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Intra-industry Trade and Labour Market Adjustment in France

Hatem Derbel [α], Neila Dammak [σ] & Ali Chkir [ρ]

Abstract - According to the "smooth adjustment hypothesis", the labor market adjustment costs entailed by trade liberalization are lower if trade expansion is intra industry rather inter industry in nature. In this paper, we study the link between trade and labor-market changes in France over the period 1986-2011. The empirical survey, uses a panel data models with fixed effects, it showes a negative correlation between changes of employment and marginal intra-industry trade. These results confirm the smooth adjustment hypothesis. The mesure of marginal IIT is then found to be more appropriate for the analysis of adjustment issues than the traditional static IIT index.

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I. Introduction

In recent decades, intra industry trade (IIT), the simultaneous import and export of very similar goods, has been a pervasive and steadily growing empirical phenomenon. A range of theoretical models have been developed to explain its existence. These models associate IIT with welfare gains from trade that arise through the exploitation of scale economies, an increase in product variety and the intensification of competitive pressures (see Helpman and Krugman, 1985). In addition to these gains, it is also widely believed that trade expansion of the intra-industry type entails relatively smooth resource reallocation and hence low transitional adjustment costs, this proposition that has become known as the "smooth adjustment hypothesis" (SAH).

The relationship between IIT and adjustment has been a close one from the very earliest work on IIT. However, the existing literature in this relationship between IIT and adjustment has some serious limitations. First, researchers have so far used the conventional Grubel Lloyd (GL) index in analysing trade patterns. However, Hamilton and Kniest (1991) have argued that such a static measure of IIT is not inherently related to changes in trade and specialization, and suggested the use of alternative measures of marginal IT (MIIT). Therefore GL indices are complemented with a measure of MIIT[1]. Second, some evidence in support of the SAH was recently found, the results of these studies were not fully conclusive. Third, the smooth adjustment hypothesis, both in the GL and in the MIIT version, have rarely been subjected to explicit tests in France.

In this paper, we estimate directly the relationship between IIT and adjustment indicators. Specifically, we suggest that too little emphasis has been given to what is in effect the manifestation of adjustment pressures, the labour market. The concept of labour market adjustment revolves primarily around job gains and losses and the subsequent need for workers to relocate and/or retrain.

The paper is organized as follows. Section 2 presents the static and dynamic measurement of intra-industry. Section 3 outlines the theoretical background of the relationship between intra-industry trade and labor market adjustment. Section 4 presents the results of empirical researches. The estimation results are presented in Section 5. Section 6 concludes.

II. Measuring Intra Industry Trade

IIT has traditionally been measured by the Grubel-Lloyd (GL) index:

$$GL_{it} = IIT_{it} = 1 - \frac{|X_{it} - M_{it}|}{(X_{it} + M_{it})}$$

where M stands for imports in a particular industry i, X represents corresponding exports, and t is the reference year. The value of this index ranges between 0 and 1, inclusive. The former value indicates that all trade is of the inter-industry type, the latter that all trade is IIT. It has become standard practice not to adjust the index for overall trade imbalance, since an unbalanced trade account can well be compatible with overall balance of payments equilibrium.

The GL index is a static measure, in the sense that it captures IIT for one particular year. However, adjustment is a dynamic phenomenon. By suggesting the concept of marginal IIT (MIIT), Hamilton and Kniest (1991) have opened a dimension to the empirical study of IIT which acknowledged this problem and endeavoured to define IIT in a sense that is compatible with the smooth-adjustment hypothesis. They argued that the observation of a high proportion of IIT in one particular time period does not justify a priori any

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[1] See Greenaway and Milner (1986) for litterature survey.

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prediction of the likely pattern of change in trade flows. Even an observed increase in static IIT levels between two periods (GLt-GLt-1> 0) could "hide" a very uneven change in trade flows, concomitant with interrather than intra-industry adjustment. MIIT, however, denotes parallel increases or decreases of imports and exports in an industry. Matched changes of sectoral trade volumes are expected to have a neutral effect on employment. For example, if industry i imports expand, domestic jobs may be threatened in that industry, but if industry i exports expand by a comparable amount, this may offset lost market share in the domestic market and yield a zero net change in the industry's domestic employment. Brülhart (1994) has suggested the following index to measure MIIT[2]:

$$A_{it} = MIIT_{it} = 1 - \frac{\left|\Delta X_{it} - \Delta M_{it}\right|}{\left|\Delta X_{it}\right| + \left|\Delta M_{it}\right|}$$

Where Δ stands for the difference between years t and t-n. This index, like the GL coefficient, varies between 0 and 1, where 0 indicates marginal trade in the particular industry to be completely of the inter-industry type, and 1 represents marginal trade to be entirely of the intra-industry type. The index A shares most of the statistical properties of the GL index.

III. Intra- Industry Trade and Adjustment: Theoretical Background

The relationship between IIT and adjustment has been a close one from the very earliest work on IIT. Recent developments in intra-industry trade (IIT) literature focus on the relationships between IIT and adjustment costs associated with changes in trade pattern. The effects of trade liberalisation depend on whether trade is of an inter-industry or intra-industry nature. Whereas the former is associated with a reallocation of resources between industries, the latter suggests a reallocation within industries.

The hypothesis SAH, first made by Balassa (1966) and further developed by Greenaway and Milner (1986) and Brülhart and Elliott (2002), consider that intra-industry trade entails lower adjustment costs than inter-industry trade expansion. In fact, IIT will be associated with relatively low labour-market problem, since, with intra-industry adjustment, workers move within industries rather than between them.

On the theoretical side, several models have been developed. They generally indicate that this trade appears to be favorable for structural adjustment. If intra-industry trade resulting strategies "reciprocal dumping" for example, as in the oligopoly model of Brander-Krugman (1983), the same firm's share of the national market decline, but in return gets an increase its sales abroad. The development of foreign trade in this context does not factor reallocation.

In addition, as part of a trade model based on monopolistic competition model of Dixit-Stiglitz (1977), intra-industry, which is the product differentiation and consumer preferences for diversity, requires no more reallocation of factors that the creation of inter-industry trade and that can generate positive effects on earnings. The opening of trade can benefit all staff who enjoy the benefits of greater diversity of goods offered. If the combined model type elements Hecksher-Ohlin and elements of monopolistic competition, the negative effects of Stolper-Samuelson type may be dominated by the positive effects of product diversity.

In the model of Krugman (1982), the number of differentiated products and therefore the number of firms does not vary with trade openness. This simplifies the adjustment problems. However, the conditions facilitating the adjustment can not be met. For this reason Lancaster (1982) stresses that the way to model monopolistic competition has a significant impact on the conclusions regarding the effects of trade opening. The wording in the Dixit-Stiglitz (1977) shows that adjustment costs are low while the one proposed by Lancaster (1980) shows that the effects of trade liberalization are much more "disturbing" for the economy concerned. The Lancaster model assumes that firms will have to leave the industry with differentiated products, others will expand their production by exploiting stronger economies of scale. Overall, adjustment problems, such as labor movements intra-industry could create structural unemployment, are stronger in the Lancaster version than in version Dixit-Stiglitz-Krugman.

Thus, the theory of international trade under imperfect competition generally finds that adjustment costs are almost nonexistent in the case of strategies of "reciprocal dumping" in oligopoly, low in the case of monopolistic competition in the Dixit-Stiglitz-Krugman somewhat stronger in the case of monopolistic competition in Lancaster. Alternatively, if the intra-industry trade in horizontally differentiated variety makes gains while avoiding significant adjustment costs for countries, intra-industry vertical differentiation may result in adjustment costs outweigh intra-industry trade in horizontally differentiated. Thus, there is no equivalent for countries to specialize in products for low-end or high end in the same branch. In practice, since it is very difficult to distinguish previous cases in which one finds oneself, the new international trade theory retains only the general idea that, whatever the origin of intra-industry, the development of this trade will pose fewer problems in practice adjustment that the growth of international trade flows branches.

The rationale behind this hypothesis can be concisely summed up as follows. According to the Hecksher-Ohlin Model, in response to the new good's

[2] Hamilton and Kniest (1991), Greenaway et al. (1994) and Menon and Dixon (1997) have proposed alternative measures

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relative prices, free trade induce countries to a deeper specialisation on the industries where they posses comparative advantage, that is, inter-industry specialisation. But if the relative factor endowments of countries are very similar and industries consist on a range of differentiated varieties with scale economies on its production, similarity on consumer's tastes will create an exchange of different varieties of the same products or intra-industry trade. So, in that case countries are going to experience intra-industry specialisation. In any case, the adaptation to the new situation requires de re-location of a part of the production factors. Given that the workers and managerial skills are more similar within industries than between different industries, such a re-location will be easy if it happens within the same industry. That argument is the basis for the smooth adjustment hypothesis (SAH).

IV. Empirical Researches on IIT and Adjustment

The first studies that used econometric methods suited to test the SAH include Brülhart and Elliott (1998), Sarris et al. (1999) and Tharakan and Calfat (1999). Most former studies used as a labour market adjustment costs variable either the change in Industry level employment changes (ΔLj). This variable has been seen as an inverse proxy for adjustment costs. The higher/lower this variable the lower/higher the adjustment costs, based on the assumption that the lower the employment loss implied by trade the lower the adjustment costs. As Brülhart and Elliott (1998) argue, net sector employment change is a measure of net employment performance rather than adjustment costs.

Measures of employment performance should not necessarily be expected to be systematically related to type of trade expansion. In this case, no clear relation can be predicted between MIITj and ΔLj. Therefore, higher levels of MIIT are expected to be associated with lower levels of variation in total employment of each sector, while in industries where the inter-industry component of trade expansion is dominant (industries with lower MIIT indexes) the net change in total employment can be either positive (in industries with net export expansion) or negative (in industries with net import expansion) and so either larger or smaller than in industries where the intra-industry component of trade expansion is dominant. To overcome this problem Brülhart (1999) suggests the use of an alternative measure: the absolute value of total employment changes ($|\Delta Lj|$). According to the frequently invoked Smooth Adjustment Hypothesis (SAH), the factor-market adjustment pressure induced by increased trade exposure is negatively related to the share of IIT in the expanded trade flow. Although some evidence in support of the SAH was recently found (Brulhart and Elliot (2000); Brulhart and Thorpe (2001); Brulhart et al. (2004), Brulhart, Elliott and Lindley (2006), Cabral and Silva (2006) ...), the results of these studies were not fully conclusive. In fact, others studies find that this type of trade causes more problems of adjustment in employment than inter-industry trade (Hamilton and Kniest (1991); Brulhart and Elliott (1998); Brulhart and Thorpe (2000); Erlat and Erlat (2003); Ferto and Soos (2008) ...).

V. Empirical Model and Data

a) The Model

We study the link between IIT and adjustment in France. A data set, with matched disaggregated industry and trade data based on the ISIC code (Rev. 4) for France over the period 1986-2011, has been compiled. All data were obtained through the International Economic Data Bank (IEDB) The following basic equation has been estimated:

$$DEMPL_{it} = \beta_0 + \beta_1\, DPROD_{it} + \beta_2\, DCONS_{it} + \beta_3\, TREX_{it} + \beta_4\, IIT_{it} + \varepsilon_{it}$$

$$DEMPL_{it} = \beta_0 + \beta_1\, DPROD_{it} + \beta_2\, DCONS_{it} + \beta_3\, TREX_{it} + \beta_4\, IIT_{it} + TREX * IIT_{it} + \varepsilon_{it}$$

with $\varepsilon_{it} = \gamma_i + \eta_{it}$; $\eta_{it} \sim \text{iid}\,(0,\ \sigma^2)$ and γ_i correlated with regressors, where i denotes industries and t denotes years.

DEMPL, the dependent variable, is the absolute value of employment change between t and t-n, which we use as a proxy for the costs of adjustment in the labour market.

Underlying this proxy is the assumption that the total resource cost involved in moving labour across sectors is proportional to the size of net payroll changes, and that this proportion is similar across industries and over time. The explanatory model is specified as follows.

DPROD stands for the absolute value of the change in labour productivity (output per worker) between year's t and t-n. A priori, this variable is expected to relate positively to DEMPL. The second regressor, DCONS, is the absolute value of the change in apparent consumption, and is also expected to relate positively with DEMPL.

TREX represents trade exposure, calculated as the ratio of imports plus exports over output. One could expect TREX also to correlate positively with our

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dependent variable, given that greater trade exposure will increase inter-industry specialization pressures and Schumpeterian processes through intensified competition. The crucial priors concern the IIT variable. According to the smooth-adjustment hypothesis, this should relate negatively to the level of inter-industry job changes, as measured by DEMPL. The literature on MIIT suggests that this relationship should be particularly pronounced when IIT is understood in the sense of a measure such as the A index rather than in the sense of the GL index. Both of these indices are investigated for comparison.

Given that unknown industry-specific effects undoubtedly play a role in the context of our model, a model that uses panel data has been chosen. A fixed-effects estimator was chosen, since the data set covers the entire manufacturing sector. All variables are in constant prices, and, with the exception of IIT measures, in natural logarithms.

b) Results

We estimate a panel model with fixed effects for the case of France over the period between 1986-2011. Table 3 reports the results carried out on yearly intervals:

Tableau 3 : Résultats de l'estimation

	GL index		Aidex	
	No interaction	Interaction term	No interaction	Interaction Term
DLPROD	0.008 (0.03)	0.003 (0.04)	0.09 (0.06)	0.10 (1.376)
DLCONS	0.260 (2.17)	0.25 (0.03)	0.1070 (0.052)	0.1144 (0.001)
LTREX	-0.19 (-0.02)	-0.7 (-0.07)	-0.21 (-0.08)	-0.23 (-0.04)
GL	0.58 (1.87)	0.6 (2.46)		
LTREX*GL		0.295 (3.21)		
A			-0.10 (0.01)	-0.15 (0.05)
LTREX*A				-0.291 (0.09)

The figures in parentheses are t ratios.

The results shows that:

I. The signs of the coefficients DLPROD and DLCONS are consistent with our expectations. We obtained a positive effects of consumption and productivity on employment in all specifications.
II. The estimated coefficients of the TRADE variable are significant for all cases and they have expected signs.
III. Concerning the GL indices, we obtained a positive and statistically insignificant in the model without interaction. This effect is always negative and statistically insignificant in the model with interaction. This confirms that the GL index can not be a good indicator of intra-industry trade.
IV. The coefficients on the A index are significant with expected sign. We obtained a negative effect in all specifications. This shows firstly that the hypothesis SAH is verified. On the other hand, the best index to study the impact of intra-industry trade on employment is the index A.

VI. Conclusion

The aim of this paper is to study the relationship between intra-industry trade and the movement of employment, taking the latter as an indicator of the adjustment costs of the labor market. The assumption that the intra-industry trade entails less adjustment cost of employment that the inter-industry trade has been accepted by economists. However, the diversity of empirical results raised the question of the choice of the index measuring intra industry trade. The empirical study, using a panel fixed effect, showed that the hypothesis SAH is verified in the case of France. The mesure of marginal IIT is found to be more appropriate for the analysis of adjustment issues than the traditional static IIT index.

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