CEPII

Trade and Labor Market: What do we know?

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Summary

There is a large consensus in the economic literature suggesting the positive impact of globalization on the aggregate well-being of a country. However, a clear-cut conclusion has not been reached on winners and losers from globalization. For this reason, international trade is often accused of increasing wage inequality in both developing and developed countries. A first stream of literature focused on workers characteristics to identify winners and losers from globalization. Workers with characteristics (*e.g.*, education levels) intensively used in import-competing sectors are likely to suffer from international trade; while workers having characteristics intensively needed in exporting sectors will gain. This is a clear-cut explanation but it does not fit the data as the reality is much more complex. Labor market shocks caused by trade openness are diffuse, and it is difficult to group those who suffer/gain into well-identified categories. The firm and the type of task in which workers are employed definitely contribute to identify winners and losers from globalization. Recent CEPII research outputs, based on detailed French firm and worker-level data, confirm that identifying who lost and who gained with globalization is a very difficult task.

RESEARCH AND EXPERTISE
ON THE WORLD ECONOMY

"More careful research may lead to larger estimates of the effect of North-South trade on the distribution of wages, or future growth in that trade may have larger effects than we have seen so far. At this point, however, the available evidence does not support the view that trade with the Third World is an important part of the wage inequality story."
Paul Krugman, 1994, "Does Third World Growth Hurt First World Prosperity?", Harvard Business Review, July-August 1994.

"It's no longer safe to assert that trade's impact on the income distribution in wealthy countries is fairly minor. There's a good case that it is big, and getting bigger."
Paul Krugman, "Trade and Inequality, revisited" Vox, June 2007.

Introduction

Globalization is frequently blamed for fuelling wage inequality in both developing and developed countries, and its winner and losers are a constant focus of public debate. For these reasons, the labor market effects of globalization are burning issues for policy makers, and debated at length in academia over recent decades. In the 1990s, most economic literature found globalization (*i.e.*, international trade) had a mild effect on wages and workers' income, suggesting a moderate concern for globalization's losers (see Richardson, 1995). Policy questions remained, however, and in the recent years academic researchers have renewed their interest in this topic.

Several reasons explain why this issue is again at the heart of important debates. First, the magnitude of economic changes at stake have continuously increased. In the 1990s and 2000s, world trade has grown at a rapid pace driven by trade liberalization policies and increasing exports capacities in developing and emerging countries. In the 1990s, one could safely assert that trade with low-wage countries could not significantly impact labor markets in developed countries because south-north trade flows represented only a small share of total developed nations' imports and GDP. This is no longer the case. In 1990, more than 91% of the manufactured goods imported by EU-15 countries were sourced from a developed nation (this figure includes intra-EU trade): in 2015, the share was less than 71%. The situation is even more striking for the United States where its share of imports of manufactured goods from developed countries dropped from 83% in 1990, to 48% in 2015. Coupled with rapid deindustrialization and growing inequalities in many developed nations,[1] the question of the labor market impact of trade with low wage countries is more acute today than it was in the last century. Second, academic research on international trade and labor markets has made significant progress over the last 20 years. The recent availability of individual data on firms and workers, and the flourishing literature on heterogeneous firms trade model (since Melitz 2003)[2] and job polarization (Autor 2010), offer new research perspectives.

Third, in a context of global crisis with persistent and oftentimes growing social inequalities, and steady deindustrialization, public opinion in many Western countries is under pressure, and provide growing support to populist and/or protectionist parties. These political changes destabilize the democratic equilibrium and question the consensus in favor of multilateral and regional integration.

The recent rejection of the European Union expressed by the British vote in favor of Brexit, and the election of Donald Trump with his openly protectionist program, are striking illustrations of this shift in public opinion. In both cases, voters, and especially the lower middle classes who have experienced a drop in social status, have clearly expressed their rejection of globalization. The desire to end immigration has of course played an important role. But distrust of international trade was also a decisive factor (Colantone and Stanig, 2016). These votes received attention because they will have important concrete political consequences, and they have taken place in nations that historically have been key proponents of trade liberalization. These are, however, only the most visible outcomes of a deep trend in developed nations' public opinion. The rejection of the European constitutional treaty in 2005 by French and Dutch voters, and the growing influence of far-right and populist movements in most European countries, also testify to this trend.

In this context, the role of academic research is to assess as precisely as possible the labor market impact of globalization, and to identify the channels through which international trade affects wage inequalities. Who are the winners/losers from globalization? How can nations really benefit from globalization? This policy brief presents the state of academic knowledge on these questions. We start by presenting statistical data on trade and labor market inequalities, with a special focus on France. Then, we survey the literature with an aim of showing how difficult that task is to determine globalization's winners and losers, and to list the possible links between trade and labor markets. Finally, we present CEPII economists' recent academic research. They illustrate the ambiguous consequences of trade on workers, and the subsequent difficulties for policy makers to propose appropriate solutions to compensate for the social consequences of international trade.

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(1) The ratio of US employment in industry over total employment decreased from more than 26% to about 17% between the early 1990s and 2010. This ratio decreased from 29.6% to 22% in France, from 32% to less than 29% in Italy, from 34% to 23% in Spain, from 32% to 19% in the UK (source: World development indicators).

(2) Strictly speaking, in the original Melitz (2003) model there is not room for wage inequality since workers all have the same ability. However, the Melitz (2003) model gave rise to a wide growth of trade model with heterogeneous factors that allow for wage inequality (Helpman, Istkhoki and Redding 2010; Costinot and Vogel 2010).

1 Trade and inequalities: Perceptions and facts

1.1 Public opinions on the gain from trade

The public perception of the consequences of globalization seems to be subtler than usually presented. Opinion polls reveal that citizens' perceptions are quite close to the most commonly accepted academic findings. Citizens often recognize that trade liberalization may have positive macroeconomic impacts, but that it is likely to create winners and losers within countries.

This contrast in opinion about the consequence of trade is a major finding emerging from public opinion analysis. Pew Research Center (2014) reveals that citizens across 44 developed and developing countries assert that international trade and global business relationships are beneficial for their countries. This positive opinion is shared by an overwhelming majority of citizens in most of the countries surveyed: 90% of those polled in Germany believe trade has positive consequences for their country, 88% in the UK, 73% in France, 68% in the United States, and 89% in China.

Trade is perceived as being a good thing. But opinions are more ambiguous when one asks who benefits the most from international trade. In the same Pew poll, only 31% polled in developed countries think that international trade creates jobs; 25% agreed that it raises wages. The answers vary substantially across countries, as shown in Table 1. For the developed countries surveyed in this study, however, an absolute majority of citizens agree that trade creates jobs or increases wages.

This finding is confirmed by the 2010 Eurobarometer survey carried out in EU countries (Eurobarometer, 2010). The survey indicated that a significant majority of EU citizens believes "globalization is an opportunity for economic growth" (56% agree with this statement, only 27% disagree)[3]. Yet, 60% hold that "globalization increases social inequalities" (23% disagree). This view is widely shared across European countries. The share of "agree" is less than 50% in only five countries,[4] and is never less than the proportion of "disagree". It is noteworthy that the Pew Research Center (2014) survey shows that public opinions are much more positive about the labor market impact of globalization in developing and emerging countries than in developed countries.

At first glance, the public perceptions might seem puzzling. The survey results give the impression that developed countries'

In developed countries, the feeling that international trade induces significant social costs and tends to increase social inequality is widely shared. This view is particularly strong in France.

Table 1 – Public opinions about globalization in a selection of countries
(in %)

Trade…	U.S.	France	Germany	U.K.	China
… is good for your country	68	73	90	88	89
… creates jobs	20	24	43	50	67
… destroys jobs	50	49	28	19	11
… increases wages	17	14	28	34	61
… decreases wages	45	47	31	17	12

Source : Pew Research Center (2014).

citizens are convinced that globalization generates economic benefits, but they are beyond their grasp.[5] This is not surprising result, however, for trade theorists. Standard trade theories show that trade liberalization is likely to generate positive trade gains at the country level, but trade with low-wage countries is likely to hurt the majority, and foster inequalities in labor-scarce economies.

Recent empirical research also confirms that distrust of globalization influences election results. In many countries, populations most threatened by exposure to imports from low wage countries increasingly support protectionists and/or extreme-right populist parties. Jensen *et al.* (2016) show that the vote share for the incumbent party is lower in US counties with a high concentration of low-skilled manufacturing sectors. Che *et al.* (2016) find that US counties subject to greater competition from China exhibit relative increases in voter turnout and the share of votes cast for congressmen who are more likely to support policies that place restrictions on imports. Autor *et al.* (2016) partially confirm this result, but provide more details on the electoral consequences of rising trade exposure. Their empirical analysis suggests that voters in US districts most exposed to import competition are more likely to elect an extreme congressman who promotes more protective policies for the majority community. Typically, trade-exposed districts that are right-leaning with more white citizens move further right, whereas left-leaning areas with large minority populations move further left. In other words, trade shocks in the United States tend to reinforce electoral polarization by favoring ideologically extreme candidates of both parties.

The influence of globalization on electoral results is not limited to the United States. In Germany, import competition from China and Eastern European countries increases the vote share of extreme-right parties (Dippel *et al.* 2015). Chinese imports provided growing electoral support to the National Front. Finally, Colantone and Stanig (2016) show that UK regions more exposed

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(3) Respondents in Southern Europe are less positive than Northern and Eastern Europeans. Only 49% of Italians and 44% of French agree with this statement. These percentages are larger, however, than the share of respondents who disagree.

(4) Romania, U.K., Netherlands, Latvia and Malta.

(5) As workers, many individuals in developed countries think that they are not benefiting from globalization. They seem not to perceive gains either as consumers. In almost all countries very few believe that trade lowers prices (Pew Research Center, 2014; Eurobarometer, 2010).

to the recent surge of manufacturing imports from China showed systematically higher vote shares in favor of the Brexit during the June 2016 referendum.

Fact 1: *In developed countries, the feeling that international trade induces significant social costs and tends to increase social inequality is widely shared. This view is particularly strong in France.*

1.2 Trade policies and trade patterns

The expansion of trade is not simply an exogenous trend driven by technological progress in transport and telecommunication. It is also the consequence of a series of political decisions aiming to foster multilateral and regional integration. In Figure 1 we compare the trade patterns of France, Germany, United Kingdom, and the United States along with their weighted average applied tariff.[6] Unsurprisingly, we observe a rapid decline of trade protections and a contemporaneous increase in exports and imports (as a share of total GDP). The patterns reported in Figure 1 recall that trade policy affects international trade: an obvious remark, but one with important policy implications. Workers, whose jobs are directly challenged by imports, can feel directly affected by public decisions and legitimated entitled to claim for compensation.

Exposure to international trade increased greatly since the 1970s and accelerated in the 1990s. This trend is visible in all major economies, including France, and came with trade liberalization policies.

Fact 2: *Exposure to international trade increased greatly since the 1970s and accelerated in the 1990s. This trend is visible in all major economies, including France, and came with trade liberalization policies.*

1.3 Wage inequalities: a focus on France

The policy (and social) concern about the labor market effects of globalization is rooted in the tendency to increase wage inequality. In Figure 2, we show the pattern of wage inequality, defined as skilled over unskilled workers' wages between 1991-2005.[7] For the sample of developed countries considered here, there is a clear upward trend in wage inequality, which has been extensively documented by Autor (2010), Goldin and Katz (2007), and Piketty and Saez (2006). In the last three decades, developing countries also experienced increases in wage inequality after the trade liberalization waves and World Trade Organization (WTO) accessions of the 1980s and 1990s (see Goldberg and Pavcnik 2007). At first glance, France is an exception. Figure 3 plots the evolution of min-to-mean wage ratio (an inverted measure of wage inequality) for France and the

United States (as a benchmark), over the period 1976-2013. For France, the min-to-mean wage ratio has been stable over time, suggesting constant wage inequality in the past 50 years (with a minimum wage held constant at half of mean wage). Conversely, for the United States, the figure shows a rapid increase of wage inequality consistent with the facts shown in Figure 2, and the increasing share of US imports shown in Figure 1. This finding suggests that strong labor market regulations and the high level of minimum wage protected France against a rapid increase in wage inequalities. Of course, the downside is a persistent high level of unemployment: since 1984, France's average annual unemployment rate has fallen to less than 8% on only seven occasions, and was never less than 7%).

The composition of France's wages changes when examined in more detail using the French employer-employees data (DADS).[8] In Table 2, we show that over the period 1995-2010, the hourly compensation in France for skilled workers grew by 23%, while those of unskilled workers grew by 26%. On average, the wage gap, defined here as the ratio between skilled and unskilled workers average hourly wage, decreased by 2.13%. This picture is consistent with Figure 3, where we showed that in the last 15 years, wage inequality in France remained unchanged. But, when we consider changes in hourly wages by occupation rather than aggregate education level, we obtain a less positive image. Table 3 reports the level and changes of average wages by two-digit occupations from 1995 to 2010. Hourly wage for skilled industrial and manual workers grew by 39% and 38%, respectively. Hourly average wage also increased consistently for security workers (56%) and office workers (33%). Interestingly, unskilled industrial and manual workers also experienced consistent increases in their hourly wages, 35% and 33%, respectively. So, if both skilled and unskilled workers experienced high wage increases in the last 15 years, which working class experienced losses or marginal wage increase? The answer is middle-class workers. Scientific and educational professionals (12%), teachers and related professionals (15%), and shopkeepers (16%) all experienced smaller wage increases than skilled and unskilled production workers. These trends confirm the job polarization of the French labor market highlighted by Harrigan *et al.* (2015) and Fontagné *et al.* (2014). One way to show whether middle-class workers experienced relative wage losses (*i.e.* polarization of wages) is by comparing the average wage of bottom- and top-10 paid workers with the median wage workers. To this end, in Figure 4 (panel a) we focus on the 1999-2007[9] period, and show the
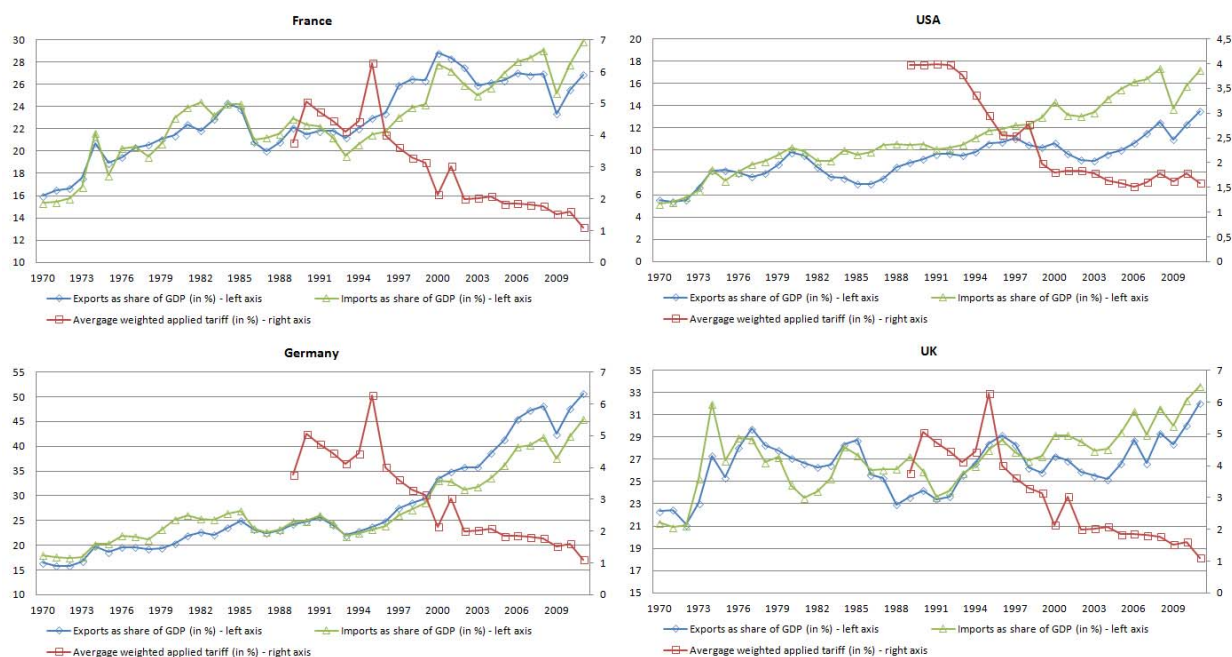
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(6) The patterns shown in Figure 2 do not support any causal interpretation, but simply a suggestive qualitative evidence of the negative relationship between trade and tariff protection. Indeed, there is not unique consensus in the existing literature concerning the role of trade policy in stimulating international trade.

(7) Unfortunately, EUKLEMS does not provide either more recent data or data for France.

(8) DADS data were accessed at CEPII within the context of LIBCOMI project (CASD) – access point ME144.
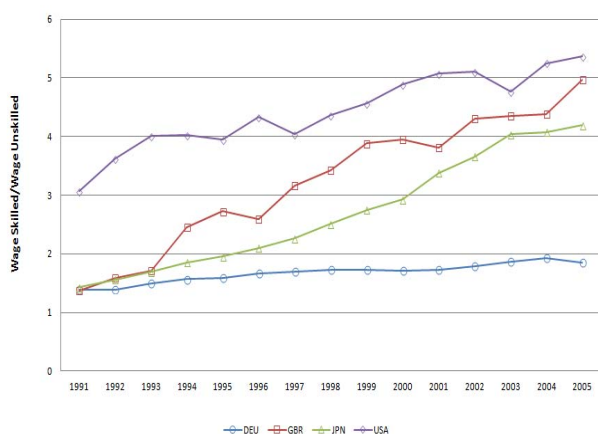
(9) Here we want to focus on the post Euro adoption period until the crisis occurred in 2008.

Figure 1– Exports and Applied tariff in France, USA, UK and Germany
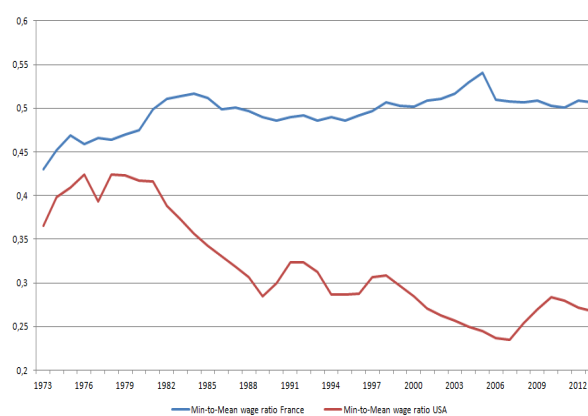

Source: Authors' calculation from World Development Indicators (World Bank).

Figure 2 – Wage Gap over the period 1991-2005

Source: Authors' calculations on EU KLEMS data.

Figure 3 – Wage inequality in France and USA. Historical perspective

Source: OECD stats.

Table 2 – Hourly wage by skill level in France. Comparison 1995-2010

	1995	2010	% Change
Hourly Wage	12,11	14,95	23,45
Skilled	12,90	15,92	23,41
Unskilled	6,85	8,65	26,28
Wage Gap	1,88	1,84	-2,13

Source: Authors' calculations on DADS. Note: unskilled workers are those employed in PCS occupations 67, 68 and 69 (*i.e.* Unskilled Industrial workers, Unskilled manual workers and Farm Workers).

Table 3 – Hourly wage by occupation in France. Comparison 1995-2010. Occupations sorted by hourly wage in 1995

CS Code	Occupation Description	Wage in 1995	Wage in 2010	% Change
23	Head of businesses	31,23	38,43	23,05
37	Top managers and professionals	21,04	25,76	22,43
38	Technical managers and engineers	19,21	24,01	24,99
34	Scientific and educational professionals	18,58	20,97	12,86
35	Creative professional	17,65	21,97	24,48
22	Shopkeepers	14,34	16,68	16,32
21	Small business owners and workers	13,42	15,83	17,96
42	Teachers and related	12,52	14,42	15,18
46	Mid-level managers and professional	12,01	14,43	20,15
48	Foremen, supervisors	11,55	15,19	31,52
47	Technicians	10,93	14,16	29,55
43	Mid-level health professionals	10,4	13,75	32,21
65	Skilled transport and wholesale workers	8,62	11,2	29,93
62	Skilled Industrial workers	8,39	11,68	39,21
54	Office workers	8,36	11,13	33,13
53	Security workers	7,88	12,29	55,96
63	Skilled manual workers	7,57	10,5	38,71
69	Farm Workers	7,57	8,49	12,15
64	Drivers	7,42	9,85	32,75
67	Unskilled Industrial workers	6,85	9,27	35,33
56	Personal services workers	6,29	7,52	19,55
68	Unskilled manual workers	6,12	8,18	33,66

Source: Authors' calculations on DADS.

ratio of wages for workers at the 90th and 50th percentile of wage distribution and the French imports from developing country (both series taken in first difference to eliminate any time trend). Panel b of Figure 4 displays the ratio of wages for workers at the 50th and 10th percentile. The gap between the 90th and the 50th increased over time, particularly since 2002 when the imports from developing countries increased sharply (China joined the WTO in 2001). The wage gap between workers at the 50th and 10th of the distribution, however, decreased over the period. Although these two graphs do not support any causal interpretation, they qualitatively confirm a (limited but significant) loss in economic status for French middle-class workers, contemporaneous with an increasing import penetration from low-wage countries.

Since the 1980s, wage inequalities have risen in most developed countries. In France, however, the increase in wage inequalities has been limited. But, as in other developed nations (e.g., the United States), polarization of the French labor market increased in the recent years. Wages in both low and high skilled occupations increased more than in occupations with an intermediate level of skill intensity.

Fact 3: *Since the 1980s, wage inequalities have risen in most developed countries. In France, however, the increase in wage inequalities has been limited. But, as in other developed nations (e.g., the United States), polarization of the French labor market increased in the recent years. Wages in both low and high*

skilled occupations increased more than in occupations with an intermediate level of skill intensity.

What is observed in France, therefore, is not a simple increase of the wage gap between high skilled and low skilled workers, but a relative loss of economic status for middle-income workers driven their type of occupation. Indeed, while the role of worker characteristics is not negligible in explaining the overall wage inequality (representing the 11.2% and 11.5% of total wage inequality in 1995 and 2010)[10], other factors, such as worker's occupation and the firm/sector to which the worker belongs (*i.e.* the residual wage inequality), are crucial and represent the 88% of total wage inequality in 2010.
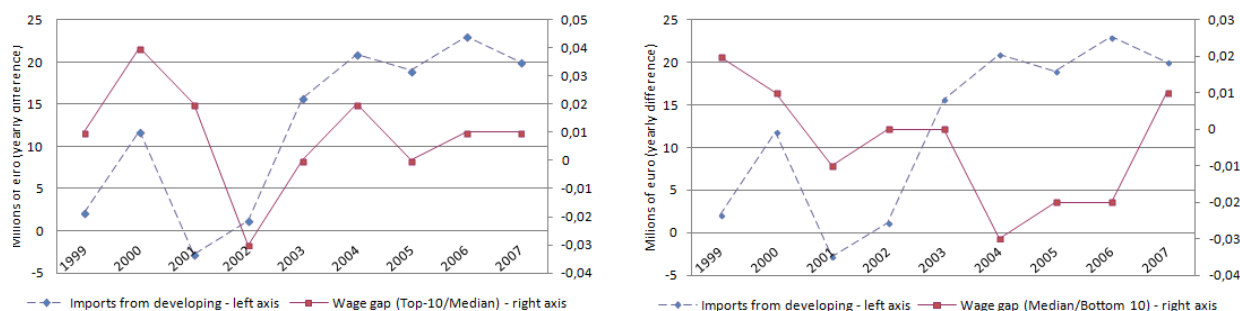
In Figure 5, we explore the determinants of the increasing role of residual wage inequality over time by studying the sources of wage heterogeneity within sectors. Following Helpman *et al.* (2012), we regress, for each sector-year cell, the log hourly wage of workers on firm, occupation fixed effects, and workers' observable characteristics (*e.g.*, age and sex). Then, the variance of wages within each cell can be decomposed into four components: (i) workers' observables, (ii) between firms' component, (iii) within firm component, and (iv) covariance between worker observables and firm component. The first component accounts for the fact that workers within a given cell have different individual characteristics that may affect their individual wage. The within firm component accounts for the wage heterogeneity between workers in the same occupation-firm (independently of their observed characteristics). Therefore, this component captures unobservable worker and job specificities, such as workers' effort, ability, and level of responsibility. Between firms' component reveals the tendency of different firms to pay different wages for the same job, while the covariance term captures the quality of the assortative matching between firms and workers. Figure 5 plots the first three components over the period 1995-2010. It appears that the wage differences across workers in the same industry are mainly driven by heterogeneity within and between firms. Together, these two components account for 92% of total variance on average over the period. Interestingly, we observed a slight increase over time of the between firm component at the expense of the within firm component, meaning that the increase of wage heterogeneity within industry has been increasingly driven by wage inequality between firms.
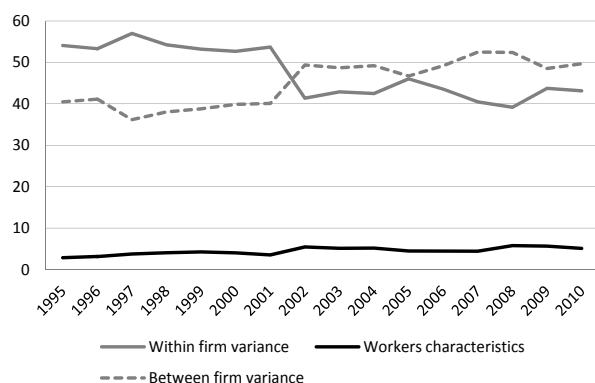
Figure 4– Yearly difference in French imports from developing countries and wage inequality

Source: BACI (CEPII) and authors' calculations on DADS.

Figure 5 – Within industry wage inequality decomposition. Firm vs. worker specific component

Source: Authors' calculations on DADS data.

Fact 4: *The increase of wage dispersion within industries between 1995 and 2010 has been driven mainly by the increase of wage heterogeneity across firms.*

Fact 4 supports the idea that in addition to the worker's characteristics and occupation, the firm in which the worker is employed also plays an important and growing role in determining his/her wage. Indeed, firms are different in many dimensions (productivity, size, skill intensity, import and export participation), so they adjust their labor force heterogeneously after a common demand or competition shock. In other words, the evidence shown in Figure 5 suggests that to understand how trade has affected labor markets, it is not enough to study the possible impact across different education levels, or across industries or occupations; rather, it is also necessary, within the same sector, the same occupation, and the same level of education, to account for the heterogeneous reaction of firms to the globalization shock. Literature on the international trade and labor market approach to this conclusion comes after a long a debate, which is summarized in the next section.

The increase of wage dispersion within industries between 1995 and 2010 has been driven mainly by the increase of wage heterogeneity across firms.

■ **2 Trade and wage inequality: In search for a causal relationship**

Two waves of research based on two classes of theoretical frameworks can summarize the literature on international trade and labor market. Each of them led to very different conclusions as illustrated by the two quotes of Paul Krugman views reported in the first page of this policy brief. In the 1980's and 1990's, the first wave of research built on the factor proportion theory of trade and the Stolper-Samuelson Theorem. The second departs from this standard theoretical framework and shows other channels through which trade may impact the labor markets.

2.1 **In the 1990s empirical studies concluded that the losses of jobs were mostly attributable to technology and not to international trade**

In the early 1990s, an extensive research program focused on assessing the respective contributions of international trade and technological changes on the surge of wage inequalities among skilled and unskilled workers and/or mass unemployment in developed countries associated with fast growing imports from low wage countries. Researchers concluded that job losses were mostly attributable to technology, and not international trade.

Two arguments commonly used to explain the widening skill differentials in the 1980s and 1990s are: (i) skill-biased technological changes and (ii) international trade. Skill-biased technological advances have increased the demand for skilled relative to unskilled workers, pushing up the wage for the former class of workers. Many studies have provided empirical support for this proposition (Bartel and Lichtenberg 1985; Bound and Johnson 1995; Kruger 1993, Berman, Bound and Griliches 1994).

Yet, based on the standard factor proportion theory and the related Stolper-Samuelson theorem, trade liberalization results in increasing wage inequalities in developed countries. In countries

relatively better endowed with skilled labour, trade liberalization will increase exports of goods whose production process is relatively intensive in this factor. Then, in these countries, trade-induced specialization will boost demand for skilled labour, and skilled workers will enjoy higher wages. Inversely, unskilled workers will incur a decrease in their wages. In unskilled labour intensive countries, trade liberalization will promote exports of unskilled labour intensive goods, so unskilled workers gain from freer trade and skilled workers lose, the magnitude of wages inequalities is reduced.

The factor proportion theory of trade, also called the Heckscher–Ohlin-Samuelson or HOS model, is the workhorse for trade economists, and the inspiring theory behind policy dealing with the governance of trade liberalization. This model has been used to explain the reallocation of workers across sectors after trade liberalization, and the resulting effect on wages. It assumes a perfectly competitive labor market with no friction and the free intersectoral movement of workers. Such assumptions imply a null effect of trade on unemployment because workers who lose their job in one sector instantaneously find a new job in the expanding sector; that is, in the sector that gains from trade openness.

Careful analyses reveal several important facts that do not match with this Stolper-Samuelson mechanism. First, the standard factor proportions theory of trade has not proven to be very helpful in explaining the pattern of trade (*e.g.*, Trefler, 1993, 1995; Davis and Weinstein, 2001).

Second, a large body of studies casts doubt on the idea that a Stolper-Samuelson effect has played an important role in the dynamics of wages in developing countries. Although this literature leads to contrasting conclusions, it concludes that wage inequalities have also increased in developing countries:
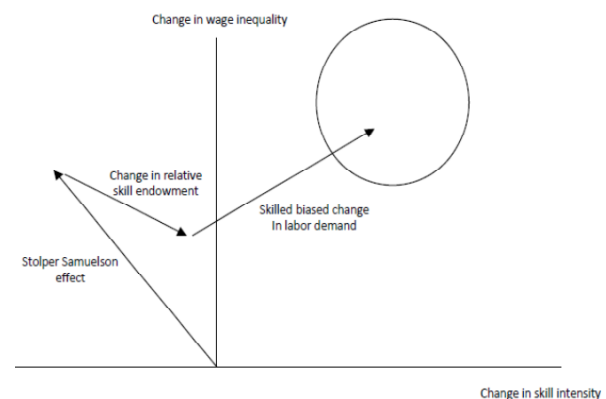
• The gap in the skilled/unskilled wage has widened in many developing countries that reduced their trade protections in the 1990s and 2000s (see Goldberg and Pavcnik 2007 for a survey). In Mexico, for instance, the difference between a typical university-educated worker's pay and that of an unskilled worker rose by 68% between 1987 and 1993 (Cragg and Epelbaum 1996); in Colombia, the return on a university degree (relative to primary education) increased by 16% between 1986 and 1998.

• The contribution to wage inequalities of the rapid trade liberalization during the 1980s and 1990s in these countries is the explicit object of a vast literature. Using Mexican manufacturing plants over the period 1984-1990, Hanson and Harrison (1999) show that 1985 tariff reform dramatically increased the skilled-unskilled wage gap. Further, Goldberg and Pavcnik (2005) tested the labor market effects of Colombia's trade liberalization in the 1980s and 1990. They found that in sectors with larger tariff cuts wages declined relative to the economy-wide average. Since the tariff cuts induced by the 1980s and the 1990s, trade liberalization focused on unskilled intensive sectors (to strengthen Colombia's comparative advantage).[11] The authors conclude, therefore, that Colombian trade liberalization induced

an increase in wage gap. The same conclusion was reached by Attanasio et al. (2004) in the case of Colombia. The widening of the wage gap occurred in many developing countries described above, where presumably unskilled labor is abundant, is inconsistent with the Stolper-Samuelson effect. However, in other developing countries, trade liberalization implied a reduction in the wage gap – as predicted by the standard Stolper and Samuleson effect. Brazil experienced unilateral trade liberalization in 1988-1994, which reduced wage inequality (Gonzaga et al. 2006). Using Indonesian firm-level data in the period 1991-2000, Amiti and Cameron (2012) studied the effect of the 1995 entry of Indonesia into the WTO. While such a trade liberalization episode consistently reduced the output tariff for Indonesian firms (from 22% in 1991 to 8% in 2000), it does not significantly impact the wage skill premium.

An additional subtle, but strong argument explains the relative demand for skilled labor and the related increase of wage inequalities. Everything else being equal, a relative decrease in unskilled wage should lead to an increase of the relative demand for unskilled workers in each industry (and firm). This reaction is a logical response of employers to price changes. It is also a mechanism that allows labor markets clearing along the path of specialization: as the unskilled-intensive production declines, the relative employment of unskilled workers should rise in each firm – including high-skilled intensive industries – to maintain full employment of unskilled workers in the economy. Repeated evidence shows, however, that skill-intensity has raised, not declined (*e.g.*, Berman, Bound and Griliches 1994).

Figure 6 summarizes the mechanisms that might be at work. The vertical axis shows changes in wage inequalities, while the horizontal axis represents changes in skill intensity. The main changes observed in developed countries since the 1980s are represented by the circle in the right quadrant, a simultaneous increase of wage inequalities and skill intensity. As explained above, the Stolper-Samuelson effect alone cannot explain these changes. In a skill-abundant country, trade openness should increase wage inequality, but reduce skill intensity. Of

Figure 6 – Changes in wage inequality and skill intensity: the mechanism

Source: From Cortes and Jean (1994).

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(11) See Figure 3 in Goldberg and Pavcnik (2005).

course, the concomitant increase of college educated workers in those countries (among other factors) might have played on the other direction, by reducing wage inequality and increasing skill intensity. It is theoretically possible that the combination of trade openness with low wage countries, and a change in the relative supply of skilled labor explains the profound changes in labor markets observed in developed countries since the 1980s. However, these two mechanisms are indirect channels. It is more likely that something else must have changed in the labor demand that directly impacted both inequalities and skill intensity by making skilled workers relatively more desirable.

What must be determined, then, is the cause of this change in relative demand for skills. In the 1990s, the main suspect was technological progress. The rapid expansion of automation and computerization profoundly changed industrial production patterns, and made it possible to reduce the importance of repetitive tasks, eliminating many low-skilled jobs. Skilled-bias technological change is a convincing explanation. It matches with the facts listed above, likely to increase simultaneously wage inequalities and skill intensity, involves changes that occur within industries (and within firms), not between industries, and may affect simultaneously and similarly, inequalities in developed and developing countries. All this has led to a fairly-broad consensus within the scientific community that trade has played only a minor role in the progression of inequalities, which are caused predominantly by technological change.

Fact 5: *A fairly- broad consensus in the scientific community in the 1990s suggests that international trade had a minor role in affecting wage inequality in both developing and developed countries.*

2.2. Alternative channels: Offshoring and changes in the competition environment

Suspicions turned back to trade, however. How could such a profound change in the structure of world production have only minor consequences on labor markets? Two new arguments linking globalization to labor markets rapidly emerged: offshoring and changes in the competitive environment. Both arguments can explain changes in the relative demand of skilled labor as technical changes, but they are closely linked to international trade.

2.2.1. Offshoring

The "offshorability" of some stages of production and the contemporaneous reduction in the trade costs led to the rapid boom of international offshoring, who has been recently claimed as a possible determinant of wage inequality. The relocation of unskilled workers' intensive stages of production in developing

> *A fairly-broad consensus in the scientific community in the 1990s suggests that international trade had a minor role in affecting wage inequality in both developing and developed countries.*

countries is expected to increase the relative demand for skilled workers in developed countries, with a consequent increase in the skilled/unskilled wage gap.

Feestra and Hanson (1997, 1999) present a simple and illuminating theoretical argument to explain how offshoring can affect inequalities in all countries. They assume a final good with a long value added chain. Several intermediate goods are needed and each differs in terms of skilled labor intensity. Then, the production of skilled intensive intermediate goods is relatively cheaper in developed countries, while the low-wage countries have the advantage in the production of unskilled intensive inputs. If firms in developed countries can slice up their value added chain, they will outsource the production of the most unskilled intensive inputs in developing countries and keep at home the most skilled intensive. As the cost of outsourcing decreases, the firms tend to outsource larger parts of their value added to the developing countries, and the proportion of inputs produced in the developing country increases. Consequently, the demand for unskilled workers decreases in the developed countries, while the cost gain expands the production of skilled intensive inputs and, therefore, the demand for skilled workers. Wage inequalities increase in the developed countries as does skill intensity within industries and firms. In the developing countries, the newly outsourced inputs are less unskilled intensive compared to the inputs previously produced in the country. Here also the relative demand for skilled workers increases, leading to higher wage inequality.

Grossman and Rossi-Hansberg, (2008) present a more complete theory of offshoring. They assume that the value added chain is made up of a continuum of tasks with different degrees of "offshorability". More routine tasks are more easily moved offshore. Again, trade openness reduces offshoring costs and allows firms in developed countries to offshore a larger fraction of tasks. Again, if offshored tasks are relatively unskilled intensive, this movement will increase wage inequalities.[12] Interestingly, the model does not require strong assumptions about the relationship between the skilled intensity of the tasks and their degree of "offshorability". Therefore, if one assumes that the most difficult tasks to offshore are the ones at the two extremes of the skill intensity spectrum,[13] the population most negatively affected by globalization will be the workers with intermediate levels of

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(12) The authors insist however on the "productivity effect" of trade in tasks that benefit to all workers. As firms increase the number of task that are offshored, their overall production cost decreases in a way that is equivalent to a positive productivity shock for all tasks that remain in the home country. With this "productivity effect", all workers may gain to trade in tasks, which contrasts with the distributional conflict predicted by the standard HOS model.

(13) Some low-skilled industrial jobs, such as housekeeping, surveillance or delivery, cannot be relocated. At the other end of the spectrum, management tasks and those requiring complex and continuous interactions must also be carried out on site. Conversely, some production tasks, which employ medium-skilled workers can be offshored more easily.

education. In this case, the model can explain the polarization of the labor market (Autor *et al.*, 2006).

These theoretical predictions linking offshoring to wage inequality are strongly supported by empirical analyses. Feenstra and Hanson (1997) analyse the consequences of offshoring on US manufacturing firms in Mexico, and find that offshoring increased wage inequality in both the United States and Mexico. In a later paper, Feestra and Hanson (1999) compare the effect of computerization and product offshoring using US data. They find that both computerization and product offshoring increased the demand for skilled labor (non-production workers), with the effect of computerization twice as large as the effect of offshoring. In a more recent paper, Hijzen *et al.* (2005) find that international offshoring had a strong negative impact on the demand for unskilled labour in the United Kingdom. Similarly, Geishecker and Görg (2008) find that offshoring had a strong impact on wages in Germany, where a one percentage point increase in offshoring reduced the wage for workers in the lowest skill categories by up to 1.5%, while it increased wages for high-skilled workers by up to 2.6%. In line with Grossman and Rossi-Hansberg (2008), Oldenski (2012) provides evidence that offshoring is responsible for the polarization of the US workforce over the period 2002-2008. Oldenski also shows that the offshoring-wage relationship depends on the type of occupation being offshored. Workers performing non-routine tasks have increased their wages after offshoring, while increases in offshoring lead to a reduction of wages for workers employed in routine tasks.

These results confirm that international offshoring is an important component in explanations of the changing skill structure of manufacturing industries in many industrialized countries. Importantly globalization in this case produces winners and losers depending on the type of occupation and task covered by the workers, rather than on their observable characteristics. This is in line with the empirical facts shown above.

2.2.2. Change in the competition environment

As countries open to trade, their firms simultaneously face stronger competition on the domestic market and greater export opportunities. These changes induce changes in firms' labor demand and composition effects that increase the relative demand for skills within the firms and within industries.

Composition effects are at the heart of Burstein and Vogel (2016) model. They propose an extension of the Heckscher-Ohlin model by introducing firm heterogeneity. Within industries, firms differ in terms of skill intensity and productivity, the most skilled intensive firms being also the most productive ones. In this framework, trade liberalization reallocates factors of production towards comparative advantage sectors, increasing

> *Recent literature on heterogeneous firms revisited the role of international trade affecting wage inequality in both developing and developed countries through its impact on the labor demand of high- and low- productive firms.*

the wage gap in countries having comparative advantage in skill-intensive sectors, which is consistent with a standard factor content of trade model. But the theoretical model proposed by Burstein and Vogel (2016) also suggests that trade liberalization reallocates factor of production towards more skill intensive firms in *all* sectors. This implies a generalized wage gap also in countries with comparative advantage in unskilled intensive sectors, and reconciles the empirical evidence surveyed above that is in contrast with standard Stolper-Samuelson predictions. Another line of research points to the endogenous evolution of firms' relative demand for skill labor. Again, the idea is simple. Trade openness leads firms to invest to resist foreign competition and increase their chances in global markets. These investments may be not Hicks-neutral, but biased in favor of skill labor.[14]

Departing from these frameworks with perfect labor markets and homogenous workers, the model proposed by Helpman *et al.* (2010) introduces search and matching frictions in the labor market to study the trade-employment nexus. They assume that firms need to screen workers so as to discover their true ability. More productive firms invest more in the screening of their workforce, and therefore hire higher ability workers on average than less productive firms. They also pay higher wages. This model also reveals a composition effect: as the economy opens to trade, highly productive firms expand relative to less productive firms. This divergence between firms' outcomes tends to increase wage inequality between workers employed in the most performing firms and those employed in the least productive ones. Additionally, the expansion of revenue for exporting firms creates an incentive for those firms to further enhance their worker screening and exclude low-ability workers. Thus, trade openness, again, increases wage inequality; however, further trade liberalization has a non-monotonic impact on wage inequalities. Interestingly, wage inequality does not occur between skilled and unskilled workers, but within each category of workers. Trade fosters the wage difference between workers with high and low (hardly observable) ability, and/or between those who have the chance to be employed in a highly productive firm and those, less lucky, who work for less performing employers (see also Amiti and Davis 2011).

Fact 6: *Recent literature on heterogeneous firms revisited the role of international trade affecting wage inequality in both developing and developed countries through its impact on the labor demand of high- and low- productive firms.*

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(14) Theonig and Verdier (2003) present a model of endogenous defensive skill-biased innovation driven by globalization. Veroogen (2008) develops a comparable argument, but based on endogenous quality choices.

▌ 3. Some recent evidence on the impact of globalization on French labor markets

In this section, we present some of the evidence based on French matched employer-employee data with a focus on the evidence provided by CEPII working papers. We summarize here the effects of globalization on wage dynamics by looking at how firms adjusted their employment and wage levels depending on their exposure to foreign competition and performance on global markets. In the following discussion, we present recent studies that compare employment and wages in firms based on whether they are exposed to foreign competition, exporting or importing, and belong to a multinational company.

France is a good laboratory for analyzing the changes in the wage inequality and workforce composition of firms facing globalization forces. Although the French labor market has a rigid wage structure so that any shock risks to be channeled by adjustment in the employment, we have seen above that the dispersion of wages has indeed changed in recent decades. As shown in Section 2, what determines the evolution of wages among workers is not only their observed characteristics and occupation, but the type of firms for which they work. Therefore, a careful analysis of the social consequences of globalization requires that we study the heterogeneity of firms' responses to globalization. Faced with globalization, the line that separates workers who win from those who lose also distinguishes between winning and losing firms.

3.1   Technological change, trade and Job polarization in France

The polarization of the labor market in France has recently been analyzed using employer-employee match data provided by the INSEE. Tackling the issue of job polarization at the firm level is fundamental for a proper understanding of the forces driving the polarization of the French labor market. Indeed, technological change and foreign demand shocks affect labor markets essentially through firms' specific decisions on workforce composition. Malgouyres (2016) finds that Chinese import competition implied that the job polarization in the manufacturing sectors applied to employment growth, but not wage growth. In a recent CEPII working paper, Harrigan, Reshef and Toubal (2015) analyze job polarization of the French labor market over the period 1994-2007, to assess the consequences of technological change and globalization at the firm level, in the same empirical analysis. In the first part of the paper, the authors clearly show the job polarization of the French labor market by finding increases (over time) in the employment of high- and low-wage occupations, and a decrease in the employment of middle-wage occupations. This is graphically summarized in Figure 7 below.

Harrigan *et al.* (2015) dig further into overall job polarization by testing whether it originated from within-firm job composition or by firm size dynamics. Indeed, technological change and foreign demand shocks might change the within-firm composition of

Note: Vertical axis is change in the occupation specific aggregate hours worked in France over the period 1994 to 2007. The horizontal axis is the rank of occupations based on their average wage in 2002. The size of circles depends on the occupation's share of hours in 2002.
Source: Harrigan *et al.* (2015).

workers, but also might imply variations in the size of the firm, as well as on the entry/exit dynamics of firms. The authors find that changes in within-firm job composition explain the great majority of the overall dip in the employment of high skilled industrial workers, but do not explain the dip in the employment of middle-wage office workers, which are entirely explained by firms' size dynamics. The analysis then assesses the respective contribution of technology change and exposure to international trade to these evolutions. While technological change has an important role in shaping job polarization in non-manufacturing sectors, trade plays an important role in affecting job polarization in manufacturing sectors. Importantly, the authors find that importing firms experienced a strong growth of skilled industrial and manual workers, with slower growth in unskilled industrial workers. Importing implies a strong skill upgrading process in the manufacturing firm: imported intermediate inputs appear to substitute for low-skill workers, but complement for high-skill workers in manufacturing firms. This result is consistent with a simple offshoring story. Exporting was found to have a role in the polarization of tasks across French firms. Top managers, skilled industrial and manual workers benefited from positive shocks in the foreign markets, which strongly contributed to the job polarization pattern in the manufacturing sector. The paper's bottom line is therefore nuanced in suggesting that greater exposure to global markets induced profound but subtle changes in firm-level employment structure. It seems clear that trade has important consequences on the labor market and changes the structure of employment and wages. However, the determination of who gained and who lost is complex, and it is hard to say how trade impacted wages inequalities.

3.2   Wage and employment in exporting firms

As highlighted in Section 1, the firm-specific component of French wage inequality is constantly increasing over time, while intra-firm wage dispersion is declining. Bombardini, Tito and Orefice (2015) explain these features by using French matched employer-employee data in the period 1995-2007. Their study focuses on

a specific channel through which trade might affect how firms set their wages. When firms and workers are complementary in production, the allocation of the right worker to the right job/task maximizes the performances of the firm. In a world without frictions in the labor market (i.e. searching costs), firms will always select the ideal worker and all workers in the same firms will have similar "ability" and thus similar wage. However, searching for the optimal employer-employee match is costly (as in Helpman *et al.* 2012), and firms accept a given degree of deviation from the ideal worker to avoid further searching costs. Therefore, the presence of frictions in the labor market represents itself a source of within-firm wage inequality since workers with different abilities will have different wages (i.e. within-firm wage dispersion).

Bombardini *et al.*'s (2015) paper explores whether the possibility of serving foreign markets changes the degree of deviation from the ideal worker, and thus the within-firm component of wage inequality. The possibility of serving the foreign market forces the exporting firms to find a better employer-employee match than non-exporting firms. When stakes are high, matching with the right worker becomes particularly important because deviations from the ideal match quickly reduce the value of the relationship. In a first set of results, authors show that exporting firms hire on average workers with higher ability (as revealed by lifetime wage) and have a significantly less dispersed set of workers' types (*i.e.* lower within-firm wage inequality). An exporting firm displays an average worker ability that is 3% standard deviations higher than non-exporting firms. Moreover, an exporting firm features worker variability that is 4.9% standard deviations lower than non-exporting firms. These results are coherent with other empirical findings by Davidson *et al.* (2014) on worker-firm matched Swedish data. Davidson *et al.* (2014) find that globalization improves the efficiency of the matching process in the Swedish labor market by showing that export-oriented sectors display a higher correlation between firm and worker types.

In a second set of estimations, Bombardini *et al.* (2015) dig more into the role of trade on firm-worker match by showing the effect of an increase in market access for French firms on their set of hired workers: exporters seem to choose a less dispersed workforce when having better access to foreign markets.

These results have interesting implications for the overall wage inequality in France. By hiring less dispersed sets of workers, exporting firms have lower within-firm wage inequality, but pay higher wages on average. In this respect, trade openness contributes to reinforce the inequality of labor income between workers employed in firms that benefit from globalization and those employed in less productive firms that just suffer from increasing foreign competition.

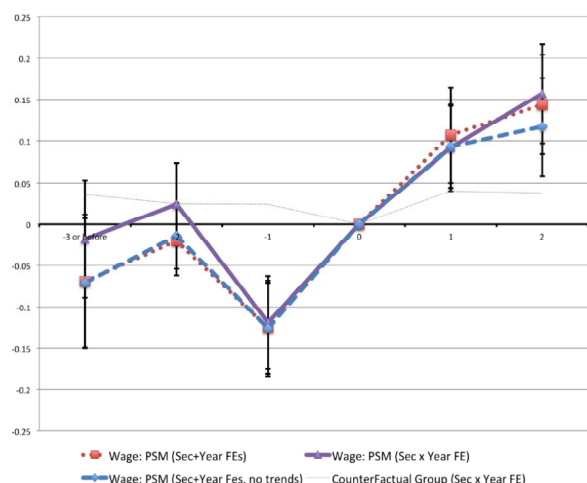## 3.3 Wage and employment in multinational firms

The study presented above shows the extent to which the heterogeneity of firms' capacities to succeed in world influences the wages paid to its employees. Thus, being employed by a company that has taken advantage of globalization determines whether a worker is a winner of globalization. Multinational firms are the best representatives of these successful firms. On average, they are larger, more productive, and more integrated into global markets than domestic firms. As a result, they can better select their employees, and share larger profits. The internationalization of firms is therefore a channel through which globalization may increase wage inequalities between workers with comparable characteristics, but employed in different firms.

It is well-established that multinational firms pay higher wages on average (Hijzen *et al.* 2013; Huttunen 2007). The literature provides many explanations for the multinational wage premium. Upon acquisition, a foreign multinational can substitute its technology with that of the acquired firm, boosting productivity and thus the wages of the acquired firm, after paying the cost to integrate the new technology. Arnold and Javorcik (2009) and Guadalupe *et al.* (2012) show evidence that multinational firms invest substantially to improve the production capacities of target firms. In addition to the technology adoption channel, there is also a potential cost synergy in producing varieties in the parent and acquired firms so that the merged firm produces additional units of output given their productivities. Finally, the selection of workers might play an important role in shaping the productivity of acquired firm: multinational firms are expected to attract more talented workers.

In a detailed analysis that controls for many confounding factors, Orefice *et al.* (2015), in a recent CEPII working paper, assess the multinational firm wage premium in France. Using detailed administrative data linking French workers and firms over the period 2002-2007, this study shows that globalization, through foreign mergers and acquisitions of French firms, has a strong dynamic effect on the hourly wage of French workers. They document a distinct U-shape pattern in worker-lever wage surrounding the year the employer is foreign acquired. As shown in Figure 8 below, Orefice *et al.* (2015) find a dip in earnings (hourly wage) in the years before domestic firms switch to become foreign acquired (Multi-National Enterprise, MNE). Noticeably, worker-level wages decline by almost 10% the year before the foreign acquisition (see Table 4 in Orefice *et al.*, 2015). In the same period, workers employed by similar non-acquired firms do not experience any drop in hourly wage, suggesting a negative wage gap between workers in acquired versus non-acquired firms. However, after acquisition the hourly wage of workers begins to rise. The year after the foreign acquisition, hourly wage is 10% higher than observed the year of acquisition and much higher that the wage observed in the few years preceding the acquisition. Also in this case, workers employed in similar non-acquired firms do not experience changes in their wage, suggesting a positive wage gap between workers in acquired vs. non-acquired firms. These trends in firm-level wages is consistent with the evidence in Blonigen *et al.* (2014), namely that French foreign acquired firms experience a negative productivity shock before the year of their acquisition. Interestingly, Orefice *et al.* (2015) also show that the increase in the hourly wage persists

Source: Orefice *et al.* (2015). Note: point estimates correspond to results reported in Orefice *et al.* (2015) in Table 4. The plotted estimates for the counterfactual group in grey are obtained by estimating the baseline specification of Table 4 using only observations from similar non-acquired firms. The time of acquisition has been set at zero.

in the second year after the foreign acquisition. Two years after the acquisition, the hourly wage is 12% higher than observed the year of acquisition, suggesting the permanent nature of such positive shock. By comparing the wage shock before and after the foreign acquisition, the authors conclude that post-acquisition wages gain more than compensate the wage drop in the pre-acquisition period.

▌ 4. Concluding remarks and policy recommendations

Trade integration is likely to increase well-being at the country-level. Globalization produces winners and losers, however, which makes the realization of trade integration policies difficult for two reasons: (i) because the labor market adjustments to globalization might be larger than the global gain; and, (ii) because making globalization socially acceptable necessitates strong policies aimed at redistributing the gains of globalization to those hurt by foreign competition, and to help them to find a new job in a continuously evolving labor market.

This is also a serious challenge to those undertaking economic analysis. Point (i) above means that we must assess clearly the cost of globalization incurred by workers to better evaluate trade gains. Point (ii) means that we need to clearly identify the losers of globalization to propose appropriate social policies.

Regarding point (ii), economists and politicians armed with standard trade models will have straightforward simple insights. Workers employed in import-competing industries and, more generally, those who have characteristics (*e.g.*, education levels) used intensively in import-competing industries, are likely to suffer from globalization. Inversely, workers in exporting industries, and those with characteristics that are intensively needed in these industries will gain. In this case, winners and

losers from globalization could be easily identified based on observable workers' characteristics (i.e. education), and policy makers could set policies aimed at improving such workers' characteristic in their respective countries and facilitate the reallocation of workers across industries. The accurate response to the social impact of globalization should be a mix of education, and distributive and regional policies. If the losers of globalization in a developed country like France are mostly the less educated workers employed in import competing industries, government should first invest in education to increase the relative supply of skilled labor. Since the most impacted by trade openness are the poorest, a more redistributive fiscal policy would allow to efficiently redistribute the trade gains among workers. Finally, if import competing industries are clustered in some specific regions, public support to these territories should also be considered.

Unfortunately, reality is much more complex. There are undoubtedly winners and losers of globalization, but labor market shocks caused by trade openness are diffuse, and it is difficult to group those who suffer into well-identified categories. Recent CEPII research outputs, based on detailed French firm and worker-level data, confirm that identifying who lost and who gained with globalization is a very difficult task.

Therefore, proposing accurate policies to mitigate the social consequences of globalization is a great challenge for policy makers. Of course, ambitious and well-conducted education policies are needed but they should not simply be aimed at increasing the average level of education. With global trade, firms also need production and manual workers, and a workforce capable of adapting, over the course of life, to rapid economic changes. An ambitious redistribution policy is also needed to contribute to reducing inequality and fighting poverty. But providing support to the poorest does not necessarily respond to the problem of the drop in social status of the middle classes caused by globalization.

Recent advances in empirical analyses of the social impacts of globalization call for a rethinking of public policies. We must find ways to facilitate the retraining of workers who are not fortunate enough to have a job in a winning occupation or in a winning firm. The geographical and professional mobility of workers to improve employer-employee matching must be facilitated. Evolutions of the tax and social protection systems should aim at enabling unfortunate workers to better cope with temporary shocks generated by a more competitive and changing global environment. Since the fate of workers and enterprises seems to be intimately linked, we must also conduct investment and competitiveness policies to improve firms' performance on the global market.

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