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# Marginal Intra-Industry Trade and Employment Reallocation: The Case Study of Iran's Manufacturing Industries

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**Abstract** The purpose of this paper is to test the smooth adjustment hypothesis by using panel technique for Iran's manufacturing industries at the 4-digit aggregation level of ISIC classification, during time period 2001–2006. According to the smooth adjustment hypothesis, intra-industry trade expansion entails lower adjustment costs than inter-industry one. In this paper, by distinguishing marginal intra industry trade to its horizontal and vertical types and employing the total reallocation effect as a proxy of the adjustment cost of reallocation between sectors and occupations, we've tested smooth adjustment hypothesis for both marginal intra industry trade and its types. So, comparing with other empirical studies, this paper has used marginal vertical and horizontal intra industry trade as well as marginal intra industry trade to test the hypothesis. The obtained results do not support the hypothesis for marginal intra industry trade. On the other hand, by distinguishing marginal intra industry trade to marginal horizontal and vertical intra-industry trade, this hypothesis is expectedly confirmed. This result is justifiable since marginal horizontal intra industry trade is a change of intra industry trade with the similar factor intensity while marginal vertical intra industry trade is mainly based on the differences in factor endowment.

**Keywords** smooth adjustment hypothesis · marginal horizontal intra-industry trade · marginal vertical intra-industry trade · employment reallocation · manufacturing industries · panel data · Iran

**JEL classification** F16 · J62 · C33

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## 1 Introduction

Adjustment costs are all costs of transferring resources from one sector to another as a result of any change in the economy, such as changes in technology, demand, regulations, natural conditions, political stability and international agreements. Labour markets receive more attention than capital markets since the former bear higher costs and it can also have a considerable political influence. They are particularly important in developing countries that are specialized in labour intensive manufacturing sectors (Laird and Cordoba 2006).

Adjustment costs in the context of trade expansion are those welfare losses that arise in labour markets from temporary unemployment, due to factor price rigidity or from costs incurred through job search, re-location and re-training (Brülhart and Elliott 2002; Fertő 2005).

Recent developments in theoretical literature in Intra-Industry Trade (IIT) have paid attention to the relationship between intra-industry trade and adjustment costs (Fertő and Soos 2008). Based on Smooth Adjustment Hypothesis (SAH), intra-industry trade expansion will have lower adjustment costs than inter-industry trade one (Faustino and Leitão 2009; Fertő 2005; Brülhart and Elliott 2002).

The reason is linked to the nature of intra industry trade, that is, this type of trade as a simultaneously export and import implies an easy move of the similar factors among sectors.

Marginal Intra-Industry Trade (MIIT) is a central concept in the analysis of labor-market adjustment costs especially when trade patterns change. In such a case, the MIIT index of Brülhart (1994) is usually considered as more suitable index than the static index of Grubel and Lloyd (1975) to explain or to test the relationship between labor-market adjustment and intra-industry trade (Faustino and Leitão 2010).

The purpose of present paper is to test SAH by distinguishing MIIT into its types. For this by using Iran's manufacturing industries data at the ISIC 4-digit aggregation level during time period 2002–2006, we have employed a proxy to measure the adjustment cost which introduced by Cabral and Silva (2006). This measure is based on occupational changes in each industry, measuring not only total changes in the employment level but also changes in the composition of the labour force of each industry (Cabral and Silva 2006).

The rest of the paper is organized as follows. Section 2 provides the literature including theoretical and empirical background of SAH. Section 3 presents model specification and data description. Section 4 is devoted to the empirical results and ultimately the conclusion is provided in Section 5.

## 2 Literature

### 2.1 Theoretical background

Adjustment costs are caused by any changes in economy. The more movements in factor production, the more the cost will impose on the economy. According to the frequently invoked smooth adjustment hypothesis, the factor-market adjustment pressure induced by increased trade exposure is negatively related to the share of IIT in the expanded trade flow (Brülhart et al. 2006).

The intuition behind the SAH is straightforward. These costs are more possible to arise while changing trade and subsequently sectoral restructuring, since, in this case, factors moves from the contracted sectors to the expanded ones. In the framework of intra industry trade, production factors are similar. It's why that inter industry trade imposes more adjustment costs compared to intra industry one.

Brülhart and Elliott (2002) consider a small open economy exposed to a demand shock that is induced by the removal of some trade protections. This alters the relative goods prices, which consequently causes resources to move from one activity to another. In this model, an increase in import competition of a particular industry may decrease the demand of production factors of this industry. Regarding to labour as the mobile factor in the short run, this factor will be the first affected one from the adjustment pressure. Under the definition of the SAH, this means that the adjustment costs will be lower than if the shocks occur in different industries when the offsetting import and export shocks occur simultaneously within a sector.

This issue can be investigated by the Jones-Samuelson specific-factors version of a neoclassical trade model. Therefore, the specific-factors model suggests two sources of adjustment costs, factor specificity and factor-price rigidity. The relevant empirical manifestations are factor-price disparities and unemployment. In fact, both phenomena may appear jointly.

Also, the monopolistic-competition model of IIT is generally employed as the base of the SAH. For instance, Krugman model (1981) puts forward the hypothesis which is "IIT poses fewer adjustment problems than inter-industry trade". The mainstream models of IIT in horizontally differentiated goods assume the products of an industry to be perfectly homogenous in terms of quantitative and qualitative factor requirements and thus eliminate transitional costs by assumption (Brülhart et al. 2004).

To test the SAH, some previous studies have examined the relationship between IIT and the distance of worker moves. When trade expansion is IIT, workers will more frequently move within their own industry (for details see i.e. Brülhart et al. 2006; Elliott and Lindley 2006). Hence, according to the SAH, adjustment costs in the form of unemployed resources and of adjustment services will be low if trade expansion is IIT.

Furthermore, Changes in intra industry trade, i.e. marginal IIT, means changes in trade of goods with similar factor intensities and in this case, movements in production factors and consequently adjustment costs will be low. But adjustment costs due to changing IIT depend on the type of intra industry trade. Specifically, the adjustment costs of horizontal differentiation are lower than vertical one and the latter is similar to inter industry trade and so, it may involve the economy with more the adjustment costs.

Researchers such as Helpman and Krugman (1985), Abd-el-Rahman (1984, 1986 and 1991) and Greenaway, Hine and Milner (1994) have divided IIT into its vertical and horizontal components. The implication of this division for the SAH is that factors may be relatively less mobile within vertically differentiated industries than in horizontally ones. Given that horizontally differentiated goods have similar factor intensity, the labour skill requirements will be more similar in horizontally differentiated sectors compared with vertically ones. Then, more retraining will be required and consequently there will be greater adjustment costs for the latter. It is mentionable that horizontal intra industry trade is defined as the simultaneous export and import of goods whose unit values are within a specified range, commonly with dispersion of ±15 %. Based on the logic of the SAH, we expect vertical IIT to have more adjustment costs than horizontal IIT (see, Brülhart and Elliott 2002). Thus, VIIT (and MVIIT) is positively related to adjustment costs and HIIT (and MHIIT) is negatively linked to the costs.

Cabral and Silva (2006) argue that the adjustment variables used in most of the studies such as Faustino and Leitão (2010), Faustino (2010), Faustino and Leitão (2009), Fertő and Soos (2008), Fertő (2005), Erlat and Erlat (2003) and Brülhart and Thorpe (2000) measure only variations in total labour of a sector, a very limited adjustment variable that should not be expected to have any significant relation with the trade variables used to test the SAH. They suggest a new measure of labour market adjustment costs that is capable of assessing and measuring not only total changes in the employment level but also changes in the composition of the labour force of each industry. Therefore, this variable considers the effects of labour reallocation between sectors as well as jobs and it gives a more complete picture of adjustment.

### 2.2 Empirical background

Empirical studies on SAH may be divided into two groups: The first group supports the SAH, but the second one does not provide any support for the hypothesis. Faustino and Leitão (2010), Faustino (2010), Fertő and Soos (2008), Brülhart et al. (2006), Cabral and Silva (2006) and Brülhart and Elliott (2002) have supported the SAH. On the other hand, Faustino and Leitão (2009), Fertő (2005), Brülhart et al. (2004), Erlat and Erlat (2003) and Brülhart and Thorpe (2000) have not provided any support for the SAH.

It's mentionable that there is only one study (Brülhart and Elliott 2002) that has tested SAH for types of IIT (HIIT and VIIT) and there is no study on testing the hypothesis for marginal horizontal intra-industry trade (MHIIT) and marginal vertical intra-industry trade (MVIIT).

Table 1 represents empirical studies on SAH.

## 3 Methodology

### 3.1 Model specification

The present research examines the SAH for Iranian manufacturing industries by using panel data method. Since the adjustment costs are dynamic phenomena, it seems that the static Grubel Lloyd index (GL) is not a suitable measure to test the hypothesis. Consequently, recent theoretical developments emphasize the importance of marginal IIT (MIIT) especially in the framework of trade expansion. To divide MIIT into marginal VIIT and marginal HIIT, we've used the trade types' index of Fontagné et al. (1997). This index is calculated in two stages. In the first stage, trade flow is divided into two and one way trades based on overlapping condition. According to this criterion, the trade will be two way if minority flow is at least 10 % of majority one. In the second stage, based on Dixit and Stiglitz and regarding to similarity condition, two-way trade is itself divided into its types, i.e., horizontal and vertical ones. Then, MIIT is calculated based on Brülhart's index (1994) which is a transformation of the Grubel and Lloyd (1975):

$$MIIT_{it} = 1 - \frac{|\Delta X_{it} - \Delta M_{it}|}{|\Delta X_{it}| + |\Delta M_{it}|} \tag{1}$$

Where $X_{it}$ and $M_{it}$ indicate export and import of goods in industry $i$ in time $t$, respectively. This measure takes value between zero and one (Brülhart 2002).

According to the SAH, the higher the proportion of marginal intra-industry trade, the lower adjustment costs are associated with the trade. In other words, the relation between the

**Table 1** Empirical studies on SAH

| Study | Time | Country | period | Proxy for adjustment cost | Index | estimation method | Result on SAH |
|---|---|---|---|---|---|---|---|
| Brulhart & Thorpe | 2000 | Malaysia | 1970–1994 | absolute value of employment change | $\lvert\Delta L_j\rvert$ | panel data | nonsupport |
| Brülhart & Elliott | 2002 | UK | 1980s | average unemployment duration[a] | $\mathrm{DURATION}_j$ | OLS | support |
| Erlat &Erlat | 2003 | Turkey | 1974–99 | the absolute value of the change in employment | $Ln\lvert\Delta L_j\rvert$ | panel data | nonsupport |
| Brülhart, et al. | 2004 | Irish | 1980s | excess job reallocation[b] | $\mathrm{WITHIN}_j^n$ | panel data | nonsupport |
| Fertő | 2005 | Hungary | 1992–2002 | change in employment | $\Delta L_j$ | panel data | nonsupport |
| Brülhart, et al. | 2006 | UK | 1992–2000 | Worker moves[c] | $INDMOVE_j$ and $\mathrm{OCCMOVE}_j$ | panel data | support |
| Cabral & Silva | 2006 | Portugal | 1995, 1997, 1999 | total reallocation effect | $TE_j$ | panel data | support |
| Fertő & Soos | 2008 | Hungarian & Poland | 1990–98 | absolute value of total employment changes | $\lvert\Delta L_j\rvert$ | panel data | support |
| Faustino & Leitão | 2009 | Portugal | 1996–2003 | change in total employment | $\Delta L$ | panel data | support |
| Faustino & Leitão | 2010 | Portugal | 1996–2003 | absolute employment changes | $\lvert\Delta L_j\rvert$ | dynamic panel data | support |
| Faustino | 2010 | Portugal | 1996–2003 | absolute employment changes | $\lvert\Delta L_j\rvert$ | dynamic & static panel data | support |

[a] They have used two more indices namely *WAGEVARj which is* standard deviation of the real wage of the industry and *CWAGEVARj that is* standard deviation of the real wage of the industry calculated via the estimated coefficients of the sectoral Phillips curve

[b] The excess job realocation is obtained as follows:

$$\mathrm{WITHIN}_j^n = \frac{(POS_j+NEG_j)-\lvert POS_j-NEG_j\rvert}{(POS_j+NEG_j)}$$

Where

$$POS_j = \sum_i \left(L_i^1 - L_i^0\right) \quad \text{if } L_i^1 - L_i^0 > 0$$
$$NEG_j = \sum_i \left|L_i^1 - L_i^0\right| \quad \text{if } L_i^1 - L_i^0 < 0$$

[c] These indices are measured as follows:

$INDMOVE_j = \frac{\sum_x m_{xj}}{L_j}$ *Lj*=share of industry moves with *mxj*=1 if the worker *x* of industry *j* moved to a different industry, and *m*=0 if the worker stayed

And $OCCMOVE_j = \frac{\sum_x z_{xj}}{L_j}$ *where Lj*=share of occupation moves with *z*=1 if the worker *x* of industry *j* moved to a different occupation, and *z*=0 if the worker remained the same occupation adjustment cost ($AC_{it}$) and MIIT should be negative. But it may be ambiguous since MVIIT, one of the components of MIIT, is similar to inter industry trade which raises the adjustment costs.

Besides MIIT, any factors that make changes in the economy may affect on the adjustment costs. In our case, change in productivity makes production factors move between sectors or within them. Then, following Fertő (2009), we expect a positive effect of this variable on the adjustment cost. Also, scale economies can reduce inter industry labor reallocation. Since, value added in literature of industrial organization (IO) stands for minimum efficient scale (MES) (Waterson 1990), we expect the negative effect for this factor (Faustino and Leitão 2009). In the specific-factors model, adjustment costs can also arise without unemployment. In such a case, workers are imperfectly mobile and wages are flexible. Decreasing wages lead to increase demand for labour, hence lead to increase employment and subsequently raise adjustment costs (Brülhart and Elliott 2002). So, it seems that this variable has a negative effect on the adjustment costs. Human capital is the other factor affecting on the adjustment cost. Some empirical studies have used this variable as a proxy for technology-intensity. In this framework, we expect a positive effect of human capital on the employment adjustment (see, e.g. Brülhart et al. 2004). On the other hand, studies on labour market have also suggested that skilled workers tend to move more between industries and occupations.[1] Thus more skill intensive industries will be associated with moving larger number of worker and so we expect a positive effect for this factor.

We have employed two models to examine the hypotheses as well as the effects of above mentioned variables on the adjustment costs. First we have used the following model (model 1) similar to Cabral and Silva (2006) to test SAH for total MIIT:

$$\log AC_{it} = \beta_1 + \beta_2 \log MIIT_{it}^{T} + \beta_3 \log|\Delta PROD_{it}| + \beta_4 \log|\Delta VA_{it}| + \beta_5 \log|\Delta WR_{it}| + \beta_6 \log|\Delta HC_{it}| \tag{2}$$

$$\beta_2 < 0, \beta_3 > 0, \beta_4 < 0, \beta_5 > 0, \beta_6 > 0$$

Also, in order to examine SAH for marginal VIIT and HIIT, we've considered marginal VIIT and HIIT as independent variables in the following model (model 2):

$$\log AC_{it} = \beta_1 + \beta_2 MIIT_{it}^{V} + \beta_3 MIIT_{it}^{H} + \beta_4 \log|\Delta PROD_{it}| + \tag{3}$$

$$+\beta_5 \log|\Delta VA_{it}| + \beta_6 \log|\Delta WR_{it}| + \beta_7 \log|\Delta HC_{it}|$$

$$\beta_2 < 0, \beta_3 < 0, \beta_4 > 0, \beta_5 < 0, \beta_6 > 0, \beta_7 > 0$$

[1] See, e.g. Shin 1997; Jacobson et al. 1993; Greenaway et al. 1999, 2002; Haynes et al. 2002.

We have estimated the adjustment costs based on Cabral and Silva (2006) as follows:

$$TE_i = DE_i + CE_i$$
$$= 2\frac{\left|L_i^1 - L_i^0\right|}{\left(L_i^0 + L_i^1\right)} + 2\frac{\left(\sum_j \left|L_{ij}^1 - L_{ij}^0\right|\right) - \left|L_i^1 - L_i^0\right|}{\left(L_i^0 + L_i^1\right)} = 2\frac{\sum_j \left|L_{ij}^1 - L_{ij}^0\right|}{\left(L_i^0 + L_i^1\right)} \quad (4)$$

Where $L_{ij}^0$ and $L_{ij}^1$ are the number of workers in the industry $i$ that belong to the professional group $j$ in the initial (0) and final (1) years of the period under analysis, respectively. This variable combines the variation in total labour demand of the Industry-Dimension Effect ($DE_i$)-with the variation in the relative demand for different occupational groups that do not affect total demand for labour in the Industry-Composition Effect ($CE_i$). The index will be zero if the number of workers in each professional group and industry does not change during the period. The higher the value of TEj, the higher the employment reallocation and thus the higher the adjustment costs is (Cabral and Silva 2006).[2] The dimension effect (DE), the composition effect (CE) and the total effect (TE) for Iran's Manufacturing Industries are presented by Table 4 in Appendix.

This variable is also employed by recent work of Greenaway et al. (2000) and Haynes et al. (2002). According to these studies, occupational changes are the main cause of adjustment costs. Also, Campos and Dabusinskas (2002) show that transition economies involve massive occupational changes. Furthermore, adjustment costs are strongly associated with qualifications (Brown and Earle 2003).

### 3.2 Data description

In this paper, we have used data at the 4-digit aggregation level of ISIC classification during 2002–2006. To measure MIIT we have first collected data on Iran's export to and import from the rest of world at the 6-digit and 8-digit aggregation level of Harmonized Commodity Description and Coding System (HS), and then we have converted them to the ISIC 4-digit aggregation level (220 observations). Raw data are obtained from the Center of Statistic of Iran (2003–2007) and Islamic Republic of Iran Customs Administration (IRICA 2003–2007).

## 4 Empirical results

We have employed the panel technique to test SAH. To select the appropriate method of estimation among models including the pooled model, Fixed Effects (FE) model and Random Effects (RE) model, we have applied Chow, Lagrange Multiplier (LM of Breusch-Pagan) and Hausman tests by using software of Stata 9.1 and Eviews 7.[3] Table 2 presents Chow, Lagrange Multiplier and Hausman tests for the selected models.

[2] Cabral and Silva (2006) discuss several advantages of this index for SAH investigation. First, it is more informative than the alternatives. Second, it is unbiased in relation to the type of trade flow. Third, it is theory consistent. Forth, it allows gathering occupational and sectoral reallocation and requires less information.

[3] For more details about panel data technique and the related tests, see Baltagi (2008), Hsiao (2005), Gujarati (2004) and Greene (2008).

Based on Chow and Hausman tests in Table 2, we have chosen fixed effects model. Table 3 shows the results of the selected models' estimations.

As Table 3 shows the coefficient of $MIIT^T$ (model 1) is positive but statistically insignificant. Therefore, $MIIT^T$ does not support the smooth adjustment hypothesis. This result is expectable since two components, that is, MHIIT and MVIIT have a different effect on the adjustment costs. As seen from the table, the coefficient of marginal VIIT (model 2) is positive and significant. On the other hand, the coefficient of marginal HIIT (model 2) is negative and significant. These results support the SAH.

Also, the coefficients of log $|\Delta PROD|$ and log $|\Delta WR|$ are positive and significant in model 1 but insignificant in model 2. The coefficient of logVA is negative and significant in model 1 but insignificant in model 2. Furthermore, log $|\Delta HC|$ is positive and significant in three models. According to these results, it seems that a change in human capital affects positively on the adjustment costs but there are no certain results about other factors.

In sum and based on the obtained results, the SAH is not verified for total marginal intra-industry trade. But by dividing marginal intra-industry trade into marginal VIIT and HIIT, this hypothesis is confirmed.

## 5 Conclusion

In this paper, we have examined the smooth adjustment hypothesis (SAH) for Iran's manufacturing industries at the 4-digit aggregation level of ISIC classification during time period 2002–2006. Specifically, to examine the hypothesis, we have tested the relationship between the employment reallocation as the adjustment cost proxy and MIIT, marginal VIIT and HIIT. The obtained results do not support the SAH with respect to total marginal IIT. But, by dividing marginal IIT into marginal VIIT and HIIT, this hypothesis is confirmed. So, the breaking down of MIIT into its components (vertical and horizontal) gives results which are consistent with the theory.

According to the obtained results and in order to minimizing adjustment costs, we suggest that the developing countries should pay more attention to intra industry trade especially horizontal IIT in their policy making. In this relation, they may make some policies such as trading with their income similar partners, paying attention to apparent characteristics of products i.e. differentiating goods horizontally and distributing income equitably. Finally, since trade liberalization may create some adjustment costs as well as some yields, it's better for developing countries to make the balance between them.

**Table 2** Chow, lagrange multiplier and hausman tests

| Model | Test | Test-statistic | P-value | Result |
|---|---|---|---|---|
| Model 1 | Chow | 2.81 | 0.0002 | FE |
| | LM | 24.30 | 0.0002 | RE |
| | Hausman | 26.57 | 0.0256 | FE |
| Model 2 | Chow | 2.59 | 0.0002 | FE |
| | LM | 13.61 | 0.0002 | RE |
| | Hausman | 8.95 | 0.0256 | FE |
| Model3 | Chow | 4.44 | 0.0002 | FE |
| | LM | 37.12 | 0.0002 | RE |
| | Hausman | 6.12 | 0.0835 | FE |

Source: Present study

**Table 3** Results of models estimation

| Independent Variable | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| $MIIT^T$ | 0.0062 | – | – |
| $MIIT^V$ | – | 0.0619** | 0.0466** |
| $MIIT^H$ | – | −0.0324*** | −0.0404*** |
| $\|\Delta PROD\|$ | 0.3120*** | 0.0289 | – |
| $\|\Delta VA\|$ | −0.2234*** | 0.0313 | – |
| $\|\Delta WR\|$ | 0.2431*** | −0.1759 | – |
| $\|\Delta HC\|$ | 0.1253*** | 0.3648** | 0.1360*** |
| Constant | −0.8648*** | −1.3158*** | −0.9265*** |
| F | 13.3815 | 9.2825 | 4.1795 |
| P-value | 0.0000 | 0.0000 | 0.0000 |
| $R^2$ | 0.8614 | 0.7962 | 0.6031 |
| Adjusted $R^2$ | 0.7970 | 0.7104 | 0.458 |

Significance levels are: * 10 %, ** 5 %, *** 1 %

Source: Present study

## Appendix

**Table 4** Dimension Effect (DE), Composition Effect (CE) and Total Effect (TE) in Iran's manufacturing industries

| 4digit | Description | DE | CE | TE |
|---|---|---|---|---|
| 1512 | Processing/preserving of fish | 0.28 | 0.73 | 1.01 |
| 1514 | Vegetable and animal oils and fats | 1.05 | 1.24 | 2.29 |
| 1515 | Slaughtering of animals | 2.26 | −0.23 | 2.03 |
| 1516 | processing and preserving of meat and meat products | 1.80 | −0.46 | 1.34 |
| 1517 | Cleaning, grading and packing of date | 0.51 | −0.01 | 0.50 |
| 1518 | Cleaning, grading and packing of pistachio | 6.04 | −5.46 | 0.59 |
| 1519 | Cleaning, grading and packing of fruits etc. | 1.86 | −0.04 | 1.82 |
| 1520 | Dairy products | 4.71 | −1.54 | 3.17 |
| 1531 | Grain mill products | 0.56 | 0.05 | 0.60 |
| 1532 | Starches and starch products | 1.20 | −0.04 | 1.16 |
| 1533 | Prepared animal feeds | 3.56 | −0.62 | 2.95 |
| 1542 | Sugar | 1.23 | −0.30 | 0.92 |
| 1543 | Cocoa, chocolate and sugar confectionery | 4.53 | −0.97 | 3.56 |
| 1544 | Macaroni, noodles & similar products | 0.15 | 0.49 | 0.64 |
| 1545 | Manufacture of bakery products | 0.49 | 1.47 | 1.96 |
| 1546 | Manufacture of cookies, biscuits, etc. | 0.44 | 1.03 | 1.47 |
| 1547 | Processing of tea leaves | 3.24 | −2.11 | 1.13 |
| 1548 | Manufacture of food products not elsewhere classifed | 0.86 | −0.06 | 0.81 |
| 1551 | Distilling, rectifying & blending of spirits | 9.05 | −1.18 | 7.87 |
| 1552 | Wines | 0.00 | 0.00 | 0.00 |
| 1553 | Malt liquors and malt | 0.27 | 1.62 | 1.88 |

**Table 4** (continued)

| 4digit | Description | DE | CE | TE |
|---|---|---|---|---|
| 1555 | Manufacture of non-alcholic carbonated drinks | 2.09 | −1.03 | 1.06 |
| 1556 | Manufacture of diluted yogurt and mineral waters | 14.93 | −4.38 | 10.55 |
| 1600 | Tobacco products | 2.26 | 5.13 | 7.40 |
| 1711 | Textile fibre preparation; textile weaving | 3.09 | −0.73 | 2.36 |
| 1712 | Finishing of textiles | 0.68 | 0.89 | 1.57 |
| 1721 | Made-up textile articles, except apparel | 0.31 | 0.68 | 0.99 |
| 1723 | Cordage, rope, twine and netting | 2.66 | 0.12 | 2.77 |
| 1724 | Tin ores and concentrates | 1.91 | −0.12 | 1.79 |
| 1725 | Vanilla | 4.89 | −1.48 | 3.41 |
| 1726 | Veget.mater.of a kind used primar.for plaiting | 0.22 | 0.22 | 0.44 |
| 1729 | Other textiles n.e.c. | 5.94 | −0.86 | 5.08 |
| 1731 | Manufacture of knitted Garments | 2.46 | 1.29 | 3.75 |
| 1732 | Manufacture of knitted socks, purses and Hand glouses | 10.65 | −1.95 | 8.70 |
| 1810 | Wearing apparel, except fur apparel | 3.03 | 0.90 | 3.94 |
| 1820 | Dressing & dyeing of fur; processing of fur | 20.00 | −1.33 | 18.67 |
| 1911 | Tanning and dressing of leather | 0.69 | 2.12 | 2.80 |
| 1912 | Luggage, handbags, etc.; saddlery & harness | 11.88 | −1.81 | 10.07 |
| 1920 | Footwear | 4.91 | −0.89 | 4.02 |
| 2010 | Sawmilling and planing of wood | 3.37 | −1.25 | 2.12 |
| 2021 | Veneer sheets, plywood, particle board, etc. | 0.38 | 1.39 | 1.76 |
| 2022 | Builders' carpentry and joinery | 6.82 | −1.22 | 5.60 |
| 2023 | Wooden containers | 9.12 | −0.28 | 8.84 |
| 2029 | Other wood products; articles of cork/straw | 12.82 | −3.37 | 9.45 |
| 2101 | Pulp, paper and paperboard | 2.65 | −1.14 | 1.50 |
| 2102 | Corrugated paper and paperboard | 1.22 | 0.09 | 1.30 |
| 2109 | Other articles of paper and paperboard | 0.52 | 1.51 | 2.03 |
| 2211 | Publishing of books and other publications | 3.27 | −0.83 | 2.45 |
| 2212 | Publishing of newspapers, journals, etc. | 2.67 | 0.04 | 2.71 |
| 2213 | Publishing of recorded media | 20.00 | −7.12 | 12.88 |
| 2219 | Other publishing | 10.83 | −2.64 | 8.19 |
| 2221 | Printing | 0.56 | 0.01 | 0.57 |
| 2222 | Service activities related to printing | 7.39 | −1.18 | 6.21 |
| 2230 | Reproduction of recorded media | 20.00 | −9.17 | 10.83 |
| 2310 | Coke oven products | 1.27 | 3.20 | 4.46 |
| 2320 | Refined petroleum products | 1.25 | −0.26 | 0.99 |
| 2330 | Processing of nuclear fuel | 0.00 | 0.00 | 0.00 |
| 2411 | Basic chemicals, except fertilizers | 4.06 | −1.38 | 2.67 |
| 2412 | Fertilizers and nitrogen compounds | 3.27 | −0.78 | 2.48 |
| 2413 | Plastics in primary forms; synthetic rubber | 2.21 | 2.16 | 4.37 |
| 2421 | Pesticides and other agro-chemical products | 0.27 | 0.41 | 0.67 |
| 2422 | Paints, varnishes, printing ink and mastics | 0.32 | −0.07 | 0.24 |
| 2423 | Pharmaceuticals, medicinal chemicals, etc. | 0.78 | 0.35 | 1.12 |
| 2424 | Soap, cleaning & cosmetic preparations | 0.08 | 0.68 | 0.75 |
| 2429 | Other chemical products n.e.c. | 2.27 | −0.27 | 2.00 |

**Table 4** (continued)

| 4digit | Description | DE | CE | TE |
|---|---|---|---|---|
| 2430 | Man-made fibres | 3.92 | −2.25 | 1.66 |
| 2511 | Rubber tyres and tubes | 0.82 | 0.08 | 0.89 |
| 2519 | Other rubber products | 1.38 | 0.30 | 1.68 |
| 2520 | Plastic products | 2.64 | −0.66 | 1.98 |
| 2611 | flat glass | 0.65 | 2.24 | 2.89 |
| 2612 | Shaping and processing of flat glass | 1.84 | −0.18 | 1.65 |
| 2691 | Pottery, china and earthenware | 1.32 | −0.30 | 1.01 |
| 2692 | Refractory ceramic products | 0.84 | 2.02 | 2.86 |
| 2694 | Cement, lime and plaster | 0.36 | 0.08 | 0.44 |
| 2695 | Articles of concrete, cement and plaster | 0.02 | 1.03 | 1.05 |
| 2696 | Cutting, shaping & finishing of stone | 1.64 | 0.91 | 2.55 |
| 2697 | Refining of Limonite, surcon & refinding of plumbago | 0.85 | −0.27 | 0.59 |
| 2698 | Manu.of Terrazzo | 2.86 | −0.13 | 2.73 |
| 2699 | Other non-metallic mineral products n.e.c. | 2.96 | −0.78 | 2.19 |
| 2710 | Basic iron and steel | 0.17 | 0.07 | 0.24 |
| 2721 | Carpets and other textile floor coverings, knotted | 0.18 | 2.50 | 2.68 |
| 2722 | Carpets and other textile floor coverings, woven, not tufted or flocked | 0.63 | 1.94 | 2.57 |
| 2723 | Carpets and other textile floor coverings, tufted | 4.39 | 0.82 | 5.21 |
| 2731 | Casting of iron and steel | 0.40 | 0.21 | 0.61 |
| 2732 | Casting of non-ferrous metals | 0.37 | 0.00 | 0.36 |
| 2811 | Structural metal products | 2.81 | −0.71 | 2.10 |
| 2812 | Tanks, reservoirs and containers of metal | 0.22 | 1.08 | 1.30 |
| 2813 | Steam generators, except central heating hot water boilers | 3.54 | −1.05 | 2.49 |
| 2891 | Metal forging/pressing/stamping/roll-forming | 1.24 | −0.13 | 1.12 |
| 2892 | Treatment & coating of metals | 0.14 | 1.46 | 1.59 |
| 2893 | Cutlery, hand tools and general hardware | 1.46 | −0.44 | 1.01 |
| 2899 | Other fabricated metal products n.e.c. | 0.59 | 0.27 | 0.86 |
| 2911 | Engines & turbines (not for transport equipment) | 4.06 | −0.45 | 3.61 |
| 2912 | Pumps, compressors, taps and valves | 0.95 | 0.78 | 1.73 |
| 2913 | Bearings, gears, gearing & driving elements | 2.19 | −0.35 | 1.84 |
| 2914 | Ovens, furnaces and furnace burners | 1.36 | 0.40 | 1.76 |
| 2915 | Lifting and handling equipment | 2.21 | −1.29 | 0.91 |
| 2919 | Other general purpose machinery | 1.89 | −0.02 | 1.87 |
| 2921 | Agricultural and forestry machinery | 0.04 | 1.62 | 1.67 |
| 2922 | Machine tools | 3.58 | −1.20 | 2.38 |
| 2923 | Machinery for metallurgy | 1.80 | 0.50 | 2.30 |
| 2924 | Machinery for mining & construction | 1.16 | 0.46 | 1.63 |
| 2925 | Food/beverage/tobacco processing machinery | 2.28 | −0.12 | 2.16 |
| 2926 | Machinery for textile, apparel and leather | 0.62 | −0.04 | 0.58 |
| 2927 | Weapons and ammunition | 0.00 | 0.00 | 0.00 |
| 2929 | Other special purpose machinery | 0.26 | 1.22 | 1.48 |
| 2930 | Domestic appliances n.e.c. | 1.58 | 0.63 | 2.20 |
| 3000 | Office, accounting and computing machinery | 0.22 | 1.88 | 2.10 |
| 3110 | Electric motors, generators and transformers | 0.65 | 0.43 | 1.08 |

**Table 4** (continued)

| 4digit | Description | DE | CE | TE |
|---|---|---|---|---|
| 3120 | Electricity distribution & control apparatus | 0.17 | 0.90 | 1.08 |
| 3130 | Insulated wire and cable | 1.08 | −0.74 | 0.34 |
| 3140 | Accumulators, primary cells and batteries | 5.95 | −0.34 | 5.61 |
| 3150 | Lighting equipment and electric lamps | 1.41 | 0.43 | 1.85 |
| 3190 | Other electrical equipment n.e.c. | 4.06 | 2.07 | 6.13 |
| 3210 | Electronic valves, tubes, etc. | 2.68 | 1.21 | 3.89 |
| 3220 | TV/radio transmitters; line comm. apparatus | 0.53 | 0.65 | 1.18 |
| 3230 | TV and radio receivers and associated goods | 4.93 | 0.35 | 5.28 |
| 3311 | Medical, surgical and orthopedic equipment | 1.12 | 0.79 | 1.91 |
| 3312 | Measuring/testing/navigating appliances, etc. | 0.31 | 1.22 | 1.53 |
| 3313 | Industrial process control equipment | 4.70 | 2.61 | 7.30 |
| 3320 | Optical instruments & photographic equipment | 1.76 | 1.31 | 3.07 |
| 3330 | Watches and clocks | 1.60 | 0.69 | 2.29 |
| 3410 | Motor vehicles | 2.49 | 1.11 | 3.60 |
| 3420 | Automobile bodies, trailers & semi-trailers | 4.54 | −0.82 | 3.72 |
| 3430 | Parts/accessories for automobiles | 3.70 | −0.62 | 3.08 |
| 3511 | Building and repairing of ships | 0.05 | 1.44 | 1.50 |
| 3512 | Building/repairing of pleasure/sport. boats | 3.70 | −0.36 | 3.34 |
| 3520 | Railway/tramway locomotives & rolling stock | 0.06 | 3.16 | 3.23 |
| 3530 | Aircraft and spacecraft | 0.16 | 1.57 | 1.73 |
| 3591 | Motorcycles | 0.26 | 0.68 | 0.95 |
| 3592 | Bicycles and invalid carriages | 8.96 | −1.90 | 7.05 |
| 3599 | Other transport equipment n.e.c. | 1.52 | 1.59 | 3.11 |
| 3610 | Furniture | 0.22 | 1.30 | 1.52 |
| 3691 | Jewellery and related articles | 1.04 | 0.50 | 1.53 |
| 3692 | Musical instruments | 4.50 | −1.62 | 2.88 |
| 3693 | Sports goods | 3.55 | 0.85 | 4.40 |
| 3694 | Games and toys | 7.36 | −0.81 | 6.56 |
| 3699 | Other manufacturing n.e.c. | 0.40 | 0.63 | 1.03 |
| 3720 | Recycling of non-metal waste and scrap | 6.35 | −1.42 | 4.93 |

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