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Marginal Intra-industry Trade and Adjustment Costs in Labour Market

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Summary

The objective of this study is to provide some empirical evidences on the existence of labor market adjustments according to smooth adjustment hypothesis (SAH) under the impact of intra-industry trade (IIT) considering the Portuguese case over a time span between 1995 and 2006. The main methodological issue of this study consists in showing that it is preferable to use the GMM-System approach with orthogonal transformation of data. The key outcome consists in highlighting a negative linkage between marginal intra-industry trade and the amplitude of employment changes for this particular market. In addition, we find a negative correlation between changes of employment and changes in domestic consumption. Moreover, the relationship between growth of productivity and market structure is according to smooth adjustment hypothesis.

Keywords: Intra-Industry Trade, Adjustment Costs, Portugal, Labour Market

JEL Classification: F12, C33

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Marginal Intra-industry Trade and Adjustment Costs in Labour Market

Nuno Carlos Leitão, Bogdan Dima, and Dima (Cristea) Ştefana*

Abstract: The objective of this study is to provide some empirical evidences on the existence of labor market adjustments according to smooth adjustment hypothesis (SAH) under the impact of intra-industry trade (IIT) considering the Portuguese case over a time span between 1995 and 2006. The main methodological issue of this study consists in showing that it is preferable to use the GMM-System approach with orthogonal transformation of data. The key outcome consists in highlighting a negative linkage between marginal intra-industry trade and the amplitude of employment changes for this particular market. In addition, we find a negative correlation between changes of employment and changes in domestic consumption. Moreover, the relationship between growth of productivity and market structure is according to smooth adjustment hypothesis.

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Introduction

Structural and functional adjustments in labor market are playing an important role in the efficient allocation of resources and sustainable economic growth. A key determinant of such adjustments is represented by the liberalization of international trade and investment which affects inter and intra sectors mobility, real wages, labor productivity and global level of employment. A conceptual framework designed to describe the transmission channels for the impact of intra-industry trade and labor market corrections is represented by the so-called "smooth adjustment hypothesis" (SAH) (see Fertö 2009, Brülhart et al., 2006, Elliott and Lindley, 2006, Erlat and Erlat, 2006). According to this hypothesis, intra-industry trade

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lowers the costs of labor market adjustments and increases the speed of the corresponding transformation processes.

The purpose of this study is to analyze Portuguese labor market adjustment in the thirteen nine manufacturing industries between Portugal and European Union (EU-27) over the period 1995-2006 using a panel dataset. The present paper tests the smooth adjustment hypothesis (SAH) in Portuguese industry, considering manufacturing industries and using a measure of adjustment proposed by Brülhart (2000).

The structure of this study is as follows. The next section includes a literature review empirical studies. In section 3 we formulate the working hypothesis. Section 4 presents the methodology and research design, while the fifth section analyses the results. The final section provides conclusions.

Literature Review and Empirical Studies

The paradigm of intra-industry trade and labor costs adjustment begins with Balassa (1986). Some authors as Greenaway and Milner (1986) show that adjustment costs in labor market cause temporary inefficiencies, due to unemployment and factor price rigidity.

Brülhart and Elliot (2002) argue that the mobility of labor could be greater within industries (IIT) than between industries as a consequence of comparative advantages' mechanisms.

The concept of "trade-induced" occurs with trade liberalization. This concept is pivotal for the analysis of the changes in endowments, income levels and trade policy.

The classic model of IIT (Krugman, 1979) considers only one factor (labor) with monopolistic competition. The framework of Krugman (1979) assumes that countries and industries have similar factor endowments. In other words, IIT occurs within similar countries and industries. In this context, one can expect smaller labor-adjustment costs.

The smooth adjustment hypothesis (SAH) i.e the impact on symmetric or asymmetric demand shock within or between industries is linked to trade-induced effects. Brülhart and Elliot (2002) apply the specific –factor model to explain SAH. The authors consider a small open economy, where labor can move between two sectors.

Lovely and Nelson (2000) present a theoretical model that explain the relationship between marginal intra-industry trade (MIIT) and labor costs adjustments. The framework of

Lovely and Nelson (2000) consider that all trade reallocation is inter-industry trade in the presence of trade liberalization. Lovely and Nelson (2002) show that the reallocation is associated with intra-industry trade type.

Recently, Fertö and Soós (2010) analyze the labor market adjustment and IIT to Hungary and Poland between 1990 and 1998. Fertö and Soós (2010) show that the changes in domestic consumption and productivity have influence on employment change. The authors also find a negative correlation between trade openness and employment changes.

Measuring Marginal Intra-industry trade

The Grubel and Lloyd index is a static measure and as Hamilton and Kniest (1991) demonstrated the changes in this index over time do not adequately reflect the changes in trade partners. Their measure does not eliminate the scale effect. In other words, their index does not allow the comparison between industries of different size. This problem was resolved by Brülhart (1994) marginal IIT index (MIIT).

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

The Brülhart index is a transformation of Grubel and Lloyd (1975) index. The MIIT index also takes the values 0 and 1. The value 0 indicates that the marginal trade in the industry is exclusively of the inter-industry trade and the value 1 represents that the marginal trade is entirely of the intra-industry.

Development of Hypothesis

Following the research literature, we have developed the next research hypothesis:

H1: There is a positive impact in lagged depend variable (change on employment).

> **Literature's perspectives**: The induced trade variables cause a positive effect on labor market. According to Fertö and Soós (2010), Erlat and Erlat (2006) the lagged employment changes variable presents a positive sign.

H2: The marginal intra-industry trade lowers the adjustment cost.

Literature's perspectives: MIIT as marginal intra-industry trade is measured by the index of Brülhart (1994). According to SAH, we expect a negative relationship between marginal intra-industry trade and the change in employment.

H3: There is an ambiguous sign between change in labor productivity and change in sector employment.

Δ PROD is the absolute of the change in labor productivity**.**

Literature's perspectives: Brülhart and Thorpe (2000) expect and found a positive correlation between productivity and the changes on employment. However, Erlat and Erlat, 2006 found a negative sign, in the Turkey case and Fertö and Soós (2010) in the case of 12 European countries (but a positive one in the case of Poland).

H4: There is a positive correlation between change in domestic consumption and change in employment.

ΔCONS is the absolute value of the change in domestic consumption (C = $Q + M - X$) between t and $t - n$, Q being output.

Literature's perspectives: Fertö (2009) found a positive sign, when the author analysed the effects of association on the Hungarian food industry. Brülhart and Thorpe (2000) also found a positive sign to Malaysian case.

H5: There is a negative correlation between the interaction marginal intra-industry trade and openness trade (*MIIT*x *TRADE*).

Literature's perspectives: Cabral and Silva (2006) find a positive sign. Fertö and Soós (2010) found the expect sign to Poland and a positive to Hungary.

Econometric Model and Methodology

Following the literature our study applies a panel data. The dependent variable used is the absolute change in employment for the industry i in the t time period. The source used for dependent variable was Portuguese National Institute of Statistics. The data for the explanatory variables is from OECD (STAN industrial database).

For estimation purposes, we are applying the so-called GMM-System estimation. The GMM-System methodology – as proposed by Arellano and Bover (1995), Blundell and Bond (1998, 2000) and Windmeijer (2005) - is involved because estimators like fixed and random effects, IV or standard GMM may yield to biased results. Also, since a small panel sample may produce "downward bias of the estimated asymptotic standard errors" in the two-step procedure (Baltagi, 2008: 154), we use the "Windmeijer correction" for the estimated standard errors. More exactly, Windmeijer (2000, 2005) observes that part of downward bias which can appear for the standard errors in small samples is due to extra variation caused by the initial weight matrix estimation being itself based on consistent estimates of the equation parameters. In order to correct this bias, it is possible to calculate bias-corrected standard error estimates which take into account the variation of the initial parameter estimates. We employ a version of this correction applicable for GMM models estimated using an iterate-to-convergence procedure.

There are several advantages of the GMM-SYS over other static or dynamic panel estimation methods. Among these: static panel estimates, as the OLS models, are subjected to the problem of dynamic panel bias (Bond, 2002); in our database, we have 39 manufacturing industries (N) analyzed over a period of 11 years (T) and the literature includes several arguments for dynamic panel model being especially designed for a situation where "T" is smaller than "N" in order to control for dynamic panel bias (Bond 2002; Baltagi 2008); the problem of the potential endogeneity can be easier addressed in dynamic panel models than in static and OLS models, since all variables from the regression which are not correlated with the error term (including lagged and differenced variables) can be potentially used as valid instrumental variables; the dynamic panel model is able to identify short and long-run involved effects (Baltagi, 2008). In our estimation, the data are transformed by using the orthogonal deviations method. Orthogonal deviations, as proposed by Arellano and Bover (1995), express each observation as the deviation from the average of future observations in the sample for the same individual, and weight each deviation to standardize the variance. For this transformation, it can be noticed that if the original errors are serially uncorrelated and homoskedastic, then the transformed errors will also be serially uncorrelated and homoskedastic.

Dependent variable

Brülhart (2000) suggests the absolute value of employment changes (ΔEMPL) as a proxy for adjustment cost.

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

Model Specification

A formal description of our research hypothesis can be synthesized as:

$$Log\,|\,\Delta EMPL\,|_{i,t} = \beta_0 + \beta_i X_{i,t} + \delta_t + \eta_i + \Theta Z_{i,t} + \varepsilon_{i,t} \qquad (3)$$

Where, the dependent variable is represented by changes in employment *ΔEMPL* linked to a set *X* of the considered explanatory variables**.** η_i is the un-observed time-invariant specific effects; δ_t captures a common deterministic trend; *Z* is a set of instruments for the dependent and explanatory variables and ε_{it} is a random disturbance assumed to be normal, and identically distributed (IID) with E (ε_{it})=0; Var (ε_{it}) =σ^2 >0 .

The set of the considered explanatory variables includes: the marginal intra-industry trade (LogMIIT); the variations of labor productivity (LogΔPROD); the changes in domestic consumption (LogΔCONS); and a control variable (LogMIITxTRADE).

The GMM-System tries to simultaneous estimate the Equation 3 together with a re-specification designed to eliminate the country-specific effects by using first differences of the involved variables as:

$$\Delta Log\,|\,\Delta EMPL\,|_{i,t} = \beta_i \Delta X_{i,t} + \delta_t + \eta_i + \Theta \Delta Z_{i,t} + \varepsilon_{i,t} \qquad (4)$$

The system-GMM approach estimates equations (3) and (4) simultaneously, by using lagged levels and lagged differences as instruments. The presence of both lagged levels and differences is justified by Arellano and Bover (1995) and Blundell and Bond (1998) which showed that lagged levels can be poor instruments for first-differenced variables, particularly if the variables are “persistent”.

Empirical Results

Table 1 provides information about the involve variables. It appears that there is an important heterogeneity of the variables especially for Log|ΔEMPL|, domestic consumption (LogΔCONS) and the interaction between marginal intra-industry trade and openness trade (LogMIITXTRADE). Thus, the estimation methodology should treat the bias that can be induced by such diversity in the data.

Table 1: Employment Changes, Marginal Intra-industry Trade, and Adjustment Costs: Descriptive Statistics

Variables	Mean	Std Dev	Minimum	Maximum
Log|ΔEMPL|	-3,29	1,66	-10,38	0,33
LogMIIT	-0,91	1,06	-8,87	-0,01
LogΔPROD	-2,24	1,46	-6,22	3,01
LogΔCONS	5,53	1,26	1,88	10,43
LogMIITxTRADE	4,57	1,66	-4,82	8,81
N	336			

Table 2 reports on the GMM-System output with orthogonal transformation of data. The equation presents consistent estimates, with no problems with the validity of Ar(2). The Sargan test shows that there are no problems with validity of instruments used. We used the criterion of Windmeijer (2005) to small sample correction. The instruments in levels used are Log|ΔEMPL| (3,7), LogΔPROD (3,7), and LogMIITxTRADE (3,7) for first differences. For levels equations, the instruments are used first differences all variables lagged t-2.

As show in table 2, all explanatory variables are significant (Log|ΔEMPL|$_{it-1}$, at 5%, LogMIIT at 1%, LogΔPROD at 1%, LogΔCONS, at 5%, and LogMIITxTRADE at 5% level significant).

As expected the lagged change employment (Log|ΔEMPL|$_{it-1}$) has a significant and positive effect. This result is according to Fertö and Soós (2010). The index of marginal intra-industry trade (LogMIIT) has a negative sign, our result validates the hypothesis of smooth adjustment. The coefficient of absolute value of the change in apparent consumption (LogΔCONS) presents a negative sign. The variable labor productivity (LogΔPROD) presents a positive sign, which confirms the study of Fertö (2009).

For the proxy LogMIITxTRADE the expected sign is negative, but this is not confirmed by the estimation methodology.

Table 2: Employment Changes, Marginal Intra-industry Trade, and Adjustment Costs: GMM-System with orthogonal transformation of data

Variables	GMM-SYS	*t*-statistics	Significance	Expected Sign
Log|ΔEMPL|$_{it-1}$	0,23	(2,54)	**	(+)
LogMIIT	-0,70	(-2,82)	***	(-)
LogΔPROD	0,28	(3,95)	***	(+/-)
LogΔCONS	-0,58	(-2,15)	**	(-)
LogMIITxTRADE	0,42	(1,99)	**	(-)
N	336			
Arellano-Bond test for Ar(2) (P-value)	0,421			
Sargan test (P-value)	1,00			

The null hypothesis that each coefficient is equal to zero is tested using one-step robust standard error. T-statistics (heteroskedasticity corrected) are in round brackets. P-values are in square brackets; ***/**- statistically significant at the 1% and 5% levels. M2 is 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 (based on the efficient two-step GMM estimator). Sargan is a test of the over-identifying restrictions, asymptotically distributed as under the null of instruments' validity (with two-step estimator).

Conclusions

This study investigates the connections between marginal intra-industry trade and the adjustments in the labor market for the Portuguese case. Our results provide some empirical support for the viability of the hypothesis of smooth adjustment of the labor market under the impact of the changes in marginal intra-industry trade in this case reflecting lower adjustment costs. Such outcome can be better understood by taking into account the positive effects induced in employment changes by an increase in labor productivity and the inhibitor effects of a positive dynamics of consumption. In other words, it can be presumed that the labor market adjustments are labor demand-driven and the intra-industry trade is related to structural adjustments in this market. However, such interpretation should be analyzed in greater details by considering several other aspects of labor market adjustment processes such as the evolution of the real wages, the intra and inter sectors labor mobility, the social inclusion policies or the effects of openness degree.

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