[The 16th International Input-Output Conference] , Vol.1, No.1, 1—11, 2007 May

Application of the Input-Output Decomposition Technique to China's Regional Economies

Bo MENG[1] and Chao QU[2]

[1]Member of ARSC, Research Fellow, Institute of Developing Economies - JETRO
[2]Graduate School of Information Sciences, Tohoku University, Japan.

Structural decomposition techniques based on input-output table have become a widely used tool for analyzing long term economic growth. This paper first estimates interregional input-output table in constant price by using a new approach: the Grid-Search method, and then applies the standard input-output decomposition technique to China's regional economies for 1987-1997. Based on the decomposition results, the contributions to output growth of different factors are summarized at the regional and industrial level. Furthermore, industrial and regional interdependence is measured and explained by aggregating the decomposition factors into the intraregional multiplier-related effect, the feedback-related effect, and the spillover-related effect. Finally, the performance of China's industrial and regional development policies implemented in the 1990s is briefly discussed based on the analytical results of the paper.

Key Words : *Input-Output, decomposition, economic growth, China's regional economies*

1. Introduction

Structural decomposition techniques based on input-output tables (Hereafter, abbreviated as IO tables) have become a widely used tool for analyzing long term economic growth from the demand side. Using these techniques, the change of total output between two different points of time can be explained by several factors, such as the change of domestic final demand, import and technologies. In addition, how much the change in the amount of output is consequentially caused by which factor can be easily measured.

The pioneering theoretical works in this field can be traced to Leontief (1941), Chenery et al. (1963), and Carter (1970), the early extensions can be found in Miller and Blair (1985), and Forssell (1989), and for recent developments one can refer to Oosterhaven and Linden (1997), Dietzenbacher and Los (1998). Since the major purpose of this paper is to apply decomposition techniques to China's regional economies, and discuss the performance of industrial and regional development policies implemented in the 1990s, a detailed theoretical discussion will be omitted.

Up to now, many applications of IO decomposition techniques have been done not only at the single regional (national) level, but also at the interregional (international) level. For the single national case, Feldman et al. (1987) show that increases in macro economic demand are the most important factor for the US's growth for 1963-78, and that technological changes are important only for industries that grow fastest or decline most rapidly. At the single domestic regional level, Akita and Nabeshima (1992) apply the method to Japan's Hokkaido prefecture by using the intraregional IO table for 1970-85 with 10 sectors, emphasizing the importance of public investment in Hokkaido's economic growth. Furthermore, Akita (1993) extends his research to an interregional framework based on Japan's 1975, 1980 and 1985 interregional IO tables, and shows that interregional interdependence has exerted notable effects on regional economic growth in Japan and that regions are becoming more interdependent. At the international level, Oosterhaven and Hoen (1998) extend the existing decomposition technique and apply it to an EU-intercountry IO table with 25 sectors and 6 EU-countries for 1975 and 1985. Unlike other applications, in their research, the target of the decomposition is focused on total value added rather than on total output, and the effects of changes in trade patterns are separated from those of technology and preferences. They not only find that the macro economic demand is the most important component at the aggregate country level, but also that the effect of other components such as technology, and preferences are large and different between individual sectors and countries.

On the other hand, Dietzenbacher (2001) provides a new decomposition approach in which the output change is divided into quantity change and price change, and the Ghosh model is used for the price change. The approach is applied to the EU-intercountry IO table to analyze output growth in the period of 1975-85, and concludes that only 30 percent of output growth is due to quantity changes, with the remaining 70 percent being caused by price changes.

However, due to the data limitations, such techniques have never been applied to China's regional economies. Fortunately, in 2003, China's Interregional Input-Output Table with 7 regions and 10 sectors for 1987 (IRIO87) and Multiregional Input-Output Table with 8 regions and 30 sectors for 1997 (MRIO97) were published. This has made it possible to apply the decomposition techniques to China's regional economies.

After the methodological application, we will briefly discuss the performance of China's industrial and regional development policies implemented in the 1990s, based on the analytical results in the paper. Since the national policy of reform and opening was adopted in 1978, the Coastal region of China has grown rapidly while Central and Western China have developed at a slower rate. This is a result not only of the initial natural, economic and social endowments, but also is a consequence of the regional development policies which are advantageous to the coastal regions. Such policies can be regarded as a Chinese-experiment-version of Hirschmann's uneven development theory which proposes, that "An economy, to lift itself to higher income levels, must and will first develop within itself one or several regional centers of economic strength." However, the important issue is whether and how much Central and Western China have benefited from the rapid growth of the Coastal region through spillover effects. Several econometric analyses have been done on this issue from different viewpoints, such as Zhang and Felmingham (2002), Brun et. al. (2002), and Aoki (2006). Since their studies are not based on IO data, they do not clearly elucidate how the spillover effects function among regions and industries. On the other hand, Hioki (2004), Okamoto (2005), and Zhang and Zhao (2006) use MRIO97 to measure the spillover effects, and discuss Hirschmann's uneven development theory. However, since their papers are based on one time point, it is not possible to gauge how much the spillover effects contribute to regional economic growth. The decomposition analysis used in the present paper is based on China's interregional/multi-regional IO table for 1987 and 1997, which will help us to examine the interregional spillover effects in detail.

This paper proceeds as follows: Section 2 gives a brief explanation of the available data used, and proposes a new efficient methodology for estimating the price deflators by origin and commodity. Section 3 shows the standard IO decomposition technique based on an Isard-type 3-region IO model. Section 4 applies the model shown in Section 3 to China and discusses the performances of industrial and regional development policies. The concluding remarks are given in Section 5.

2. Data

(1) Basic Properties of the Data

The basic data sets used in this paper are IRIO87 and MRIO97. The former was completed in 1995, but formally published in 2003 by Ichimura and Wang (2003). The latter was published in 2003 by IDE-SDS (2003). Since the construction methods as well as industrial and regional classifications are different, we have to make some adjustments before the decomposition analysis to make the two data sets consistent.

The main differences between the tow tables can be summarized as follows: First, though both are Isard-type IO tables, the interregional matrices of intermediate demand in IRIO87 are basically constructed from survey-based data. However, in MRIO97, the interregional commodity shipments are estimated by Leontief-Strout's gravity model based on the Important-Point-Survey for 549 state owned enterprises or enterprise groups. Therefore, MRIO97 can be considered as a kind of hybrid type table. Second, MRIO97 includes interregional matrices of final demand, but such interregional information is not available in IRIO87 (see Okamoto (2005), and Meng and Ando (2006)). Third, interregional transactions in the Services industry are ignored in MRIO97 due to data limitations, but are available in IRIO87. Based on the objective of this paper, we adjusted the Services data in IRIO87, to give it the same format as MRIO97.

To maintain the consistency between the two tables, we took the greatest common factors in the industrial and regional classifications. The industrial sectors and the goods or services they produce are classified into seven categories: (1) Agriculture (AGR), (2) Mining and Processing (MIN), (3) Light Industry (LIG), (4) Energy Industry (ENE), (5) Heavy Industry and Chemical Industry (HEA), (6) Construction (CON), (7)

Table1 Regional Classification and Codes

7 Regions	China's 31 Province-level Regions
Dongbei(DB)	Liaoning(6), Jilin(7) ,Heilongjiang(8)
Huabei(HB)	Beijing(1), Tianjing(2), Hebei(3), Shandong(15)
Huadong(HD)	Shanghai(9), Jiangsu(10), Zhejiang(11)
Huanan(HN)	Fujian(13), Guangdong(19), Hainan(21)
Huazhong(HZ)	Shanxi(4), Anhui(12), Jiangxi(14), Henan(16), Hubei(17), Hunan(18)
Xibei(XB)	Inner Mongolia(5), Shaanxi(27), Gansu(28), Qinghai(29), Ningxia(30), Xinjiang(31)
Xinan(XN)	Guangxi(20), Chongqing(22), Sichuan(23), Guizhou(24), Yunnan(25), Tibet(26)

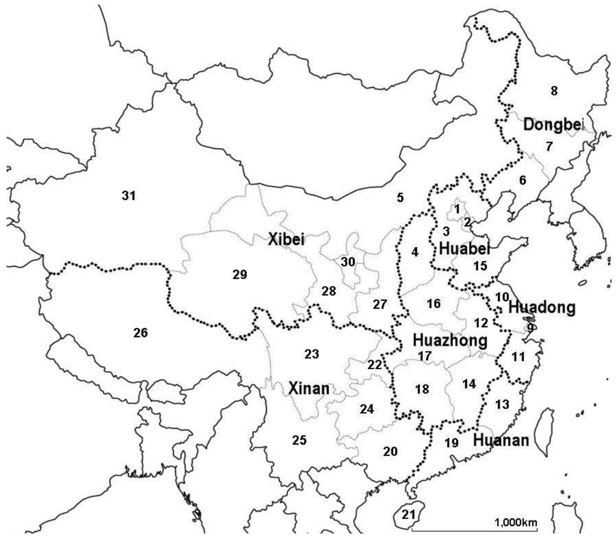

Fig.1 Regions of China

Transportation (TRA), (8) Commerce (COM), (9) Services (SER). The detailed regional classifications are shown in Table 1, and Figure 1.

It should also be noted that based on a consideration of real geographical conditions and the present economic situation in China, Inner Mongolia is included in Xibei region in MRIO97. This is inconsistent with IRIO87, where Inner Mongolia is included in Huabei region. Since no interregional IO table is available with a more detailed regional classification, it is extremely difficult to deal with the different treatment of Inner Mongolia. This may lead to some bias in our analytical results, though Inner Mongolia's economy scale is extremely small in comparison to the whole national economy.[1] Additionally, the Post and Telecommunication industry is included in the Services industry in MRIO97, but in the Transportation industry in IRIO87. This inconsistency can not be adjusted with the existing tables, and related errors may occur in our analytical results to some extent.

(2) A New Approach to Deflating the Interregional IO Table

In order to focus on real rather than nominal changes in our decomposition analysis, the IO table used should be corrected based on constant prices. The method that has been most widely used for the estimation of IO tables in constant prices is Double Deflation (DD) (see United Nations (1973)). Though this method is generally accepted, it still involves certain problems which have been reported in Sevaldson (1976), Wolff (1994), and Dietzenbacher and Hoen [7)]. The two main problems can be summarized as follows: First, under this method, an entire row in the IO table is deflated using the price index of gross output. This method ignores the practical situation where price indices are likely to be different within a row of intermediate deliveries, since most sectors produce more than one good, and each sector requires a different mix of these goods as an input. Second, the published IO table available to the normal user is already largely aggregated, meaning that the user can only adjust the IO table in constant prices via deflation after aggregation. Therefore the aggregation error may influence the accuracy of the deflation.

To encountering the above problems, Dietzenbacher and Hoen (1998) propose an alternative method from the user's viewpoint. Under their method, the intermediate deliveries in constant prices are estimated on the basis of intermediate deliveries in current prices, and the row and column sums in constant prices. This estimation precisely satisfies the requirements for applying the RAS method. Though this method performs better than DD, more exogenous information such as row and column sums in constant prices need to be available in advance. Unfortunately, when analysing developing countries, it is difficult to obtain detailed information about price deflators due to their poor statistical infrastructures. In addition, under the interregional framework, identical commodities produced in different regions may have different F.O.B. price deflators. However such differences are not definitely considered in existing researches.

In this paper, considering China's national and regional statistical situations, we propose the following alternative method for deflating the interregional IO table.

The row equilibrium condition in an Isard-type interregional IO model with competitive imports can be written in current prices as

$$X_i^r = \sum_s \sum_j x_{ij}^{rs} + \sum_s \sum_k y_{ik}^{rs} + E_i^r - M_i^r, \quad (1)$$

---

[1] The share of Inner Mongolia to National GDP was just 1.5% in 1987 and 1.4% in 1997.

where X_i^r denotes the amount of output produced by industry i located in region r, x_{ij}^{rs} and y_{ik}^{rs} respectively represent the intermediate and final demand for commodity i used by industry j and the final consumer k located in region s, when commodity i is produced in region r and shipped to region s. E_i^r and M_i^r are respectively, exports and imports of commodity i in region r. Using the price deflators, the above equation can be rewritten in constant prices as follows:

$$\begin{aligned} X'^r_i &= \sum_s \sum_j x_{ij}^{rs} \theta_{ij}^{rs} + \sum_s \sum_k y_{ik}^{rs} \sigma_{ik}^{rs} \\ &+ E_i^r \eta_i^r - M_i^r \nu_i^r. \end{aligned} \tag{2}$$

Where, X'^r_i is the output in constant prices, and θ_{ij}^{rs}, σ_{ik}^{rs}, η_i^r and ν_i^r are the price deflators relating to x_{ij}^{rs}, y_{ik}^{rs}, E_i^r and M_i^r, respectively.

For simplicity, the following assumption concerning price deflators is introduced:

$$\theta_i^r = \theta_{ij}^{rs} = \sigma_{ik}^{rs} = \eta_i^r. \tag{3}$$

This assumption implies that the price deflators may differ by region of origin and commodity, but are independent of the destination and industry where the commodity is used. However, θ_i^r is still difficult to obtain from the existing statistics in China. Fortunately, the price deflators by industry at the national level ($\bar{\theta}_i$) are available, and can be used as the initializing values to estimate θ_i^r based on the following assumption:

$$\theta_i^r = \bar{\theta}_i (1 + \alpha^r)(1 + \beta_i). \tag{4}$$

The above assumption means that θ_i^r is distributed around $\bar{\theta}_i$, and depends on the region-related parameters α^r and commodity-related parameters β_i. Therefore, the deflation of the interregional IO table is reduced to be the question of how to determine the parameters α^r and β_i.

Substituting Eq. (4) into (2), the row equilibrium condition can be rewritten in the following form:

$$\begin{aligned} X'^r_i &= (\sum_s \sum_j x_{ij}^{rs} + \sum_s \sum_k y_{ik}^{rs} + E_i^r) \\ &\cdot \theta_i (1 + \alpha^r)(1 + \beta_i) - M_i^r \nu_i^r. \end{aligned} \tag{5}$$

Since X'^r_i on the right side of the above equation can be regarded as the row-CT (Control Total) in the IO table, it should in theory equal column-CT ($X'^r_{j=i}$). Thus, regional gross value added in the interregional IO table can be described as

$$V'^s = \sum_j X'^s_j - \sum_r \sum_i \sum_j x_{ij}^{rs} \bar{\theta}_i (1 + \alpha^r)(1 + \beta_i), \tag{6}$$

where, V'^s denotes the gross value added of region s in constant prices. Since the regional GDP deflators ($\bar{\delta}^s$) are available, the parameters α^r and β_i can be estimated by the Grid Search (GS) method under the following conditions.

$$\begin{matrix} argmin \\ \{grid\ search:\ \ \alpha^r, \beta_i\} \end{matrix} \qquad \epsilon = \sum_s \left(\frac{V'^s - V^s \bar{\delta}^s}{V^s \bar{\delta}^s} \right)^2 \tag{7}$$

Table2 Merits of the Grid Search Method

	DD	RAS-based	GS
Accuracy	low	high	high*
Exogenous Information	normal	large	small
Calculation Scale	small	normal	super large
Theoretical Foundation	one price per good	composition price	composition price

*: Compare to DD

The calculation scale depends on the levels selected in GS. For example, 9 levels are selected in an interregional model with 9 sectors and 7 regions, and if the calculation proceeds under the round of sector after region, then the number of Grid Searches per circuit equals $7^9 + 9^9 = 40,353,607 + 387,420,489 = 427,774,096$. Using a supercomputer, such a calculation can be completed within less than one hour.

Compared to the DD and RAS-based methods, the merits of GS can be summarized as follows (see Table 2): First, since it is based on the balancing structure of the IO table, called the principle of Equivalence of Three Aspects, the estimated results seem more consistent and accurate than DD.[2] Second, GS vastly reduces the exogenous data requirements. In the case of this paper, applying GS only requires price deflators by industry at the national level and officially published regional GDP deflators. Third, if a supercomputer is employed for specifying the parameters in GS, monetary and time expenditures can be saved on data collection and processing. Finally, GS can be used to estimate price deflators not only by origin and destination but also by the supply-side and demand-side industries.

3. Model

Considering the features of IRIO87 and MRIO97, which are compiled as Isard type tables with competitive imports, we provide an interregional IO model with 3 regions to show how to decompose the factors of output growth.

---

[2] We also use the same data to test the performance of DD. Its GDP error is found to be about 7%, which is bigger than the 0.03% GDP error of GS.

A 3-region IO model can be given as follows:

$$X = (I - A)^{-1}Y = B \cdot Y, \tag{8}$$

where X, A, Y and B are, respectively, the vector of output, matrix of interregional input coefficients, vector of final demand, and matrix of the interregional Leontief inverse. And they are defined as the following forms.

$$X = \begin{pmatrix} X^1 \\ X^2 \\ X^3 \end{pmatrix}, \ A = \begin{pmatrix} A^{11} & A^{12} & A^{13} \\ A^{21} & A^{22} & A^{23} \\ A^{31} & A^{32} & A^{33} \end{pmatrix},$$

$$Y = \begin{pmatrix} Y^1 \\ Y^2 \\ Y^3 \end{pmatrix}, \ B = \begin{pmatrix} B^{11} & B^{12} & B^{13} \\ B^{21} & B^{22} & B^{23} \\ B^{31} & B^{32} & B^{33} \end{pmatrix},$$

where, $X^1 = (X^1_1, X^1_2, \cdots, X^1_n)'$ represents the output vector of region 1 with n sectors.

Based on Miller and Blair (1985), matrix B can be decomposed into the following three parts.

$$\begin{pmatrix} B^{11} & B^{12} & B^{13} \\ B^{21} & B^{22} & B^{23} \\ B^{31} & B^{32} & B^{33} \end{pmatrix} = \begin{pmatrix} M^1 & 0 & 0 \\ 0 & M^2 & 0 \\ 0 & 0 & M^3 \end{pmatrix}$$

$$+ \begin{pmatrix} F^1 & 0 & 0 \\ 0 & F^2 & 0 \\ 0 & 0 & F^3 \end{pmatrix} + \begin{pmatrix} 0 & B^{12} & B^{13} \\ B^{21} & 0 & B^{23} \\ B^{31} & B^{32} & 0 \end{pmatrix},$$

where, $M^i = (I - A^{ii})^{-1}$, $F^i = B^{ii} - (I - A^{ii})^{-1}$.

For a given final demand vector, in accordance with Eq. (8) and the above equation, the output of region 1 can be expressed by the following equation.

$$\begin{aligned} X^1 &= (I - A^{11})^{-1}Y^1 + [B^{11} - (I - A^{11})^{-1}]Y^1 \\ &+ [B^{12}Y^2 + B^{13}Y^3] \end{aligned} \tag{9}$$

Obviously, the first term on the right side of the above equation denotes the intraregional multiplier effect, describing the output that would have been required for Y^1 if a single-region model were used. The middle term indicates the interregional feedback effect. The last term denotes the interregional spillover effects, which capture the output in region 1 required to fulfill the final demand for the goods produced in region 2 and 3. Then the outputs of region 1 in the base year (0) and target year (t) can be given as follows.

$$X^1_0 = M^1_0 \cdot Y^1_0 + F^1_0 \cdot Y^1_0 + B^{12}_0 \cdot Y^2_0 + B^{13}_0 \cdot Y^3_0, \tag{10}$$

$$\begin{aligned} X^1_t &= (M^1_0 + \Delta M^1)(Y^1_0 + \Delta Y^1) \\ &+ (F^1_0 + \Delta F^1)(Y^1_0 + \Delta Y^1) \\ &+ (B^{12}_0 + \Delta B^{12})(Y^2_0 + \Delta Y^2) \\ &+ (B^{13}_0 + \Delta B^{13})(Y^3_0 + \Delta Y^3). \end{aligned} \tag{11}$$

Using the two equations above, the output growth rate[3] of region 1 can be written as

$$\begin{aligned} &\Delta X^1/X^1_0 = (X^1_t - X^1_0)/X^1_0 \\ &= FD^1 + FT^1 + FDT^1 \\ &= (M^1_0 \cdot \Delta Y^1 + F^1_0 \cdot \Delta Y^1 \\ &+ B^{12}_0 \cdot \Delta Y^2 + B^{13}_0 \cdot \Delta Y^3)/X^1_0 \\ &+ (\Delta M^1 \cdot Y^1_0 + \Delta F^1 \cdot Y^1_0 \\ &+ \Delta B^{12} \cdot Y^2_0 + \Delta B^{13} \cdot Y^3_0)/X^1_0 \\ &+ (\Delta M^1 \cdot \Delta Y^1 + \Delta F^1 \cdot \Delta Y^1 \\ &+ \Delta B^{12} \cdot \Delta Y^2 + \Delta B^{13} \cdot \Delta Y^3)/X^1_0. \end{aligned} \tag{12}$$

The above equation shows that in explaining the output growth rate, three factors can be taken into account: (i) FD^1, the effect coming from the changes in final demand, (ii) FT^1, the effect from the technology changes, (iii) FDT^1, the effect from the changes in both the final demand and the technology system.

On the other hand, we can also rearrange Eq. (12) into the following form.

$$\begin{aligned} &\Delta X^1/X^1_0 = (X^1_t - X^1_0)/X^1_0 \\ &= FM^1 + FF^1 + FS^1 \\ &= (M^1_0 \cdot \Delta Y^1 + \Delta M^1 \cdot Y^1_0 + \Delta M^1 \cdot \Delta Y^1)/X^1_0 \\ &+ (F^1_0 \cdot \Delta Y^1 + \Delta F^1 \cdot Y^1_0 + \Delta F^1 \cdot \Delta Y^1)/X^1_0 \\ &+ (B^{12}_0 \cdot \Delta Y^2 + \Delta B^{12} \cdot Y^2_0 + B^{13}_0 \cdot \Delta Y^3 \\ &+ \Delta B^{13} \cdot Y^3_0 + \Delta B^{12} \cdot \Delta Y^2 + \Delta B^{13} \cdot \Delta Y^3)/X^1_0, \end{aligned} \tag{13}$$

where, FM, FF, and FS, respectively, denote factors relating to the intraregional multiplier effects, feedback effects, and spillover effects.

If we separate Y into consumption (C), capital formation (I), exports (EX) and imports (IM), namely, $Y = C + I + EX + IM$, Eq. (12) and (13) can be rewritten as follows.

$$\begin{aligned} &\Delta X^1/X^1_0 = FD^1 + FT^1 + FDT^1 \\ &= (FD^1_C + FD^1_I + FD^1_{EX} + FD^1_{IM}) \\ &+ (FT^1_C + FT^1_I + FT^1_{EX} + FT^1_{IM}) \\ &+ (FDT^1_C + FDT^1_I + FDT^1_{EX} + FDT^1_{IM}) \\ &= (FD^1_C + FT^1_C + FDT^1_C) \\ &+ (FD^1_I + FT^1_I + FDT^1_I) \\ &+ (FD^1_{EX} + FT^1_{EX} + FDT^1_{EX}) \\ &+ (FD^1_{IM} + FT^1_{IM} + FDT^1_{IM}) \\ &= F^1_C + F^1_I + F^1_{EX} + F^1_{IM}, \end{aligned} \tag{14}$$

---

[3] For simplification,
Let $X^1/X^1_0 = (\Delta X^1_1/X^1_{1,0}, \Delta X^1_i/X^1_{i,0}, ..., \Delta X^1_n/X^1_{n,0})'$.

$$\begin{aligned}\Delta X^1/X_0^1 &= FM^1 + FF^1 + FS^1\\ &= (FM_C^1 + FM_I^1 + FM_{EX}^1 + FM_{IM}^1)\\ &+(FF_C^1 + FF_I^1 + FF_{EX}^1 + FF_{IM}^1)\\ &+(FS_C^1 + FS_I^1 + FS_{EX}^1 + FS_{IM}^1)\\ &= (FM_C^1 + FF_C^1 + FS_C^1)\\ &+(FM_I^1 + FF_I^1 + FS_I^1)\\ &+(FM_{EX}^1 + FF_{EX}^1 + FS_{EX}^1)\\ &+(FM_{IM}^1 + FF_{IM}^1 + FS_{IM}^1)\\ &= F_C^1 + F_I^1 + F_{EX}^1 + F_{IM}^1. \end{aligned} \tag{15}$$

Similar expressions for other regions also can be derived in the same way.[4]

4. Empirical Results

(1) Real Growth Rate of Output

Using the price deflators estimated in Section 2, the MRIO97 table can be converted into constant prices. It then becomes possible to obtain the regional and industrial growth rates of output in real terms, as shown in Table 3.1.

From the table, it is easy to see that national output increased 203.16% in the period of 1987-1997, but the structure of the increase seems unbalanced. At the industrial level, Heavy industry and Light industry have relatively high average growth rates (234.23% and 258.10%), whereas Mining and Energy industries experienced lower average growth (58.24% and 100.36%). This unbalance is mainly the result of the different industrial policies implemented in the period. Economic reform in China followed a gradualist approach with a Pareto-improvement characteristic. The growth pattern involved first improving incentives and microeconomic efficiency and then focusing on the allocation of newly created resources to more productive industries such as manufacturing (Heavy industry and Light industry). However, the high growth of the manufacturing industry has been restricted by the relatively low growth in energy production. This unbalance has been the main bottleneck to China's sustainable economic growth. Direct measures for overcoming the energy bottleneck are boosting imports and speeding up energy production. The former has made the prices and import ratio of energy goods increase rapidly, and thus influenced the international energy market. The latter depends on the discovery of new resources and massive fixed capital investment for developing existing resources, which can not be achieved in the short term. Therefore, a more realistic and strategic solution for China would be to promote energy consumption efficiency through technological innovation and other methods.

The unbalanced structure of output growth also can be observed at the regional level. For example, the southern coastal region of Huadong as well as Huabei on the east coast have clearly higher average growth rates (368.09% and 241.96%) than the other inner regions such as Dongbei (119.34%), and Huazhong (141.70%). Though this unbalance results from complex reasons, the regional development policies implemented in different regions and different periods play a crucial role. Before the economic reform of 1978, China's regional development policies were based on the Maoist development strategy which was characterized by a high dependency on redistribution. With the beginning of the reform, Hirschmann's uneven regional development strategy became the mainstream-idea among policymakers. This gave coastal regions more abilities and freedoms to seize the new opportunities and to enjoy the benefits presented by the economic openness and the implementation of reforms. As a result, given their double ascendancies, namely, geographical advantage and policy domination, it is no wonder that the coastal regions have achieved higher economic growth.

In addition, by comparing the growth rates with their average data, both column-wise and row-wise, the relative tendency of output growth by industry and region can be summarized in Table 3.1 and Table 3.2. Table 3.1 shows that for almost every industry, the coastal regions of Huanan and Huadong play the leading role in China's economic growth. Xibei is also an important region which has a positive growth tendency on average, but its growth pattern depends mainly on its endowment of resources. Table 3.2 demonstrates that Heavy industry and Services have been the key sectors for regional output growth. The growth of light industry shows a positive tendency on average, but in Xibei and Dongbei, its performance seems unsatisfactory.

(2) Contribution Ratio by Final Demand Item

As mentioned in section 3, final demand is separated into four items in the paper: consumption, capital formation, export and import. Using Eq. (14), the factor contributions to output growth by each final demand item can be calculated. Table 4 shows the calculation results aggregated by region and industry.

Obviously, at the national level, the contribu-

---

[4] the decomposition technique used in this paper is not a unique one (see Round (1985)), and the expression of growth rate is not unique either. (see Dietzenbacher and Los (1998), Paul de Boer (2006))

tion of consumption (56.28%) plays an major role followed by capital formation (40.04%) and exports (30.55%). Imports (−26.88%) make a minus contribution to the output growth because of the substitution impact. At the regional level, the structure of contributions shows an unbalanced pattern. The coastal regions have become more dependent on overseas markets. In Huanan, in particular, the contribution of exports has been larger than all other items, and the contribution from net exports shows the biggest positive impact. On the other hand, in the inner regions, domestic consumption still makes a dominant contribution, and net exports have a minus impact. This unbalanced structure implies that the inner regions remain in the stage of import substitution development, but the coastal regions have moved to export oriented development. In addition, both Huadong and Huanan are on the coast, but the effect of capital formation for the former (44.58%) is significantly larger than the latter (37.59%), and the effect of exports for the latter (66.29%) is much larger than the former (40.08%). This may be explained by the fact that Huadong has become a more capital-formation-oriented region and Huanan more export-oriented.

Similarly, the unbalanced structure can also be observed at the industrial level. The features can be summarized as follows: (i) For Agriculture, consumption makes the highest contribution to output growth among industries, but its capital formation makes the lowest contribution. This implies that the serious absence of capital formation in agriculture may be considered an important reason for the low output during the decade (refer to Table 3.1). (ii) Mining and Energy industries show a similar pattern: both have relatively high contribution ratios to each final demand item, especially imports. This implies that China faces a strict energy bottleneck which has been reflected in the rapid increase in import demand. (iii) Light industry and Heavy industry show a very different contribution structure. The former has a high ratio in consumption, very low ratio in capital formation and the highest ratio in net exports, while the latter shows the opposite trend. This indicates that the growth of Light industry has been more dependent on domestic consumption and exports, whereas Heavy industry seems to depend on capital formation. (vi) In addition, from the contribution ratios of Net Exports for Transportation, Commerce and Services, it can be concluded that these industries have strengthened their export orientation during the decade. Based on Table 4, it can be concluded that different regions are in very different development stages, showing the different economic structures in China.

(3) Contribution Ratio by Growth Factor

As explained in Section 3, using Eq. (14), the output growth can be decomposed into the three factors: changes in final demand, changes in technical coefficients and simultaneous changes in the two factors. The left side of Table 5 shows the results of the decomposition, which are obtained by aggregation over industries, regions or both. The overall results indicate that 90.12% of the output increase is due to changes in final demand, versus only 3.68% by the changes in technical coefficients, with the rest from simultaneous changes.

At the regional level, though changes in final demand are still the most important determinants of output growth, there is some variation in the results. For the coastal regions, the contributions by changes in final demand account for about 80% of output growth. For the inner regions it is over 95%. This implies that the coastal regions have become more externally oriented, whereas the inner regions, especially Xibei and Xinan, are still domestically-oriented. On the other hand, the opposite pattern of variation can be observed for the remaining factors. Namely, the changes in the technical coefficients and the simultaneous changes show relatively higher contribution ratios for the coastal regions and lower ratios for the inner regions. This implies that the technical input structure in the coastal regions changes more rapidly and plays a greater role in output growth.

At the industrial level, the results show much more variation. The effects of changes in final demand are extremely large for the Mining and Energy industries, and these positive effects are partially canceled out by the negative effects of changes in the technical coefficients and simultaneous changes. As described in the previous section, China's economic development, in particular the growth in the manufacturing industry, strongly depends on energy input. This inevitably causes an extreme increase in the demand for energy goods. However it is difficult for the change in the technical input structure for speeding up production to match the expanding increase in energy demand. Consequently, as shown in the table, the changes in the technical coefficients for the Mining and Energy industries have clear suppressive effects on output growth.

(4) Contribution Ratio by Defined Technical Factor

As mentioned in Section 3, output growth can also be decomposed into the intraregional multiplier-related effect, feedback-related effect and spillover-related effect. The decomposition results aggregated by region, industry, or both are presented in the right side of Table 5.

The overall results indicate that 82.45% of output growth is contributed by the intraregional multiplier-related effect, 16.97% by the spillover-related effect and only 0.58% by the feedback-related effect. At the regional level, the intraregional multiplier-related effect accounts for 96.08% of output growth for Dongbei and 89.00% for Xinan. Huazhong and Xibei are also inner regions like Dongbei and Xinan, but for these two regions, the multiplier-related effect only accounts for 76.84% and 77.54% of output growth. On the other hand, the spillover-related effect is extremely small for Dongbei and Xinan, but relatively high for Huazhong and Xibei. In explaining these results, the regional differences in geographical location, the spatial distribution of natural resources and transportation conditions have to be considered.

Dongbei is located in northeast China, far away from the center. Based on the advantages of land, energy and forest resources, in the early 1950, it was called the industrial cradle of China, and played an important role in China's early industrial and economic development. Therefore, it has a well developed but relatively independent industrial base and intraregional telecommunications and transportation networks. This makes Dongbei with the highest degree of self-sufficiency. Therefore, the high intraregional multiplier-related effect and low spillover-related effect for Dongbei are not difficult to interpret.

Xinan is located in southwest China, with the most complex and unfavorable geographical conditions. This makes it the most undeveloped region with the poorest transportation networks to the outside. Therefore, the intraregional multiplier-related effect is relatively high and the spillover-related effect is low.

On the other hand, Huazhong is located in the center of China, with developed transportation networks and good accessibility to other regions. Xibei is the most important production base for mining and energy goods, and has become the major origin for exporting energy to other regions. At the same time, Xibei is also an important consumption base for light industry products, and has become the main destination for imports of these goods from the outside. As a result of the above features the two regions have more linkages with other regions. Therefore, the intraregional multiplier-related effects are lowest and the spillover-related effects are high.

At the industrial level, we also see enormous variation. The intraregional multiplier-related effects account for over 90% of the output growth for Agriculture and Services industries, about 85% for Light industry and less than 75% for the rest. In explaining these results, an important factor is the spatial imbalance of production supply and demand. By the end of 1997, it is difficult to consider a unified national agriculture market as being formed in China. This restricts the interregional flows for agriculture goods. Therefore, there is a relatively high regional self-sufficiency ratio in the agriculture industry. The high multiplier-related effect for the Services industry is caused by the low interregional flow of services goods and may also partly result from the poor statistic data for services. As described earlier, the spatial distribution of natural resources is quite uneven in China, making the interregional flow for the transportation of energy goods large scale and frequent. For example, about 40% of rail transportation capacity is used for shipping coal across regions. Whereas, Heavy industry is mainly located in the inner regions for historical reasons, light industry is more developed in the coastal regions. To narrow the gap of in supply and demand between heavy and light industry goods, these is a need for significant flows of manufacturing goods across regions.

Furthermore, the feedback-related effect is extremely small. Similar results have been reported in the existing researches (see Round [22)]). For the case of China, several features of the feedback-related effect can be summarized as follows: (i) The effect for the coastal regions of Huadong and Huanan is three or four times higher than that for the other regions. (ii) Huabei is a coastal region, but it shows a fairly low feedback-related effect. This implies that its industrial structure is quite different than those of the other coastal regions. (iii) The effects for the secondary and tertiary industries are larger than those for primary industry. Therefore, it can be concluded that relatively high feedback-related effects can be observed in relatively developed regions and modern industries.

(5) Interregional Contribution Ratio by Spillover-related Effect

The magnitudes of the interregional spillover effect has been regarded as the most important measurement for assessing the impact of regional development policy. However, few empirical researches have focused on this issue for China's regional economies, because of data limitations and other reasons. In this paper, by expanding the column of FS in Table 5 region-wise (horizontally), such effects can be measured in detail.

Table6 Spillover-related Effects (%)

FD	DB	HB	HD	HN	HZ	XB	XN	sum
DB	0.00	-1.14	1.95	1.05	-0.03	1.57	0.80	4.2
HB	1.63	0.00	7.89	4.49	4.06	2.72	2.25	23.0
HD	1.80	1.98	0.00	6.01	1.15	1.29	1.45	13.7
HN	1.67	1.75	6.60	0.00	3.03	1.46	3.14	17.6
HZ	1.30	0.77	8.46	6.73	0.00	2.54	3.02	22.8
XB	2.19	4.84	4.82	2.96	5.47	0.00	1.75	22.0
XN	0.68	0.57	2.79	4.78	1.26	0.62	0.00	10.7
sum	9.28	8.78	32.5	26.0	14.9	10.2	12.4	114

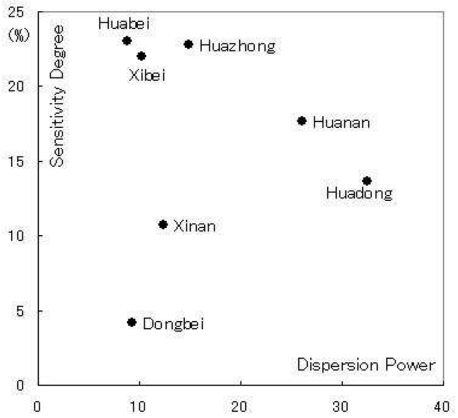

Fig.2 Dispersion Power and Sensitivity Degree

Table 6 shows the interregional contributions to output growth of the spillover-related effect. For simplicity, we use "←" to show the direction of the spillover effect. For example, HB←DB: 1.63% indicates that 1.63% of output growth in Huabei is contributed by the spillover-related effect coming from Dongbei. This can also be considered to result from the dispersion power of Dongbei or the sensitivity (absorption) power of Huabei.

Based on the detailed observation on the interregional matrix of Table 6, the major features of the interregional spillover-related effects can be summarized as follows: (i) The coastal regions of Huadong and Huanan have the largest dispersion power to nearly every region, and especially to their neighboring regions. On the other hand, they have relatively small influences from the inner regions, but are affected largely by each other (HD←HN: 6.01%, HN←HD: 6.60%). This implies that all the other domestic regions have become highly dependent on Huadong and Huanan, and that Huadong and Huanan trend to depend on each other. (ii) The situation for Huabei is much different from Huadong and Huanan, even though it is also a coastal region. The table shows that Huabei has the largest sensitivity degree, and especially that it is highly affected by the other two coastal regions (HB←HD: 7.89%, HB←HN: 4.49%), however, Huabei contributes little to other regions except Xibei. In explaining these results, Huabei's particular features have to be considered. It contains two biggest China's municipalities, Beijing and Tianjin, which are the cities under central authority. This makes Huabei more dependent on other regions, and as a result, Huabei has the largest sensitivity degree. (iii) Both Huazhong and Xibei have large sensitivity degree. Huazhong mainly receives spillover-related effects from the coastal regions of Huadong (HZ←HD: 8.46%) and Huanan (HZ←HN: 6.73%). These result from Huazhong's special geographical location, which was explained in earlier. By contrast, Xibei receives the largest effects from the inner regions of Huazhong (XB←HZ: 5.47%) and also receives relatively large effects from all the other regions. This is due to the fact that Xibei is the biggest supplier of energy goods, and in this sense, it has become very important for the economic development of other regions. In addition, it also appears that Huazhong has come to play an increasing important role in transferring the spillover effects from the coastal regions to the remote inner regions. (iv) As one of the remotest regions, Dongbei has the lowest sensitivity degree and also low dispersion power. This is mainly due to the poor transportation linkages between it and other regions. Therefore regional policies for Dongbei's economic development should focus on how to improve the transportation infrastructure between it and the outside. (v) Xinan is also a remote region and also has relatively low sensitivity degree and dispersion power. However, the linkages between Xinan and Huanan are quite strong (XN←HN: 4.78%, HN←XN: 3.14%). This implies that Xinan has taken advantage of its good access to Huanan to speed up its economic development. To provide a more visual presentation, the total effects by column and row shown in Table 6 are plotted in Figure 2. The relative position measured by dispersion power and sensitivity degree for each region can be easily confirmed.[5]

---

[5] More detailed industry-by-region results are presented in Appendix 1-3.

5. Conclusion

Compared to the "big-bang model" used in Russia's transition, China selected a gradualist model for economic reform. The process of promoting such a gradual reform has both temporal and spatial aspects. Therefore, the regional development policies implemented at the early stage of economic reform can be considered to be a Chinese version of Hirschmann's uneven development theory. As shown in the paper, consequently, different regions are in very different development stages and the factor contribution to output growth shows great variation not only at the industrial level but also at the regional level. This has become one of the most important reasons for the continuous expansion of regional economic disparities.

To narrow the regional economic disparities and to ease the energy bottleneck, two nation-level projects, "China Western Development" and "Revitalize Northeast China" were adopted at the beginning of the new century. The two projects cover all the remote inner regions, including Xibei, Xinan, and Dongbei. However, it seems that Huazhong is not sufficiently emphasized within the nation-level economic development strategy. This implies that the center of gravity of China's regional economic development has jumped from the coastal regions to the remote inner regions, and may skip over the central region of Huazhong. Is this the best way for China's regional economic development from a long-run viewpoint?

In this paper, a standard input-output decomposition technique was applied to China's regional economies. From the results, it can be concluded that the interregional spillover-related effect has become a more important factor in regional output growth. In particular, the region of Huazhong has played a significant role in transmitting the effects from the coastal regions to the inner regions. Therefore, we consider that the bridge role of Huazhong should be emphasized in designing balanced regional economic development policies in the distant future.

REFERENCES

1) Akita, T., Regional economic growth in Japan: An interregional input-output analysis, *International Regional Science Review*, 16, 231-248, 1993.
2) Akita, T. and Y. Nabeshima, Growth factor analysis of Hokkaido prefecture with regional I-O tables, *Innovation & I-O Technique*, 3(2), 48-58, 1992. (in Japanese)
3) Aoki K., Transformation of China's regional division of labor and the home market effect, *Ajia Keizai*, 47(2), 2-34, 2006. (in Japanese)
4) Brun, J. F., Combes, J. L. and M. F. Renard, Are the spillover effects between coastal and noncoastal regions in China? *China Economic Review*, 13 161-169, 2002.
5) Carter, A. P., *Structural Change in the American Economy*, Harvard University Press, 1970.
6) Chenery, H. B., Shishido, S. and T. Watanabe, The pattern of Japanese growth, 1914-1954, *Econometrica*, 30, 98-139, 1963.
7) Dietzenbacher, E. and A. R. Hoen, Deflation of input-output tables from the user's point of view: A heuristic approach, *Review of Income and Wealth*, 44(1), 111-122, 1998.
8) Dietzenbacher, E. and B. Los, Structural decomposition techniques: Sense and sensitivity, *Economic Systems Research*, 10, 307-323, 1998.
9) Feldman S. J., McClain, D. and K. Palmer, Sources of structural change in the United States 1963-1978: An input-output perspective, *Review of Economics and Statistics*, 69, 503-510, 1987.
10) Forssell, O., The input-output framework for analysing transmission of technical progress between industries, *Economic Systems Research*, 1, 429-445, 1989.
11) Hioki, S., China's regional disparity and the trickling-down effect from coastal regions to inland regions: An analysis using a multi-regional input-output model, *Bulletin of the Japan Association for Comparative Economic Studies*, 41(1), 27-38, 2004. (in Japanese)
12) IDE, *Multi-regional input-output model for China 2000*, I.D.E. Statistical Data Series 86, IDE-JETRO, 2003.
13) Ichimura, S. and H. J. Wang, *Interregional Input-Output Analysis of the Chinese Economy*, World Scientific Pub. Co. Inc, 2003.
14) Leontief, W., *The Structure of the American Economy*, Oxford University Press, 1941.
15) Meng, B. and A. Ando, A SCGE model of Chinese economy considering regional price differentials: comparison with an interregional I-O table and some empirical results, *Procs. of JSCE(D)*, 62(1), 145-156, 2006. (in Japanese)
16) Miller, R. E. and P. D. Blair, *Input-Output Analysis: Foundations and Extensions*, Englewood Cliffs: Prentice-Hall, 1985.
17) Dietzenbacher, E., An intercountry decomposition of output growth in EC countries, in Lahr, M. L. and E. Dietzenbacher (eds.), *Input-Output Analysis: Frontiers and Extensions*, 121-142, 2001.
18) Oosterhaven, J. and A. R. Hoen, Preferences, technology, trade and real income changes in the European Union: An intercountry decomposition analysis for 1975-1985, *The Annals of Regional Science*, 32, 5-5-524, 1998.
19) Okamoto, N., Compilation and application of interregional input-output table for China: with reference to *Interregional Input-Output Analysis of the Chinese Economy* edited by Ichimura and Wang, *Ajia Keizai*, 46(1), 72-87, 2005. (in

Japanese)

20) Oosterhaven, J. and J. A. van der Linden, European technology, trade and income changes for 1975-1985: An intercountry input-output decomposition, *Economic Systems Research*, 9, 393-411, 1997.

21) Paul de Boer, Structural decomposition analysis and index number theory: An empirical application of the Montgomery decomposition, *Econometric Institute Report EI*, 2006.

22) Round, J. I., Decomposing multipliers for economic systems involving regional and world trade, *Economic Journal*, 95, 383-399, 1985.

23) Sevaldson, P., Price changes as caused of variations in input-output coefficients, in K. R. Polenske and J. V. Skolka (eds.), *Advances in Input-Output Analysis*, 113-33, Ballinger, Cambridge, MA, 1976.

24) United Nations, *Input-Output Tables and Analysis, Studies in methods*, Series F, 14(1), UN, New York, 1973.

25) Wolff, E. N., Productivity measurement within an Input-Output framework, *Regional Science and Urban Economics*, 24, 75-92, 1994.

26) Zhang, Q. and B. Felmingham, The role of FDI, exports and spillover effects in the regional development of China, *Journal of Development Studies*, 38(4), 157-178, 2002.

27) Zhang, Y. X. and K. Zhao, *Interregional Input-Output Analysis*, 180-199, SSAP, 2006. (in Chinese)

(Received May 15, 2007)

Table3.1 Real Growth Rate of Output

	AGR	MIN	LIG	ENE	HEA	CON	TRA	COM	SER	AVE.
DB	131.09	11.33	114.16	53.20	151.54	106.56	79.10	168.83	230.60	119.34
HB	107.19	56.33	201.95	62.18	261.84	192.84	136.83	136.33	398.01	193.01
HD	96.34	82.19	259.36	122.86	266.77	258.34	119.37	186.49	525.73	241.96
HN	126.19	112.76	477.83	287.04	569.27	323.79	368.57	165.87	603.06	368.09
HZ	79.07	73.31	209.17	82.80	200.42	120.50	121.11	82.54	199.94	141.70
XB	181.54	141.88	184.80	144.89	228.22	252.64	251.56	178.23	298.89	208.66
XN	118.20	49.47	194.90	81.01	246.42	212.61	129.89	113.71	279.91	175.91
AVE.	108.44	58.24	234.23	100.36	258.10	197.00	152.49	141.44	351.33	203.16

Table3.2 Growth Tendency Compared with Industrial Average

	AGR	MIN	LIG	ENE	HEA	CON	TRA	COM	SER	AVE.
DB	+	−	−	−	−	−	−	−	−	−
HB	−	−	−	−	+	+	−	+	+	−
HD	−	+	+	+	+	+	−	+	+	+
HN	+	+	+	+	+	+	+	+	+	+
HZ	−	+	−	−	−	−	−	−	−	−
XB	+	+	−	+	−	+	+	+	−	+
XN	+	−	−	−	−	+	−	−	−	−
AVE.	0	0	0	0	0	0	0	0	0	0

Table3.3 Growth Tendency Comparing with Regional Average

	AGR	MIN	LIG	ENE	HEA	CON	TRA	COM	SER	AVE.
DB	+	−	−	−	+	−	−	+	+	0
HB	−	−	+	−	+	−	−	−	+	0
HD	−	−	+	−	+	+	−	−	+	0
HN	−	−	+	−	+	−	+	−	+	0
HZ	−	−	+	−	+	−	−	−	+	0
XB	−	−	−	−	+	+	+	−	+	0
XN	−	−	+	−	+	+	−	−	+	0
AVE.	−	−	+	−	+	−	−	−	+	0

Table4 Factor Contribution Ratio by Final Demand Items (%)

	Consumption Expenditure (F_C)	Capital Formation (F_I)	Domestic Final Demand (F_C)+(F_I)	Exports (F_{EX})	Imports (F_{IM})	Net Exports (F_{EX})-(F_{IM})
DB	69.05	32.98	102.03	15.64	-17.67	-2.03
HB	59.66	43.12	102.78	23.72	-26.51	-2.78
HD	47.57	44.58	92.15	40.08	-32.22	7.85
HN	49.08	37.56	86.64	66.29	-52.93	13.36
HZ	63.57	36.17	99.74	12.21	-11.95	0.26
XB	62.37	38.76	101.13	10.45	-11.58	-1.13
XN	58.91	39.93	98.84	8.83	-7.67	1.16
AGR	88.43	9.77	98.20	14.73	-12.93	1.80
MIN	72.26	48.73	121.00	45.51	-66.50	-21.00
LIG	71.04	12.56	83.59	36.69	-20.29	16.41
ENE	71.06	39.94	111.00	36.11	-47.11	-11.00
HEA	43.55	57.94	101.49	41.49	-42.98	-1.49
CON	0.00	100.00	100.00	0.00	0.00	0.00
TRA	57.95	35.13	93.08	35.64	-28.72	6.92
COM	47.77	36.92	84.70	38.67	-23.37	15.30
SER	76.42	18.51	94.93	18.72	-13.65	5.07
AVE.	56.28	40.04	96.33	30.55	-26.88	3.67

Table5 Contribution Ratio by Growth Factor and Defined Effect (%)

	Contribution Ratio by Growth Factor			Contribution Ratio by Defined Effect		
	Change of Final Demand (FD)	Change of Technique (FT)	Simultaneous Changes (FDT)	Intraregional Multiplier (FM)	Feedback (FF)	Spillover (FS)
DB	101.14	3.13	-4.26	96.08	-0.27	4.20
HB	81.61	7.55	10.84	76.76	0.20	23.04
HD	86.32	3.72	9.97	85.18	1.14	13.68
HN	81.34	5.63	13.03	76.84	0.33	22.83
HZ	103.45	-0.79	-2.67	76.84	0.33	22.83
XB	95.56	2.05	2.40	77.54	0.43	22.03
XN	98.26	1.14	0.60	89.00	0.30	10.70
AGR	106.10	-0.73	-5.37	92.09	0.10	7.82
MIN	333.40	-78.51	-154.89	65.76	-1.34	35.58
LIG	81.29	6.42	12.29	86.00	0.45	13.55
ENE	188.66	-29.64	-59.01	75.91	0.07	24.02
HEA	75.43	8.40	16.17	73.32	1.10	25.59
CON	100.00	0.00	0.00	100.00	0.00	0.00
TRA	106.14	-0.69	-5.45	74.89	0.71	24.40
COM	82.59	7.81	9.61	73.49	0.93	25.58
SER	67.27	11.15	21.59	90.56	0.40	9.04
AVE.	90.12	3.68	6.21	82.45	0.58	16.97

Appendix 1 Decomposition of Real Output Growth per Region and Sector by Final Demand Item (%)

		Total Final Demand			Consumption			Capital Formation			Exports			Imports		
		FD	FT	FDT	FD_C	FT_C	FDT_C	FD_I	FT_I	FDT_I	FD_{EX}	FT_{EX}	FDT_{EX}	FD_{IM}	FT_{IM}	FDT_{IM}
DB	AGR	80.84	8.17	10.99	72.32	7.24	11.48	10.31	0.11	-0.32	4.47	0.89	-0.12	-6.26	-0.08	-0.04
	MIN	900.08	-284.72	-515.36	517.86	-135.72	-246.54	427.98	-134.75	-264.27	283.98	-32.37	-187.24	-329.74	18.11	182.70
	LIG	88.83	5.57	5.59	82.18	5.00	7.24	9.34	-0.14	-1.09	8.62	0.71	-1.45	-11.30	0.00	0.90
	ENE	179.05	-25.56	-53.49	134.25	-14.73	-25.84	77.77	-11.15	-25.55	30.93	-1.78	-24.89	-63.90	2.11	22.79
	HEA	80.41	13.43	6.16	36.95	6.46	8.62	44.51	5.12	-1.96	27.85	2.19	-3.42	-28.89	-0.34	2.91
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	125.75	-6.32	-19.42	73.09	2.02	0.75	51.78	-9.54	-19.74	31.58	0.77	-9.39	-30.71	0.42	8.95
	COM	51.91	22.74	25.36	32.78	12.12	19.47	14.04	7.53	7.45	11.40	3.95	2.96	-6.30	-0.86	-4.52
	SER	87.18	6.22	6.61	78.95	3.74	5.94	6.62	1.61	0.89	6.95	1.05	0.26	-5.35	-0.18	-0.48
	AVE.	101.14	3.13	-4.26	64.00	2.47	2.57	39.58	-0.36	-6.24	20.44	0.83	-5.63	-22.89	0.19	5.03
HB	AGR	73.98	11.79	14.22	69.83	9.17	12.96	6.94	1.22	2.08	16.94	1.69	3.40	-19.73	-0.29	-4.21
	MIN	335.07	-82.65	-152.41	179.54	-36.91	-74.95	166.15	-40.11	-78.56	108.42	-9.95	-43.76	-119.05	4.32	44.85
	LIG	69.14	12.19	18.66	61.76	8.79	15.05	8.85	2.01	3.97	16.17	1.78	4.37	-17.63	-0.39	-4.73
	ENE	314.50	-73.40	-141.10	194.11	-38.04	-81.86	127.70	-30.37	-61.52	90.35	-9.52	-48.38	-97.66	4.53	50.67
	HEA	64.79	12.97	22.23	30.06	5.32	10.04	41.17	6.70	13.46	24.95	1.58	5.70	-31.38	-0.63	-6.96
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	103.36	1.99	-5.35	54.16	0.91	-2.03	47.53	0.42	-1.98	31.65	0.60	-3.42	-29.99	0.06	2.08
	COM	75.12	11.95	12.93	41.24	7.98	10.61	29.84	2.75	3.91	21.99	1.68	3.12	-17.96	-0.45	-4.72
	SER	57.80	15.67	26.52	49.78	9.02	16.40	7.14	5.44	10.58	6.37	1.76	5.48	-5.49	-0.55	-5.95
	AVE.	81.61	7.55	10.84	48.05	4.50	7.11	36.39	2.30	4.43	20.71	0.98	2.03	-23.54	-0.23	-2.73
HD	AGR	131.35	-9.81	-21.53	90.87	-4.70	-8.86	22.43	-3.23	-6.71	45.25	-2.68	-13.43	-27.20	0.79	7.46
	MIN	252.56	-51.42	-101.14	153.76	-24.97	-54.11	151.92	-23.88	-47.20	103.26	-6.07	-33.30	-156.37	3.50	33.48
	LIG	76.05	7.21	16.74	42.66	5.00	8.63	10.12	1.09	3.59	41.94	1.61	8.84	-18.67	-0.49	-4.33
	ENE	182.97	-25.50	-57.48	108.66	-11.23	-30.21	81.31	-13.04	-26.61	69.31	-3.03	-21.18	-76.31	1.80	20.52
	HEA	82.51	4.47	13.01	33.12	2.65	4.91	52.44	1.45	7.22	37.56	1.11	7.64	-40.61	-0.74	-6.75
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	162.47	-19.54	-42.93	73.04	-6.68	-16.67	74.88	-12.16	-27.34	59.66	-1.52	-8.89	-45.12	0.82	9.98
	COM	84.11	4.60	11.29	32.10	2.72	3.98	33.55	0.95	4.66	39.58	1.64	8.28	-21.13	-0.71	-5.63
	SER	60.10	12.07	27.83	48.82	7.34	15.25	7.27	3.83	10.14	11.51	1.76	10.54	-7.50	-0.86	-8.09
	AVE.	86.32	3.72	9.97	40.36	2.63	4.57	40.06	0.66	3.85	33.66	0.88	5.54	-27.77	-0.46	-4.00
HN	AGR	139.24	-8.48	-30.75	100.21	-5.78	-14.36	15.62	-0.95	-2.77	65.10	-2.88	-26.25	-41.69	1.13	12.64
	MIN	236.56	-28.08	-108.48	135.93	-15.08	-47.73	127.51	-11.57	-45.30	239.22	-7.06	-113.28	-266.09	5.64	97.82
	LIG	82.58	4.28	13.14	42.46	2.67	7.29	6.87	1.17	3.12	64.28	0.81	7.40	-31.03	-0.36	-4.68
	ENE	85.81	4.79	9.40	58.00	1.91	5.22	34.57	2.78	6.89	71.98	0.51	3.90	-78.73	-0.41	-6.61
	HEA	62.77	10.55	26.67	26.49	5.11	12.21	34.70	4.96	13.40	71.72	1.46	15.82	-70.14	-0.98	-14.76
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	78.94	6.45	14.60	38.07	4.46	9.00	28.08	1.11	1.41	62.76	1.04	5.44	-49.97	-0.16	-1.25
	COM	118.71	-1.65	-17.06	29.85	-0.37	-5.09	37.76	-1.31	-7.78	110.68	-0.86	-20.25	-59.58	0.89	16.06
	SER	62.77	10.34	26.89	47.26	6.54	13.84	7.10	2.97	8.46	24.95	1.57	17.00	-16.54	-0.74	-12.42
	AVE.	81.34	5.63	13.03	39.36	3.01	6.71	29.30	2.33	5.93	59.56	0.66	6.06	-46.89	-0.37	-5.67
HZ	AGR	124.28	-9.44	-14.84	105.47	-4.95	-8.44	17.00	-3.43	-5.25	10.36	-1.35	-3.38	-8.56	0.29	2.23
	MIN	284.35	-62.41	-121.94	158.00	-30.09	-64.74	128.88	-28.42	-56.95	74.28	-7.63	-37.03	-76.80	3.73	36.79
	LIG	85.01	5.91	9.09	74.53	4.87	6.96	8.80	0.78	1.49	7.68	0.37	1.45	-6.01	-0.12	-0.82
	ENE	253.07	-53.17	-99.90	155.85	-27.44	-54.59	96.85	-22.29	-44.18	62.66	-6.49	-36.16	-62.29	3.05	35.04
	HEA	82.48	6.49	11.03	38.33	2.07	3.57	44.85	4.27	7.06	15.03	0.43	2.26	-15.74	-0.28	-1.86
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	109.95	-1.97	-7.97	67.47	5.56	2.72	44.88	-7.91	-11.23	15.11	0.30	-1.44	-17.50	0.08	1.97
	COM	72.38	8.78	18.84	31.85	6.19	14.75	37.98	1.75	3.89	16.47	1.31	2.80	-13.91	-0.47	-2.59
	SER	83.86	7.09	9.05	75.02	4.63	5.52	8.32	2.08	3.41	3.92	0.63	1.55	-3.40	-0.25	-1.42
	AVE.	103.45	-0.79	-2.67	64.96	-0.01	-1.39	38.14	-0.57	-1.39	14.23	-0.32	-1.70	-13.88	0.12	1.81
XB	AGR	73.79	9.65	16.56	67.35	7.96	14.73	7.77	0.96	1.21	3.41	0.88	2.67	-4.75	-0.15	-2.05
	MIN	224.88	-41.82	-83.06	144.36	-22.18	-45.85	91.96	-18.03	-37.23	28.59	-2.63	-12.41	-40.03	1.02	12.44
	LIG	128.51	-9.35	-19.16	105.59	-7.00	-14.24	12.62	-1.78	-3.50	21.81	-0.68	-2.94	-11.51	0.12	1.52
	ENE	152.33	-16.62	-35.71	106.85	-11.51	-28.82	54.86	-4.44	-7.40	12.21	-1.11	-4.08	-21.60	0.44	4.59
	HEA	76.69	8.28	15.03	41.38	1.48	2.14	40.99	6.34	13.24	12.15	0.88	4.05	-17.83	-0.43	-4.40
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	78.23	9.39	12.38	42.93	5.64	6.99	34.95	2.86	5.57	8.24	1.16	2.56	-7.88	-0.27	-2.74
	COM	58.07	15.00	26.93	33.02	6.16	14.71	21.94	7.09	14.02	8.87	2.42	4.76	-5.77	-0.67	-6.55
	SER	77.13	8.16	14.71	68.44	5.44	11.21	8.17	2.10	3.85	3.03	0.82	1.62	-2.52	-0.20	-1.97
	AVE.	95.56	2.05	2.40	61.11	0.68	0.58	35.59	1.07	2.10	9.22	0.41	0.82	-10.36	-0.12	-1.10
XN	AGR	106.59	-1.55	-5.04	90.19	1.14	1.09	15.34	-2.58	-5.60	4.52	-0.23	-1.51	-3.46	0.12	0.97
	MIN	418.66	-104.95	-213.72	222.33	-54.61	-108.47	203.57	-46.90	-101.21	66.47	-9.12	-42.49	-73.71	5.68	38.46
	LIG	90.45	4.60	4.95	74.88	3.93	5.07	9.24	0.76	1.42	13.12	-0.19	-3.62	-6.79	0.10	2.09
	ENE	241.12	-49.89	-91.23	140.43	-32.77	-55.25	94.31	-15.79	-33.31	37.75	-3.56	-17.67	-31.39	2.23	14.99
	HEA	83.59	5.59	10.82	37.84	0.56	0.64	45.69	4.95	10.70	14.43	0.21	-1.46	-14.37	-0.13	0.93
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	106.34	-0.57	-5.77	50.93	0.32	-0.41	50.35	-1.16	-4.03	22.44	0.13	-6.54	-17.38	0.14	5.20
	COM	106.84	-2.61	-4.23	52.96	-1.00	-0.55	46.54	-1.68	-3.26	20.96	0.11	0.80	-13.62	-0.05	-1.22
	SER	68.09	11.84	20.07	60.32	7.56	11.68	6.85	3.91	8.07	3.03	0.79	2.20	-2.12	-0.42	-1.87
	AVE.	98.26	1.14	0.60	58.17	0.62	0.11	38.29	0.55	1.10	11.03	-0.10	-2.10	-9.23	0.07	1.48

Appendix 2 Decomposition of Real Output Growth per Region and Sector by the Defined Impact (%)

		Total Final Demand			Consumption			Capital Formation			Exports			Imports		
		FM	FF	FS	FM_C	FF_C	FS_C	FM_I	FF_I	FS_I	FM_{EX}	FF_{EX}	FS_{EX}	FM_{IM}	FF_{IM}	FS_{IM}
DB	AGR	97.96	-0.06	2.10	89.69	-0.02	1.38	9.30	-0.02	0.82	4.32	-0.01	0.93	-5.35	-0.01	-1.03
	MIN	154.91	-7.43	-47.48	144.62	-2.51	-6.50	56.37	-3.83	-23.58	34.48	-0.77	30.67	-80.55	-0.31	-48.07
	LIG	96.96	-0.10	3.13	92.58	-0.03	1.88	6.77	-0.04	1.38	6.45	-0.01	1.43	-8.84	-0.01	-1.55
	ENE	83.07	-0.59	17.53	84.25	-0.05	9.48	31.51	-0.40	9.96	-5.40	-0.03	9.69	-27.29	-0.11	-11.61
	HEA	94.00	-0.30	6.30	48.89	-0.06	3.20	44.01	-0.19	3.85	22.36	-0.02	4.28	-21.26	-0.04	-5.02
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	93.94	-0.38	6.44	72.10	-0.08	3.85	19.15	-0.22	3.58	18.30	-0.02	4.69	-15.60	-0.05	-5.68
	COM	88.38	0.18	11.43	58.34	0.14	5.87	23.46	0.05	5.51	14.83	0.03	3.44	-8.26	-0.04	-3.39
	SER	97.51	0.01	2.48	87.32	0.02	1.29	7.86	-0.01	1.26	7.29	0.00	0.96	-4.96	-0.01	-1.03
	AVE.	96.08	-0.27	4.20	66.55	-0.06	2.56	30.80	-0.16	2.34	12.39	-0.02	3.27	-13.66	-0.03	-3.97
HB	AGR	83.65	0.12	16.23	81.64	0.10	10.22	5.72	0.08	4.44	16.47	0.05	5.51	-20.18	-0.11	-3.94
	MIN	66.13	-4.08	37.95	47.15	-1.47	21.99	29.90	-1.77	19.35	29.94	-0.05	24.84	-40.86	-0.79	-28.23
	LIG	78.65	0.34	21.01	72.26	0.23	13.11	8.87	0.16	5.81	15.68	0.09	6.55	-18.15	-0.14	-4.46
	ENE	75.61	-2.82	27.21	60.32	-1.01	14.90	24.18	-1.25	12.87	15.99	-0.06	16.51	-24.88	-0.50	-17.08
	HEA	65.00	0.59	34.42	28.88	0.37	16.16	43.58	0.33	17.42	20.64	0.20	11.39	-28.11	-0.31	-10.55
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	68.88	0.17	30.95	35.94	0.22	16.88	32.59	0.13	13.24	18.30	0.17	10.36	-17.96	-0.35	-9.54
	COM	68.89	0.52	30.59	43.17	0.35	16.32	23.26	0.28	12.96	17.06	0.17	9.57	-14.60	-0.28	-8.25
	SER	88.42	0.33	11.26	69.32	0.18	5.71	17.91	0.17	5.09	10.31	0.07	3.23	-9.12	-0.09	-2.78
	AVE.	76.76	0.20	23.04	47.51	0.18	11.98	32.79	0.13	10.21	15.68	0.11	7.93	-19.22	-0.21	-7.07
HD	AGR	94.38	0.27	5.35	73.28	0.07	3.97	11.36	0.18	0.96	25.37	0.24	3.53	-15.63	-0.22	-3.10
	MIN	78.21	1.41	20.38	65.04	0.31	9.33	67.95	1.12	11.76	43.06	1.59	19.22	-97.84	-1.62	-19.93
	LIG	87.16	0.73	12.11	48.27	0.29	7.73	11.05	0.38	3.38	47.38	0.35	4.66	-19.53	-0.29	-3.66
	ENE	88.60	0.99	10.41	60.05	0.24	6.93	36.94	0.76	3.97	33.84	0.99	10.27	-42.23	-1.00	-10.77
	HEA	78.38	1.81	19.80	28.90	0.67	11.10	51.85	1.08	8.18	35.97	0.84	9.49	-38.34	-0.78	-8.98
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	82.14	1.36	16.49	38.46	0.44	10.79	28.82	0.89	5.67	39.84	0.89	8.52	-24.97	-0.86	-8.48
	COM	83.91	1.31	14.79	29.45	0.49	8.87	32.83	0.77	5.57	42.41	0.64	6.45	-20.78	-0.59	-6.10
	SER	90.80	0.69	8.51	66.43	0.28	4.70	17.38	0.38	3.47	20.69	0.26	2.84	-13.71	-0.23	-2.51
	AVE.	85.18	1.14	13.68	39.16	0.43	7.98	38.71	0.67	5.20	33.19	0.55	6.34	-25.88	-0.51	-5.83
HN	AGR	94.42	0.34	5.24	76.77	0.14	3.15	9.69	0.14	2.07	34.30	0.33	1.34	-26.33	-0.27	-1.32
	MIN	32.73	4.20	63.07	44.73	1.80	26.59	31.37	1.87	37.40	101.07	3.79	14.02	-144.43	-3.27	-14.93
	LIG	87.95	0.53	11.51	44.93	0.23	7.26	7.41	0.21	3.54	69.58	0.43	2.48	-33.97	-0.34	-1.76
	ENE	65.68	1.99	32.33	48.24	0.85	16.04	27.46	0.89	15.89	68.27	1.71	6.41	-78.29	-1.46	-6.01
	HEA	70.77	1.59	27.64	29.81	0.68	13.32	38.35	0.72	14.00	82.16	1.26	5.58	-79.55	-1.08	-5.25
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	78.00	1.12	20.88	39.98	0.48	11.07	20.75	0.50	9.35	64.16	0.94	4.14	-46.89	-0.80	-3.69
	COM	75.08	1.29	23.63	11.33	0.56	12.51	17.57	0.56	10.53	83.49	1.09	4.97	-37.32	-0.92	-4.39
	SER	89.64	0.53	9.83	62.41	0.23	5.00	13.71	0.24	4.58	41.20	0.40	1.92	-27.68	-0.34	-1.67
	AVE.	81.37	0.99	17.64	39.65	0.43	9.00	28.83	0.44	8.29	61.86	0.80	3.62	-48.98	-0.68	-3.27
HZ	AGR	91.13	-0.12	8.99	87.04	-0.03	5.07	5.38	-0.06	3.00	0.53	-0.03	5.12	-1.82	-0.01	-4.20
	MIN	61.40	-2.18	40.77	44.07	-0.56	19.65	21.01	-1.35	23.85	2.20	-0.26	27.67	-5.88	-0.01	-30.39
	LIG	82.34	0.33	17.33	75.81	0.24	10.31	5.92	0.10	5.06	2.75	0.01	6.74	-2.15	-0.02	-4.78
	ENE	78.33	-1.65	23.31	63.98	-0.44	10.28	16.82	-1.02	14.59	2.03	-0.18	18.16	-4.50	-0.01	-19.71
	HEA	63.39	0.95	35.66	28.71	0.65	14.62	35.34	0.32	20.53	3.15	0.03	14.54	-3.80	-0.05	-14.03
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	61.37	0.85	37.78	56.69	0.62	18.43	7.29	0.27	18.18	-0.38	0.02	14.33	-2.24	-0.05	-13.16
	COM	53.20	1.18	45.62	29.30	0.81	22.67	22.16	0.40	21.05	4.16	0.04	16.38	-2.43	-0.06	-14.49
	SER	89.11	0.33	10.56	80.01	0.21	4.95	8.44	0.12	5.24	2.22	0.01	3.87	-1.56	-0.01	-3.50
	AVE.	76.84	0.33	22.83	52.62	0.30	10.65	24.61	0.07	11.50	2.25	-0.01	9.97	-2.64	-0.03	-9.28
XB	AGR	89.10	0.16	10.74	82.65	0.10	7.29	7.09	0.06	2.79	4.30	0.01	2.66	-4.94	-0.01	-2.00
	MIN	46.52	1.27	52.21	48.15	0.71	27.47	10.79	0.59	25.32	-3.24	0.09	16.71	-9.17	-0.11	-17.29
	LIG	88.25	0.18	11.56	76.65	0.12	7.57	3.99	0.07	3.28	14.98	0.01	3.20	-7.37	-0.01	-2.49
	ENE	56.52	0.87	42.61	44.96	0.48	21.09	21.49	0.41	21.12	-4.42	0.06	11.38	-5.51	-0.07	-10.98
	HEA	60.01	0.76	39.22	28.16	0.41	16.43	37.71	0.36	22.50	6.37	0.05	10.66	-12.24	-0.06	-10.37
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	74.49	0.47	25.04	42.56	0.27	12.73	31.27	0.21	11.91	5.24	0.03	6.69	-4.57	-0.04	-6.28
	COM	55.99	0.88	43.13	29.49	0.50	23.90	24.10	0.38	18.57	5.93	0.06	10.06	-3.54	-0.06	-9.39
	SER	90.66	0.18	9.16	80.35	0.10	4.64	9.69	0.08	4.36	3.22	0.01	2.24	-2.60	-0.01	-2.08
	AVE.	77.54	0.43	22.03	51.06	0.24	11.08	27.94	0.20	10.63	4.50	0.03	5.92	-5.95	-0.03	-5.59
XN	AGR	95.77	0.08	4.15	89.91	0.04	2.48	5.89	0.04	1.23	0.69	0.00	2.10	-0.72	0.00	-1.65
	MIN	71.88	1.06	27.06	48.91	0.39	9.95	36.04	0.69	18.73	-7.20	0.02	22.04	-5.87	-0.04	-23.67
	LIG	92.19	0.17	7.64	79.71	0.09	4.08	8.50	0.08	2.83	5.61	0.01	3.70	-1.63	-0.01	-2.96
	ENE	86.32	0.47	13.21	46.10	0.19	6.13	37.92	0.28	7.01	6.24	0.01	10.27	-3.95	-0.02	-10.20
	HEA	82.29	0.50	17.21	31.37	0.23	7.45	51.76	0.27	9.32	4.24	0.02	8.92	-5.08	-0.02	-8.48
	CON	100.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	78.40	0.56	21.04	40.15	0.25	10.44	35.06	0.31	9.80	6.13	0.02	9.89	-2.94	-0.02	-9.08
	COM	72.77	0.83	26.40	38.13	0.41	12.88	29.84	0.42	11.34	5.90	0.03	15.94	-1.10	-0.03	-13.75
	SER	92.54	0.21	7.25	76.04	0.11	3.42	15.29	0.10	3.43	2.83	0.01	3.18	-1.62	-0.01	-2.78
	AVE.	89.00	0.30	10.70	53.78	0.14	4.99	34.55	0.16	5.22	3.12	0.01	5.70	-2.45	-0.01	-5.21

Appendix 3 Interregional Spillover-related Effects (%)

		DB	HB	HD	HN	HZ	XB	XN
DB	AGR	0.00	-0.63	0.85	0.67	0.34	0.53	0.34
	MIN	0.00	-23.25	2.29	-1.55	-34.92	10.49	-0.53
	LIG	0.00	-1.07	1.10	0.95	0.56	1.09	0.50
	ENE	0.00	3.78	3.56	3.01	0.36	3.78	3.04
	HEA	0.00	-2.39	3.06	1.54	0.76	2.14	1.18
	CON	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	0.00	-2.87	2.40	1.25	0.88	3.31	1.47
	COM	0.00	2.54	3.25	1.46	1.51	1.65	1.02
	SER	0.00	0.32	0.80	0.39	0.28	0.43	0.26
HB	AGR	0.99	0.00	5.39	3.83	2.49	1.91	1.63
	MIN	-6.86	0.00	21.79	10.86	0.37	6.08	5.70
	LIG	1.91	0.00	6.42	4.03	4.21	2.57	1.87
	ENE	-1.45	0.00	8.47	8.10	1.58	4.73	5.78
	HEA	2.64	0.00	12.06	6.53	6.23	3.81	3.15
	CON	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	2.63	0.00	6.59	5.19	7.21	5.69	3.64
	COM	3.83	0.00	8.99	5.01	6.28	3.49	2.99
	SER	1.37	0.00	3.78	1.85	2.17	1.14	0.95
HD	AGR	1.04	0.47	0.00	3.87	-0.99	0.67	0.29
	MIN	0.72	6.32	0.00	22.37	-12.51	2.15	1.32
	LIG	1.67	2.23	0.00	5.13	0.99	1.31	0.77
	ENE	1.56	1.44	0.00	8.52	-4.68	1.70	1.87
	HEA	2.49	2.34	0.00	8.71	2.09	1.70	2.47
	CON	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	2.66	2.53	0.00	6.19	-0.17	2.88	2.42
	COM	2.54	3.39	0.00	5.37	1.40	1.39	0.68
	SER	1.04	1.60	0.00	2.77	1.57	0.67	0.85
HN	AGR	0.89	0.34	1.63	0.00	0.61	0.64	1.13
	MIN	3.58	3.79	33.44	0.00	10.95	4.20	7.10
	LIG	1.41	1.38	3.51	0.00	2.17	1.11	1.93
	ENE	2.42	2.12	12.45	0.00	5.93	2.09	7.33
	HEA	2.42	2.74	10.73	0.00	4.61	2.20	4.94
	CON	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	2.33	2.21	6.70	0.00	3.69	2.30	3.64
	COM	2.75	2.65	7.69	0.00	4.09	2.10	4.35
	SER	0.89	1.03	3.74	0.00	1.71	0.74	1.71
HZ	AGR	1.12	-0.13	1.05	5.41	0.00	0.63	0.91
	MIN	-0.41	-6.59	21.65	13.70	0.00	6.92	5.50
	LIG	1.53	1.00	5.48	5.18	0.00	1.99	2.14
	ENE	-1.27	-7.01	10.24	9.54	0.00	4.75	7.06
	HEA	1.73	1.97	14.13	9.80	0.00	3.48	4.56
	CON	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	2.76	2.26	12.16	8.84	0.00	6.21	5.54
	COM	4.18	5.53	14.93	9.63	0.00	5.19	6.16
	SER	0.77	1.09	3.85	2.51	0.00	1.04	1.29
XB	AGR	1.54	2.75	1.87	1.74	2.09	0.00	0.75
	MIN	8.38	7.74	12.11	6.68	12.95	0.00	4.35
	LIG	1.75	2.84	2.25	1.67	2.43	0.00	0.63
	ENE	4.02	4.87	8.01	6.79	10.96	0.00	7.96
	HEA	2.72	6.63	10.14	5.61	11.59	0.00	2.53
	CON	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	2.90	6.85	5.60	3.17	6.42	0.00	0.09
	COM	3.47	19.78	6.54	3.60	6.70	0.00	3.04
	SER	0.83	2.42	1.88	1.08	2.07	0.00	0.88
XN	AGR	0.38	0.31	0.72	2.13	0.48	0.13	0.00
	MIN	1.41	-1.56	12.27	12.72	-2.64	4.86	0.00
	LIG	0.68	0.31	1.19	3.46	0.72	1.28	0.00
	ENE	0.84	-0.03	4.35	6.73	1.26	0.07	0.00
	HEA	1.00	1.12	5.41	6.89	2.40	0.40	0.00
	CON	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	TRA	1.52	1.34	5.18	6.81	3.85	2.34	0.00
	COM	1.43	1.20	3.95	16.50	2.71	0.62	0.00
	SER	0.40	0.50	1.64	3.07	1.02	0.61	0.00