Trade liberalization and wages: Evidence from a quasi-natural experiment*

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Abstract

We study the impact of a textiles international trade liberalization agreement on the wages of the Portuguese workers in that sector. This agreement was implement over a four-phase period, starting in 1995 and ending in 2005. We take advantage of employer-employeed administrative data with a comprehensive coverage of the Portuguese economy to estimate causal effects with a difference-in-differences setup. Our results suggest that the Portuguese textile and clothing industry adjusted wages downwards, on average, the treatment effect it lies between -6% and -9% in the 1995-2009 period. This impact comes about progressively. Our estimates are robust particularly in the first two phases of liberalization, 1995 to 2000. A more careful interpretation is required for the two final periods, 2002-2004 and 2005-2009; although all estimates show losses, there is more uncertainty.

Keywords: Trade liberalization; Employment and wages; Quasi-experiment

*Opinions expressed herein do not necessarily reflect the views of the *Banco de Portugal*. Any errors are of our responsibility.

1 Introduction

There is a huge literature on the effects of free international trade on goods prices and labor and capital remunerations. The start of the debate dates to the 19th century, when a number of classical economists – including Smith and Ricardo – wrote about the topic. The issue has increasingly captured the interest of authors and has not abated with the prominence of globalization in today's economic and political debates.

We look at the issue of trade liberalization in the context of the 1993 international Agreement on Textiles and Clothing (ATC). During a transition period, quotas put in place by the Multi Fibre Agreement of 1973 were phased out. In particular, an increasing percentage of imports of textiles and clothing was liberalized: 16% starting in January 1995; an additional 17% in January 1998; 18% more in January 2002; and the remaining 49% in January 2005.

The Portuguese textile and clothing industry had an important role in the country's employment and exports. In 1991, employment in the textiles and clothing sector represented 15% of total private sector salaried employment. This share decreased steadily, reaching only 4.7% in 2009. In 1991, clothing products exports peaked at 17% of total manufacturing exports. Since then, its importance has declined to only 4% in 2006. The decline in textile exports started earlier, from 1982 to 2006 the exporting share dropped 11 percentage points (19% to 8%).

This decline is a clear sign that the industry went through an adjustment process. In this paper, we focus on wage adjustments. Did the competition from low labor cost countries affect negatively the wages of textile and clothing workers? We answer this question by performing a difference-in-differences estimation. If our identification strategy is credible, we will be able to provide causal inference on the impact of trade liberalization on the wages of Portuguese workers. Because there were other sectors of activity that were not affected by this trade liberalization, we will use them as control group. In particular, we show that the paper and metal industry share a common wage trend with the treated sector during the before period, 1991 to 1994. Therefore, we use these sectors as counterfactuals for the evolution of wages in the textile and clothing sector in the absence of the 1993 agreement.

Our baseline evidence is based on a difference-in-differences model estimated with firm fixed effects and accounting for clustering at the same firm level. It shows that from 1995 to 2009, Portuguese textile and clothing industry adjusted wages downwards, on average, -5.9%

if the paper sector is used as a counterfactual or 9.0%, if the counterfactual is the metal sector. This impact occurred progressively over the four periods of implementation; treatment wages started by losing 4.0% to the counterfactual paper sector until the total loss reached 7.9% in the final period, 2005-2009. Similar values for the metal sector as counterfactual are -7.8% and -11.9%.

We also study the possibility of anticipation effects because market participants in Portugal and abroad knew the rules that would come into play in 1995. To account for it, we excluded from our sample 1994 observations. In this case, point estimates reach 6.5% and 10.5%, respectively, when paper and metal industries act as counterfactual.

We were able to perform a falsification exercise that corroborates our identification strategy. When the control sectors (paper and metal) are compared with a fourth sector, namely the chemical, neither has a significant wage differences in the four periods of this pseudo trade liberalization. We also performed a sensitiveness analysis, which showed that the estimates for the first two liberalization periods (up to 2000) are tightly estimated. However, the estimates for the final two periods are subject to higher uncertainty; estimates based on worker or worker and firm fixed effects yield larger estimates. This lower precision is expected as we are moving further away from 1993 a lot of factors are changing in these sectors and in the overall economy. Nonetheless, all estimator yield point estimates that indicate that the textile and clothing sector did worse with the trade liberalization (relatively to the counterfactuals).

Overall, the evidence supports the hypothesis that international competition affected negatively the wages of the workers in the textile and clothing industry with relative losses never inferior to 6%.

2 Literature

The effects of international trade on national production factors has captured the attention of economists ever since at least the writings of Adam Smith and David Ricardo. Stolper and Samuelson (1941) published a very influential article in the middle of the World War II, suggesting that free trade affects the distribution of income between wages and profits. In a capital-abundant developed country, free international trade has the effect of i) reducing the real reward for labour; and ii) increasing the real return to capital. However, the harm that free trade inflicts to one factor of production (labour) is less that the gain for the other

(capital). This means that it is possible to help the suffering factor (labour) through a redistributive policy, making both factors (labour and capital) better off as a result of trade. In a less developed labour-abundant country, the opposite takes place, and redistribution in the opposite direction (from labour to capital) may be needed.

On the same lines, Samuelson (1948) argued that not only free factor mobility but also free trade affects factor prices, thus extending the earlier Heckscher-Ohlin theorem according to which only free factor movements could fully equalize factor prices. Similarly, Lerner (1952) maintained that free international trade implies an equalization of factor prices.

A related topic is the effect of trade liberalization on wage inequality between skilled and unskilled workers. Following the Stolper-Samuelson argument, in an economy which only uses labour as a production factor, and skilled workers are abundant, trade reduces the relative wage of unskilled workers, being a source of wage inequality.

The literature on the link between international trade and wage inequality has accumulated an enormous amount of works. It is almost impossible to summarize all of them in a comprehensive way. However, an excellent survey of the 1980s and early-1990s studies has been authored by Freeman (1995). In particular, Freeman focused on the evidence for the United States, stressing the existence of two groups of studies: the so-called "factor content" studies and the "price effect" studies.

Following Slaughter (1999), the basic idea of factor content studies is that importing goods with high content of unskilled labour reduces the "effective" relative labour supply of skilled labour in the American economy, increasing the skilled wage premium (immigration of unskilled labour force has a similar effect). The core intuition of price effect studies is that the relative demand for skilled labour is not downward-sloping everywhere, but characterized by infinitely-elastic segments (since there are many sectors in an economy, not just one). Thus, a shift in the effective relative labour supply of skilled labour caused by trade may not affect wage inequality.

In general, factor content studies estimate that trade affects wage inequality, though the magnitude of the impact is controversial (Wood 1995, Borjas, Freeman and Katz 1997) depending on the slope of the relative demand for skilled labour. In contrast, price effect studies do not usually report any significant effect (see Slaughter, 2000, for a survey).

Taken together, the empirical studies of the 1980s and of the early 1990s do not attribute

to international trade a major role in determining wage inequality (Freeman, 1995). This stylized fact inspired several minds, including that of Krugman (1995) who developed a clever model to explain the evidence.

On the same lines, in a later contribution, Krugman (2000) stressed that the link between international trade and wages is characterized by non-linearities: the actual effect of trade on wage inequality depends on volumes. If volumes are small, then the impact of trade is likely to be small. In particular, he argued that the volumes of trade registered until the middle of the 1990s were too small to have significantly contributed to shape the evolution of wage inequality in the United States. Technology changes seemed to have played a major role (a shift upward in the relative demand of skilled labour, in the model proposed by Slaughter (1999)).

Yet, as a matter of fact, the U.S. economy recorded a surge in imports from very low-wage countries in the first years of the new century. In 2006, trade volumes with low-wage countries were much bigger than ten years before. This suggested that the earlier view on the link between trade and wages had to be "reconsidered". Indeed, in an update of his 1995 article in the *Brookings Papers on Economic Activity*, Krugman (2008) proposed a model to explain how free international trade could significantly affect the structure of American wages, being harmful for unskilled workers.

Summing up, a rapid sketch of the literature suggests that the effect of trade liberalization on wages is ultimately an empirical question. The goal of the applied researcher should be that of providing clean causal estimates. This paper makes a step in this direction.

Unlike most of earlier studies (e.g. Learner, 1998; Feenstra and Hanson, 1999; Edwards and Lawrence, 2010; Stone and Cavazo- Cepeda, 2011), our paper analyzes the impact of international trade on wages in a quasi-experimental setting. A notable exception is a recent article by Brülhart, Carrère and Trionfetti (2012) who studied how regional employment and nominal wages in Austria responded to trade liberalization, exploiting the policy change due to the opening of Central-Eastern European markets, after the fall of the Iron Curtain in 1990.

3 The Agreement on Textiles and Clothing of December 1993

Textile and clothing industries are closely related both in terms of technology and trade since textiles are the major inputs for clothing products. These industries are labour-intensive and mostly populated by small and medium-sized firms. The firms generally produce low value-added goods, though some high value-added segments, such as fashion, co-exist with the others (Amador and Opromolla 2009).

Textiles and clothing are important industries in the Portuguese manufacturing. As stressed by Amador and Opromolla (2009), these two sectors - taken together - represented 2 per cent of gross value added, 4.3 per cent of employment, and 11.8 per cent of total manufacturing exports in 2006. However, these numbers were roughly twice bigger at the beginning of the 1990s.

Over the last twenty years, textile and clothing industries have experienced some structural shocks which significantly impacted their characteristics and relative size within the Portuguese economy. One important shock - which affected these industries not only in Portugal but worldwide - was the progressive elimination of the quantitative restrictions to imports of textile and clothing products, enforced by the Agreement on Textiles and Clothing (ATC) of December 1993.

Portugal has a long record of participation in free trade, which dates back to the accession of the country to the European Free Trade Association (EFTA) in 1960. The country joined the European Economic Community (EEC) in 1986 and the European Single Market (ESM) in 1993.

Before the ATC signature, the EEC market was protected by the import quotas imposed under the Multi Fibre Agreement (MFA) of December 1973. The ATC was inspired by a liberalization principle. It designed a transition period during which a progressive phase-out on quotas had to be implemented. Four key dates and shares were agreed (Spinanger, 1999): 16 per cent of 1990 imports had to be liberalized starting from January 1995; 17 per cent since January 1998; 18 per cent since January 2002; and the remaining 49 per cent since January 2005.

In addition, in December 2001, international trade was affected by a new major shock: China joined the World Trade Organization (WTO). This event further increased the competitive pressure on Portuguese textiles and clothing.

As stressed by Cabral and Esteves (2006), the share of developing countries in world trade grew steadily in the 1990s and early 2000s, reflecting mainly the strong expansion of trade flows from Asia and Central-Eastern European countries. The share increased from around 28% in 1991 to roughly 44% in 2005.

The weight of clothing products in Portuguese manufactured exports started to decline since around 1991, a year when it peaked to almost 17%. The decline was steady, and the share reached a level of around 4% in 2006. In contrast, the share of textile products started to decline well before 1991. The industry experienced a continuous decline since 1982, from roughly 19% to 8% in 2006 (Amador and Opromolla 2009).

Between 2000 e 2005, Portugal lost around 2 percentage points of its market share in France, Spain and the UK - the major buyers of Portuguese clothing and textile products - while China increased its market share in those markets by 8 to 10 percentage points (Cabral and Esteves 2006).

In addition, textile, clothing and footwear products represented the highest share of Portuguese manufactured imports from low-cost countries, amounting to an average of 13.8% between 1998 and 2006, with a peak of 16.1% in 2006 (Cardoso and Esteves 2008). In a context of high competition even in the domestic market, the industries of textile, clothing and footwear products suffered the highest decline in import prices, between 1998 and 2006, in the whole Portuguese manufacturing, amounting to -0.5 percentage points (Cardoso and Esteves 2008).

The absolute number of firms and establishments in the clothing industry declined between 2001 and 2006 by roughly 1000 units. In the textile industry, the number of firms and establishments stopped growing since around 2000, after having increased at slow rates during the 1990s (Amador and Opromolla 2009).

Overall, the phase-out of the MFA, when it started in 1995, hit two industries which were already experiencing a downsizing. The decline was already apparent in the aggregate data. The share of gross value added was declining in both the textile industry and the clothing industry, since 1986 and 1993 respectively. Similar patterns have been documented for the share of employees (Amador and Opromolla 2009). Since 1995 onwards, the dynamics of these industries may have been affected by the increased international competition due to the ATC. The next sections focus on the wage dynamics.

4 Data

We use an annual administrative employer-employee dataset, *Quadros de Pessoal*, which reports, with respect to October of each year, all private sector employment in Portugal. Our analysis starts in 1991, four years prior to the implementation of the trade agreement, and ends in 2009, avoiding the onset of the financial crisis. *Quadros de Pessoal* have very detailed firm, worker and match data and have been extensively used in the microeconomic analysis in Portugal (e.g. Cabral and Mata 2003, Martins, Solon and Thomas 2012). Unfortunately, the data are not available for 2001.

All observations were checked for longitudinal consistency of time invariant information and have valid information for the variables included in the estimation.

5 Results: Average treatment effect on the treated

The debate on the impact of trade liberalization will be ultimately settled by the empirical evidence. We estimate models that analyze how the gradual openness of the textile and clothing sector to international trade impacted wages.

5.1 Methodology: Difference-in-differences

Unconditional estimator

To identify the causal treatment effect, we use a standard difference-in-differences model (Meyer 1995). Let Y_{ijt}^{Treat} be the outcome of interest for individual i, in firm j, at time t in state $Treat$, where $Treat = 1$ if subjected to the treatment, and 0 otherwise. Due to the fact that, at time t, the match ij cannot be in both states, the individual treatment effect, $Y_{ijt}^{1} - Y_{ijt}^{0}$ cannot be computed. However, with an appropriate control group, the difference-in-differences overcomes this limitation by comparing the average behavior before and after the trade agreement for the treatment group with the before and after outcomes for the control group.

The identification requires that the average outcomes for treated and controls would have followed parallel paths over time in the absence of the treatment; this assumption is known

as the common trend:

$$E[Y^0_{ijt} - Y^0_{ijt'} \mid Treat = 1] = E[Y^0_{ijt} - Y^0_{ijt'} \mid Treat = 0], \tag{1}$$

where t' is a time period before the new agreement. In the empirical estimation, we will pay particular attention to this condition to choose an adequate control group.

If the assumption expressed in equation (1) holds, the average treatment effect on the treated can be estimated by the sample analogues of

$$\{E[Y_{ijt} \mid Treat = 1] - E[Y_{ijt} \mid Treat = 0]\} - \left\{E[Y_{ijt'} \mid Treat = 1] - E[Y_{ijt'} \mid Treat = 0]\right\}, \tag{2}$$

where Y_{ijt} is the observed outcome at time t. If treated and control groups are not balanced in covariates, which may occur in quasi-experimental settings, the difference-in-differences setup can be extended to accommodate a set of covariates, and the average impact estimated with a linear regression model (Angrist and Pischke 2009).

Conditional estimator

In our empirical setting, we estimate the following conditional difference-in-differences model:

$$\log(Y_{ijt}) = \beta_1 Treat_{ijt} + \beta_2 After_{ijt} + \beta_3 After_{ijt} \times Treat_{ijt} + X_{ijt}\Psi + \varepsilon_{ijt} \tag{3}$$

where Y_{ijt} is the monthly or hourly wage of worker i in firm j at time t; $After_{ijt}$ is a dummy variable taking value one for the period after the reform, 1995 to 2009, and zero for the period before the reform, 1991 to 1994; $Treat_{ijt}$ is defined for each period t and equals 1 for the *treatment group* (matches in textile firms) and 0 for the *control group* (matches in firms in sector that fulfill the common trend assumption; more on this below). Consequently, the coefficient on the interaction term, $After_{ijt} \times Treat_{ijt}$, identifies the causal average treatment effect on the treated due to the policy change.

There are elements of heterogeneity across the firms and individuals that we control for with X_{ijt}, which contains the following set characteristics: (i) female indicator; (ii) quadratic polynomial in (log) age; (iii) quadratic polynomial in (log) tenure months; (iv) educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree (4 or less years of schooling is the reference group); (v) foreign ownership majority indicator;

(vi) log firm size measured by the number of workers; (vii) quadratic polynomial in (log) firm age; (viii) and year fixed-effects, in which case the variable $After_{ijt}$ drops from the regression.

Despite the quasi-experimental setting, there are econometric issues that may hinder the identification. To address standard concerns of time-invariant omitted variables and endogeneity of explanatory variables, we estimate equation (3) with panel data models, namely, the fixed effects estimator (Lee 2005). In the baseline estimation, we account for firm time-invariant effects and correct standard errors for firm clustering. As a statistical robustness, we will also account for worker fixed effects and simultaneously for worker and firm fixed effects. The latter fixed effects estimator assumes that the error term $\varepsilon_{ijt} = \alpha_i + \lambda_j + u_{ijt}$, where the worker unobserved component, α_i, and the firm unobserved component, λ_j, are non-orthogonal to X_{ijt} and u_{ijt} is the idiosyncratic error.

5.2 Common trend

As discussed, a key identifying assumption in the difference-in-differences estimator is the existence of a common trend between treatment and control units in the period before the reform. The existence of a common trend in (log-)wages prior to the reform can be formally tested with the following specification:

$$y_{ijt} = \theta_1 Treat_{ijt} + \theta_2 Time_t + \theta_3 Treat_{ijt} Time_t + X_{ijt}\Phi + \varepsilon_{ijt}, \tag{4}$$

where $Time_t$ is a linear time trend and the remaining variables are defined as in equation (3). The coefficient θ_3 of the interaction term, $Treat_{ijt} \times Time_t$, identifies the change in the difference of log-wages between treatment and control matches over time in the before period, . If the common trend assumption holds, then θ_3 should be statistically non-significant.

While the treatment group is well-defined, namely pairs worker-firm (matches) in the textile sector, the control group may take different forms. The broader definition would include all matches but those in the textile sector. However, we opt for a more careful choice of the control group, which turns out also to be a more parsimonious definition. We select the control group by estimating the common trend equation for different sectors (e.g. leather/shoes, paper, food and lodging, etc) and elect as control groups those sectors that fulfill the common trend assumption.

In our data and in the 1991-1994 period, the paper and metal sectors have a common trend

in (log) wages with the textile sector. The term paper sector refers to both the pulp and paper industry, but also to industries such as printing and book edition. The metal sector comprises industries that produce transportation material and technical and scientific equipment.[1]

Table 1 reports the point estimates and corresponding p-values of θ_3. When the paper or the metal industry are the control groups, the common trend assumption holds for all firms and for those with more than 50 workers (columns (1) to (4)). When we put together as a control group matches in the paper and metal sectors, the common trend assumption holds, for a significance level of 1%, when all firms are considered (column (5)), but holds at standard significance levels for larger firms (column (6)).

This set of results led us to prefer slightly the estimations based on the paper industry acting as the control group. Nonetheless, we will report results for both sectors throughout the paper to assess the sensitivity of the results to the choice of the control group.

5.3 Average treatment effect on the treated

The trade agreement was implemented over a long period, 1995-2009, which raises issues with the identification strategy, namely, the choice of the before period. Should it be kept on the 1991-1994 period or should it be sort of a rolling window that moves as the next stage comes into place? Because there is no definite answer, we will consider different options in the definition of the before and after periods to estimate equation (3).

Lets consider first the paper sector as the control group, without imposition any restrictions on firm size. We start by considering 1991-1994 as the before period and the entire period of implementation of the trade agreement, 1995-2009, as the after period. Over this long period, the average treatment effect on the monthly wages of the treated stands at -5.9% (column (1) of Table 2). In other words, wages in the textile sector are on average 5.9% smaller than they would have been in the absence of the trade agreement. This is arguably a crude estimate for two reasons. It ignores that the agreement was implemented gradually over four periods. Also, it is estimated over a long span of fifteen-year, where the identification hypotheses may be challenged.

To address potential shortcomings, we start by keeping the before period still in 1991-1994, but consider individually each of the implementation phases, 1995-1997, 1998-2000, 2002-2004,

[1] In terms of CAE codes, the paper industry corresponds to codes 341 and 342 in revision 1, 21 and 22 in revision 2 and 17 and 18 in revision 3. Similarly, the metal sector corresponds to codes 384 and 385 in revision 1, 30 to 35 in revision 2 and 26, 27, 29 and 30 in revision 3.

and 2005-2009 (column (2), Table 2). In the first phase, the impact on monthly wages in the textile industry was -4.0%. In the second phase, wages still underperformed a counterfactual by -6.4%; relatively to the first period, the additional impact on wages was -2.4 percentage points (p.p.). But textile workers kept on suffering with the trade agreement, -6.5% in the third period and, a cumulative effect -7.9% in the final period; additional impacts of -0.2 p.p. and -1.4 p.p., respectively. Each wave of additional openness carried further (relative) devaluation of wages in the textile sector, but the strongest marginal impacts occurred earlier on. This may suggest that firms and workers were better able to adjust in the medium term.

But how fast did firms react to each additional wave of international competition? In particular, did they adjust smoothly over each wave or sharply at the beginning of each wave? We try to infer the quickness of the response by estimating an equation that still keeps the before period in 1991-1994, but that considers individually each year of the after period. The point estimates presented in column (3) of Table 2 suggest that the adjustment worked swiftly within the first phase; more like a discontinuity rather than a smooth transition to the new rules. In the second phase (1998-2000), the adjusted occurs throughout the period. In the third phase (2002-2004), which had an impact similar to the second phase, the variation within year is very small. In the fourth phase, the first three years have impacts similar to the third phase, but then it picks up, not without some oscillation and even regressing a bit in the final two years.

Finally, we consider shifting the before period to the interval preceding the each of the four phases. This would bring the before period closer to each after period, where it may be fairer to compare treatment and control units. For instance, column (4) presents the estimates for the first phase with the before period set in 1991-1994; column (5) moves the before period to 1995-1997 and the after period to the second phase, 1998-2000. The estimates in columns (4)-(7) are compatible with those of column (2). The first phase impact is estimated also at -4.0%; the additional impact of the second phase, -2.3 p.p., which approximates the -2.4 p.p. estimate implied by the -6.3% and -4.0% reported in column (2).

We conclude that the trade liberalization had a significant impact on the wages of textile workers. They accumulated losses relatively to the counterfactual that amount to 7.9% in 15 years of the process.

Table 3 repeats the exercise, but now for the metal sector as the control group. In this

case, the average treatment effect on the treated for the entire period is -9.0% and the cumulative effect reaches 11.9%. An higher impact, somewhere between 3 and 4 p.p., relatively to estimates obtained with the paper sector. Interestingly, the significant impacts occur in the first period (1995-1997), -6.7%, and in the final period (2002-2009) with an additional loss of 5.0 p.p. (columns (4) and (7)). In the intermediate periods, the additional impacts are non-significant (columns (5) and (6)).

In the Appendix, we include estimates for samples restricted to larger firms, namely, firms with more than 50 workers (Tables 8 and 9). The point estimates are statistically more robust, but only slightly larger. For instance, the average treatment effect for the treated in the entire period is 6.3% and 9.4%, respectively, when paper and metal sectors are the control units (versus the initial estimates of 5.9% and 9.0%).

5.4 Anticipation effects

The ACT, enacted in 1993, was known to market participants – firms and workers – not only in Portugal, but all over the world. This public information could have been used by participants to adjust their market strategies. For our exercise, this implies that firms might have started the adjustment process before 1995, when the trade liberalization came into play. In other words, our estimates may suffer from anticipation effects in the spirit know in the labor literature as Ashenfelter's dip (Ashenfelter 1978).

To study the possibility of anticipation effects, we exclude from our sample all 1994 observations. Given the negative impact already reported, we might expect that textile and clothing industries started their downward adjustment earlier in preparation for enhanced competition. Table 4 reports average treatment effects on the treated for both paper and metal industries as counterfactuals. Column (1) shows a slightly larger negative impact, -6.5%, when the paper industry is the counterfactual (previous estimate was -5.9%). When the metal industry is the counterfactual, column (3) shows an increase of 1.5 percentages points in the estimated impact, -10.5% versus -9.0%. If each wave is considered individually, columns (2) and (4), the final estimates of the impact of trade liberalization still increase 0.6 percentage points or 1.5 percentage points, respectively, for paper and metal industries as counterfactuals.

In the Appendix, we reestimate the common trend equation, but excluding 1994 from the

sample. The common trend becomes even more robust; point estimates are smaller and with p-values which can reach 97.7%. These results lead us to conclude with confidence that there was an anticipation effect, which adds to the point estimates an additional reduction of wages ranging from -0.6 to -1.5 percentage points.

5.5 Heterogeneity

Hitherto, we have been focusing on the impact on total monthly wages. However, faced with a competitive shock, firms might have adjusted in the intensive margin, namely, on hours worked. If firms reduced the number of hours worked, then part of the average treatment effect on the paycheck that workers take home (which includes also overtime pay) might be attributable to shorter hours rather than adjustments in the hourly wage rate. We test this potential adjustment by considering hourly wages as our dependent variable.

Column (1) of Table 5 uses hourly wages as the outcome variable, but repeats the earlier exercise (reported for convenience in column (3)). This variable ought to account for variation in worked hours. The effect of hours on the monthly wages could go both ways. On the one hand, firms facing additional competition could try to lower hourly labor wages by keeping wages and increasing worked hours. On the other hand, faced with lower demand firms could reduced worked hours and concomitantly push down monthly wages. With the exception of the first phase, the point estimates of the hourly wages regression suggest a smaller impact (in absolute value), both when the paper industry (top panel) or the metal industry (bottom panel) are the counterfactuals. This would favor the thesis that part of the total wages adjustment came about with a reduction in hours worked. This is confirmed in the column (2), which shows that hours worked decreased, with the exception of the first phase. The negative demand shock caused textile and clothing firms to reduce in the intensive margin.

However, when we consider 95% confidence intervals, the hourly (1) and monthly wages (3) point estimates are not different, i.e., the corresponding confidence intervals intercept each other. For this reason, we stick with monthly wages because they are less likely to be affected by measurement errors, contrarily to hourly measures. In Portugal, the national minimum wage is a monthly value, contrarily, for instance, to the United States where it is set as an hourly value. This might justify a less accurate tracking of working hours in Portugal.

But we also consider the possibility of heterogeneous impacts. In particular, because

the textile industry is rather labor intensive, employing a large fraction of females and non-qualified workers, it is conceivable that different groups of workers might have been affected differently by the trade agreement. However, the data do not reveal significant differences. The policy had a similar impact across genders. At standard significance levels, the confidence intervals of the estimates presented in columns (4) and (5) of Table 5 overlap; i.e., statistically, we cannot reject the hypothesis that the impact is the same for females and males. The same exercise for qualified and non-qualified workers reveals a similar pattern (columns (6)-(7)). There are no statistical differences in the impacts between the two types of workers.

Overall, there is little evidence of heterogeneous impacts across different workers in the textile industry. The burden of adjustment was shared equally.

6 Statistical robustness: Falsification and other estimators

This section tests the statistical robustness of our estimates. We start by performing a falsification exercise. Then, we assess the sensitiveness of our point estimates to the choice of the estimator.

6.1 Falsification: Pseudo-treated, common trend and impact

This section replicates the structure of section 5.3: first, choice of the appropriate control group and, only then, estimation of the average (pseudo-) treatment effect.

Because we want to perform a falsification exercise, we start by assuming erroneously that a similar trade liberalization occurred in the paper and metal sectors. These sectors, where no such changes occurred and which had played the role of control units, are now relabelled as pseudo-treated units. Next, we chose a control group for these two pseudo-treated sectors. Similarly to section 5.3, this choice was based on respecting the common trend assumption in the before period (1991-94). It turns out that the chemical sector is the one with the strongest resemblance in terms of wage performance with the pseudo-treated sector.[2] The upper panel of Table 6 shows the common trend point estimates for all firms and for those with more than 50 workers; in all cases, we cannot reject the existence of a common trend in the before period. This is reassuring for the estimation of the pseudo difference-in-differences.

[2]The chemical sector corresponds to CAE codes 351, 352, 355 and 356 in revision 1, 24 to 26 in revision 2 and 20 to 23 in revision 3.

The estimates of the (pseudo) average treatment effect for the four periods of a pseudo trade liberalization are presented in the lower panel of Table 6. Overall, as expected, there are no signs of significant differences between pseudo-treated and control units. The only exception seems to be the estimates for the third period, 2002-2004, where depending on the choice of the level of statistical significance one might find significant differences. With these results in mind, we may want to interpret the estimates of the (true) average treatment effect (section 5.3) for the 2002-04 wave with additional caution. This is the only caveat that comes out of the falsification exercise.

6.2 Statistical sensitivity

In this section, we test the sensitivity of our point estimates to the choice of the estimator. In particular, we explore the possibility that controlling for firm-related omitted variables is not enough to obtain an unbiased estimate of the treatment effect. We consider also the possibility that omitted variables are correlated with the treatment indicator due to time invariant worker characteristics and more encompassing that such characteristics are due to both worker and firm omitted variables. Therefore, in Table 7, along with the baseline estimates based on firm fixed effects, we report two additional estimates: worker fixed effects and simultaneously worker and firm fixed effects.

The results are reassuring for the first two waves of trade liberalization. However, for the final waves, controlling for worker or jointly for worker and firm fixed effects yields substantially larger point estimates, which increase with the distance to the before period (Table 7).

It is still true that the average treatment effect hovers around 4% in the first wave and 6 to 7% in the second wave, if the paper sector is used as the counterfactual (top panel of Table 7, columns (1)-(3)). A similar comparison, with the metal sector as counterfactual, yields estimating hovering around 8% and 9%, respectively (bottom panel of Table 7). This invariance to the choice of the estimator is lost in the final two periods of trade liberalization. With the paper sector as the counterfactual, the worker and worker and firm point estimates for the third wave almost double the firm fixed effects (-6.5% vs. -13% or -11.9%). When the metal sector is the counterfactual, the difference is smaller (-8.4% vs. -13.1% or -10.4%). In the final period, the newer estimates reach -17.2% and -15.8%, which compare with only

7.9% (paper sector) and -19.8% and -17.2% relatively to the baseline of -11.9% (metal sector). Limiting the sample to larger firms does not affect the results (columns (4)-(6)).

Overall, these results led us to conclude that our point estimates are rather robust in the first two waves of trade liberalization. We are confident that wages in the textile were affected negatively relatively to the counterfactual offered by the paper and metal sectors; the average treatment effect lies between -6 and -9%. In the final two waves, which start in 2002, 8 years after the first wave came into place, we are less confident on suggesting a definite impact of the policy. Nonetheless, we can state that there are no signs of recovery for the wages of textile workers; all point estimates imply further loss, some of which can almost double the losses experienced in the first two waves.

7 Conclusion

We look at the issue of trade liberalization in the context of the 1993 international Agreement on Textiles and Clothing (ATC). During a transition period, import quotas were phased out: 16% of starting in January 1995; an additional 17% in January 1998; 18% more in January 2002; and 49% in January 2005.

At the time of the trade liberalization, the Portuguese textile and clothing industry played an important role in the country's exports. We use a difference-in-differences estimation to provide causal inference on the impact of trade liberalization on the wages of Portuguese workers employed in that industry. We use other sectors of activity, namely paper and metal, as control groups.

Our study shows that the wages of workers in the textile and clothing industry lost relatively to the counterfactual without the trade liberalization. Our results are based on solid grounds, but have nonetheless some caveats. We carefully chose the control units by selecting sectors that shared a common wage trend in the before period, in particular, the paper and metal industry.

Once this careful choice was made, we estimated the average treatment effected on the treated based on the difference-in-differences estimator. Over the four waves of trade liberalization, we were able to show that, on average, wages lost between 6% and 9%, depending on whether the counterfactual is the paper or the metal industry, respectively. These point estimates may reach 6.5% and 10.5% if we consider the possibility that there was an anticipation

effects during 1994, the year prior to the trade liberalization.

The major caveat with our results is the validity for the final two periods of trade liberalization, 2002-2004 and 2005-2009. Our baselines estimates show further relative wage losses in these two periods. But these values almost double with alternative estimators; this does not occur in the first two periods. Therefore, we conclude confidently that there was a negative impact of trade liberalization on the wages of the textile and clothing industry, but we are less confident on putting a number on the effects from 2002 until 2009.

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Table 1: Common trend estimation

Control industry:	Paper		Metal		Paper & Metal	
Firm size:	All	Above 50	All	Above 50	All	Above 50
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × Time	-0.014	-0.009	-0.014	-0.008	-0.015	-0.011
	(0.162)	(0.594)	(0.123)	(0.450)	(0.019)	(0.199)
No of observations	850910	562685	836342	583721	955397	649855

Notes: Firm fixed effects estimates of the Treat × Time coefficient; p-values in parentheses adjusted for firm clustering. The "before" period corresponds to 1991 to 1994. For each period, treatment units identify workers in textile firms and control units workers in firms in the paper or metal or in both sectors. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 2: Difference-in-differences estimation: Textile versus Paper

Treat × After	Before period						
		1991-94			1995-97	1998-00	2002-04
β_3	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1995-2009	-0.059						
	(0.000)						
1995-1997		-0.040		-0.040			
		(0.000)		(0.000)			
1998-2000		-0.063			-0.023		
		(0.000)			(0.001)		
2002-2004		-0.065				-0.010	
		(0.000)				(0.345)	
2005-2009		-0.079					-0.017
		(0.000)					(0.000)
1995			-0.039				
			(0.001)				
1996			-0.041				
			(0.002)				
1997			-0.039				
			(0.000)				
1998			-0.050				
			(0.000)				
1999			-0.065				
			(0.000)				
2000			-0.073				
			(0.000)				
2002			-0.067				
			(0.000)				
2003			-0.062				
			(0.000)				
2004			-0.066				
			(0.000)				
2005			-0.082				
			(0.000)				
2006			-0.068				
			(0.000)				
2007			-0.091				
			(0.000)				
2008			-0.079				
			(0.000)				
2009			-0.078				
			(0.000)				
No of observations	3432001	3432001	3432001	1468627	1221936	1152380	1069039

Notes: Firm fixed effects estimates of the Treat × After coefficient; p-values in parentheses adjusted for firm clustering. The "before" period corresponds to 1991 to 1994 in columns (1)-(4), the other "before" are defined in columns (5)-(7). The "after" period is given in the initial column. For each period, treatment units identify workers in textile firms and control units workers in firms in the paper sector. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 3: Difference-in-differences estimation: Textile versus Metal

Treat × After	Before period						
		1991-94			1995-97	1998-00	2002-04
β_3	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1995-2009	-0.090						
	(0.000)						
1995-1997		-0.078		-0.067			
		(0.000)		(0.000)			
1998-2000		-0.089			-0.004		
		(0.000)			(0.825)		
2002-2004		-0.084				0.004	
		(0.000)				(0.821)	
2005-2009		-0.119					-0.050
		(0.000)					(0.005)
1995			-0.079				
			(0.000)				
1996			-0.060				
			(0.001)				
1997			-0.095				
			(0.000)				
1998			-0.096				
			(0.000)				
1999			-0.096				
			(0.000)				
2000			-0.076				
			(0.009)				
2002			-0.077				
			(0.000)				
2003			-0.079				
			(0.000)				
2004			-0.096				
			(0.000)				
2005			-0.134				
			(0.000)				
2006			-0.144				
			(0.000)				
2007			-0.126				
			(0.000)				
2008			-0.095				
			(0.000)				
2009			-0.076				
			(0.003)				
No of observations	3837642	3837642	3837642	1534634	1404688	1347565	1248042

Notes: Firm fixed effects estimates of the Treat × After coefficient; p-values in parentheses adjusted for firm clustering. The "before" period corresponds to 1991 to 1994 in columns (1)-(4), the other "before" are defined in columns (5)-(7). The "after" period is given in the initial column. For each period, treatment units identify workers in textile firms and control units workers in firms in the metal sector. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 4: Difference-in-differences estimation: Anticipation effects (exclude year 1994)

Treat × After β_3	Before period 1991-1993			
	Paper		Metal	
	(1)	(2)	(3)	(4)
1995-2009	-0.065		-0.105	
	(0.000)		(0.000)	
1995-1997		-0.046		-0.094
		(0.000)		(0.000)
1998-2000		-0.069		-0.105
		(0.000)		(0.000)
2002-2004		-0.071		-0.100
		(0.000)		(0.000)
2005-2009		-0.085		-0.135
		(0.000)		(0.000)
No of observations	3242421	3242421	3654950	3654950

Notes: Firm fixed effects estimates of the Treat × After coefficient; p-values in parentheses adjusted for firm clustering. The "before" period corresponds to 1991 to 1993 in columns (1)-(4), the other "before" are defined in columns (5)-(7). The "after" period is given in the initial column. For each period, treatment units identify workers in textile firms and control units workers in firms in the paper sector. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 5: Difference-in-differences estimation: Heterogeneity (Textile versus Paper)

Treat × After β_3	Hourly wages (1)	Hours worked (2)	Monthly wages Baseline (3)	Females (4)	Males (5)	Non-qualified (6)	Qualified (7)
			Textile versus Paper				
1995-1997	-0.044	0.004	-0.040	-0.032	-0.036	-0.039	-0.033
	(0.000)	(0.445)	(0.000)	(0.000)	(0.002)	(0.000)	(0.005)
1998-2000	-0.027	-0.035	-0.063	-0.059	-0.045	-0.068	-0.028
	(0.007)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.031)
2002-2004	-0.036	-0.028	-0.065	-0.064	-0.042	-0.073	-0.022
	(0.002)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.130)
2005-2009	-0.052	-0.027	-0.079	-0.078	-0.059	-0.087	-0.032
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.059)
No of observations	3431949	3431949	3432001	2281556	1150445	2960007	387318
			Textile versus Metal				
1995-1997	-0.068	-0.010	-0.078	-0.044	-0.078	-0.070	-0.101
	(0.000)	(0.424)	(0.000)	(0.045)	(0.000)	(0.000)	(0.000)
1998-2000	-0.028	-0.061	-0.089	-0.044	-0.082	-0.085	-0.099
	(0.069)	(0.000)	(0.000)	(0.028)	(0.000)	(0.000)	(0.000)
2002-2004	-0.042	-0.041	-0.084	-0.032	-0.074	-0.076	-0.097
	(0.026)	(0.006)	(0.000)	(0.106)	(0.001)	(0.000)	(0.000)
2005-2009	-0.079	-0.040	-0.119	-0.090	-0.098	-0.112	-0.128
	(0.001)	(0.008)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)
No of observations	3837631	3837631	3837642	2455959	1381683	3356251	393368

Notes: Firm fixed effects estimates of the Treat × After coefficient; p-values in parentheses adjusted for firm clustering. The "before" period corresponds to 1991 to 1994. The "after" period is given in the initial column. For each period, treatment units identify workers in textile firms and control units workers in firms in the metal sector. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 6: Falsification (pseudo-treated): Common trend and pseudo-ATE

Pseudo-treatment industry:	Paper		Metal	
Control industry:	Chemical			
Firm size:	All	Above 50	All	Above 50
	(1)	(2)	(3)	(4)
	Common trend			
Treat × Time	-0.010	-0.010	-0.010	-0.016
	(0.326)	(0.465)	(0.263)	(0.138)
No of observations	261888	165385	247983	186776
	Pseudo Average Treatment Effect			
1995-1997	-0.015	-0.020	0.023	0.020
	(0.260)	(0.343)	(0.233)	(0.385)
1998-2000	-0.013	-0.019	0.012	0.006
	(0.399)	(0.427)	(0.545)	(0.801)
2002-2004	-0.033	-0.054	-0.020	-0.044
	(0.041)	(0.026)	(0.330)	(0.083)
2005-2009	-0.025	-0.037	0.005	-0.010
	(0.158)	(0.185)	(0.829)	(0.723)
No of observations	1832882	1045313	2244451	1582271

Notes: Firm fixed effects estimates of the Treat × Time coefficient; p-values in parentheses adjusted for firm clustering. The "before" period corresponds to 1991 to 1994. For each period, treatment units identify workers in pseudo-treatment (paper or metal) firms and control units workers in firms in the chemical sector. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 7: Difference-in-differences estimation: Statistical sensitiveness

Treat × After	All			Larger than 50		
	Firm	Worker	F & W	Firm	Worker	F & W
β_3	(1)	(2)	(3)	(4)	(5)	(6)
			Textile versus Paper			
1995-1997	-0.040	-0.041	-0.040	-0.051	-0.044	-0.043
	(0.000)	(0.000)	(0.000)	(0.003)	(0.010)	(0.000)
1998-2000	-0.063	-0.084	-0.080	-0.068	-0.083	-0.077
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
2002-2004	-0.065	-0.130	-0.119	-0.060	-0.125	-0.115
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
2005-2009	-0.079	-0.172	-0.157	-0.079	-0.173	-0.160
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No of observations	3432001	3432001	3432001	1997096	1997096	1997096
			Textile versus Metal			
1995-1997	-0.078	-0.093	-0.070	-0.090	-0.103	-0.085
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
1998-2000	-0.089	-0.111	-0.091	-0.097	-0.117	-0.102
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
2002-2004	-0.084	-0.131	-0.104	-0.076	-0.123	-0.102
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
2005-2009	-0.119	-0.198	-0.172	-0.116	-0.194	-0.176
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No of observations	3837642	3837642	3837642	2528560	2528560	2528560

Notes: Estimates of the Treat × After coefficient; p-values in parentheses adjusted for clustering. Columns (1) and (4) present firm fixed effects estimates (baseline estimates). Columns (2) and (5) present worker fixed effects estimates. Columns (3) and (6) present firm and worker fixed effects estimates. The "before" period corresponds to 1991 to 1994. The "after" period is given in the initial column. For each period, treatment units identify workers in textile firms and control units workers in firms in the paper or metal sectors. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Appendix

Table 8: Difference-in-differences estimation: Textile versus Paper (larger firms)

Treat × After	Before period						
		1991-94			1995-97	1998-00	2002-04
β_3	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1995-2009	-0.063						
	(0.000)						
1995-1997		-0.051		-0.047			
		(0.003)		(0.005)			
1998-2000		-0.068			-0.017		
		(0.000)			(0.141)		
2002-2004		-0.060				-0.007	
		(0.001)				(0.729)	
2005-2009		-0.079					-0.020
		(0.000)					(0.011)
1995			-0.046				
			(0.033)				
1996			-0.060				
			(0.017)				
1997			-0.046				
			(0.010)				
1998			-0.057				
			(0.004)				
1999			-0.070				
			(0.000)				
2000			-0.078				
			(0.000)				
2002			-0.077				
			(0.003)				
2003			-0.051				
			(0.003)				
2004			-0.052				
			(0.005)				
2005			-0.079				
			(0.001)				
2006			-0.056				
			(0.004)				
2007			-0.106				
			(0.000)				
2008			-0.082				
			(0.000)				
2009			-0.084				
			(0.001)				
No of observations	1999419	1999419	1999419	946322	738734	644225	553598

Notes: Firm fixed effects estimates of the Treat × After coefficient; p-values in parentheses adjusted for firm clustering. Sample restricted to firms with more than 50 workers each period. The "before" period corresponds to 1991 to 1994 in columns (1)-(4), the other "before" are defined in columns (5)-(7). The "after" period is given in the initial column. For each period, treatment units identify workers in textile firms and control units workers in firms in the paper sector. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 9: Difference-in-differences estimation: Textile versus Metal (larger firms)

Treat × After	Before period						
		1991-94			1995-97	1998-00	2002-04
β_3	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1995-2009	-0.094						
	(0.000)						
1995-1997		-0.090		-0.075			
		(0.000)		(0.000)			
1998-2000		-0.097			0.005		
		(0.000)			(0.802)		
2002-2004		-0.076				0.016	
		(0.001)				(0.395)	
2005-2009		-0.116					-0.051
		(0.000)					(0.011)
1995			-0.091				
			(0.000)				
1996			-0.070				
			(0.002)				
1997			-0.109				
			(0.000)				
1998			-0.110				
			(0.000)				
1999			-0.107				
			(0.000)				
2000			-0.074				
			(0.031)				
2002			-0.074				
			(0.002)				
2003			-0.068				
			(0.004)				
2004			-0.086				
			(0.000)				
2005			-0.133				
			(0.000)				
2006			-0.137				
			(0.000)				
2007			-0.122				
			(0.000)				
2008			-0.092				
			(0.003)				
2009			-0.075				
			(0.016)				
No of observations	2530883	2530883	2530883	1066813	960514	880856	774083

Notes: Firm fixed effects estimates of the Treat × After coefficient; p-values in parentheses adjusted for firm clustering. Sample restricted to firms with more than 50 workers each period. The "before" period corresponds to 1991 to 1994 in columns (1)-(4), the other "before" are defined in columns (5)-(7). The "after" period is given in the initial column. For each period, treatment units identify workers in textile firms and control units workers in firms in the metal sector. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.

Table 10: Common trend estimation, excluding 1994

Control industry:	Paper		Metal		Paper & Metal	
Firm size:	All	Above 50	All	Above 50	All	Above 50
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × Time	-0.009	0.001	0.001	0.009	-0.006	0.003
	(0.643)	(0.977)	(0.946)	(0.493)	(0.617)	(0.806)
No of observations	660741	444099	653075	462479	743195	513739

Notes: Firm fixed effects estimates of the Treat × Time coefficient; p-values in parentheses adjusted for firm clustering. The "before" period corresponds to 1991 to 1993. For each period, treatment units identify workers in textile firms and control units workers in firms in the paper or metal or in both sectors. Besides the treatment variables, the control variables included in the regressions are: (i) Female indicator; (ii) Quadratic polynomial in (log) age; (iii) Quadratic polynomial in (log) tenure months; (iv) Educational attainment indicators: (a) 4-6 years, (b) 7-9 years, (c) 10-12 years, and (d) college degree. Workers with 4 or less years of schooling are the reference group; (v) Foreign ownership majority indicator; (vi) Log firm size measured by the number of workers; (vii) Quadratic polynomial in (log) firm age.