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A Comparative Analysis of Sectoral Multipliers of Input-Output Model and Social Accounting Matrix

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Abstract

The present study is to indicate that the comparison between sectoral production multipliers of an input-output (I/O) model and a social accounting matrix (SAM) framework is almost impossible without taking into account accounting balances and theoretical considerations. Theoretically, the I/O model provides the Leontief's production function, on the basis of which sectoral output multiplier can be derived. In a SAM, however, the combined Leontief-Keynes models dominate multipliers commonly known as accounting multiplier matrices. The inter-industry blocks of these matrices cannot be called sectoral output multipliers as in an I/O model, rather they are known as sectoral supply multipliers. Therefore, the two sectoral multipliers are of different nature and cannot be compared for assessing sectoral performance and sectoral policy analysis of the key sectors. In the light of these evidence, this important question can be posed that whether it is possible to compare sectoral multipliers of the two approaches or not? To investigate this, two databases were used, namely the conventional I/O tables and SAM. The data for both sets of tables, prepared by the Research Center of the Islamic Parliament for the year 2011, were aggregated into 21×21 sectors. The overall results indicated that sectoral output multipliers of a conventional I/O model grossly overestimated multipliers of key sectors while sectoral supply multipliers of a conventional SAM underestimated multipliers of the key sectors. To solve the problem and make sectoral multipliers of the two approaches comparable, deduction of imports has been proposed. The overall findings showed that sectoral output multipliers of a conventional I/O model were overestimated about 1.284 unit on average and sectoral supply multipliers of a conventional SAM were underestimated about 1.245 unit on average. Considering the domestic I/O model and SAM, however, it was observed that sectoral output multipliers is on an average 1.202 in domestic IOM whereas in domestic SAM sectoral output multipliers is on an average 1.237. Consequently, the two approaches were comparable in sectoral policy analysis.

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1. Introduction

The aggregate keynsian economics can be visualized as an aggregate producer and an aggregate consumer. Its consumption multiplier can be considered as a driving force for the income distribution (Ghosh and Sengupta, 1984). On the basis of the classification of Marx, considering Marxian class theory, Kaldor, Passenetti and Kalecki in 1960s extended the Keynesian macro - economic model of a single producer and a single consumer into a model of a single producer and two consumers (Labors and Capitalists), i.e. which is also called the extended post keysian model (Banouei, 1989). On the one hand**,** as main data requirements for both approaches come from the macro national accounts, socio-economics analysis of structures of production and income distribution are beyond the scope of these models. On the other hand, however, analyzing structure of production and the matrix of Production multipliers does play an important role in Leontief's model of many producers and a single consumer (IOM). Leontief assumes households as an exogenous variable which seizes analysis of the structures of production and income distribution (Banouei and Mahmoudi, 2001)

The introduction of social accounting matrix (SAM) made it possible to comprehensively disaggregate accounts and sub-accounts of the social and economic groups of household sector along with the other accounts in a consistent format with a matrix structure. As compared to the sectoral output multipliers of IOM, the disaggregated accounts in SAM add a flavor of flexibility to SAM multipliers in analyzing the social and economic aspects, the accounting mechanisms encompassed in the IOM and SAM frameworks are in different nature. For instance, accounting balances in the conventional IOM reveal a balance between domestic supply and demand with net trade, i.e. exports minus imports, whereas in the SAM framework, the balances for every account are organized in terms of total supply and total demand. The former provides *sectoral output multipliers* which have their roots in the Leontief's production function, whereas the latter provides sectoral multipliers which are currently known as *sectoral supply multipliers*[1]. The above observations suggest that the two sectoral multipliers are of two different nature, and therefore, cannot be compared for sectoral policy analysis and identification of key sectors.[2] Therefore, an important question is raised: Is it possible to make sectoral multipliers of the two approaches comparable? In the present study, it is proposed that the posed question still remains unanswered after excluding imports from both input–output table (IOT) and SAM. The main reason for this

[1] In recent years, such terms as sectoral output multipliers and sectoral supply multipliers have attracted the attention of the regional IO analysts. For more information on the technical aspects of these terms refer to: Flegg and Tohmo (2015), Krorenberg (2009) and Krosenberg (2012).

[2] The IOT can usually be derived from the SAM. Since an IOT does not take into account the induced effects while the SAM is more compatible with the real world, because in addition to direct and indirect effects, it also considers induced effects. Accordingly, the results of the two methods are not the same. The present study takes these considerations into account in pursuing its objectives.

is that sectoral multipliers excluding imports from IOT and SAM would represent *sectoral domestic output multipliers*. Regarding these, two sets of data base for the year 2011 have been employed. One set is related to the conventional IOT and SAM, including imports for 72 sectors, and the other one is concerned with domestic IOT and SAM for the same sectoral classification. For ease of analysis, data for both sets of tables have been aggregated into 21 sectors.

With regards to all the above issues, this paper is presented in the following way. The theoretical approaches concerning multipliers in IOM and SAM approaches will be examined in Section One. Section Two focuses on the importance of import deduction for making production coefficients of the two mentioned approaches comparable. Database and adjustments are examined in Section three. The empirical results of the present study will be discussed in Section Four and, finally, the paper ends with a summary discussion and conclusions of the research results.

2. Theoretical comparison of IOM and SAM Multipliers

Regarding IOM's approach, the production equation introduced as Equation 1 is employed:

$$x_i = \sum_j X_{ij} + f_i \qquad (1)$$

Table 1. The Structure of the simple input-output table

From(i)→ To (j)↓	Processing Sectors	Purchases by Final Demand	Total Demand
Processing Sectors	X_{ij}	f_i	x_i
Payment Sectors (Value Added)	v'_j		
Domestic Outlay	x'_j		
Import	m'_j		
Total Supply	x'_j		

Source: Miller and Blair (2009).

Based on the Table 1, Equation 1 indicates that total output equals to intermediate consumption (X_{ij}) and final demand (f_i). Accordingly, it can be assumed that jth sector must use a_{ij} units from sector i, which is known as Leontief production function, in order to produce 1 unit. This relationship has been represented with Equation 2:

$$a_{ij} = X_{ij} \left[\hat{x}_j\right]^{-1} \qquad (2)$$

where $\widehat{X}_j$ refers to the diagonal matrix of total output, i.e. domestic supply. Equation 2 can be rewritten using Equation 3 and Equation 2 replacing in the equation (1):

$$X_{ij} = a_{ij}\left\lfloor \widehat{x}_j \right\rfloor \tag{3}$$

$$x_i = \sum_j a_{ij} x_j + f_i \tag{4}$$

Considering that $A = [a_{ij}]$, we have:

$$x = Ax + f \tag{5}$$

$$x = (I - A)^{-1} f \tag{6}$$

Consequently, based on the Table 1, the following observations can be made:

- Regarding Leontief's approach, production function is based on Leontief production function in which inputs (or factors) of production are employed with constant ratios; therefore, total output is employed for Leontief's approach in the IOM. So, the IO system structure is based on the constant ratio of production assumption and lack of substitution possibility of production methods.
- Based on Equation 6, $(I - A)^{-1}$ is the Leontief inverse matrix which is known as the production multiplier.
- The accounting balances in IOM reveal the balance between domestic supply and domestic demand with net trade (exports minus imports). Consequently,

  $$Y = C + G + I + E - M \tag{7}$$

  Where Y refers to domestic output, M to import, C to consumption, I to investment, and E to export. In this equation, Y stands for domestic supply, $C+G+I$ refers to domestic demand, and $E-M$ refers to net trade.
- The IOT, Table 1, represents domestic supply, output, and domestic demand plus net trade the values of which are precisely equal to the aggregate expenditure in the Keynesian model. Therefore, the IOT results in table 2.

Table 2. The main structure of the simple input-output table

From(i)→ To (j)↓	Processing Sectors	Final Demand + Net Export	Domestic Demand
Processing Sectors	X_{ij}	f_i	$x^d{}_i$
Payment Sectors (Value Added)	v'_j		
Domestic Supply	x'^d_j		

Leontief sectoral output multiplier focuses only on inter-sectoral linkages in economy, but it has no sensitivity to the sector linkages related to the consumption and income of institutions (households). The SAM approach, in return, reflects the production cycle view for the whole economy with no constraint on detailed classification of different socio-economic groups and endogenous production factors and institutions. Table 3 represents the SAM based on exogenous and endogenous accounts at the macro level.

Table 3. The Macro structure of SAM in terms of exogenous and endogenous accounts

From(i)→ To (j)↓		Endogenous Accounts			Exogenous Accounts	Total Demand
		1.Processing Sectors	2.Production Factors	3.Institutions	4. Other Accounts	
Endogenous Accounts	1.Processing Sectors	T_n			x_n	y^d
	2.Production Factors					
	3.Institutions					
Exogenous Accounts	4. Other Accounts	l_n			r	y^x
Total Supply		y'^d			y'^x	

As Table 3 shows, the production multiplier of SAM comprises a simultaneous relation between production sectors, income of production factors and domestic economic institutions. Therefore,

$$y^d = \sum T_n + x_n \tag{8}$$

where $y^d = \left[\hat{y}_i^d\right]$ and $x_n = \left[x_i\right]$

$$B_n = T_n[\hat{y}^d]^{-1} \tag{9}$$

where $\left[\hat{y}^d\right]$ is diagonal matrix of the total supply calculated by the sum of domestic supply and import. It is worth mentioning here that import is in the rest of the world account (exogenous account) which is part of the SAM.

After replacing Equation 8 with Equation 9, we have:

$$y^d = B_n y^d + x_n \tag{10}$$

$$y^{d} = (I - B_n)^{-1} x_n \qquad (11)$$

Accordingly, based on Table 3, the following observations can be made:

- In the SAM framework, the combined Keynes- Leontief model dominates multipliers commonly known as the accounting matrix multiplier.
- In the SAM framework, the balances of every account are achieved in terms of total supply and total demand[1]. Based on inter-industrial block of the SAM, therefore, one can estimate sectoral multipliers currently known as sectoral supply multipliers.
- $(I - B_n)^{-1}$ is known as an accounting multiplier and, in the absence of consumption elasticity considerations, the equality of average propensity and marginal propensity to consume is prevailed[2].
- The balance of SAM is in terms of aggregate supply and aggregate demand is similar to national accounts in macroeconomic relations.

Based on the aforementioned observations, a difference in technical coefficient was observed between the IOT (A_{ij}) and the SAM approach (B_{ij}). This distinction is due to the fact that the balance is created in between domestic supply and domestic demand with net trade in the IOT and between aggregate supply and aggregate demand in the SAM approach. The former gives sectoral output multipliers which have their root in the Leontief's production function whereas on the basis of the inter-industry block of the latter, the sectoral multipliers estimate which are currently known as the sectoral supply multipliers. Therefore, the two sectoral multipliers are of different nature and cannot be compared in terms of sectoral performance assessment and sectoral policy analysis, especially in identifying key sectors. These can lead to an important question: is it possible for the sectoral multipliers of the two approaches to become comparable? To investigate this, one needs to look into treatment of imports in the IOM and SAM approaches.

3. The Importance of Import Deduction in the IOM and SAM Approaches

In section 1 of the present study, it was observed that the sectoral multipliers of the IOM and SAM are of different nature and cannot be compared for analytical purposes. To solve this problem; therefore, import deduction has

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[1] This is not necessarily a fundamental principle in the SAM. The wording is for the sole purpose of making a difference between the IOT and the SAM from the point of view of the import position. Therefore, the terms used, including the total demand and the total supply or the total output and the total input can be used in each case.

[2] It is worth mentioning here that for the calculation of average direct coefficients and average multipliers, two assumptions are required. First, economy has an excess capacity, and there is no constraint in the supply side. (See Banouei ,2011b; Faridzad et al.,2012; Faridzad et al., 2014; and Khaleghi et al. ,2015 for more information). Second, production technology and production factors for a given statistical year are known.

been suggested. According to the national accounts and sector accounting systems, imports can be of three different types, namely intermediate, consumption and capital goods which are respectively combined with inter-sectoral intermediate matrix, final demand, and the other endogenous and exogenous accounts in the SAM. Under this situation, we expect overestimation of output multipliers in the IOM and underestimation of supply multipliers in the SAM approach. This creates difficulty in the evaluation of key economic sectors and economic policy. For solving this problem, we separate imports in the IOM and SAM approaches, and then to create a domestic inter-sectoral intermediate matrix, in such a way that the balance in the IOT and SAM will be comparable. There are three methods for deduction of imports. (Banouei, 2011a; Pasha et al. 2013; and The Research Center of the Islamic Parliament, 2011). In the present study, the third method for deducting imports of intermediate, consumption and capital goods has been used (Banouei, 2003; and Banouei, 2011a). Determining the nature of import with a given assumption in the IOT is the responsibility of the table designers. Regardless of the competitive or non-competitive assumption, it is not possible to use the methodology or method of deducting imports provided by economic researchers or statistical institutions. Considering factors such as differences in natural resources or climate types of different countries as some criteria for distinguishing between competitive and non-competitive imports, it can be observed that the combination of competitive and uncompetitive imports varies from country to country. In this study, it is assumed that imports can be used for distinguishing a competitive nature.

4. Data Base

IOT and SAM for the year 2011 provided by the Research Center of the Islamic Parliament of Iran were used to operationalize the mentioned methods. The 70×70 symmetric IOT was of an industry-by-industry type and the industry technology assumption was assumed. The data related to both sets of tables were aggregated into 21×21 sectors.

5. Analysis of Empirical Results

Two types of data base were used for empirical purposes. The first type was the conventional IOT which was based on the balance of domestic demand and supply with net trade and SAM based on total demand and supply. The second type, the domestic IOT and the domestic SAM, and their balance was based on total output or domestic supply. Production multipliers[1] of the 21 sectors were calculated using Leontief demand-driven approach (i.e. through estimation of the normalized backward direct and indirect multipliers) and the Ghosh supply-driven model, through normalized backward multipliers with direct and indirect effects. The results have been presented in Tables 4-11.

[1] The calculation of key sectors was based on matrix relationships and done with Excel software, and the entire calculation process is reserved for authors.

Table 4. Key sectors in the conventional IOT, based on normalized sectoral output multipliers

Key Sectors	Normalized Backward Multipliers	Key Sectors	Normalized Forward Multipliers
Manufacture of basic metals	1.4639	Manufacture of wood and paper products	1.6096
Manufacture of textiles and wearing apparel	1.3189	Manufacture of basic metals	1.5169
Manufacture of wood and paper products	1.2794	Manufacture of refined petroleum and other chemical products	1.4312
Manufacture of refined petroleum and other chemical products	1.2576	Manufacture of other non-metallic mineral products	1.2331
Manufacture of other non-metallic mineral products	1.1219	Agriculture	1.0702
Agriculture	1.0500	Manufacture of textiles and wearing apparel	1.0544

Table 5. Key sectors in the conventional SAM, based on normalized sectoral supply multipliers

Key Sectors	Normalized Backward Multipliers	Key Sectors	Normalized Forward Multipliers
Agriculture	1.2486	Wholesale and retail trade and repair of motor vehicles and motorcycles	1.4291
Wholesale and retail trade and repair of motor vehicles and motorcycles	1.2217	Banking and Insurance	1.4271
Human health activities	1.1518	Agriculture	1.4237
Banking and Insurance	1.1141	Manufacture of food products and beverages	1.3756
Transport, Postal and courier activities	1.1069	Transport, Postal and courier activities	1.3715
Manufacture of food products and beverages	1.0367	Human health activities	1.0370

Considering Tables 4 and 5, the following observations were made:

- As the 21-sector conventional IOT reveals, the normalized sectoral output multipliers for 6 sectors have been more than one unit, above the average. Furthermore, the highest sectoral output multipliers have been associated with the manufacture of basic metals and wood and paper products. The results show that all of the normalized sectoral output multipliers are industrial-type sectors. Agricultural sector is a key economic sector, , based on the IOM, however, industry has had the largest number of key sectors.
- The results concerning the normalized sectoral backward and forward multipliers, based on the conventional SAM, have been depicted in Table 5. In comparison to the IOM, the SAM approach provides different results regarding the key economic sectors. For instance, as one can see, agriculture and wholesale and retail trade services have had the highest normalized backward and forward supply multipliers. It can also be observed that the key sectors of the two approaches, without any consideration to the nature and existence of import in inter-sectoral relationships, are not comparable from a theoretical point of view. Therefore, appropriate policies cannot be adopted with only taking into account the key sectors of the two approaches.
- With regard to the aforementioned theoretical basis, the Leontief demand-driven model, the Leontief production function can be estimated through $a_{ij} = X_{ij}\left[\hat{x}_j\right]^{-1}$ where $\left[\hat{x}_j\right]$ is a diagonal matrix of total output. Regarding the SAM approach, and taking into account $B_n = T_n\left[y^d\right]^{-1}$, however, there is no production function, because B_n is estimated through $\left[y^d\right]$ which is the sum of total output and import. Therefore, it sectoral output multipliers are expected that to be smaller than sectoral supply multipliers.
- As Tables 4 and 5 show, there is an overestimation of sectoral output multipliers, of about 1.284 unit, on average in the conventional IOM and an underestimation of sectoral supply multipliers, of about 1.245 unit on average, in the conventional SAM. Consequently, sectoral policy analysis cannot be suitable for comparing the two approaches. Tables 6 and 7 demonstrate the results after import deduction.

Table 6. Key sectors in the domestic IOT, based on normalized sectoral output multipliers

Key Sectors	Normalized Backward Multipliers Coefficients	Key Sectors	Normalized Forward Multipliers Coefficients
Manufacture of basic metals	1.3270	Manufacture of other non-metallic mineral products	1.3002
Manufacture of refined petroleum and other chemical products	1.2188	Manufacture of basic metals	1.2810
Manufacture of wood and paper products	1.1539	Manufacture of refined petroleum and other chemical products	1.2649
Manufacture of other non-metallic mineral products	1.1308	Manufacture of wood and paper products	1.1430
Agriculture	1.0611	Agriculture	1.1366

Table 7. Key sectors in the domestic SAM, based on normalized sectoral output multipliers

Key Sectors	Normalized Backward Multipliers Coefficients	Key Sectors	Normalized Forward Multipliers Coefficients
Wholesale and retail trade and repair of motor vehicles and motorcycles	1.2282	Manufacture of food products and beverages	1.5124
Agriculture	1.2065	Real estate activities	1.4535
Banking and insurance	1.1312	Agriculture	1.4300
Transport, Postal and courier activities	1.0973	Electricity, Water and distribution of Natural gas	1.3555
Electricity, Water and distribution of Natural gas	1.0476	Banking and Insurance	1.3247
Real estate activities	1.0070	Wholesale and retail trade and repair of motor vehicles and motorcycles	1.2666
Manufacture of food products and beverages	1.0054	Transport, Postal and courier activities	1.2545

Concerning the key sectors, imports were separated from the conventional IOM and SAM and the following results were revealed:

- After import deduction, sectoral output multipliers were calculated through the two approaches. Based on the results, sectoral supply multiplier could not be applied to the SAM and domestic IOM.
- Based on domestic IOM, as Table 6 depicts, , industrial sectors, such as manufacture of basic metals and manufacture of other non-metallic mineral products appeared to be propellant sectors. Furthermore, agricultural sector had the last rank, based on normalized backward and forward output multiplier.
- The results in Table 7, concerning the domestic SAM, , show that key sectors have concentrated in the service sectors. This is similar to what was observed in the conventional SAM. Sectoral output multipliers and sectoral supply multipliers were different in their rankings, however.
- Based on the results of Tables 6 and 7, sectoral output multipliers an average of 1.202 unit in the domestic IOM but an average of 1.237 unit in the domestic SAM. Consequently, the two approaches are comparable in sectoral policy analysis.

The results concerning the comparison of the conventional and the domestic IOM revealed an overestimation of sectoral output multiplier in which the average sectoral output multiplier was about 1.284 unit for the conventional IOM whereas it was about 1.202 unit for the domestic IOM. Furthermore, the results concerning the comparison of the conventional and the domestic SAM revealed that the average sectoral supply multiplier was about 1.245 unit for the conventional SAM whereas it was about 1.237 unit for the domestic SAM. Therefore, there was an underestimation of sectoral supply multipliers in the SAM. (Tables 8 and 9).

In the following tables, the key sectors have been compared based on the two approaches. Table 8 demonstrates the comparison of the key sectors in the conventional IO and SAM, made through calculation of the average sectoral output multipliers and the average sectoral supply multipliers. As it can be seen, the key sectors have revealed multipliers with higher than unity, based on the normalized direct and indirect backward and forward linkages. The results further show that key sectors of the conventional IOM have concentrated in industrial sectors while key sectors of the conventional SAM have concentrated in agriculture and service sectors. Considering different theoretical approaches for comparing the conventional IOM and SAM, the two aforementioned multipliers and the selected key sectors cannot be compared. The endogenous production account along with the endogenous production factors and institutions would lead to concentration of the key sectors in the conventional SAM in agriculture and service sectors.

Table 8. Comparison of key sectors in the conventional IO and SAM (based on average sectoral output multipliers and average sectoral supply multipliers)

Rank	Key Sectors of the Conventional IO	Key Sectors of the Conventional SAM
1	Manufacture of basic metals	Agriculture
2	Manufacture of wood and paper products	Wholesale and retail trade and repair of motor vehicles and motorcycles
3	Manufacture of refined petroleum and other chemical products	Transport, Postal and courier activities
4	Manufacture of textiles and wearing apparel	Manufacture of food products and beverages
5	Manufacture of other non-metallic mineral products	Human health activities
6	Agriculture	Banking and Insurance

As it can be seen from Table 9, key sectors are comparable because domestic the IO overestimate the sectoral output multipliers and SAM underestimate the sectoral output multipliers. Consequently, the results demonstrate that:

- Rankings of some sectors change. For example, for the domestic IOM, manufacture of other non-metallic mineral products is in the 3rd place while it was in the 5th place before. Manufacture of basic metals sector has not changed its position, however. Although manufacture of textiles and wearing apparel has been revealed as one of the key sectors based on the conventional IOM, it has not been considered as a key sector and has been removed based on the domestic IOM.
- The comparison between rankings of key sectors based on the conventional and domestic SAM shows that agricultural sector has held the same rank. Some sectors, such as real estate activities and electricity, water and distribution of natural gas have not been ranked as key sectors based on the conventional type, but ranked as key sectors based on the domestic SAM.
- Although there has been no similarity between key sectors of the IOM and the SAM, due to the social effects of the SAM, changes in the ranking of the key sectors and removal of some key sectors, after import deduction, show different pictures of economy for policymaking, especially in relation to investment in key sectors.

Table 9. comparison of key sectors in the domestic IO and SAM (based on average sectoral output multipliers)

Rank	Key Sectors Ranking of Domestic IO	Key Sectors Ranking of Domestic SAM
1	Manufacture of basic metals	Agriculture
2	Manufacture of refined petroleum and other chemical products	Wholesale and retail trade and repair of motor vehicles and motorcycles
3	Manufacture of other non-metallic mineral products	Manufacture of food products and beverages
4	Manufacture of wood and paper products	Real estate activities
5	Agriculture	Banking and Insurance
6	-	Electricity, Water and distribution of Natural gas
7	-	Transport, Postal and courier activities

6. Conclusions

Theoretically, the IOM provides the Leontief's production function, from which the sectoral output multipliers can be derived. In the SAM framework, the combined Leontief-Keynes models dominate multipliers which are commonly known as accounting multiplier matrices. The inter-industrial block of this matrix cannot be referred to as sectoral output multipliers as in IOM, rather they are accurately described as sectoral supply multipliers. Therefore, the two types of sectoral multipliers are of different nature and cannot be compared for assessing sectoral performance and sectoral policy analysis of key sectors. Not only can the application of the conventional IOM and SAM approaches lead to an overestimation of sectoral output multipliers in the IOM and an underestimation of sectoral supply multipliers in the SAM, but it can also provide different pictures of economic sector performance. To solve the problem and make the sectoral multipliers of the two approaches comparable, deduction of imports has been proposed.

The present study's results showed a significant overestimation of sectoral output multipliers for the Leontief demand-driven and Ghosh supply-driven approaches, and an underestimation of sectoral supply multipliers for the SAM approach. Accordingly, application of sectoral output multipliers based on a domestic IOM and SAM can provide a clear picture of sectoral performance for determining key economic sectors. Therefore, there searchers need to consider these structural revisions; otherwise, they may unintentionally remove/add a key sector which should/should not be considered as a key sector. The overall findings showed that, firstly, the key sectors were concentrated on industrial sectors for IOM and on service sectors and agricultural sectors for the conventional SAM. Secondly, regarding the domestic IOM, although the normalized average of sectoral output multipliers were concentrated on industrial sectors, some key sectors, such as manufacture of textiles and wearing apparel, were eliminated for the conventional IOM. Furthermore, in the domestic SAM, some sectors such as human health activities were eliminated from but some sectors such as electricity, water and distribution of natural gas were added to the key sectors. The overall findings of the present study showed that the two approaches, after import deduction, suggested similar results, based on which policymakers can take an appropriate decision on economic planning for the key sectors.

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