Intra-Industry Trade and Labour Market Adjustment in the Automobile Industry

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Abstract

This paper examines the effects of increased intra-industry trade on the labour market adjustment costs in Portugal's automobile industry. Using a static and dynamic panel data approach, the results show a negative correlation between changes of employment and marginal intra-industry trade. These results confirm the smooth adjustment hypothesis, as well as suggesting that the multinational companies (MNC) engaged in the automobile sector have low adjustment costs if they increase the intra-firm trade, that is, the trade in automobile components between different units of MNCs.

Keywords: Adjustment costs, Automobile industry, Marginal intra-industry trade, Panel data

JEL classification: F14; C33.

1. Introduction

In recent years, a research trend has emerged in the international economics literature with regard to the testing of the effects of intra-industry trade (IIT) on labour market adjustment (Brülhart et al., 2006; Erlat & Erlat, 2006; Fertö, 2009). The theoretical hypothesis, known as the smooth adjustment hypothesis (SAH), posits that IIT promotes a reallocation of production factors that cost less than inter-industry trade, which induces a greater labour reallocation.

Whereas most of the empirical studies have tested the SAH considering all of the industries within an economy, the present paper tests the same hypothesis considering solely the reallocation of labour within the automobile industry (between sectors of this industry). Production in this industry is fragmented around the world and the role of multinational companies (MNC) in the automobile industry is increasing. If the SAH is applicable to this globalized industry, this conclusion may be of use in the study of the role of MNC.

The empirical studies generally use the marginal IIT (MIIT), proposed by Brulhart (1994), to test the effects of IIT on labour adjustment costs. It is expected that when MIIT increases, the labour adjustment costs decrease. The present paper tests the SAH in the Portuguese automobile industry, considering sectors of this industry and using the Brulhart (2000) measure for adjustment costs: the absolute value of total employment changes in the automobile industry between 1995 and 2006. We have considered Portugal's EU-27 trading partners, as well as the BRIC countries (Brazil, Russia, India and China) and the United States of America (USA).[1]

The SAH is tested by means of both static and dynamic panel data analyses. To estimate the dynamic model, the paper applies the methodology of Arellano and Bond (1991). The static and dynamic results, using the fixed-effects estimator, suggest that the SAH applies for the Portuguese automobile industry.

2. Theoretical Basis and Empirical Studies

The costs associated with the reallocation of factors between industries and within industries are short-term costs and may be theoretically explained by the specific-factors model (Jones, 1971). In this model, only the factors that are mobile between industries are costless and move smoothly. The other factors are considered specific factors and the adjustment is sticky and not smooth in the short term. The adjustment costs arise because there are unemployment and factor price differences between industries. The factor specificity implies factor price differences. Since the adjustment is sticky rather than smooth in the specific factors model, as in the Heckscher-Ohlin model, trade theorists have questioned whether the adjustment is smoother if IIT prevails. In the short term, we always have adjustment costs, but the labour market cost is lower if the labour reallocation occurs within the same industry, rather than between different industries.

Researchers have differed as to the choice of measures of adjustment costs. Some empirical studies use the industry employment change as an inverse proxy for adjustment costs (Brülhart & Elliot, 1998; Grenaway et al., 1999). Other studies consider the index for intra-industry job turnover as defined by Davis and Haltiwanger (1992) (see, for example, Brülhart, 2000), while the most recent analyses use data on individual workers' moves (Brülhart et al., 2006; Elliot & Lindley, 2006; Cabral & Silva, 2006).Different measures for the dependent variable and different econometric methods may reach different conclusions. The choice of different explanatory variables may also lead to different results. The dynamic panel data analysis is justified because MIIT and employment changes are dynamic phenomena. Sometimes there is a gap between trade theory and empirical studies.

3. Econometric Model

3.1 Dependent Variable and data sources

The dependent variable used is the absolute change of employment in the automobile sector.

$$\Delta EMPL = 2\left(\frac{EMPL_t - EMPL_{t-1}}{EMPL_t + EMPL_{t-1}}\right)$$

The source used for the dependent variable is the Portuguese Ministry of Labour. The data source for the explanatory variables is INE (Portuguese National Institute of Statistics). The MIIT in the automobile sector is calculated with the disaggregation of five digits of the EAC (Economic Activities Classification).

3.2 Explanatory variables and theoretical hypotheses

Hypothesis 1: There is a negative correlation between the absolute change in labour productivity and the absolute change in employment.

ΔPROD is the absolute of change in labour productivity**.** It is expected that an increase in productivity decreases the labour requirements. Erlat & Erlat (2006) considered a negative coefficient for this variable. However, Fertö (2009) argues that we can also expect a positive effect if we consider that the industry may expand.

Hypothesis 2*:* When domestic consumption increases, employment also increases.

ΔCONS is the absolute of change in apparent consumption (CONS=Q+M-X, being Q=output, M=imports and X= exports). A positive sign is expected for the coefficient of this variable. When demand increases, production and employment also increase.

Hypothesis 3: When the MIIT increases, the labour adjustment cost decreases.

$$MIIT = 1 - \frac{|\Delta X - \Delta M|}{|\Delta X| + |\Delta M|}$$

According to the SAH, a negative coefficient is expected for this variable.

We also consider the multiplicative dummy variable EUxMIIT. EU is a dummy variable that equals 1 if the country is a European Union (EU) trading partner and 0 otherwise. A negative sign is expected, because the trade between EU partners is mainly of the intra-industry trade type.

Hypothesis 4: There is a negative relationship between the industrial concentration (CONC) and the change in employment.

CONC is the ratio of the four largest firms' sales relative to total sales plus imports of an industry. The expected sign is negative, because the industrial concentration does not allow free entry and exit and we have a low labour reallocation.

Hypothesis 5: There is a positive relationship between trade and the changes in employment.

TRADE is exports plus imports. Brülhart et al. (2006) and Fertö (2009) found a positive sign. We also use TRADExMIIT. Following Fertö (2009), we expect a negative sign for the coefficient of this variable.

Model specification

$$|\Delta EMPL|_{it} = \beta_0 + \beta_1 X_{it} + \delta t + \eta_i + \varepsilon_{it}$$

Where $|\Delta EMP|$ is the absolute change in employment in the automobile industry; X is a set of explanatory variables; η_i is the unobserved time–invariant specific effects; δt captures a common deterministic trend; ε_{it} is a random disturbance assumed to be normal and identically distributed (IID) with E (ε_{it}) =0 and Var(ε_{it})=σ^2 >0.

The model can be rewritten in the following dynamic representation:

$$|\Delta EMPL|_{it} = \rho|\Delta EMPL|_{it-1} + \beta_1 X_{it} - \rho\beta_1 X_{it-1} + \delta t + \eta_i + \varepsilon_{it}$$

4. Estimation results

4.1 Static Panel Data

We present the fixed-effects (FE) estimates in Table 1. The regression coefficients are estimated using the FE estimator and the orthogonal deviation (Arellano & Bond, 1991). The OLS estimator was excluded through the F-statistic and the Hausman test rejected the null hypothesis that there are no significant difference in the random effects (RE) estimates and the FE estimates.

The model presents three statistically significant variables: absolute value of the change in labour productivity (ΔPROD at 1%), absolute value of the change in apparent consumption (ΔCONS, at 1%) and the marginal intra-industry trade (MIIT, at 1%), trade (TRADE, at 1%), and EUxMIIT (at 10%). The labour productivity (ΔPROD) presents a negative coefficient, as was expected. The domestic consumption (ΔCONS) presents a negative correlation, confirming the results of Brülhart & Elliot (2002). The variable MIIT is statistically significant with a negative coefficient, confirming the SAH hypothesis. The control variables TRADE, EUxMIIT and TRADExMIIT are not statistically significant.

Insert Table 1 Here

4.2 Dynamic Panel Data

In Table 1, second equation, we can observe the determinants of the absolute changes in employment, using a dynamic model and compare them with the FE estimator.

The equation presents consistent estimates, with no second-order serial correlation (m2 statistic). The equation presents six significant variables ($|\Delta \text{EMPL}|_{t-1}$, ΔPROD, ΔCONS, MIIT, TRADE, and EUx MIIT). The lagged dependent variable ($|\Delta \text{EMPL}|_{t-1}$), presents a negative sign. The past changes in employment have a negative correlation with the current changes in employment. The variable ΔPROD presents a negative sign and is significant at the 1% level. This result was expected. The apparent consumption (ΔCONS) presents a negative sign, confirming the other empirical studies (see, for example, Fertö, 2009). MIIT has a negative coefficient, confirming the static results and the SAH. A negative effect of MIIT on changes in employment was expected for the European partners and the results do not confirm the hypothesis, because the estimated coefficient for EUxMIIT is positive. The trade between Portugal and EU for the automobile industry is mainly that of vertical IIT (VIIT) instead of horizontal IIT (HIIT) and this entails costly adjustments. This could explain the positive coefficient. The variable TRADE is significant with the expected sign. The results suggest that free trade has a competitive effect on the domestic market, which implies a greater factor reallocation and an increase of the labour market adjustment costs. The market structure (industrial concentration) and the multiplicative dummy variable TRADExMIIT are not significant.

5. Conclusion

The aim of this paper was to test the smooth adjustment hypothesis (SAH) in the Portuguese automobile industry, using a panel data analysis and two different estimators. The SAH that factors of production reallocate more smoothly within, rather than between, sectors is confirmed in both the static and the dynamic analyses. The costs of adjustment in the labour market were proxied by the absolute value of total employment changes in the industry. The marginal intra-industry trade index, calculated with the appropriate disaggregated level, was used to test the SAH. The negative coefficient of this variable in both models suggests that the smooth adjustment hypothesis also applies when we are analyzing a specific industry. Comparing our findings with other empirical studies for all industries, we obtained similar results (see, for example, Brülhart, & Elliott, 1998; Brülhart, 2000). Finally, there is no great difference between static and dynamic results. However, in future research, we need to take more countries and a bigger sample into consideration in order to use GMM (Generalized Method of Moments) estimators (GMM-DIF estimator or GMM-system estimator).

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Notes

Note1. Russia and five EU countries (Bulgaria, Cyprus, Estonia, Lithuania and Latvia) were excluded due to the unavailability of data. In addition, note that Belgium and Luxembourg are treated as a single combined economy.

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Table 1. Dependent Variable: Absolute Employment Changes

Variables	Static model	Dynamic model	Expected Sign
$\|\Delta$ EMPL$\|_{t-1}$		-0.353 (-7.64)***	(-)
$\|\Delta$ PROD$\|$	-0.002 (-3.41)***	-0.001(-4.24)***	(-)
$\|\Delta$ CONS$\|$	-8.1e-9 (-2.69)***	-1.8e-8 (-4.73)***	(+)
MIIT	-0.038 (-3.4)***	-0.032 (-2.35)**	(-)
CONC	-0.06 (-1.05)	-0.032 (-0.30)	(-)
TRADE	3.16 (1.07)	6.85e-11 (3.72)***	(+)
TRADExMIIT	-1.1e-11 (-0.45)	-1.28e-11 (-0.93)	(-)
EUxMIIT	0.04 (1.22)	0.05 (2.08)**	(-)
C	-0.28(-12.8)		
M1		1.66 [0.096]	
M2		-1.251 [0.211]	
R^2	0.28	0.15	
N	116	116	

The null hypothesis that each coefficient is equal to zero is tested, using robust standard error. T-statistics (heteroskedasticity corrected) are in round brackets. ***/**/* indicates statistical significance at the 1%, 5% and 10% levels. P-values are in square brackets. M1 and M2 are tests for first-order and second–order serial correlation in the first-differenced residuals, asymptotically distributed as N (0, 1) under the null hypothesis of no serial correlation.