CHAPTER 6

SOUTH AFRICA-US MARGINAL INTRA-INDUSTRY TRADE AND LABOUR MARKET ADJUSTMENTS

…distribution problems from opening trade will not be serious if countries are sufficiently similar in factor proportions that the trade, which result, is primarily intra-industry.

Paul, R.Krugman (1979:968)

6.1 INTRODUCTION

This chapter deals with the role of marginal intra-industry trade (MIIT) on labour market adjustment in the services sector of South Africa. Specifically, the adjustment costs entail welfare losses that arise in the labour markets from temporary unemployment resulting from factor-price rigidity or from costs incurred through job search, retraining and relocation (Brülhart, 2002:110). The smooth adjustment hypothesis (SAH) postulates that HIIT entails lower factor-market adjustments than inter-industry. In view of data limitations, the analysis is descriptive in nature.

The rest of the chapter is organized as follows. Theoretical literature on the SAH is presented in Section 6.2. Section 6.3 describes various MIIT indices while Section 6.4 is devoted to issues on the empirical testing of SAH. The trade-induced labour market adjustment costs in South Africa are discussed in Section 6.5. This entails computation of MIIT indices as well as a discussion on the difficulties of linking these indices to employment data. The final section presents the main insights and concluding remarks.

6.2 THEORETICAL LITERATURE ON THE SMOOTH ADJUSTMENT HYPOTHESIS (SAH)

Balassa (1966) first made the postulation that IIT entails lower factor-market adjustments costs than inter-industry. The rationale of this assertion is that according to HOS model, reallocation of resources from import competing to export producing industries would improve productive efficiency and result in redistributions of incomes from the former to the latter. However, if trade is of intra-industry type, the income redistribution of trade liberalisation is likely to be smaller than in the standard Stolper-Samuelson theorem. This point is underscored by Balassa (1966: 472) argument that "…It would appear that the difficulties of adjustment to freer trade have been generally overstated. It is apparent that the increased exchange of consumer goods is compatible with unchanged production in every country…These considerations may explain why the fears expressed in various member countries about the demise of particular industries have not been realised…"

Brülhart (2002:110) points out that the adjustment costs are shaped by the underlying factor endowments, demand patterns, technologies, income levels and policy regimes of the trading countries.

Since Balassa's (1966) seminal work, the SAH has become firmly established as conventional trade wisdom. The new models of trade based on monopolistic competition and assuming horizontal differentiation of products as in Krugman (1979, 1981) and Lancaster (1979) underpin the SAH. Helpman and Krugman (1985) further established this view using the integrated equilibrium approach.

One problem with CHO-based models, which explain IIT through scale economies and monopolistic competition, is that they assume the products of an industry to be perfectly homogeneous in terms of factor intensity. This means that intra-industry adjustment

costs are eliminated simply by assumption (Brülhart, 2002:111). However, empirical studies on IIT contain goods/services with differing technologies as well.

Brülhart (2002:111) argues that in applied work, there are two reasons why IIT may entail smaller adjustment costs than inter-industry trade. Firstly, production factors (labour, capital, land, entrepreneurship) are more mobile across firms (within one industry) than between industries. In the context of labour, skills acquired by the workers and managers of a contracting firm can be utilised without much retraining in an expanding firm of the same industry. For instance, in South Africa's telecommunications sector, skills acquired by labour in firms dealing with telex and telegram services (a contracting telecommunication industry firm) can be applied to value-added services such as email, voice mail and video-teleconferencing services (expanding telecommunication industry firm). Similarly, if specialisation occurs within a multi-product/service firm, workers can be transferred from one department to another instead of a typical corporate "downsizing/rightsizing" strategy in response to globalisation.

Secondly, there is more flexibility of relative wages within industries than between industries. As pointed out by Brülhart (2002:111), this assertion relates to the intra-industry, specific-factors or Ricardo-Viner model. In this model, asymmetric trade shocks across producers in one industry coupled with immobility of workers in the short-run, results in temporary unemployment if wages are not flexible across producers. This is caused by minimum-wage legislation and contractual wage agreements at the industry level.

Lovely and Nelson (2002) note that there is substantial direct evidence from research by labour economists on the question of the relative costs of inter-versus intra-industry adjustment. Specifically, there is a substantial body of research work, which finds that the costs of being unemployed in terms of lower wages is higher under inter-industry adjustment (Neal, 1995, Kletzer, 1996). They argue that workers accumulate human capital, which is portable between firms in the same sector, but is not portable between sectors. When a sector contracts (for the importable sector in HOS model), labour is

forced to move to the expanding exportable producing sector. In the case of IIT, some firms may go out of business, but liberalisation does not generate high costs (in terms of job loss), as is the case with inter-industry adjustment.

Using Ethier's (1982) general-equilibrium framework, Lovely and Nelson (2000) show that changes in domestic absorption, which influence trade flows but which are distinct from production changes, make MIIT an unreliable guide to labour market pressure.

Although the CHO model underpins the SAH under HIIT, it cannot explain VIIT, which is the most common type of "North-South" trade (Clark and Stanley, 1999). Models such as Falvey and Kierzkowski (1987), Flam and Helpman (1987), Shaked and Sutton (1984) can explain VIIT and factor market adjustments. Since vertically differentiated (quality) products/services have different factor intensities and countries specialisation will depend on relative factor endowments, the nature of IIT (in terms of VIIT and HIIT) is quite important in testing SAH, especially in South Africa-US IIT in services.

The upshot of these models is that associating inter-industry trade with painful adjustment and IIT with less costly adjustment is flawed if products/services are differentiated vertically (Fontagné and Freudenberg, 2002). The point is that adjustment costs associated with VIIT might be substantial due to the fact that specialising along the quality spectrum bolstered by R& D expenses, endowment in human capital and advertising may be associated with costly displacement of resources. However, the results from Chapter 5 remotely show that HIIT dominates South Africa-US IIT in services.

6.3 MARGINAL INTRA-INDUSTRY TRADE (MIIT) MEASURES

The GL index is a static measure since it is based on trade data for one period only. Hamilton and Kniest (1991) argue that the observation of a high proportion of IIT in one particular time period does not justify a priori any prediction of the likely pattern of change in trade flows. Brülhart (2000) reiterates the same point by arguing that even an

observed increase in static IIT levels between two periods, as computed by quasi-dynamic measures such as Greenaway *et al.,* (1994) and Dixon and Menon, 1997 could conceal a very uneven change in trade flows similar to inter-rather than intra-industry adjustment. Motivated by this concern, a number of alternative measures have been developed to capture the MIIT concept empirically.

6.3.1 Hamilton and Kniest (HK) index

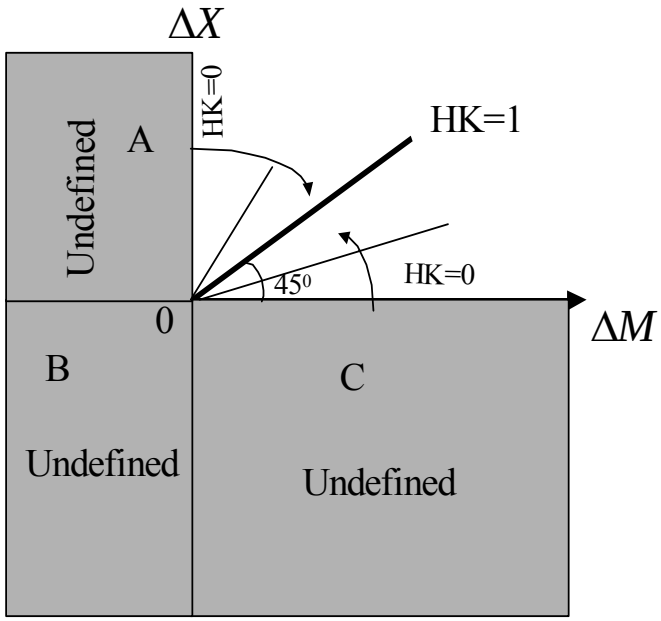
Hamilton and Kniest (1991) were the first to construct an index of MIIT. They argue that evaluating the consequences of trade expansion requires a focus on how IIT changes at the margin. Their index in Equation 6.1 effectively computes the proportion of the changes in exports or imports, which is matched.

$$HK = \begin{cases} \dfrac{\Delta X}{\Delta M}, \textit{for} & \Delta M > \Delta X \geq 0 \\ \dfrac{\Delta M}{\Delta X}, \textit{for} & \Delta X > \Delta M \geq 0 \\ 1, \textit{for} & \Delta X = \Delta M > 0 \\ \textit{Undefined}, \textit{for} & \Delta M < 0, \textit{or}, \Delta X < 0 \end{cases} \tag{6.1}$$

The composition of the change in trading patterns is the main determinant and information on levels of exports or imports is not essential. The HK index can be mapped on to a two-dimensional Euclidean space as shown in Figure 6.1.

This index has a number of flaws. Firstly, HK interpreted any situation where the index is undefined as indicating an increase in exports and a decrease in imports (or vice versa), which shows inter-industry trade (shaded regions A and C). However, the HK index is also undefined where both imports and exports decrease, a condition in which the matched decreases should be documented as MIIT (shaded region B).

Figure 6.1: The graphical representation of HK MIIT index



Source: Brülhart (2002:119)

Notes: ΔX and ΔM are the changes in exports and imports, respectively

Secondly, as pointed out by Greenaway *et al.*, (1994), the fact that HK index is undefined when exports (X) or imports (M) decrease leads to a non-random omission of a significant number of statistical observations and hence to potentially unreliable results.

However, Greenaway and Milner (2003) note that despite the shortcomings, the fundamental insight from the HK index lies in underscoring, for the first time, the importance of MIIT measures for adjustment effects of IIT.

6.3.2 Brülhart (B) indices

Brülhart (1994) suggest three different MIIT indices that attempt to address the problems encountered in HK index. All these indices are defined and do not suffer from the trade imbalance bias discussed in Section 2.6.1.2.3 (Chapter 2). The first index is Brülhart A;

$$B^A = 1 - \frac{|\Delta X - \Delta M|}{|\Delta X| + |\Delta M|} \tag{6.2}$$

This index varies from 0 to 1, where 0 indicates marginal trade in the specific industry is completely of inter-industry type, while 1 corresponds to marginal trade that is entirely of intra-industry type. The main strength of this index is that unlike the HK index, it is defined in all cases and shares many properties of GL index.

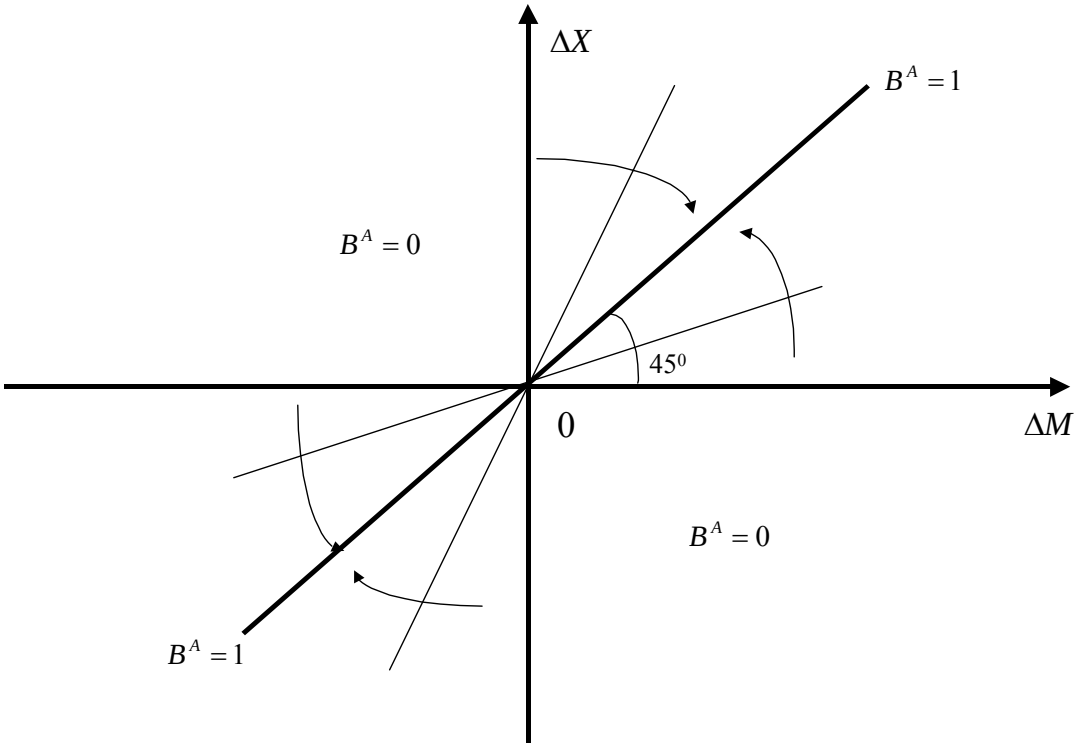
However, it differs in two ways from the GL index (Olivera and Terra, 1997). Firstly, it does not suffer from downward bias as a result of disaggregation. Secondly, there is no mathematical relationship between the index for a particular period and the indices of its sub-periods. This index can be mapped onto a $\Delta X, \Delta M$ Cartesian plane as shown in Figure 6.2.

The second index is Brülhart B measure of MIIT, which allows for an investigation into the distribution of trade-induced gains (losses) between countries;

$$B^B = \frac{\Delta X - \Delta M}{|\Delta X| + |\Delta M|} \tag{6.3}$$

This index is related to B^A i.e. $B^B = 1 - B^A$. The index contains information about about both the proportion of MIIT and country-specific sectoral performance. Unlike the GL-type indices, B^B ranges from –1 to 1. The closer the index is to 0, the higher the MIIT, whereas values close to –1 and 1 represent higher marginal inter-industry trade.

Figure 6.2: Brülhart A MIIT index



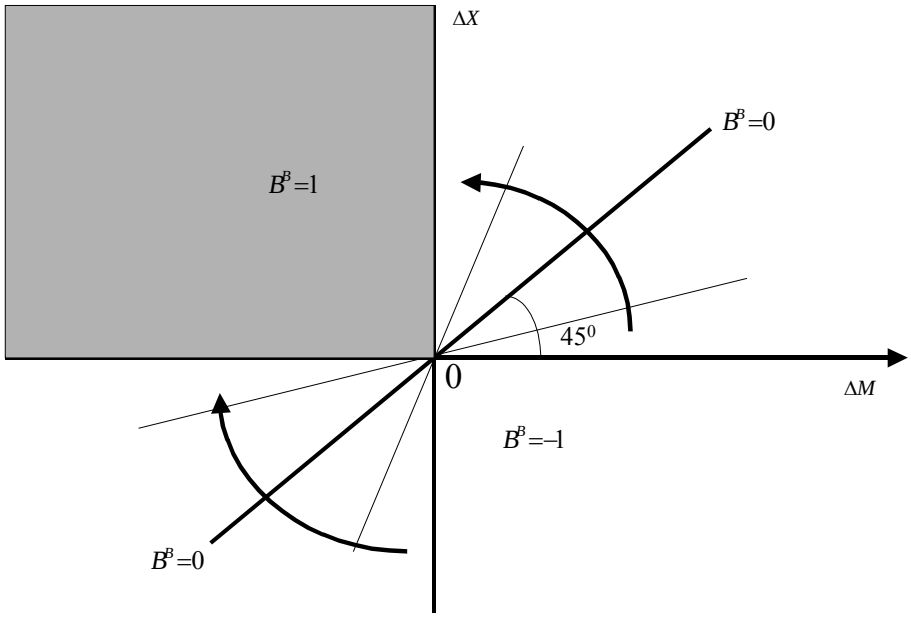
Source: Brülhart (2002:119)

Notes: ΔX and ΔM are the changes in exports and imports, respectively

There are two conditions used to determine whether the index is positive or negative. Firstly, B^B index is positive if changes in exports (ΔX) are greater than changes in imports (ΔM). Positive values of B^B indicate that exports are expanding at the expense of imports (strong domestic industry performance). Secondly, B^B index is negative if changes in exports (ΔX) are less than changes in imports (ΔM). Negative values of B^B indicate weak domestic industry performance. The index is shown in Figure 6.3.

One problem with this index is that unlike the GL-type indices, it cannot have a (un) weighted average taken to assess MIIT at the country level due to the fact that an average of –1 and 1 is zero.

Figure 6.3: Brülhart B MIIT index



Source: Brülhart (2002:125)

Notes: ΔX and ΔM are the changes in exports and imports, respectively

The final index constructed by Brülhart (1994) is the C measure of MIIT, which is unscaled;

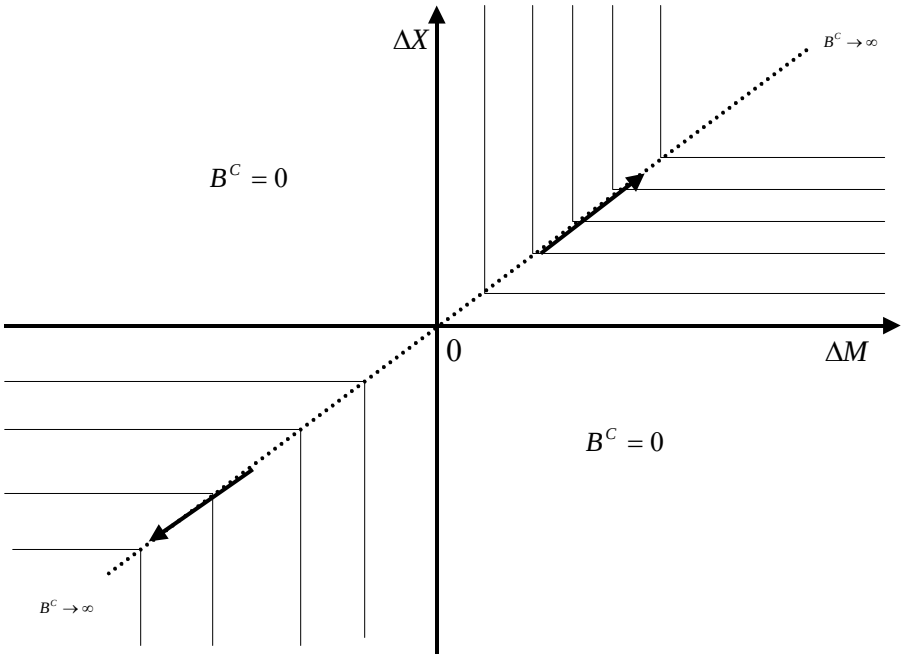
$$B^C = \left(|\Delta X| + |\Delta M|\right) - |\Delta X - \Delta M| \qquad (6.4)$$

This index is strictly non-negative and can be scaled even at the disaggregated industry level. Figure 6.4 shows a graphical representation of this index.

Thom and McDowell (1999) and Andresen (2003) argue that the Brülhart indices cannot distinguish between inter-industry trade and vertical intra-industry trade, and therefore overstate the costs of adjustment. This is predicated on the fact that changes in trade composition although the costs of adjustment for VIIT (quality differentiated

goods/services) may be higher than HIIT (variety differentiated goods/services), both would have lower adjustment costs than inter-industry trade.

Figure 6.4: Brülhart C MIIT index



Source: Brülhart (2002:119)

Notes: ΔX and ΔM are the changes in exports and imports, respectively

6.3.3 Azhar and Elliot index

Using the specific factors model, Azhar and Elliot (2001, 2003) propose a measure of trade-induced adjustment that meets a number of SAH criteria; monotonicity, consistency and country-specificity. Firstly, the greater the sectoral disparity in trade flows the higher the factor market disruption and therefore the greater the adjustment costs. This means that the index is an increasing function of the net change in trade (monotonicity).

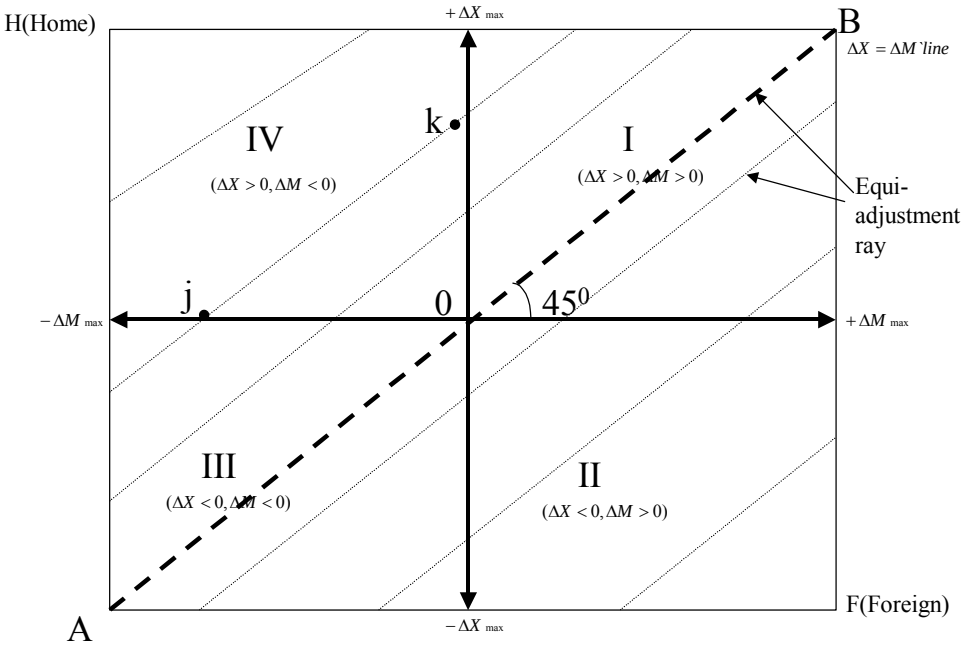
Secondly, the factor reallocation requirements associated with a given level of unmatched trade changes are the same as for the bilateral trade partners. This means that adjustment costs associated with an industry expansion are equal to those associated with an industry contraction (consistency).

Thirdly, the index provides a measure of whether a country is specialising "into" or "out of" an industry. This provides information on whether subsequent adjustment costs are associated with an industry expansion or contraction. This information has further implications for policymakers looking at industrial and competition policy or reacting to the pleas of lobby groups in the country such as COSATU in South Africa (country specificity).

Finally, if firms have identical factor requirements then matched trade changes will have no resource reallocation costs. This is predicated on the fact that matched increases or decreases in exports and imports means that an industry's total demand is unaffected and hence no resource reallocation is required.

Figure 6.5 presents Azhar and Elliot's geometric device that allows visualisation of the evolution of trade flows and shed light on the potential adjustment pressure associated with trade pattern change. Figure 6.5 is a trade adjustment space (TAS). The length of any side of the TAS is two times the maximum of the largest absolute value of whichever is bigger from the import and export values in the study period. The upper and lower triangles (AHB) and AFB) define the net exporter and net importer planes respectively. The origin (0) represents the unique ($\Delta X = 0, \Delta M = 0$) case. Quadrant I contains all positive and quadrant III all negative changes. The 45-degree AOB line is that of perfectly matched trade changes and hence zero adjustment. Lines parallel to AOB are termed equi-adjustment rays. Any two points, such as j and k on an equi-adjustment line share equal adjustment pressures.

Figure 6.5: Industry trade adjustment space (TAS)



Source: Azhar and Elliot (2003:6)

Notes: ΔX and ΔM are the changes in exports and imports, respectively

The further a point is away from the AOB line, the greater is the adjustment pressure. Points to the right of AOB line have different implications for the home country. In this case exports will be falling relative to imports so adjustment might require firms to lay off workers that will result in an increase in temporary unemployment. This is called contractionary associated adjustment costs. Azhar and Elliot (2003) point out that if the assumption of symmetry across expanding and contracting sectors is weakened so that it is easier for an economy to adapt to expansion rather than contractions then the lines of equi-adjustment become non-linear and asymmetric.

They suggested the following measure of adjustment costs, which satisfies the four criteria of monotonicity, consistency and country-specificity.

$$S = \frac{\Delta X_t - \Delta M_t}{2\left(\max\left(\left|\Delta X_t\right|,\left|\Delta M_t\right|\right)\right)} \text{ for } t = 1,2,..n \qquad (6.5)$$

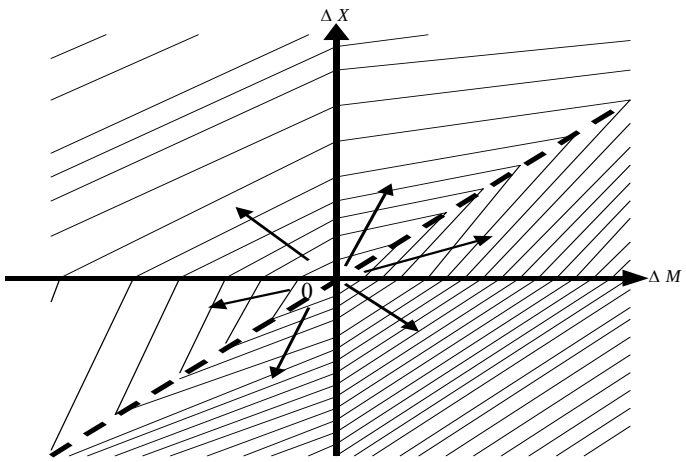
The index has a range of $-1 \leq S \leq 1$.

6.4 EMPIRICAL TESTING OF THE SAH

The SAH is a generally accepted canon of international economics. However, its empirical testing has not been straightforward due to a number of reasons (Brülhart, 2002). Firstly, no one-dimensional measure of MIIT can fully describe the three dimensions of adjustment costs over the trade-change plane. Secondly, there is still no exhaustive theoretical model that can generate marginal intra-and inter-industry trade and thus serve as a basis for specification of empirical models.

Brülhart (2002) illustrates the first problem using a hypothetical mapping of trade-induced adjustment costs (Figure 6.6), which is akin to Azhar and Elliot (2003).

Figure 6.6: Hypothetical map of adjustment costs and trade changes



Source: Brülhart (2002:126)

Notes: ΔX and ΔM are the changes in exports and imports, respectively

Figure 6.6 is a map of iso-adjustment contours, which assumes that adjustment costs rise monotonically as one moves away from the origin of the Cartesian plane. However, this rise occurs at different rates depending on the direction taken. Therefore the debate on the appropriate measure of MIIT boils down to the question about which is the most important direction of skewness in the distribution (with the initial point being the one that is symmetric about the origin). Equation 6.6 can represent the information in Figure 6.6.

$$AC_i = \alpha\left|\Delta X_i - \Delta M_i\right| + \beta\left(\Delta X_i - \Delta M_i\right) + \gamma\left(\left|\Delta X_i\right| + \left|\Delta M_i\right|\right) \qquad (6.6)$$

Where AC_i is adjustment costs in service sector i. Brülhart (2002) suggests that four restrictions, rooted in assumptions implicit in MIIT literature, can be placed on this model to generate the mapping in Figure 6.6. Equation 6.6 encapsulates the second hypothesis of this study in Section 1.6 (Chapter 1).

Hypothesis 1: Adjustment costs increase in absolute amount of unmatched trade change i.e. $\alpha > 0$

The relevance of MIIT would be confirmed if the estimated α is statistically significant. This would indicate that the degree of "matchedness" of trade changes within sectors actually matters for adjustment costs.

Hypothesis 2: Export expansion (contraction) causes lower (higher) adjustment costs than import expansion (contraction) i.e. $\beta < 0$

This would indicate that sectoral trade performance matters for adjustment costs and that indices such as Brülhart's B^B or Azhar-Elliot (2001) are important.

Hypothesis 3: For given volumes of trade change, adjustment costs are minimised where changes in imports and exports are of equal size i.e. $|\alpha| > |\beta|$

This hypothesis would confirm the GL type measures of MIIT such as Brülhart's B^A index.

Hypothesis 4: Adjustment costs increase in absolute amount of total trade change i.e. $\gamma > 0$

Most empirical evidence that support the SAH uses specifications akin to Equation 6.6. These studies use econometric analysis to evaluate the claim that IIT is "non-disruptive" and some of them apply simple correlation between various MIIT measures and some measure of adjustments costs (Table 1 in Lovely and Nelson, 2002:36). Murphy and Stobl (2004) warn that such bivariate analysis have to be interpreted with causation due the methodological limitations. A few studies attempt to control for a small set of other factors in an OLS setting. Brülhart (2000) study conducted on Irish data proxies adjustment costs by plant-level job turnover rates and includes, among the independent variables, the Brülhart's B index and a measure of trade-intensity.

There are other approaches to modelling the SAH in literature. One approach examines whether factor intensities are less heterogeneous within than between industries. Greenaway and Milner (2003) note that considerable heterogeneity has been found within industries but differentials between industries are also significant.

The second empirical approach models SAH via political-economy considerations. The work of Lundberg and Hanson (1986) and Marvel and Ray (1987) suggest that the fast trade liberalisation in sectors subject to high initial IIT levels result from a lower demand for protection in these sectors. This means that IIT has modest welfare effects. However, in a bid to find the direction between IIT and liberalisation in Australia, Ratnayake and Jayasuria (1991) suggest that previous single equation estimations suffered from

simultaneity bias and they found no effect of tariff reductions when estimated through a system of simultaneous equations. Their study shows a reversed direction of causation, from trade liberalisation to IIT.

Lovely and Nelson (2002) argue that regardless of the method or the measure of adjustment, the results show that there is little evidence of a systematic relationship between MIIT and adjustment costs. Lovely and Nelson (2000, 2002) argue that the reason for this disappointing results is that there is a fundamental problem in the theory underlying the asserted link between the measures of MIIT in use and any plausible measure of labour adjustment costs. They add that the fundamental problem emanates from the fact that changes in labour allocation reflects changes in production structure while changes in trade patterns reflect changes in production and demand.

However, all these studies focussed on trade in goods with very few studies on services. Moshirian (1998) used Hamilton and Kniest (1991) MIIT index to measure the significance of IIT in additional trade in financial services generated by financial deregulation and hence trade liberalisation in Japan over the period 1980-1995. The study computed MIIT indices and found that it was moderate.

There is no study on MIIT in services sector in South Africa. This thesis therefore attempts to fill this gap.

6.5 LABOUR MARKET- INDUCED ADJUSTMENT COSTS IN SOUTH AFRICA

6.5.1 South Africa-US MIIT in services

The SAH maintains that the two types of IIT (HIIT and VIIT) have different factor market adjustment costs. It would be lower (nil in theory) for HIIT and different from zero (both positive or negative) for VIIT and inter-industry trade. This basically means that using measures of total IIT or total MIIT in testing SAH could lead to misleading

results because they encompass two effects of IIT on adjustment costs that are of different sign.

An appropriate modelling strategy of the SAH entails considering a number of characteristics. Firstly, exports or imports should be properly identified as being part of either IIT or inter-industry trade. Secondly, the analysis of MIIT should minimise geographical aggregation bias by using bilateral trade flows. Thirdly, the calculated IIT indices should minimise the bias arising from sectoral aggregation by using as much disaggregation as possible. Fourthly, the model should distinguish between VIIT and HIIT using the methodology proposed by Abd-el-Rahman (1991) or Greenaway, Hine and Milner (1994), which incorporate price (unit value) differences. The assumption is that prices properly reflect quality differences. Finally, the analysis should use an appropriate proxy for adjustment costs.

The thesis addresses some of these concerns. Firstly, the SAH is considered for those services sectors containing a significant IIT component. This was done in Chapter 3 using the criterion that significant IIT only exists if minority flows are at least 12 per cent of majority flows. Secondly, geographical aggregation bias is minimised by considering South Africa and the US. Thirdly, sectoral aggregation bias is minimised by considering trade flow classification of the US BEA. However, the travel sector is not disaggregated at the same level as the other sectors.

There are factors that make it difficult to address all the concerns. Firstly, disentangling HIIT from VIIT is not possible due to lack of prices (unit value) data. Secondly, data on employment from STATSSA, commonly used as a proxy for labour market adjustment costs, are not available at the same level of aggregation as the trade data from US BEA.

Thirdly, South Africa-US trade in services is about 20 per cent of total trade in services (Table 1.2 in Chapter 1), which implies that the labour market dynamics in South Africa's service sector cannot be attributed to her trade with the US per se. The appropriate approach is to have a trade weighted MIIT index for all major trading

partners disentangled into HIIT and VIIT. However, this is frustrated by lack of bilateral trade data with many countries.

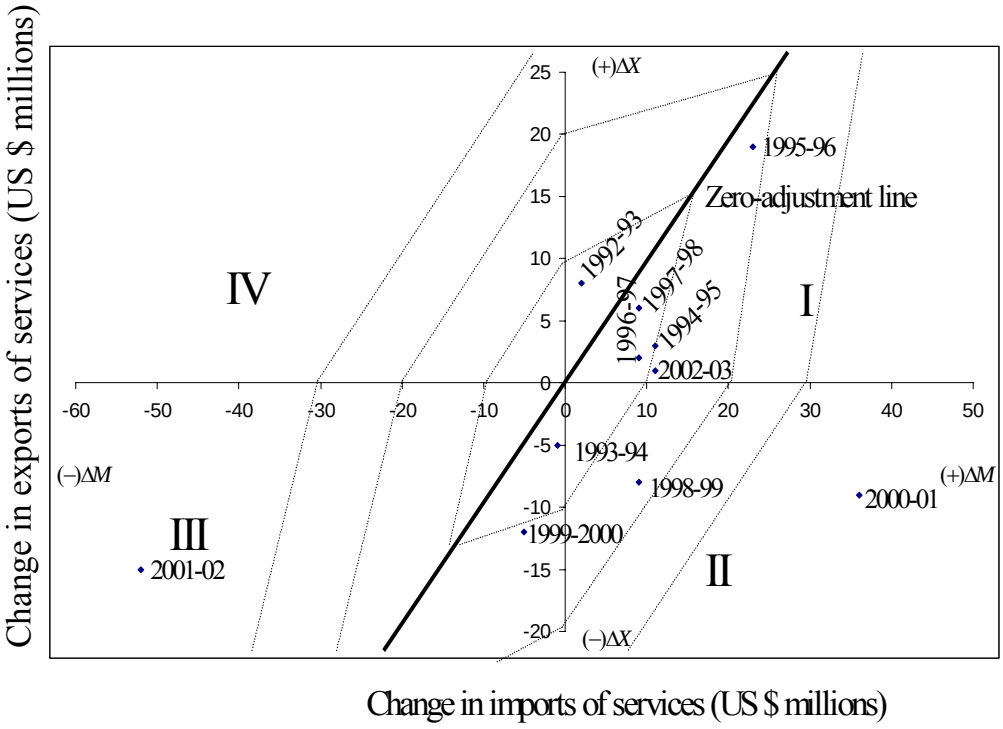
Fourthly, as pointed out by Lovely and Nelson (2002), it is inappropriate to try to explain labour-market adjustment using MIIT indices because changes in labour allocation reflect changes in production structure while changes in trade patterns reflect changes in production and demand. This therefore means that information on changes in domestic final-services demand and changes in input usage is required. Moreover, there is need to get information on price changes induced by the liberalisation.

It is against this background that the thesis does not provide a rigorous test of the SAH. The thesis uses MIIT indices to draw inferences about the SAH and the results should be treated as suggestive and not conclusive. Brülhart (1994) and Azhar and Elliot (2003) indices are used because they are subject to fewer limitations than other measures of MIIT.

Figure 6.7 shows TAS for South Africa's telecommunications services sector. The co-ordinates to the right of zero-adjustment line record negative S index and the further a co-ordinate is away from this line, the greater the adjustment pressure. For the majority of the year-on-year nominal changes, both ΔX and ΔM were positive (quadrant I) and on the right of the central zero-adjustment line.

The most volatile years are towards the end of the period (1998-99, 2000-01 and 2001-02) and seem to reflect the macroeconomic turmoil associated with the events in South Africa and the US around this period (e.g. the depreciation of the rand in 2001 and the September 11 bomb blast in the US). The largest positive value (measured as the greatest perpendicular distance from the right of the central zero-adjustment line) was 2001-02 (corresponding to S index of 0.36). Similarly, the largest negative value was 2000-01 (corresponding to S index of -0.43). *Ceteris paribus*, a contraction of South Africa's telecommunication sector and an increase in worker displacement in the period 2000-01 is expected.

Figure 6.7: Trade adjustment space (TAS) for South Africa-US IIT in telecommunication services in the period 1992-2003



Source: Authors' own construction. Data from the US BEA. It is available at (http://www.bea.gov/bea/di/1001serv/intlserv.htm

Notes: The Azhar and Elliot's (2003) trade adjustment space applied to South Africa's telecommunications services sector.

Trade adjustment space graphs could be drawn for all the service sectors but since the same information is incorporated in the S index, Table 6.1 presents this index for the various service industries.

Table 6.1: Trade-induced adjustment (S index) for South Africa-US IIT in services for the period 1992-2003

Service industry	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	Average
Travel(tourism) services	-0.12	-0.32	0.00	0.58	-0.36	0.33	-0.50	-0.09	0.45	0.26	0.47	0.06
Other business, professional and technical services	0.00	0.02	-0.04	-0.02	-0.06	-0.06	0.11	0.05	-0.02	0.48	-0.40	0.01
Telecommunications services	0.06	-0.04	-0.08	-0.04	-0.07	-0.03	-0.16	-0.07	-0.43	0.36	-0.10	-0.05
Airfreight services	0.33	0.00	0.00	0.17	0.50	-0.33	0.00	0.33	-0.33	0.17	0.50	0.12
Research, development, and testing services	-0.02	0.02	-0.02	-0.05	0.00	0.02	0.05	-0.08	-0.08	0.24	-0.12	0.00
Advertising services	0.25	0.00	0.00	0.75	-0.25	0.50	-0.25	0.00	0.25	-0.75	0.75	0.11
Legal services	0.00	-0.05	0.05	-0.25	0.20	0.00	-0.10	-0.45	0.35	0.00	0.05	-0.02
Ocean port services	-0.50	-0.03	0.00	-0.08	-0.14	-0.03	-0.33	0.17	0.31	-0.17	0.08	-0.07
Ocean freight services	0.50	0.05	0.02	-0.04	0.10	0.04	0.15	-0.05	-0.15	0.07	0.02	0.06
Financial services	0.00	0.08	-0.15	-0.12	0.03	-0.43	0.13	-0.17	-0.23	0.00	0.63	-0.02
Management, consulting, and public relations services	-0.20	0.05	-0.20	0.05	-0.15	-0.20	-0.45	0.35	0.00	0.10	-0.25	-0.08
Education and training services	-0.50	-0.01	-0.05	0.09	-0.06	0.02	-0.01	-0.05	-0.04	-0.05	0.15	-0.05

Source: Data from the US BEA. It is available at (http://www.bea.gov/bea/di/1001serv/intlserv.htm

Notes: The shaded cells show years with negative S index (deteriorated sectoral trade balance).

Columns 2 through 10 show the Azhar and Elliot (2003) MIIT index (trade-induced adjustment) for the different periods. The final column shows the average over the period 1992-2003. A number of trends emerge from the table. Firstly, on average, 50 per cent of the unaffiliated trade industries have negative S index (shaded cells). This means that sectoral trade balance has deteriorated over the period. In order of magnitude, the most severe (contracting) trade-induced adjustment pressures were experienced in management consulting and public relations management consulting and public relations; ocean port services; education and training services; telecommunication services; financial services and legal services.

Secondly, the largest adjustment costs associated with expanding sectors are for air freight; advertising; ocean freight services; travel (tourism); other business, professional and technical services; and research, development and testing services.

The findings from the S index are augmented with the Brülhart A and B MIIT indices.

Table 6.2: Brülhart A MIIT index for South Africa-US IIT in services (1992-2003)

Service industry	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	Average
Travel(tourism) services	0.67	0.28	0.99	0.00	0.09	0.30	0.00	0.68	0.00	0.54	0.07	0.33
Other business, professional and technical services	N/A	0.00	0.00	0.80	0.00	0.25	0.00	0.00	0.33	0.10	0.00	0.15
Telecommunications services	0.40	0.33	0.43	0.90	0.36	0.80	0.00	0.59	0.00	0.45	0.17	0.40
Airfreight services	0.00	N/A	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.20
Research, development, and testing services	0.00	0.00	0.67	0.00	1.00	0.00	0.57	0.83	0.83	0.68	0.00	0.42
Advertising services	0.00	N/A	N/A	0.00	0.00	0.00	0.67	1.00	0.00	0.00	0.00	0.19
Legal services	N/A	0.00	0.00	0.00	0.00	1.00	0.00	0.18	0.00	N/A	0.67	0.21
Ocean port services	0.00	0.67	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.40	0.12
Ocean freight services	0.00	0.00	0.00	0.00	0.00	0.25	0.22	0.46	0.00	0.00	0.00	0.08
Financial services	0.86	0.00	0.39	0.57	0.67	0.00	0.00	0.62	0.00	1.00	0.00	0.37
Management, consulting, and public relations services	0.00	0.00	0.00	0.00	0.40	0.00	0.18	0.00	1.00	0.50	0.29	0.22
Education and training services	0.00	0.64	0.00	0.33	0.00	0.73	0.86	0.50	0.76	0.55	0.00	0.40

Source: Data from the US BEA. It is available at (http://www.bea.gov/bea/di/1001serv/intlserv.htm

Notes: The shaded cells show years where marginal trade is completely of inter-industry type.
N/A means the MIIT index could not be computed due to situations of division by 0. The average excludes the periods marked with N/A.

Table 6.2 shows the Brülhart A MIIT index, which like the GL index varies between 0 and 1. MIIT of 0 indicates marginal trade in particular service sector to be completely of inter-industry type and 1 represents marginal trade to be entirely of intra-industry type. The index shows that, on average, new trade was mainly of intra-industry type. In terms of magnitude, the leading sector was research, development and testing services. The shaded cells show cases where there is 0 MIIT implying high adjustment costs.

Table 6.3: Brülhart B MIIT index for South Africa-US IIT in services (1992-2003)

Service industry	1992-1993	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
Travel(tourism) services	-0.33	-0.72	0.01	1.00	-0.91	0.70	-1.00	-0.32	1.00	0.46	0.07
Other business, professional and technical services	N/A	1.00	-1.00	-0.20	-1.00	-0.75	1.00	1.00	-0.67	0.90	0.00
Telecommunications services	0.60	-0.67	-0.57	-0.10	-0.64	-0.20	-1.00	-0.41	-1.00	0.55	0.17
Airfreight services	1.00	N/A	0.00	1.00	1.00	-1.00	0.00	1.00	-1.00	1.00	0.00
Research, development, and testing services	-1.00	1.00	-0.33	-1.00	0.00	1.00	0.43	-0.17	-0.17	0.32	0.00
Advertising services	1.00	N/A	N/A	1.00	-1.00	1.00	-0.33	0.00	1.00	-1.00	0.00
Legal services	N/A	-1.00	1.00	-1.00	1.00	0.00	-1.00	-0.82	1.00	N/A	0.67
Ocean port services	-1.00	-0.33	-1.00	-1.00	-1.00	-1.00	-0.75	1.00	1.00	-1.00	0.40
Ocean freight services	1.00	1.00	1.00	-1.00	1.00	0.75	0.78	-0.54	-1.00	1.00	0.00
Financial services	0.14	1.00	-0.61	-0.43	0.33	-1.00	1.00	-0.38	-1.00	0.00	0.00
Management, consulting, and public relations services	-1.00	1.00	-1.00	1.00	-0.60	-1.00	-0.82	1.00	0.00	0.50	0.29
Education and training services	-1.00	-0.36	-1.00	0.67	-1.00	0.27	-0.14	-0.50	-0.24	-0.45	0.00

Source: Data from the US BEA. It is available at (http://www.bea.gov/bea/di/1001serv/intlserv.htm

Notes: The shaded cells show years where marginal trade is completely of inter-industry type.
N/A means the MIIT index could not be computed due to situations of division by 0. The average excludes the periods marked with N/A.

Table 6.3 shows Brülhart B MIIT index. The closer the B index is to 0 the higher the MIIT. When B is equal to 0, marginal trade in services between the South Africa and the US in that particular sector is entirely of intra-industry type. This is the case for legal services in 1997-1998. Both –1 and 1 represent marginal trade to be entirely of inter-industry type. This is the case with most of the services. The shaded cells show the industry and the period when South Africa specialised *"out"* of the sector. The same interpretation can be done for the cells with positive B index where South Africa specialised "*into*" the sector.

It is, however, imperative to note that, as Brülhart (1994) points out, the interpretation is mercantilist in nature. The relation between a particular sector's export performance and its import penetration does not convey the full information on competitiveness and

adjustment costs (Lovely and Nelson, 2002). Nevertheless, this analysis provides some indication of service sectors that South Africa specialised "*into*" and those where she specialised "out of" and what sectors the pattern of specialisation remained unaffected by increased (or reduced) service trade flows between South Africa and the US.

Comparing the results from Table 6.1 with Table 6.3, there is close resemblance. This can be seen from the fact that the shaded cells (severe adjustment costs) are the same.

6.5.2 MIIT and employment in the services sector

This section tries to see whether there is a link between the MIIT indices (Tables 6.1, 6.2 and 6.3) and adjustment costs proxied by changes in employment. However, in addressing this issue it is imperative that the MIIT indices reported on the basis of US BEA service classification (Tables A.1 to A.4) be concordant with South Africa standardised industry employment data collected by STATSSA reported on the basis of standard industrial classification (SIC).

Table 6.4 presents the structure of South Africa's standardised industry employment classification used by STATSSA. The first column in this table reports the classification at 2-digit level while the second column shows the service industries included in that category. The change in employment reported in Table 6.5 is based on column one of Table 6.4.

The US BEA classification is concordant with STATSSA classification for travel services only. For the other services the STATSSA classification lumps together too many service categories. A case in point is STATSSA communication sector, which includes telecommunication, national postal activities and courier activities other than postal activities. It is difficult to isolate telecommunications sector's employment figures to be compared with the MIIT indices for telecommunication.

This means that the change in employment data in Table 6.5 can only be compared with MIIT indices for the case of catering and accommodation sector. This sector lost jobs significantly over the period 1992 to 2003. The most affected labour category is the semi-and unskilled. This agrees with the MIIT S indices in Table 6.1.

Table 6.4: South Africa standardised industry employment classification

industry classification (2-digit level)	Services included
Catering and accommodation services	Hotels, camping sites and other provision of short-stay accommodation; restaurants, bars and canteens
Transport and storage	Railway transport; other land transport; other scheduled passenger land transport; other non-scheduled land transport; freight transport by road; transport via pilelines; water transport; sea and coastal water transport; inland water transport; air transport; cargo handling; storage and warehousing; othe supporting transport activities; travel agency and related activities; activities of other transport agencies
Communication	National postal activities; courier activities other than national postal activities; telecommunications
Finance and insurance	Monetary intermediation; central banking; other monetary intermediation;other financial intermediation n.e.c; lease financing; other credit granting; insurance and pension funding, except compulsory social security; life insurance; pension funding; medical aid funding; othe insurance n.e.c.
Business services	Renting of air transport equipment;hardware consultancy; research and development;legal services; technical testing and analysis;advertising (Other activities left out due to space limitations)
Other services	Education; hospital activities; sewerage and refuse disposal, sanitation, and similar activities; motion picture and video production and distribution; news agency activities; museum activities and preservation of historical sites and buildings; sporting activities (Other activities left out due to space limitations)
Other producers	Washing and (dry-) cleaning of textiles and fur products; hairdressing and other beauty treatment; funeral and related activities; other service activities n.e.c.
Wholesale and retail trade	Wholesale trade and commission trade, except of motor vehicles and motor cycles; retail trade; sale, maintenance and repair of motor vehicles and motor cyles, retail trade in automotive fuel
General government services	General government services

Source: Quantec Research (http://ts.easydata.co.za/TableViewer/summary.aspx)

Table 6.5: Percentage change in South Africa's employment in selected service sectors

Service industry	Labour category	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Average
Business services	Highly skilled	15.90	7.03	11.48	6.95	12.75	7.38	7.38	11.84	6.64	-0.81	2.01	10.23	18.52	6.35	8.83
	Skilled	6.75	6.71	6.37	8.90	4.92	6.96	6.27	11.75	7.46	2.77	2.82	10.20	17.82	1.80	7.25
	Semi-and unskilled	12.76	-1.60	2.42	5.55	4.67	-0.95	-0.45	8.64	6.28	6.36	5.44	8.97	17.15	-5.94	4.95
Catering and accommodation services	Highly skilled	15.59	-13.13	2.64	4.88	0.15	3.97	-2.32	1.62	-6.67	-12.83	-7.41	-4.81	-2.73	4.73	-1.16
	Skilled	9.95	-9.72	0.04	-6.53	-1.66	0.73	-4.78	1.28	-5.48	-10.96	-5.21	-5.36	-3.29	4.10	-2.63
	Semi-and unskilled	3.98	-5.84	-7.82	2.76	-6.22	2.08	-2.95	0.19	-8.44	-14.67	-9.37	-6.32	-4.28	3.01	-3.85
Communication	Highly skilled	11.52	-2.76	-12.98	-8.75	46.76	-2.16	-9.11	2.14	-18.29	17.26	13.96	3.84	10.42	-5.74	3.29
	Skilled	20.55	9.68	-1.60	-6.15	3.73	3.91	0.08	-1.18	-27.15	2.07	0.25	-0.05	6.18	-9.45	0.06
	Semi-and unskilled	-18.09	-8.18	-1.61	-5.13	-18.51	-3.73	1.36	-0.31	-26.75	2.39	0.44	-1.85	4.23	-11.15	-6.21
Finance and insurance	Highly skilled	13.52	0.70	15.28	3.05	9.03	8.21	8.78	6.78	5.26	0.02	2.19	3.34	1.48	5.06	5.91
	Skilled	4.20	4.26	5.23	2.00	4.12	8.29	8.42	4.34	1.73	-3.75	-1.58	1.09	-0.82	2.63	2.87
	Semi-and unskilled	49.54	5.48	-33.69	62.65	-22.48	6.90	22.16	12.70	7.18	-0.07	1.36	2.71	0.75	4.22	8.53
Transport and storage	Highly skilled	13.80	-12.13	13.61	-26.86	-9.32	8.16	1.41	-0.69	-10.03	-4.04	-6.70	-6.55	-0.01	4.85	-2.47
	Skilled	-9.43	-10.81	-10.21	-10.89	-12.95	-0.11	-3.01	-3.01	-10.73	-3.92	-6.25	-8.15	-1.74	2.99	-6.30
	Semi-and unskilled	-0.65	-3.44	-0.27	-10.97	-5.34	1.57	-5.35	-6.65	-14.60	-8.08	-9.99	-8.59	-2.21	2.48	-5.15
General government services	Highly skilled	-1.54	4.85	3.91	-0.41	1.80	0.81	7.58	0.40	-3.05	-5.95	-7.05	-1.25	0.96	14.68	1.13
	Skilled	0.47	5.46	2.94	2.01	0.91	-5.26	3.93	0.51	-0.61	-2.19	-2.75	-1.14	1.08	5.59	0.78
	Semi-and unskilled	0.09	-9.41	-4.71	-2.88	1.51	-14.41	-4.99	-2.68	0.50	1.36	1.55	-3.16	-1.02	-36.71	-5.35
Other producers	Highly skilled	18.21	2.94	-6.82	-13.52	-2.31	21.36	14.31	5.52	-4.03	-14.55	-22.81	-3.60	-1.23	1.95	-0.33
	Skilled	-5.59	-4.40	-0.59	1.71	-1.16	-2.62	-1.93	0.51	0.17	-0.80	-0.35	-3.45	-1.15	3.34	-1.16
	Semi-and unskilled	-0.87	-1.80	-1.62	-2.20	-1.57	0.28	-2.97	2.76	2.69	2.61	2.58	2.72	2.78	-2.49	0.21
Other services	Highly skilled	10.06	1.91	4.40	6.55	6.84	7.95	5.19	4.68	2.15	1.82	1.87	4.50	5.92	3.34	4.80
	Skilled	-4.63	-3.37	0.96	4.44	3.22	2.61	2.78	5.65	5.43	6.38	6.80	4.27	5.70	3.12	3.10
	Semi-and unskilled	21.27	-9.95	-14.39	27.06	-15.52	-0.13	5.31	3.09	-0.62	-1.76	-2.17	1.55	2.81	0.20	1.20
Wholesale and retail trade	Highly skilled	14.32	3.20	4.81	-2.77	5.89	6.40	2.74	2.24	6.84	12.14	0.76	3.76	2.62	3.33	4.73
	Skilled	-5.37	1.22	-0.29	1.44	-4.64	4.64	3.88	2.69	6.80	11.77	0.32	3.02	1.89	2.57	2.14
	Semi-and unskilled	11.04	-3.26	-0.48	-3.14	1.89	-0.65	-2.74	-0.38	6.55	13.42	2.44	2.00	0.88	1.56	2.08

Source: Data from Quantec Research (http://ts.easydata.co.za)
Notes: Shaded cells are those service sectors and years with job losses

In view of the concordance difficulties and the fact that the changes in employment reported in Table 6.5 cannot be attributed to South Africa's trade with the US alone, no further attempt is made to relate employment data with MIIT indices. Instead, inferences are drawn directly from the MIIT indices. Specifically, the results show that South Africa-US MIIT in services is low in many services.

6.6 MAIN INSIGHTS AND CONCLUDING REMARKS

This chapter focused on identifying whether there are some trade-induced labour market adjustment costs in terms of job losses. This research question emanates from the postulation that HIIT entails lower factor-market adjustment costs than inter-industry or VIIT. This means that using measures of total IIT or total MIIT in testing SAH could lead to misleading conclusions because they encompass two effects of IIT on adjustment costs that are of different sign. The problem in the South Africa-US IIT in services is that available trade data does not have the prices components to facilitate disentangling HIIT from VIIT. Nonetheless, the results from Chapter 5 remotely suggests that HIIT dominates South Africa-US IIT in services.

The following are the other factors that limit the testing of SAH for South Africa-US IIT in services. Firstly, South Africa's standardised industry employment data reported by STATSSA, commonly used as a proxy for labour adjustment costs, is not available at the same level of aggregation as the trade data from US BEA. Secondly, South Africa-US trade in services constitutes about 18.5 per cent of total trade in services implying that the labour market dynamics in South Africa's service sector cannot be attributed to her trade with the US per se. The remaining 81.5 per cent of the trade should be incorporated in the analysis. Thirdly, it is inappropriate to try to explain labour-market adjustment using MIIT indices within a bivariate setting because changes in labour allocation reflect adjustments in production structure while changes in trade patterns reflect changes in production and demand. This therefore means that information on changes in domestic final-services demand and changes in input usage is required. Moreover, there is need to

get information and price changes induced by the liberalisation. All these pieces of information are not readily available for South Africa.

Despite these shortcomings, the thesis attempts to make inferences about SAH using descriptive analysis of the total MIIT indices. The descriptive analysis, using Brülhart (1994) and Azhar and Elliot (2003) indices, provides some indications of the sectors that South Africa seems to have specialised "into" and "out of". The results show that MIIT is low for most service sectors remotely suggesting that since South Africa-US trade is dominated by HIIT (Chapter 5), it entails high labour adjustment costs.

The next chapter presents the summary of the main insights and policy implications from Chapters 1 to 6.