and higher within-group inequality. In a Melitz model with search and matching frictions, Helpman et al. (2010) found that rising openness firstly increases, and subsequently decreases inequality. Amiti and Davis (2011) combine firm heterogeneity, fair wage, production with intermediate goods and trade costs heterogeneity across firms to analyse the moves in wages due to tariff cuts in the final and in the intermediate goods. They show that a drop in output tariffs raises the wage in exporting firms and lowers it in non-exporting firms. A cut in input tariffs increases the wage in input-importing firms and decreases it in the firms that do not import their inputs. This creates inter-firm wage inequality.

The empirical works attempting to verify Melitz’s mechanisms and predictions are now several. It should firstly be reminded that Melitz model can itself be seen as an ex post theoretical explanation for certain observed regularities, and particularly for the fact that exporting firms were typically more profitable and offered better pay to their manpower than purely domestic firms (Bernard & Jensen, 1995 and 1997). Most empirical works confirm that, when firms are heterogeneous, trade and openness increase profit and wage differences (Bernard et al., 2007; Frias & Kaplan, 2009) and wage inequality (Egger et al., 2013).

**Globalization-driven skill biased technological change**

Several theoretical works have shown that globalization may increase inequality by encouraging skill biased technological change (SBTC), i.e., by fostering skill intensive technologies and pushing R&D in this direction. SBTC typically results in lower relative demand for unskilled workers, and a derived increase in the skill premium and inequality. Initiated by Wood (1994), this idea has subsequently been soundly justified and modelled by Thoenig and Verdier (2003). The main explanation is that, when property rights on patents are poorly enforced in the South, northern firms are encouraged to boost technologies in which the South suffers a disadvantage, i.e. skill-intensive ones\(^4\).

Finally, a number of empirical works have confirmed that globalization can encourage SBTC (Morrison Paul & Siegel, 2001 for the impact of trade on computerization in the US; Bloom et al., 2011 for the impact of imports from China on technological change in 12 EU countries).

**Globalization-induced tax and social competition**

\(^4\) Other approaches in which globalization fosters SBTC can be found in Acemoglu (1998, 2003a).
The interplay between openness and institutions within HOS-type and Melitz-type trade approaches has already been exposed. In addition, globalization can increase inequality if it modifies institutions in the sense of lower redistribution and lower social protection. This particularly occurs in the cases of tax and social competition, which is essentially related to North-North globalization.

Since the seminal article of Zodrow and Mierzkowski (1986)\textsuperscript{5}, it is commonly admitted that international capital mobility (one of the striking characteristics of globalization) generates corporate tax competition (CTC) that can lead to a ‘race to the bottom’ and lower social welfare. This can increase the number of working poor when the cut in corporate levies induces cuts in social transfers.

CTC was tested and estimated in several ways. First, one can estimate the social planners’ reaction functions and verifying that there are strategic interactions, i.e., a positive relationship between the tax rate in one country and the tax rates abroad. This first type of works has clearly confirmed CTC (Zodrow, 2010, for a review). Secondly, one can verify the impact of corporate taxation upon FDI inflows and outflows, a negative impact confirming CTC. The majority of these works came to the conclusion that corporate taxation has had indeed a negative impact upon the location of FDI (see the reviews by De Mooij & Ederveen, 2006, and Devereux & Maffini, 2007). Thirdly, one can verify that higher capital mobility or growing globalization reduces corporate taxation. Here, the evidence is mixed. If corporate taxation is measured by statutory tax rates, then CTC is confirmed (Benassy-Quéré et al., 2007; Cassette & Paty, 2008; Devereux et al., 2008; Devereux & Fuest, 2012). In contrast, international capital mobility increases corporate taxation when the latter is measured either by the corporate taxes on GDP ratio, or by the effective corporate tax rate, i.e. the ratio of corporate levies on corporations’ profits (Slemrod, 2004; Hines, 2005; Mendoza & Tesar, 2005; Dreher, 2006; Devereux et al., 2008; Devereux & Fuest, 2012). So, the decrease in the statutory tax rate must have been offset by an increase in the tax bases (Hines, 2005) or by higher returns to capital.

Higher mobility of the most skilled and richest workers can identically lead to an income tax competition which reduces both the marginal income tax rate and the amount of levies available for redistribution. Mobility at the top of income and wealth distribution incites governments to lessen the marginal income tax rate (the rate applied to the highest tax bracket) as well as wealth and inheritance taxation. Once again, this generates a ‘race to the

bottom’ as regards tax progressiveness. Studies assessing the role of capital, inheritance and wealth taxes in driving deposit holdings are rare. A narrow number of papers estimate the role of source country capital taxation. Huizinga & Nicodème (2004) find no statistically significant effects of source taxes on capital deposits in their preferred specifications. In contrast, Johannesen (2010) finds a significantly negative effect of an increase in the Swiss source taxation of capital income on deposit holdings in Switzerland.

Finally, cost competition between advanced countries can also lead to a race to the bottom as regards employment and social protection, i.e., social competition. The literature on social competition is recent and essentially empirical. As in the case of tax competition, there are several ways to test social competition. The first consists in assessing the impact of social and employment protection upon multinational firms’ FDI. Görg (2002), Javorcik & Spatareanu (2005), and Dewit et al. (2009) find that higher labour standards have a negative impact on FDI inflows, a result however challenged by Kucera (2002) and Rodrik (1996). Olney (2010) shows that employment protection had a significant negative impact on American MNFs’ (multinational firms’) FDIs.

A second type of empirical works consists in estimating the impact of globalization upon public social expenditure (as a percentage of GDP). Here, one attempts to diagnose which of the so-called efficiency hypothesis (globalization reduces government expenditures) and compensation hypothesis (globalization increases government expenditures because of higher demand for social insurance) was prevailing. The results are rather mixed. The number of works finding a negative impact is broadly equal to the number of those diagnosing a positive impact (Gemmels et al., 2008), and several works find no significant relationship. A third way to assess social competition is to test the strategic interactions between the countries’ social policies. If social protection in one country is positively related to that in other countries, this is an indication of a race to the bottom. Positive interactions were found by Olney (2010) and Davies & Vadlamannati (2013). It can finally be pointed out that that higher public social expenditure is not contradictory with lower protection and lower levies. Higher social expenditure can come with lower personal protection when the number of recipients augments, and with lower levies when budget deficits increase.

From the above-reviewed literature, it is clear that:

1. There are several channels through which globalization impacts upon inequality, and, by this way, on in-work poverty.
2. A distinction can be made between North-South and North-North globalization.
3. North-South globalization essentially impacts on inequality through trade and offshoring based on the South comparative advantage in terms of less skilled labour, and to a lesser extent through trade-driven SBTC. These three channels jeopardise the wage position of less skilled workers compared to skilled workers in advanced countries.

4. North-North globalization essentially acts through capital mobility, which creates tax and social competition that reduces redistribution and social norms raising thereby in-work poverty.

2.2. The working poor: major characteristics

From the eighties, the development of the working poor in the US has given rise to a growing literature. However, the researches in this subject have remained almost exclusively empirical and centred on the main determinants and characteristics of in-work poverty.

In most countries, the working poor are defined as persons who work and belong to a poor household, i.e., a household below the poverty line.

The working poor characteristics have been divided between professional, personal, family and more rarely institutional/country specific characteristics (Kalugina, 2012, for a review. The impact of these characteristics on the incidence of working poverty may differ across countries. However, it is possible to portray the main traits of the working poor. They are generally young and low-skilled men, with insecure professional positions such as temporary contracts and part-time jobs (OECD, 2009, Lohmann, 2006, 2008 and 2009; Guillén et al., 2009; Peña-Casas, 2009). Note that the higher risk to be working poor for men is at odds with the findings on poverty in general which show a greater probability for women. This ‘gender paradox’ is usually explained by the fact that the less favourable activity status of women is often offset by the household dimension.

The probability to be working poor is higher for single parents, for families with one unemployed parent, and this probability increases with the number of children. Belonging to an ethnic minority, particularly immigrants, increases the risk of in-work poverty. Being low-paid is a key characteristic in the US, but not in Europe. Finally, in-work poverty is correlated to general poverty and inequality (Guillén et al., 2009). Most of the characteristics of the working poor are typically close to those of the poor in general.

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6 According to the retained definition, these are restrained to the only employed workers or they also comprise the unemployed.

Several comparative studies on European data have attempted to account for countries’ institutional contexts (Allègre, 2008; Andreß & Lohmann ed., 2008; Peña-Casas & Latta, 2004). The institutional context is usually reflected by welfare state provisions and labour market institutions: trade unions, wage-bargaining systems, public transfers (Andreß & Lohmann ed., 2008). A developed welfare state tends to reduce the number of working poor. For instance, in-work poverty is low in the countries like Denmark, Finland and Sweden. However, it is also surprisingly low in Anglo-Saxon European countries (Ireland and the UK). In-work poverty rates are very heterogeneous in Continental European countries (Austria, Belgium, France, Germany, Luxembourg and Netherlands) whereas they are high in Southern European countries (Greece, Italy, Portugal and Spain).

Very little works have been carried out on the impact of globalization on the working poor. However, the results of Cormier and Craypo (2000) suggest that globalization and industrial restructuring could reinforce in-work poverty. Hellier (2013) provides a simple mechanism by which globalization impacts upon the working poor. If North-South openness reduces the real wage of the less skilled, a proportion of these workers may fall under the poverty line. The number of working poor can however be concurrently lessened when the same mechanisms pushes certain worker out of the labour market, i.e., they fall in exclusion.

3 Globalization and in-work poverty: theoretical framework

We firstly investigate the factors that make an individual be working poor. We subsequently define the several dimensions of globalization and we analyse their impacts upon the incidence of being working poor.

3.1. In-work poverty: key determinants

We define the condition for an individual to be working poor and we examine the different factors affecting this condition.

a) The condition to be working poor

Consider individual $i$ whose wage is determined by her/his efficient labour (productivity). If efficiency differs across individuals, this results in different wages across workers. Let $w_i$ be individual $i$’s labour income, identified to wage for the sake of simplicity.
Let $r_{P,i}$ be the private capital income and rents (henceforth *rents*) received by individual $i$ and $r_{G,i}$ the net public transfers (unemployment benefits not included) s/he receives from the government. We finally denote $b_{U,i}$ the benefits s/he receives when being unemployed.

The personal income of individual $i$ when s/he works is thus $I_i = w_i + r_{P,i} + r_{G,i}$.

We denote $L$ the personal income corresponding to the poverty line.

Let finally $w_i$ be the individual’s reservation wage (its determination is exposed hereafter).

Suppose that there is no involuntary unemployment. Individual $i$ works if $w_i > w_i$ and s/he is poor if $w_i + r_{P,i} + r_{G,i} < L$. By combining the preceding two conditions, we determine the condition for an individual to be working poor:

$$w_i < w_i < L - r_{P,i} - r_{G,i}$$

(1)

When there is no involuntary unemployment, all the individuals verifying (1) are working, and condition (1) is the necessary and sufficient condition to be working poor. When there is involuntary unemployment, some individuals verifying (1) may be unemployed and condition (1) is necessary (but not sufficient) to be working poor.

In any case, shifts in the different factors defining (1) modify the probability to be working poor. To analyse the occurrence of in-work poverty, we can thus study the factors that shift both inequalities $w_i < w_i$ and $w_i < L - r_{P,i} - r_{G,i}$. These are:

1) the definition of the poverty line $L$,

2) the determinants of labour income $w_i$,

3) the private rents $r_{P,i}$,

4) the definition and determinants of public transfers $r_{G,i}$ and unemployment benefits $b_{U,i}$ and

5) the definition of the reservation wage $w_i$.

b) *The poverty line* $L$

In our presentation, the poverty line is determined in terms of income. In this respect, two different definitions can be considered.

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8 Another type of definition is based on deprivation. It consists in defining a basic basket of goods necessary to have a ‘normal’ life. Then, a household is poor if more than a given number of these goods are missing. We do
The first and most usual is based on a certain percentage of the median income. In most cases, the threshold of 60% of the median income is selected to determine the poverty line. This is what we do here. However, this threshold suffers a weakness, namely, when the median income decreases at the same rate as bottom incomes, then the impoverishment of the latter is erased by the lowering of the median income-related poverty line.

Another way to measure the poverty line is to define a deprivation threshold in terms of income. This covers two types of deprivation. Firstly, a deprivation in terms of minimal consumption expressed in price, and thus a minimum income. Secondly, a deprivation in terms of relative income, which depicts the feeling of individuals who get poorer in relation to other workers and consider themselves as poor. A convenient way to combine both types of deprivation is to define the poverty line as a percentage of the average income. Actually, the normal ‘basic’ consumption typically changes with time and it increases with the society purchasing power. In addition, the average income can be seen as a norm for the poor and a growing gap between the poor’s income and the average income is a good measure of relative income deprivation. As a consequence, and since the average income is typically higher than the median income, we shall define the second poverty line at 50% of the average income.

In short, we shall consider two poverty lines. The first is defined by the 60% of the median income threshold, and the second by the 50% of the average income threshold. Formally:

\[ I^j = \beta^j \left( w^j + r^j_p + r^j_d \right), \quad j = M, A \]  

Superscript \( j \) indicates, either the median income \( M \) or the average income \( A \); \( w^j, r^j_p \) and \( r^j_d \) are the labour \( j \)-income, the private \( j \)-rents, and the \( j \)-net public transfers; \( \beta^j = 0.6, 0.5 \) for \( j = M, A \).

Finally, we make the usual assumption that the median income is lower than the average income (\( I_M < I_A \)) and we also suppose that both the labour income \( w \) and the private rents \( r_p \) are higher for on average than for the median income: \( w^M < w^A \) and \( r^M_p < r^A_p \).

c) Labour income \( w_i \)

Labour income depends on several dimensions. Firstly, and particularly when considering the competition from emerging countries (the South), it is important to make a distinction between skilled and unskilled workers. On top of that, we cannot just divide the population not retain this definition because it does not allow analysing properly the impact of globalization. However, our second definition permits to consider the income linked to a minimum basket of goods.
into two homogenous groups because we need heterogeneity across unskilled workers so as to distinguish poor from non-poor unskilled workers.

A simple way to model such a situation is to assume that a worker is defined by two characteristics, i.e., her/his cognitive skill \( h_i \) (henceforth skill) and her/his non-cognitive personal attributes \( \lambda_i \) (henceforth personal attributes). The former depicts the individual’s education level and experience and the latter gathers the personal attributes that impact upon her/his productivity such as health, strength, non-cognitive skills (self-confidence, appearance etc). Personal attributes are distributed inside the interval \([\lambda_L, \lambda_U]\).

To be a skilled worker, an individual must at least possess the cognitive skill level \( h \).

An unskilled worker is paid \( w_i L \lambda \) and a skilled worker \( w_i H \eta \), with \( \eta = h_i \lambda_i \), \( w_L \) and \( w_H \) being the wage per efficiency unit of unskilled and skilled workers respectively. We assume \( w_H h > w_L \) so that anyone with a skill higher than \( h \) selects to be a skilled worker. Then individual \( i \) endowed with skill \( h_i \) and personal attributes \( \lambda_i \) receives the following wage \( w_i \) when working:

\[
q_i = \begin{cases} 
  w_i L \lambda & \text{if } h_i < h \\
  w_i H \eta & \text{if } h_i > h 
\end{cases}
\]  
(3)

Note that the wages of unskilled and skilled workers typically overlap because the personal attributes may offset the skill-related difference in wage.

We finally suppose that the reservation wage is effective for at least certain individuals.

Without loss of generality, we can write \( \lambda_L^A = 1 \), with \( \lambda_L^A \) the average personal attribute of unskilled workers.

From the above assumptions, it is clear that the average wage is:

\[
w^A = q_L w_L + q_H w_H \eta^A_H
\]  
(4)

with \( \eta^A_H \) the average \( \eta \) of skilled workers, \( q_L \) and \( q_H \) the proportions of unskilled and skilled workers in the working population.

\( d) \) Rents \( r_{p,i} \)

For the sake of simplicity, rents \( r_{p,i} \) are defined as incomes from capital. Assuming that capital assets holdings differ across individuals, we can write:

\[
r_{p,i} = r_p \times k_i
\]  
(5)
where \( k_i \) are the assets possessed by individual \( i \) and \( r_p \) the return rate of assets.

We make the additional two assumptions that (i) the poor and the individuals who are at the (upper) vicinity of the poverty line have no capital and thus no rents, which is a rather reasonable hypothesis, and (ii) the assets owned by the median income earner are lower than the average asset holding (which is always the case given the distribution of wealth amongst individuals in all countries).

e) Public transfers and unemployment benefits

To simplify, we assume a redistribution scheme such that the individual’s net transfer is proportional to the difference between the average income and her/his income before redistribution \( w_i + r_p k_i \):

\[
r_{G,i} = r_G(I^A - w_i - r_p k_i)
\]

(6)

where superscript \( A \) indicates an average value; \( I^A = w^A + r^A_p \) is the average income; the circumflex denotes a before-redistribution income and \( 0 \leq r_G < 1 \) measures the redistribution intensity.

Straightforwardly, the average net public transfer is nil.

Individual \( i \)'s after-redistribution income is:

\[
I_i = (1 - r_G)(w_i + r_p k_i) + r_G I^A
\]

(7)

We finally suppose that non-working individuals receive unemployment benefits. These simply consist of a certain percentage \( b_U \) of what the individual would earn if s/he had a job:

\[
b_{U,i} = b_U \times w_{i} \hat{\lambda}_i
\]

(8)

f) The reservation wage

The individual’s income when working is defined by equation (7).

Assume that individuals receive unemployment benefits when they do not work. Her/his non-working ‘received’ income \( I^U_i = b_{U,i} + r_{G,i} + r_p k_i \) is thus:

\[
I^U_i = (1 - r_G)(b_U w_i + r_p k_i) + r_G I^A
\]

We suppose that, on top of \( I^U_i \), the non-working individuals’ effective incomes must be augmented by a certain extra-revenue \( \delta_i = \delta \times \lambda_i^{\beta} \), \( 0 < \beta < 1 \), that depicts the goods and
services the individual can self-produce when being out of the labour market. The exponent \( \beta \), \( 0 < \beta < 1 \), just indicates that the marginal productivity of (efficient) labour is decreasing in the self-production function. The effective non-working income \( I_i^E \) can be written:

\[
I_i^E = (1 - r_G)(b_I w_i + r_p k_i) + r_G I^A + \delta \lambda_i^\beta
\]

Finally, the reservation wage is the wage \( w_i \) that equalises the income when working \( I_i \) with the effective non-working income \( I_i^E \):

\[
w_i = \frac{\delta \lambda_i^\beta}{(1 - r_G)(1 - b_U)}
\]

It can be easily checked that \( w_i \) increases with both \( r_G \) and \( b_U \).

3.2. The impacts income shifts upon in-work poverty

We suppose that all the working poor are unskilled workers. Firstly, this is consistent with the evidence that unskilled workers account for the large majority of the working poor. Secondly, even if a limited number of skilled individuals can fall in working poverty, it is very unlikely that their professional position is skilled. In fact, they typically occupy unskilled positions even if they are skilled. As we restrain our analysis to the unskilled, the labour income of individual \( i \) being working poor is \( I_i^L = w_i \lambda_i \). Given that individuals below and close to the poverty line receive no rents, the condition (1) to be working poor becomes:

\[
w_i < (1 - r_G)(1 - b_U)
\]

By inserting (6) and (9) into this condition, we obtain:

\[
\frac{\delta \lambda_i^\beta}{w_L(1 - r_G)(1 - b_U)} < \lambda_i < \frac{(1 - r_G)(I^A - w_i \lambda_i)}{w_L}
\]

For given values (i) of \((w_L, r_G, b_U)\), (ii) of the average income \( I^A \) and (iii) of the poverty line \( I \), condition (10) determines a set of working poor defined in terms of personal attributes.

---

9 \((1 - r_G)(b_I w_i + r_p k_i) + r_G I^A + \delta \lambda_i^\beta = (1 - r_G)(w_i + r_p k_i) + r_G I^A \Rightarrow w_i = \delta \lambda_i^\beta / (1 - r_G)(1 - b_U)\).

10 \(\frac{\partial w_i}{\partial r_G} = \frac{\delta \lambda_i^\beta}{(1 - r_G)^2} > 0; \frac{\partial w_i}{\partial b_U} = \frac{\delta \lambda_i^\beta}{(1 - b_U)^2} > 0\). Logically, \( w_i \) also increases with \( \lambda_i \).

11 This can derive from skill obsolescence due to technological changes, shrinkage in aptitudes due to affective disorder etc.
This set of working poor is the interval $[\lambda, \lambda]$ such that:

$$\lambda = \left( \frac{\delta}{w_L(1-r_G)(1-b_U)} \right)^{1/(1-\beta)}$$

(11)

$$\tilde{\lambda} = \frac{L-r_GI^A}{(1-r_G)w_L}$$

(12)

The set of working poor can change by its two sides, $\lambda$ and $\tilde{\lambda}$. An increase in $\lambda$ corresponds to the passage of certain non-poor workers below the poverty line, i.e., an increase the number of working poor. A decrease in $\tilde{\lambda}$ signifies that the wage of certain non-working individuals moves above their reservation wage, which make them join the set of working poor.

In what follows, we thus analyse the impact of changes in the different components of income (wages, rents, social transfers and unemployment benefits) upon each limit of the set of working poor ($\lambda$ and $\tilde{\lambda}$) and thus on the incidence of working poverty.

a) Impacts of income shifts upon $\lambda$

**Proposition 1.** The lower limit of the set of working poor $\lambda$:

1) increases with the redistribution rate $r_G$ and the unemployment compensation rate $b_U$;
2) decreases with the unskilled labour unit wage $L_w$.

**Proof.** Appendix A

A rise (reduction) in $\lambda$ lessens (augments) the number of working poor. Hence, increases (decreases) in $r_G$ and $b_U$ raise (lessen) the number of working poor whereas an increase (decrease) in $w_L$ lessens (raises) it. The explanations for this are as follows: the rise in $r_G$ decreases the return to working and augments its opportunity cost, the increase in $b_U$ augments the opportunity cost of working, and the rise in $w_L$ augments the return to working.

---

12 $\lambda$ and $\tilde{\lambda}$ are the roots of equations

$$\lambda_i = \frac{\delta \beta}{w_L(1-r_G)(1-b_U)}$$

and

$$\tilde{\lambda}_i = \frac{L-r_G(I^A-w_L\lambda_i)}{w_L}$$

respectively.
b) Impacts of income shifts upon $\lambda$

We make a distinction between the two definitions of the poverty line, i.e., the average income based poverty line and the median income based poverty line.

**Proposition 2.** When the poverty line is defined at 50% of the average income, the upper limit of the set of working poor $\lambda$:

1) decreases with the unskilled labour unit wage $w_L$ and the redistribution rate $r_G$.
2) increases with the skilled labour unit wage $w_H$ and return to capital $r_P$.
3) does not change when $w_L$, $w_H$ and $r_P$ increase at the same rate.

**Proof.** Appendix B.

As an increase (decrease) in $\lambda$ augments (lessens) the number of working poor, increases in $w_L$ or/and $r_G$ lower the number of working poor whereas increases in $w_H$ and $r_P$ raise it.

In the case of the median income based poverty line $I^M$, it is typically impossible to make precise predictions of the impacts of shifts in the components of personal income upon the upper limit $\lambda$. This is because:

1) The impacts of shifts in $w_L$ and $w_H$ obviously depend on whether the median income earner is a skilled or an unskilled worker. Actually, the incomes of both types of worker overlap because unskilled workers with high aptitudes can earn more than low-aptitude skilled workers, and the median income earner can be inside this set of overlapping.

2) Changes in the income components ($w_L$, $w_H$, $r_P$, and $r_G$) can shift the ranking of individuals on the income ladder, and thereby the median income earner and her/his characteristics $\lambda^M$, $h^M$ and $k^M$.

3) The upper limit of the set of working poor $\lambda$ depends on how the incomes at the vicinity of the poverty line $(1-r_G)w_jh_j + r_GI^A$ behave in relation to the poverty line $I^M = 0.6 \times I^M$. When the median income worker changes with incomes shifts, those incomes close to the poverty line can decrease more (less) than that of the pre-shift median income, but less (more) than the post-shift median income (even if both the pre and post-shift median incomes move in the same direction). It is thus impossible to determine whether incomes shifts increase or decrease the number of working poor at the upper limit of their set.
Appendix C presents an analysis of the possible impacts of shifts in income determinants upon $\tilde{\lambda}$ when the poverty line is $L^M$. The effects of changes in $w_L$, $w_H$ and $r_P$ are ambiguous. The only clear result is that an increase (decrease) in $r_G$ moves the upper limit downwards (upwards), lowering (increasing) thereby the number of working poor.

3.3. The impact of globalization on in-work poverty

Based on the literature reviewed in Section 2, we firstly highlight the main changes in incomes related to globalization by distinguishing North-South trade from North-North globalization. We subsequently combine these changes with the results determined in the preceding Section 3.2 so as to yield our main predictions in terms of impacts of globalization upon in-work poverty.

a) Globalization-induced income shifts

As mentioned in the review of literature, North-South trade firstly increases inequality because of differences in factor endowments between the two areas. Less skilled labour being the abundant factor in the South, the development of North-South trade and offshoring to the South of unskilled intensive stages of production tend (i) to lower the wages of unskilled workers, and (ii) to increase the wage of skilled workers and the return to capital in advanced economies. North-South trade also raises the skill premium by fostering skilled biased technical change.

North-North trade firstly increases efficiency by specializing each economy in its most productive sectors (within Ricardian approaches) and by ‘selecting’ the most productive firms in each country (within Melitz’s approach). This could be seen as increasing the three types of private incomes, i.e., $w_L$, $w_H$ and $r_P$, without any bias in favour of one of them. When Melitz approach is combined with imperfections on the labour market, this can also foster inequality at the expense of unskilled workers.

North-North globalization also impacts upon income distribution by inducing changes in institutions, particularly on the labour market. Two main channels were put forward, both being essentially linked to capital mobility: tax competition and social competition. Within our framework, this consists in lowering both the redistribution rate $r_G$ and the unemployment compensation rate $b_U$.
In brief, North-South trade and offshoring to the South typically results in a decrease in $w_L$ and an increase in $w_H$ and $r_p$. North-North trade increases both $w_H$ and $r_p$, and it has an ambiguous impact upon $w_L$. Finally, globalization-driven changes in institutions typically lessen the redistribution rate $r_G$ and the unemployment benefits rate $b_U$.

b) Impacts on working poverty

We can now combine (i) the shifts in incomes generated by the different dimension of globalization and (ii) the impacts of income shifts upon the limits of the set of working poor ($\lambda$ and $\bar{\lambda}$), so as to predict the effects of globalization on in-work poverty. Table 1 describes these predictions by distinguishing the two definitions of the poverty line.

<table>
<thead>
<tr>
<th></th>
<th>Moves in $\lambda$</th>
<th>Moves in $\bar{\lambda}$ Poverty line $\lambda^A$</th>
<th>Moves in $\bar{\lambda}$ Poverty line $\lambda^M$</th>
<th>Total impact on in-work poverty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N-S Trade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease in $w_L$</td>
<td>Upward move</td>
<td>Upward move, the 3 income shifts going in the same direction.</td>
<td>Ambiguous.</td>
<td>- $\lambda^A$ line: Increase.</td>
</tr>
<tr>
<td>Increase in $w_H$ and $r_p$</td>
<td></td>
<td></td>
<td></td>
<td>- $\lambda^M$ line: Ambiguous.</td>
</tr>
<tr>
<td><strong>N-N Trade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unclear move in $w_L$, Increase in $w_H$ and $r_p$</td>
<td>Decline or rise depending on whether $w_L$ increases or decreases.</td>
<td>- No impact when $w_L$, $w_H$ and $r_p$ increase at the same rate.</td>
<td>- No impact when $w_L$, $w_H$ and $r_p$ increase at the same rate.</td>
<td>- $\lambda^A$ line: Ambiguous.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- $\lambda^M$ line: Ambiguous.</td>
</tr>
<tr>
<td><strong>Tax &amp; social competition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease in $r_G$ and $b_U$</td>
<td>Lower $\lambda$ due to the decrease in the reservation wage.</td>
<td>Upward move due to lower redistribution.</td>
<td>Upward move due to lower redistribution.</td>
<td>- $\lambda^A$ line: Increase.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- $\lambda^M$ line: Increase.</td>
</tr>
</tbody>
</table>

When considering the average income based poverty line $\lambda^A$, North-South trade (NST) increases both the lower limit $\lambda$ and the upper limit $\bar{\lambda}$. The first move reduces the incidence of working poverty because lower $w_L$ lessens the incentive to work. The second increases this incidence by moving certain non-poor worker below the poverty line. The upward move in $\bar{\lambda}$ can be considered as significant because the three determinants ($w_L$, $w_H$ and $r_p$) reinforce each other. We can thus expect an increase in the number of working poor because the second
move is supported by the three shifts in $w_L$, $w_H$ and $r_p$ whereas the first is only based upon the decrease in $w_L$. Consequently, NST typically increase the incidence of being working poor when the poverty line is $T^A$.

When the poverty line is based on the median income, the impact of NST is ambiguous. The impact upon $\lambda$ depends on the type of the median worker (skilled or unskilled) and on whether the income shifts change the worker corresponding to the median income.

The effect of North-North trade (NNT) is similar when considering both definitions of the poverty line. In both cases, the impact is rather ambiguous. The move in $\lambda$ is ambiguous, the increases in $w_L$, $w_H$ and $r_p$ have no impact when they operate at the same rate, and the Melitz model with labour market imperfections tends to increase in-work poverty.

Finally, tax and social competition (TSC) clearly augments the number of working poor. On the one hand, the decrease in $r_G$ raises in-work poverty by both sides, namely, by lowering the reservation wages and making low paid workers become poor. On the other hand, the decrease in $b_U$ further depress the reservation wage.

In short, (i) NST increases the incidence of working poverty when the poverty line is defined in terms of average income whereas its effect is rather ambiguous in the case of a median income based poverty line, (ii) the effect of NNT is ambiguous, and (iii) TSC augments the number of working poor.

4 Data and empirical strategies

To investigate the effects of globalisation on the incidence of in-work poverty in advanced European countries we implement a twofold empirical strategy. The first strategy is based on aggregate data by country and analyses the determinants of the share of working poor in the working population by applying a two-way fixed effects estimator. The second strategy is based on a multilevel analysis. The multilevel analysis is an appropriate econometric technique when investigating the relationship between individual and society. The individual probability of being working poor is analysed by taking into account simultaneously individual and macroeconomic contextual variables.

Both strategies thus introduce several macro-indicators of globalization that depict the mechanisms analysed in the preceding sections, and other macro-determinants such as GDP.
growth, R&D expenditures or the unemployment benefits. The analysis is implemented for 16 countries over 6 years.

4.1. Database and variables

We use 6 rounds (2005-2010) of the European Statistics on Income and Living Conditions (EU-SILC). EU-SILC is the reference source for income and social exclusion statistics, providing information on income and on the most important socio-demographic and labor characteristics of individuals and households. Started in 2003 with 7 European countries, it covers 29 countries in 2010. As we focus on the impact of globalization on working poverty in the most developed European countries, we limit our analysis to 16 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and the UK.

We use the European definition of “in-work poverty risk”: “Individuals who are classified as ‘employed’ (distinguishing between ‘wage and salary employment plus self-employment’ and ‘wage and salary employment’ only) and who are at risk of poverty” (European Commission, 2009). Individuals are classified as employed according to the definition of the most frequent activity status (MFAS). The MFAS is defined as the status individuals declare to have occupied for more than half the number of months in the calendar year. On this basis, the indicator is thus the percentage of individuals at risk of poverty in the population of individuals of working age who are ‘employed’ (Ponthieux, 2010).

In European studies, the risk of poverty threshold is expressed as 60 per cent of the national median equalized disposable income (Eurostat, 2012; Peña-Casas and Latta, 2004).

In this paper we use two definitions of poverty: at 60% of the country median income and at 50% of the country average income\(^{13}\). The explanation for these definitions was exposed in previous section (cf. section 3.1).

Indicators of globalization

Globalization is a multidimensional phenomenon. However, we concentrate here on the economic part of globalization measured by a country’s openness to trade, in which we make a distinction between “North-North” and “North-South” trade. More precisely we use the following indicators (cf. Table A2 in Appendix):

1) Country openness to trade, i.e., the sum of total imports and exports as a share of GDP.

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\(^{13}\) Table A1 in the Appendix reports the incidence of in-work poverty according to these definitions of poverty threshold. The difference between the two definitions is not very high.
2) The imports of manufactured products from the “South” as a percentage of GDP to proxy the impact of delocalisation to emerging countries.

3) The sum of imports and exports with the developed countries as a share of GDP to capture the impact of the “North-North” trade on in-work poverty.

We must correct the “country size bias”, i.e., the fact the small countries trade more without being necessarily more open. In this purpose, we follow Leibrecht et al. (2011) and estimate the three trade ratios as functions of the relative country size (GDP of the country on the average GDP of the sample) and use the residuals of this regression as proxies of the three above ratios measuring the country’s openness to trade.

Control variables

Several control variables are considered. There is a vast empirical literature on the determinants of the probability of being working poor (Kalugina, 2012). Hellier (2013) proposes a theoretical framework that provides theoretical foundations for most of these factors. Low education significantly increases the probability of being the working poor. Economic cycle, unemployment benefits as well as countries research and development efforts could impact the level of working poverty. We use the following control variables (cf Table A2 in Appendix D):

1) The growth rate of real GDP to capture the influence of business cycles.

2) The share of persons with low educational attainment which is defined as the percentage of 25-64-aged people with an ISCED (International Standard Classification of Education) education level of 2 or less (pre-primary, primary and lower secondary education).

3) Gains of the transition from unemployment to work: this indicator is based on the OECD participation tax rates for a transition into full-time work for persons receiving unemployment benefits at the initial level and measures the financial gains of moving to work from unemployment.16

14 The ‘South’ comprises emerging countries and Eastern European Countries (CEESs): Turkey, South African Union, Ecuador, Mexico, Brazil, Argentina, Chile, Colombia, Tunisia, Egypt, Indonesia, India, Malaysia, Philippines, Thailand, Brunei, Bangladesh, Sri Lanka, Russia, China, Indochina and Central European countries (Albania, Bulgaria, Former Czechoslovakia (then Czech Republic and Slovakia), Hungary, Poland, Romania.

15 The North includes the United States, Canada, France, Belgium, Luxembourg, Germany, Italy, The Netherlands, the United Kingdom, Ireland, Denmark, Finland, Norway, Sweden, Island, Austria, Switzerland, Spain, Greece, Portugal, Israel, Japan, Australia/New Zealand, South Korea, Hong Kong, Singapore, Taiwan.

16 OECD participation tax rates measure the extent to which taxes and benefits reduce the financial gain of moving into work. We use this indicator to construct the gain of moving into work i.e. our indicator is calculated as follows: (1-participation tax rate)/participation tax rate. We take the 50% of average worker (AW) earnings and use the average over 6 family types available in OECD data. For more details on OECD participation tax rates see: www.oecd.org/els/social/workingincentives
4) Research and development expenditures as a percentage of GDP.

The empirical strategy consists of three successive estimates. First, we introduce the total trade without distinction of “North-North” and “North-South” trade. Second, we introduce trade with the South and finally we add to the last estimation the “North-North” trade. In all three specifications we introduce a country’s relative size in order to correct the small country bias (Leibrecht et al., 2011).

4.2. Macroeconomic estimates

Our empirical strategy is based on the macro analysis of the percentage of working poor. The fixed effects approach is a valuable panel data estimation technique which allows controlling for country unobservable heterogeneity. The following empirical model is estimated:

\[ WP_{it} = \beta G_{it} + \gamma C_{it} + \alpha_i + \nu_t + \epsilon_{it} \]

where \(i\) is the country index (16 countries) and \(t\) is the year index (from 2005 to 2010). The dependent variable \(WP_{it}\) is the percentage of working poor in country \(i\) and year \(t\). \(G_{it}\) is the globalisation indicators in country \(i\) and year \(t\) and \(C_{it}\) corresponds to control variables (cf. section 4.1.). \(\alpha_i\) and \(\nu_t\) capture the country and time fixed effects, and \(\epsilon_{it}\) is the remainder error term. The estimated coefficients \(\beta\) could be interpreted as the marginal effect of a one unit increase in the respective globalisation indicator on the percentage of working poor.

We use Schaffer’s \textit{xtivreg2} Stata command with the standard errors robust with respect to serial correlation and heteroscedasticity (Leibrecht \textit{et al.}, 2011; Schaffer, 2010).

4.3. Multilevel estimates

The model presented above is based on aggregate data at the country level. It provides information about the macroeconomic determinants of in-work poverty incidence in European countries. It is nevertheless impossible to analyse individuals’ behaviours within such a model because the the probability of being working poor is to a large extent influenced by individual and family characteristics (cf. section 2.2). The multilevel modelling makes possible to account for both individual/family and countries’ institutional contexts, using a statistical model that properly includes both types of dependencies (Hox, 2002). If the institutional framework matters, individual responses within one particular country are usually not

---

17 The data are missing for Greece in 2008, 2009 and 2010.
independent observations (Greenan et al. 2013). Multilevel models explicitly take such correlations into account and combine individual and contextual factors by providing correct inferences, i.e., statistically efficient estimates of regression coefficients, correct standard errors, confidence intervals and significance tests (Hox, 2002).

Respondents in the EU-SILC survey are individuals from each of the 16 EU countries. Thus, the dataset is hierarchical, with a level 1 (the individual, indexed by $i$) nested in a level 2 (the country, indexed by $j$). In our case, the country is the level where the contextual effects are assessed.

The estimated empirical model could be presented as follows. Suppose that underlying the binary response $y_{ij}$ there is a continuous latent variable $y_{ij}^*$ that is related to the observed $y_{ij}$ as follows:

$$
y_{ij} = \begin{cases} 
1 & \text{if } y_{ij}^* \geq 0 \\
0 & \text{if } y_{ij}^* < 0
\end{cases}
$$

We can define a two-level random intercept model as follows:

$$y_{ij}^* = \beta_0 + \beta_1 x_{ij} + \beta_2 z_j + u_j + \epsilon_{ij}$$

This model includes individual-level variables (noted $x_{ij}$) and country-level variables (noted $z_j$). The errors $\epsilon_{ij}$ are distributed as logistic with mean zero and variance $\pi^2/3$ and are independent of $u_j$.

At the individual level we measure gender, age (three categories), education (three categories), country of birth (foreign versus native), family composition (five categories), employment status (self-employed versus employee and part-time versus full-time work), sector of the workplace (12 categories) and occupations (9 categories).

The country-level variables are similar to those used in the macro-estimates (cf. section 4.1).
5 Results

5.1. Results of the macro-estimates

Table 3 depicts the results for the first step estimation (total trade without distinction between “North-North” and “North-South” trade).

| Table 3. First step estimation

<table>
<thead>
<tr>
<th></th>
<th>60% of median income</th>
<th>50% of average income</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total trade</strong></td>
<td>0.039</td>
<td>0.084***</td>
</tr>
<tr>
<td><strong>Country’s relative size</strong></td>
<td>0.24***</td>
<td>0.031***</td>
</tr>
<tr>
<td><strong>Low educational attainment</strong></td>
<td>0.0008</td>
<td>-0.018</td>
</tr>
<tr>
<td><strong>Gains of the transition from unemployment to work</strong></td>
<td>0.008</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>R&amp;D expenditures</strong></td>
<td>0.254</td>
<td>-0.736</td>
</tr>
<tr>
<td><strong>Real GDP growth</strong></td>
<td>-0.031</td>
<td>-0.077**</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.1007</td>
<td>0.1694</td>
</tr>
<tr>
<td><strong>Nb of observations</strong></td>
<td>93</td>
<td>93</td>
</tr>
</tbody>
</table>

* significant at 10% level, ** significant at 5% level, ***significant at 1% level

Estimates based on xtivreg 2 Stata command

Trade openness is the measure of globalization. The coefficient is positive but not statistically significant for the poverty threshold based on 60% of median household disposable income. In contrast, the effect is significant and positive for poverty thresholds based on average income. This indicates that, as a whole, globalization increases the working poverty. In terms of control variables only real GDP growth is significant: high economic growth diminishes working poverty based on average income.

Even if total trade seems to have a positive impact on the working poor in the “50% of average income” specification, we know from the theoretical discussion that there should be a difference between trade of manufacturing with emerging countries which increases in-work poverty, and trade with advanced countries the impact of which is ambiguous. Table 4 depicts the results of the estimates when making this distinction. North-South trade and North-South offshoring are measured by the imports of manufacturing goods from emerging countries. In all specifications the coefficient is significant and positive. When introducing trade with advanced countries this positive effect of emerging countries on working poverty persists while the effect of North-North trade is negative but not significant.

| Table 4. Second step estimation

<table>
<thead>
<tr>
<th></th>
<th>Iia)</th>
<th>Iib)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>60% of median</strong></td>
<td>60% of average</td>
<td>60% of median</td>
</tr>
<tr>
<td><strong>North-South trade</strong></td>
<td>0.329**</td>
<td>0.400***</td>
</tr>
<tr>
<td><strong>Country’s relative size</strong></td>
<td>0.028***</td>
<td>0.37***</td>
</tr>
<tr>
<td><strong>North-North trade</strong></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Low education</td>
<td>0.022</td>
<td>0.018</td>
</tr>
<tr>
<td>Gains of the transition from unemployment to work</td>
<td>-0.004</td>
<td>-0.014</td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td>0.124</td>
<td>-0.736</td>
</tr>
<tr>
<td>Real GDP growth</td>
<td>-0.033</td>
<td>-0.062*</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.1272</td>
<td>0.1479</td>
</tr>
<tr>
<td>Nb of observations</td>
<td>93</td>
<td>93</td>
</tr>
</tbody>
</table>

* significant at 10% level, ** significant at 5% level, *** significant at 1% level
Estimates based on xivreg 2 Stata command

5.2. Results of the multi-level estimates

The results of the multi-level estimates are presented in Tables 5 and 6 for the poverty line at 60% of the median income and at 50% of the average income respectively. In these tables, three different models are reported depending on the specification of the macroeconomic level. The first model (model I) includes ‘Total trade’ without distinction between “North-South” and “North-North” trade. The second model (model IIa) includes only “North-South” trade. The third (model IIb) includes both “North-South” and “North-North” trade.

Individual level heterogeneity

At the individual level, our results are in line with the empirical literature on working poverty (cf. section 2.2).

For both poverty lines we find evidence of the so-called “gender paradox”: the probability of being working poor is higher for men compared to women.

Young workers are more vulnerable to working poverty and the working poor are mostly concentrated among low educated workers.

Workers born abroad are more frequently exposed to working poverty.

The likelihood of becoming working poor is the highest for single parents when compared to all other family structures.

Insecure professional positions (like part-time versus full-time work) as well as self-employment matter and they increase significantly the probability of being working-poor.

Finally, the most vulnerable occupations for both definitions of the poverty line are craft workers and elementary occupations and agriculture, and the probability of being working poor is the highest in the following two sectors: other services and hotels.

Country level heterogeneity

Most country-level variables provide significant explanations for the differences in the probability of being working poor in European countries. For both poverty lines, the
probability of being working poor is higher in countries open to trade: the coefficient of ‘Total trade’ is significant and positive.

When distinguishing between North-South and North-North trade, only the ‘North-South trade’ coefficient remains positive and significant whereas the ‘North-North trade’ coefficient is insignificant and displays a negative sign in most specifications. This is in line with the results found at the aggregate level.

When comparing the specifications with different poverty lines, the globalisation variables’ coefficients are larger in absolute value and some of them become more significant for the estimation based on the average income poverty line. This is also in line with our theoretical prediction: the pro-poverty impact of globalization is expected to be more intense when the poverty line is based on the average income than when it is based on the median income (cf. section 3.2).

As regards the control variables, the results are as follows.

Low educational attainment is positively and significantly correlated with the probability of being working poor for both definitions of the poverty line in the second specification. This shows that the probability of being working poor is higher in those countries where the percentage of low educated is high. This result is confirmed by the individual level positive correlation (see above): having a low education increases the probability of being working poor. The negative impact of gains of the transition from unemployment to work on working poverty is less intuitive. It could suggest that certain factors that foster in-work poverty also increase unemployment, which results in higher public expenses on unemployment and probably lesser financial gain of moving to work.

Depending on the poverty line definition, the results differ concerning R&D expenditures. The coefficient is positive and significant in three models out of four for the median income based poverty line, while it is negative and significant only in the last model for average income based poverty line. It raises the questions about the nature of R&D activities in the advanced European countries and its impact on median and average level of life.

Finally, the coefficient of ‘real GDP growth’ is negative in all specifications and significant in three models of four for the average income based poverty line. This suggests that, quite logically, economic growth favours better quality jobs and decreases the probability of being working poor.
Table 5. Probability of being working poor (60% of median income poverty line): multilevel model

<table>
<thead>
<tr>
<th>Variable</th>
<th>I</th>
<th>IIa)</th>
<th>IIb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
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<td>-3.834***</td>
<td>-3.834***</td>
</tr>
<tr>
<td><strong>Individual level : number of observations = 631815</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>-0.335***</td>
<td>-0.335***</td>
<td>-0.335***</td>
</tr>
<tr>
<td>Low education</td>
<td>0.835***</td>
<td>0.834***</td>
<td>0.834***</td>
</tr>
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<td>0.310***</td>
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<tr>
<td><strong>Tertiary education</strong></td>
<td>Reference</td>
<td></td>
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</tr>
<tr>
<td>Age Group &lt;24</td>
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<td>0.491***</td>
</tr>
<tr>
<td>Age Group 25-44</td>
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<td>-0.012</td>
<td>-0.011</td>
</tr>
<tr>
<td>Age Group 45+</td>
<td>Reference</td>
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</tr>
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<td>0.746***</td>
<td>0.746***</td>
</tr>
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</tr>
<tr>
<td>Household of more than one adult, no child</td>
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<td>-1.156***</td>
<td>-1.156***</td>
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<td>-0.654***</td>
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<td>Self-employed versus Employee</td>
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<td>1.280***</td>
<td>1.280***</td>
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<td>Part-time versus Full-time work</td>
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<td>0.689***</td>
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<td>Agriculture and fishing</td>
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<td>1.227***</td>
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<td>0.324***</td>
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<td>0.827***</td>
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<td><strong>Clerks</strong></td>
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* significant at 10% level, ** significant at 5% level, ***significant at 1% level
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<td>Construction</td>
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<td><strong>Clerks</strong></td>
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<td>0.034</td>
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<td>-0.183***</td>
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<td>0.399***</td>
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<td>0.458***</td>
<td>0.458***</td>
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<td>Crafts and related trades workers</td>
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<td>0.512***</td>
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<tr>
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</tr>
<tr>
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<tr>
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<td>0.003**</td>
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<td>North-North trade</td>
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<td>R&amp;D expenditures</td>
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* significant at 10% level, ** significant at 5% level, ***significant at 1% level
6 Conclusion

We have assessed the impact of globalization upon working poverty in advanced European countries over the period 2005-2010. All our results are consistent with the mechanisms highlighted in Section 3.

As expected, the result are both more significant and of higher intensity when poverty is defined as a percentage of the average income than when defined in terms of the median income. This shows that, when lowering the income of low-skilled workers, globalization lessens the income of the median worker as well because s/he has a rather low skill in a number of European countries.

North-South trade has a positive and significant impact upon in-work poverty for both measurements of the poverty line, even if the impact is higher when poverty relates to the average income. This is in line with the usual theoretical finding that competition from emerging countries tends to hurt unskilled workers by lowering their wages compared to that of other workers. This also shows that globalization must have decreased the income of the bottom tail of the unskilled more than that of the median worker.

In all specifications, North-North trade has no significant impact upon in-work poverty, which is once again in line with what was expected from the theoretical mechanisms.

Finally, total trade (without discriminating between North-South and North-North trade) has a significant positive impact on in-work poverty. This shows that, despite the still predominant share of advanced economies in the trade of European countries, the weight of the South is now large enough to make total trade increase significantly the number of poor workers.

In summary, globalization appears to be a key factor that significantly boosts in-work poverty.

References


Appendix A. Impacts of income shifts upon $\lambda$

$$\lambda = \left( \frac{\delta}{w_L(1-r_G)(1-b_U)} \right)^{1/(1-\beta)}$$

$$\frac{\partial \lambda}{\partial w_L} = -\frac{1}{1-\beta} \left( \frac{\delta}{w_L(1-r_G)(1-b_U)} \right)^{\beta/(1-\beta)} \frac{\delta}{(1-r_G)(1-b_U)} w_L^{-2} < 0$$

$$\frac{\partial \lambda}{\partial r_G} = \frac{1}{1-\beta} \left( \frac{\delta}{w_L(1-r_G)(1-b_U)} \right)^{\beta/(1-\beta)} \frac{\delta}{w_L(1-b_U)} (1-r_G)^{-2} > 0$$

$$\frac{\partial \lambda}{\partial b_U} = \frac{1}{1-\beta} \left( \frac{\delta}{w_L(1-r_G)(1-b_U)} \right)^{\beta/(1-\beta)} \frac{\delta}{w_L(1-r_G)} (1-b_U)^{-2} > 0$$
Appendix B. Changes in $\tilde{\lambda}$: the case of the average income based poverty line

The average income-based poverty line is (remember that $r_G^A = 0$):

$$L^A = 0.5I^A = 0.5\left(q_Lw_L + q_Hw_H\eta_H^A + r_pk^A\right)$$

Because of Eq. (5), $\tilde{\lambda} = \frac{I^A - r_G^A I^A}{(1 - r_G)w_L}$, which yields by inserting $I^A$ into this equation:

$$\tilde{\lambda} = \frac{(0.5 - r_G)(q_Lw_L + q_Hw_H\eta_H^A + r_pk^A)}{(1 - r_G)w_L}$$

The condition for $\tilde{\lambda}$ to exist is $0.5 < r_G$. Let us suppose that this condition is fulfilled, which is a rather realistic assumption.

$$\frac{\partial \tilde{\lambda}}{\partial w_L} = -\frac{(0.5 - r_G)(q_Hw_H\eta_H^A + r_pk^A)}{(1 - r_G)^2w_L^2} < 0$$

$$\frac{\partial \tilde{\lambda}}{\partial w_H} = \frac{(0.5 - r_G)q_H\eta_H^A}{(1 - r_G)w_L} > 0$$

$$\frac{\partial \tilde{\lambda}}{\partial r_G} = -\frac{0.5q_Lw_L + q_Hw_H\eta_H^A + r_pk^A}{(1 - r_G)^2w_L} < 0$$

$$\frac{\partial \tilde{\lambda}}{\partial r_p} = \frac{(0.5 - r_G)k^A}{(1 - r_G)w_L} > 0$$

Finally, and increase in $w_L$, $w_H$ and $r_p$ at the same rate maintains $\tilde{\lambda}$ unchanged.

Appendix C. Changes in $\tilde{\lambda}$: the case of the median income based poverty line

The median income-based poverty line is $L^M = \beta_M I^M$, $\beta_M = 0.6$.

Hence, $L^M = 0.6\left(w_M + r_M + r_G^M\right)$, where superscript $M$ depicts the median income worker.

We firstly determine the impacts of income shifts upon $\tilde{\lambda}$ when these shift do not change the median income worker. We subsequently discuss the cases in which this median worker changes.

a) When the median income is an unskilled worker

As the median income is an unskilled worker, $I^M = (1 - r_G)(w_L\lambda^M + r_pk^M) + r_G I^A$ and:

$$L^M = 0.6\left((1 - r_G)(w_L\lambda^M + r_pk^M) + r_G I^A\right), \text{ with: } I^A = q_Lw_L + q_Hw_H\eta_H^A + r_pk^A$$
Because of Eq. (5), \( \tilde{\lambda} = \frac{I^M - r_G I^A}{(1 - r_G) w_L} \), which yields by inserting \( I^M \) into this equation:

\[
\tilde{\lambda} = \frac{0.6(1 - r_G)(w_L \lambda^M + r_p k^M) - 0.4 r_G I^A}{(1 - r_G) w_L}.
\]

By inserting \( I^A \):

\[
\tilde{\lambda} = \frac{0.6(1 - r_G)(w_L \lambda^M + r_p k^M) - 0.4 r_G (q_L w_L + q_H w_H \eta_H^A + r_p k^A)}{(1 - r_G) w_L}.
\]

The condition for \( \tilde{\lambda} \) to exist is:

\[
3(1 - r_G)(w_L \lambda^M + r_p k^M) > 2r_G (q_L w_L + q_H w_H \eta_H^A + r_p k^A)
\]

\[\iff r_G < \frac{3(w_L \lambda^M + r_p k^M)}{3(q_L w_L + q_H w_H \eta_H^A + r_p k^A)}\]

Logically, there is a level of redistribution above which there in-work poverty vanishes.

---

**Proposition A1.** When (i) the poverty line is \( I^M \), (ii) the median income earner is unskilled, and (iii) this median worker does not change with the shifts in income determinants, then:

1) The impact of \( w_L \) is ambiguous: a decrease in \( w_L \) entails a rise in \( \tilde{\lambda} \) for

\[ r_G < \frac{3k^M}{3k^M + 2k^A + 2r_p^{-1}q_H w_H \eta_H^A} \], i.e., very low levels of the redistribution rate.

Otherwise a decrease in \( w_L \) moves \( \tilde{\lambda} \) downwards.

2) \( \tilde{\lambda} \) and the number of working poor increase with \( w_H \).

3) The impact of \( r_p \) is ambiguous: \( \tilde{\lambda} \) increases (decreases) with \( r_p \) for

\[ r_G < (>) \frac{3k^M}{3k^M + 2k^A} \].

4) \( \tilde{\lambda} \) and the number of working poor decrease with \( r_G \).
It must be highlighted that a decrease in $w_L$ typically increase $\tilde{\lambda}$ and thus the number of working poor except for very low redistribution rates, and the increase in $r_p$ is more ambiguous because condition $r_G < \frac{3k^M}{3k^M + 2k^A}$ is less restrictive.

$$\tilde{\lambda} = 0.6(\lambda^M + r_p k^M / w_L) - 0.4 \frac{r_G}{1 - r_G} (q_L + q_H w_H \eta^A_H / w_L + r_p k^A_L / w_L)$$

\textbf{b) When the median income is a skilled worker}

As the median income is a skilled worker, $I^M = (1 - r_G)(w_H \eta^M + r_p k^M) + r_G I^A$, and:

$$I^M = 0.6\left((1 - r_G)(w_H \eta^M + r_p k^M) + r_G I^A\right), \quad \text{with: } I^A = q_L w_L + q_H w_H \eta^A_H + r_p k^A_H$$

Because of Eq. (5), $\tilde{\lambda} = \frac{I^M - r_G I^A}{(1 - r_G)w_L}$, which yields by inserting $I^M$ into this equation:

$$\tilde{\lambda} = 0.6(1 - r_G)(w_H \eta^M + r_p k^M) - 0.4r_G (q_L w_L + q_H w_H \eta^A_H + r_p k^A_H)$$

$$(1 - r_G)w_L$$

The condition for $\tilde{\lambda}$ to exist is:

$$3(1 - r_G)(w_H \eta^M + r_p k^M) > 2r_G (q_L w_L + q_H w_H \eta^A_H + r_p k^A_H)$$

$$\Leftrightarrow r_G < \frac{3(w_H \eta^M + r_p k^M)}{3(w_H \eta^M + r_p k^M) + 2(q_L w_L + q_H w_H \eta^A_H + r_p k^A_H)}$$

Logically, there is a level of redistribution above which there in-work poverty vanishes.

1) $\frac{\partial \tilde{\lambda}}{\partial w_L} = 0.4r_G (q_H w_H \eta^A_H + r_p k^A_H) - 0.6(1 - r_G)(w_H \eta^M + r_p k^M) < 0$ because of (1).

A decrease in $w_L$ entails an increase in $\tilde{\lambda}$, and hence more working poor.

2) $\frac{\partial \tilde{\lambda}}{\partial w_H} = 0.6(1 - r_G)\eta^M - 0.4r_G q_H \eta^A_H$

$$\frac{\partial \tilde{\lambda}}{\partial w_H} > 0 \Leftrightarrow 3(1 - r_G)\eta^M > 2r_G q_H \eta^A_H \Leftrightarrow r_G < \frac{3\eta^M}{2q_H \eta^A_H + 3\eta^M}$$
Proposition A2. When (i) the poverty line is $l^M$, (ii) the median income earner is skilled, and (iii) this median worker does not change with the shifts in income determinants, then:

1) $\lambda$ and the number of working poor decrease with $w_L$.

2) The impact of $w_H$ is ambiguous: $\lambda$ and the number of working poor increase (decrease) with $w_H$ for $r_G < (>) \frac{3\eta^M}{2\eta^A + 3\eta^M} \bar{\alpha}$.

3) The impact of $r_p$ is ambiguous: $\lambda$ and the number of working poor increase (decrease) with $r_p$ for $r_G < (>) \frac{3k^M}{2k^A + 3k^M}$.

4) $\lambda$ and the number of working poor decrease with $r_G$

By combining propositions A1 and A2, we find that the impacts of $w_L$, $w_H$ and $r_p$ are ambiguous (this finding is reinforced if the income shift comes with a change in the median income earner).

The only effect that is clear is that an increase (decrease) in $r_G$ moves down (up) the upper limit $\lambda$ and thereby the number of working poor. This result is still valid when the income shift comes with a change in the median income earner.
APPENDIX D.

Table A1. In-work poverty rate in European countries

<table>
<thead>
<tr>
<th>Year</th>
<th>AT</th>
<th>BE</th>
<th>DE</th>
<th>DK</th>
<th>ES</th>
<th>FI</th>
<th>FR</th>
<th>GR</th>
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<tbody>
<tr>
<td>2005</td>
<td>6.7</td>
<td>5.6</td>
<td>3.9</td>
<td>3.0</td>
<td>4.4</td>
<td>3.8</td>
<td>4.1</td>
<td>6.1</td>
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<tr>
<td>2006</td>
<td>6.4</td>
<td>5.4</td>
<td>4.0</td>
<td>3.2</td>
<td>5.5</td>
<td>4.4</td>
<td>4.3</td>
<td>6.0</td>
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<tr>
<td>2007</td>
<td>6.1</td>
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<td>2.9</td>
<td>7.3</td>
<td>4.8</td>
<td>5.3</td>
<td>6.4</td>
</tr>
<tr>
<td>2008</td>
<td>6.4</td>
<td>5.9</td>
<td>4.7</td>
<td>3.7</td>
<td>7.1</td>
<td>5.1</td>
<td>5.6</td>
<td>6.8</td>
</tr>
<tr>
<td>2009</td>
<td>6.0</td>
<td>5.1</td>
<td>4.5</td>
<td>3.4</td>
<td>6.8</td>
<td>3.7</td>
<td>3.8</td>
<td>6.6</td>
</tr>
<tr>
<td>2010</td>
<td>5.0</td>
<td>4.7</td>
<td>4.5</td>
<td>3.4</td>
<td>7.1</td>
<td>3.7</td>
<td>3.8</td>
<td>6.2</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Year</th>
<th>IE</th>
<th>IT</th>
<th>LU</th>
<th>NL</th>
<th>NO</th>
<th>PT</th>
<th>SE</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>5.9</td>
<td>5.3</td>
<td>8.9</td>
<td>8.6</td>
<td>9.8</td>
<td>7.0</td>
<td>5.9</td>
<td>5.6</td>
</tr>
<tr>
<td>2006</td>
<td>6.1</td>
<td>5.9</td>
<td>9.7</td>
<td>9.2</td>
<td>10.3</td>
<td>7.9</td>
<td>4.4</td>
<td>4.9</td>
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<tr>
<td>2007</td>
<td>5.7</td>
<td>5.2</td>
<td>9.9</td>
<td>9.7</td>
<td>9.3</td>
<td>7.7</td>
<td>4.5</td>
<td>5.3</td>
</tr>
<tr>
<td>2008</td>
<td>6.3</td>
<td>5.5</td>
<td>9.0</td>
<td>8.5</td>
<td>9.4</td>
<td>7.8</td>
<td>4.7</td>
<td>5.6</td>
</tr>
<tr>
<td>2009</td>
<td>4.9</td>
<td>4.7</td>
<td>10.2</td>
<td>10.6</td>
<td>10.1</td>
<td>8.1</td>
<td>5.0</td>
<td>5.8</td>
</tr>
<tr>
<td>2010</td>
<td>7.5</td>
<td>7.5</td>
<td>9.5</td>
<td>9.5</td>
<td>10.6</td>
<td>8.5</td>
<td>5.2</td>
<td>5.6</td>
</tr>
</tbody>
</table>

1 – The poverty line is based on 60% of median disposable household income
2 – The poverty line is based on 50% of average disposable household income
Table A2. Definition of variables and data sources

<table>
<thead>
<tr>
<th>Variable</th>
<th>Source</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade</td>
<td>Eurostat</td>
<td>Average of imports and exports of the items goods and services of the balance of payments divided by GDP.</td>
</tr>
<tr>
<td>North-South trade</td>
<td>Chelem</td>
<td>The sum of imports of manufacturing goods from emerging countries including BRICs as well as New Europe States as a percentage of GDP.</td>
</tr>
<tr>
<td>North-North trade</td>
<td>Chelem</td>
<td>The sum of total imports and total exports with developed countries.</td>
</tr>
<tr>
<td>The size of the South</td>
<td>Chelem</td>
<td>The sum of export of manufacturing goods from emerging countries including BRICs to the rest of the world as a percentage of GDP.</td>
</tr>
<tr>
<td>Low educational attainment</td>
<td>Eurostat</td>
<td>The indicator is defined as the percentage of people aged 25 to 64 with an education level ISCED (International Standard Classification of Education) of 2 or less. ISCED levels 0-2: pre-primary, primary and lower secondary education.</td>
</tr>
<tr>
<td>Gains of the transition from unemployment to work</td>
<td>OECD</td>
<td>The financial gains of moving to work from unemployment.</td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td>Eurostat</td>
<td>Research and development expenditure as a percentage of GDP. Research and experimental development (R&amp;D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. R&amp;D expenditures include all expenditures for R&amp;D performed within the business enterprise sector (BERD) on the national territory during a given period, regardless of the source of funds. R&amp;D expenditure in BERD are shown as a percentage of GDP (R&amp;D intensity).</td>
</tr>
<tr>
<td>Real GDP growth</td>
<td>Eurostat</td>
<td>Real GDP growth rate. Percentage change on previous year.</td>
</tr>
</tbody>
</table>

Table A3. Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade</td>
<td>49.89</td>
<td>27.95</td>
<td>22.2</td>
<td>142.6</td>
</tr>
<tr>
<td>Trade “North-South”</td>
<td>4.05</td>
<td>1.83</td>
<td>1.12</td>
<td>8.86</td>
</tr>
<tr>
<td>Trade “North-North”</td>
<td>26.57</td>
<td>14.87</td>
<td>7.87</td>
<td>76.61</td>
</tr>
<tr>
<td>Low education attainment</td>
<td>31.22</td>
<td>14.43</td>
<td>11.8</td>
<td>73.5</td>
</tr>
<tr>
<td>Gains of the transition from unemployment to work</td>
<td>41.95</td>
<td>31.61</td>
<td>3.81</td>
<td>134.04</td>
</tr>
<tr>
<td>R&amp;D expenditures</td>
<td>2.04</td>
<td>0.82</td>
<td>0.59</td>
<td>3.94</td>
</tr>
<tr>
<td>Real GDP growth</td>
<td>1.16</td>
<td>3.13</td>
<td>-8.5</td>
<td>6.6</td>
</tr>
</tbody>
</table>