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Application of Financial Social Accounting Matrix (FSAM) for Analyzing Real-Financial Linkages of the Iranian Economy

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ABSTRACT

Prevailing views in Iran suggest that the financial sector mobilizes more resources to services than to the commodity-producing sectors. On account of double counting in intermediate inputs, the conventional multipliers derived from the Financial Social Accounting Matrix (FSAM) cannot solve this problem. As an alternative to conventional multipliers, FSAM GDP multipliers that indicate the growth performance of a financial system of the economy are proposed. Using a newly constructed 2016 FSAM for Iran, both conventional and GDP multipliers of the Real Social Accounting Matrix (RSAM) and FSAM have been worked out. The overall findings are as follows: First- the average conventional and GDP multipliers in FSAM are larger than their corresponding figures in RSAM. Second- in RSAM, the average conventional multipliers of commodity-producing sectors are larger than services whereas the GDP multipliers give the opposite pictures that support the prevailing opinions in Iran. Third- Concerning conventional and GDP multipliers at the sectoral level, the results show that in the case of conventional multipliers, 8 out of 10 top highest multipliers are commodity-producing sectors whereas GDP multipliers give exactly the opposite trend which vindicates the resource mobilization of financial sector towards the service sectors.

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1. Introduction

The importance of integrating the financial and real sectors of the economy has been recognized in the 1993 system of national accounts (United Nations et al. 1993). These initial efforts coupled with the recent financial crisis of the world, accentuated the need of developing a comprehensive and integrated accounting framework encompassing both the real and financial sectors of the economy [1]. The Real Social Accounting Matrix (RSAM) [2] could be used as a starting point for such integration. From the sequence of accounts, FSAM captures the financial sector that is generally known as loanable funds markets [3] and remains outside of RSAM. Such integration is an extended version of input-output accounting, which subsequently expanded to RSAM and further incorporated into satellite institutional accounts, giving an extended RSAM, known as the Financial Social Accounting Matrix (FSAM). However, an input-output model which is used for short-term impact analysis is limited only to the production account which is a sub-account of the real sector. On the other hand, RSAM is useful for socio-economic analysis; it is an incomplete model because it captures the real sector of the economy (production account, factor accounts, institutional account, and external account) and does not include financial linkages with the real sector of the economy. That is the detailed intermediary role of the financial institutions and transaction agents, and their financial assets and liabilities remain outside RSAM (Aray et al., 2017). Therefore, compared to RSAM, FSAM can capture the workings of the financial system of the country, allowing households and corporations to borrow from the pool of savings in the economy to finance more investment spending (Leung and Secrieru, 2012).

Compared to RSAM, the main advantages of FSAM are as follows: The first advantage is that the financial sector can function as the connector for the entire sets of the real sector of the economy through financial intermediation. The second advantage is its comprehensive accounting framework and its flexibility for economic modeling. The third advantage is that the financial sector can identify the surplus sector and hence provide adequate financial support for the deficit sector, the mechanism through which the strengths, and vulnerabilities of the economic activity are transmitted (Klein, 2003; Aray et al., 2017). The fourth and last advantage is that RSAM is used for the standard Computable General Equilibrium (CGE) modeling, and FSAM can be used for financial CGE modeling to analyze the static and dynamic aspects of the economy (Robinson, 1991; Emini and Fofack, 2004; Statistical Indonesia and Bank of Indonesia, 2009).

Considering the above background and the available literature in the context of Iran, it is observed that the focus of all the literature has been concentrated on analyzing Iran's saving behavior and financial intermediation using the partial equilibrium model. For instance, several studies including Rahmani and Bagherpur (2017), Balali and Vahdat Moaddab (2015), Samadi et al. (2015), Piraee et al. (2013), Sobhani and Barkhordari (2011), Kaghazian et al. (2011), Yavari and Emamgholipor (2010), Rezaei (2010), Nouferesti and Ahmadi (2008), Abrishami and Rahimzadeh Namvar (2006), Bahrami and Aslani (2005), Mojtahed and Karami (2003), Kheyr Khahan and Baradaran Shoraka (2003) have empirically tested alternative theories of savings for

Iran. Meanwhile, studies including Farmanara et al. (2019), Taghavi and Pahlavani (2018), Khademalizadeh (2013), Mahdavi et al. (2011), Hasanzadeh and Ahmadian Yazdi (2010), Saeidi (2009), Dalali Esfahani et al. (2008), Fakhr Hosseini and Shahabi (2007) and Zangeneh (2006), were devoted to examining the relationship between Iran's financial intermediation and economic growth. However, none of the aforementioned studies addressed the linkage between the real and financial sectors in an integrated accounting framework.

Bazazan and Safi-Shapar's study is the only one that uses the 1999 FSAM, constructed by the Central Bank of Iran to analyze the role of the financial system in Iran. In this article, the difference between FSAM multipliers and RSAM conventional multipliers is taken as a criterion for measuring the role of the financial system in the entire economy (Bazzazan and Seifi-Shahpar, 2015).

Considering the above background, we observe that compared to the literature abroad, the role of the financial sector in economic growth in an integrated accounting framework of Iran has been grossly overlooked. Because this sector can potentially identify the surplus, sector and then mobilizes these resources to the deficit sectors that could in turn generate value added in the different sectors of the economy. The prevailing opinions in Iran suggest that the financial sector channelizes resources relatively more to services than to the commodity-producing sectors (Shakeri, 2016). This issue then raises an important question: Does the financial sector in Iran provide relatively more resources to services than to the commodity-producing sector?

The main purpose of this article is to fill this lacuna with the following two novelties: The first is to construct an FSAM for Iran for the year 2016. The second is to introduce a new method known as GDP multipliers to analyze the linkage between the financial and real sectors of the economy, which differs from the conventional multipliers used by Bazzazn and Safi-Shahpar.

The content of the article is structured into four sections. The first section deals with a review of the literature to identify the research gap. The conceptual framework of FSAM followed by conventional and GDP multipliers is presented in the second section. In the third section, we discuss the main statistical basis and also supplementary data for constructing FSAM in Iran for the year 2016. Empirical results and analysis are provided in the fourth section. The last section pertains to the summary and conclusion.

2. Literature Review

In the previous section, we have pointed out that one of the main advantages of FSAM is its comprehensive accounting framework as well as its flexibility in modeling economic policy. Looking into the available literature, one can observe that integrating real and financial sectors of the economy has long been the main issue and concern of economists. For instance, Cohen observed that while the Post-Keynesian era has witnessed significant strides in both expenditure and financial theory, has not attracted empirical research (Cohen, 1968:1).

The compilation of flow of funds statistics in 1952 by Copeland (Copeland, 1952), and then incorporated in the 1968 Systems of National Accounts (UN, 1968), to a great

extent, paved the way to link the financial flows (measured as the changes of financial assets in both assets and liabilities) to saving and investment behaviors of economic agents.

The importance of integrating the financial sector with the real sector of the economy in the sequence of accounts has been recognized in the 1993 System of National Accounts (UN et al. 1993), Out of which a satellite institutional economic sectors a part of an integrated accounting framework has been developed [4].

With the above background, the available literature suggests that the analysts used a different database for economic model building. This model can be largely classified into two groups. The first group applies econometric methods to analyze the workings of the financial sectors concerning the saving and investment behaviors of the economic agents. For this purpose, they use the flow of fund statistics (Tobin, 1964, Cohn, 1968). In contrast, the second group uses the matrix methods to integrate Leontief Input-Output Model with the manipulation of the Flow of Fund (FOF) model.

From the modeling point of view, all research can be further classified into the four sub-groups. The first sub-group proposed methods that convert the balance sheets of FOF accounts in such a way that can be integrated with Leontief's input-output accounts (Stone, 1997 and Klein, 2003). The second sub-group extends to construct FSAM that integrates institutional economic sectors (financial sectors) with RSAM. Based on RSAM and FSAM, these studies have estimated two types of conventional multipliers. The difference between the two conventional multipliers is considered the role of the financial sector in the entire economy (Waheed and Ezaki, 2006; 2007; Li, 2008).

The third sub-group applies FSAM conventional multipliers to analyze the importance of linkage between the financial and real sectors. For instance, Blancas (2006) uses backward and forward linkages to assess the role of the financial sector in the Mexican economy. Leung and Secrieru (2012) try to analyze the growth aspects of financial sectors for the Canadian economy. In this article, instead of using conventional multipliers, they use GDP multipliers.

The fourth sub-group uses the FSAM as a comprehensive statistical basis for Financial Computable General Equilibrium (FCGE) Modeling (Robinson, 1991; Emini and Fofack, 2004; Kim et al., 2016; Telli et al., 2008; Fargeix and Sadoulet, 1990; Simorangkir and Adamanti, 2014; Haghighi and Bahador, 2015a; 2015b; Kim and Bae, 2015; Ahmed et al., 2019).

Looking into the available literature in Iran and comparing it with the above research works, we can make the following observations: First, the majority of studies in Iran fall in the first group which applies the econometrics methods to evaluate the workings of the financial sector focusing on the saving and investment behaviors of the Iranian Economy. To mention some of them, we can refer to the studies of Farmanara et al. (2019), Taghavi and Pahlavani (2018), Rahmani and Bagherpur (2017), Balali and Vahdat Moaddab (2015), Samadi et al. (2015), Piraee et al. (2013), Khademalizadeh (2013), Mahdavi et al. (2011), Sobhani and Barkhordari (2011), Kaghazian et al. (2011),

Yavari and Emamgholipor (2010), Rezaei (2010), Hasanzadeh and Ahmadian Yazdi (2010).

Second, Bazzazan and Seifi-Shahpar's study falls into the second sub-group that uses conventional multipliers for measuring the role of the financial sector in the entire Iranian economy. Conventional multipliers have at least two drawbacks. First, they cannot assess the growing role of the financial sector in the economy. Second the conventional multipliers double-count the intermediate inputs (Leung and Secrieru, 2012).[1]

To eliminate the two mentioned drawbacks and to evaluate the growth aspect of the financial sector, the FSAM GDP multipliers are applied, which are similar to the method used by Ibid (2012).

3. A Conceptual Framework of FSAM and GDP Multipliers

3.1 Conceptual Framework of FSAM

In this article, we consider two types of multipliers: RSAM and FSAM which can be calculated using data from a SAM. What distinguish these multipliers from each other are the linkages that are assumed to be exogenous. In the case of RSAM multipliers, the links between production, income generation, and spending are assumed to be endogenous, but the linkages between income generation, savings, and investment remain exogenous. In FSAM multipliers, all of the remaining links are assumed to be endogenous (Leung and Secrieru, 2012). Figure 1 illustrates the circular income flow in the scheme of FSAM. The differences between FSAM and RSAM are highlighted in the right-below corner of the figure enclosed by a dotted line. First, FSAM has a disaggregated capital account consisting of various economic institutions. Second, FSAM has a financial account that depicts the changes in the balance sheets of economic institutions for a certain period, usually one year. The flow of funds statistics enters the FSAM as two matrices with one standing for the changes in financial assets, and another one standing for the changes in financial liabilities. We can trace the real-financial linkage in the economy through the interactions of saving-investment balances of institutions in the FSAM framework. For each economic institution and the whole economy, the identity

$$Saving - Investment = \Delta\, Financial\ Assets - \Delta\, Financial\ Liability$$

always holds. Institutions with saving-investment surplus finance the deficit of the other institutions and accumulate financial assets. Institutions make the decisions of allocating their income between spending and savings. Savings of institutions consequently would be channeled into investment. The part of the investment of an institution that cannot be financed through its savings would be mobilized through financial instruments. Consequently, for accommodating saving-investment balances distinguished between current accounts and capital accounts of various institutions, financial flows should be entered. It is worth noting that the spending and portfolio

1. Oosterhaven and Stelder (2002) introduced "net multipliers" to avoid exaggerating impacts.

decisions of institutions (i.e., the real side and financial side of the economy) must be mutually consistent in the equilibrium state.

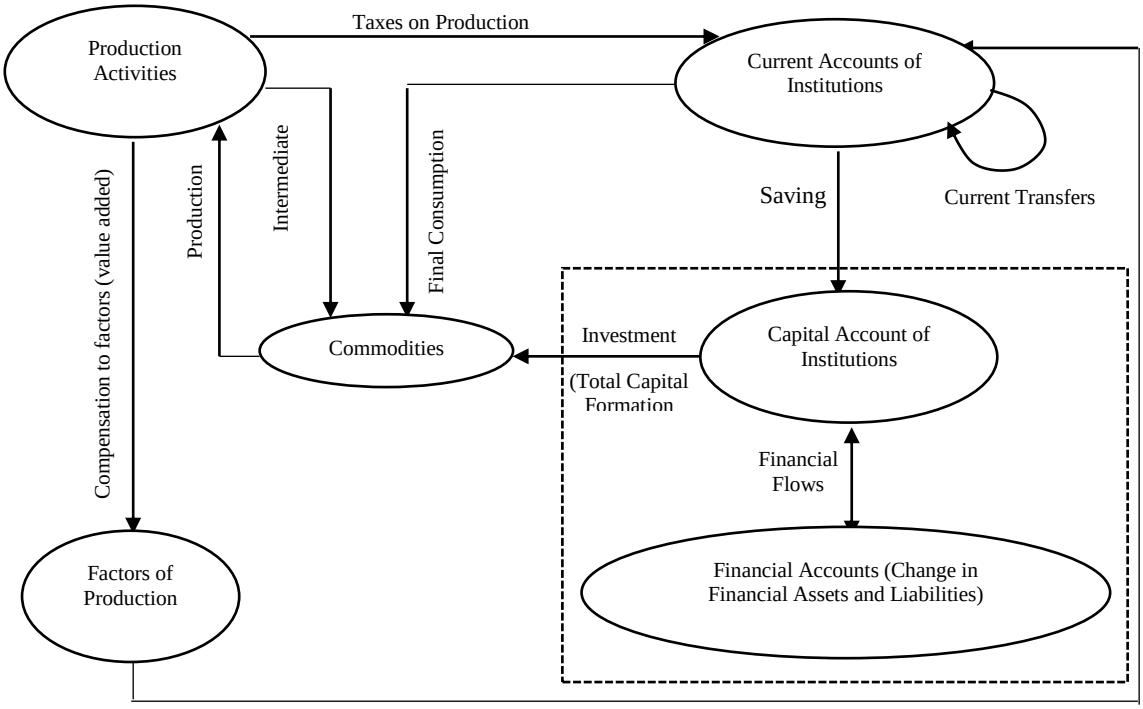

Figure 1. Economy-wide Circular Flows of Income in FSAM Framework
Source: Li (2008)

3.2 Conventional and GDP Multipliers

In this article, four types of multipliers are estimated: RSAM and FSAM GDP multipliers, RSAM, and FSAM conventional multipliers. The difference between the four types of multipliers is considered the growing role of the financial sector in the economy. The distinguishing feature of the RSAM and FSAM multipliers is how the linkages between financial and real sectors are assumed. In the case of RSAM multipliers, the links between production, income generation, savings, and investment remain exogenous, whereas, in FSAM multipliers, all the remaining links are assumed to be endogenous.

To understand the workings of the conventional and GDP multipliers, the simplified frameworks of RSAM and FSAM are presented in Tables 1 and 2.

Table 1. A Simplified Framework of RSAM in Terms of Endogenous and Exogenous Accounts

	Endogenous Accounts			**Exogenous Accounts**	**Total**
	Production	**Factors**	**Institutions (Household, Company)**	**Other Accounts**	
Production	T_{11}	0	T_{13}	f_1	y_1
Factors	T_{21}	0	0	f_2	y_2
Institutions (Household, Company)	0	T_{32}	T_{33}	f_3	y_3
Other Accounts	l_1'	l_2'	l_3'	l	y_x
Total	y_1'	y_2'	y_3'	y_x'	

Source: Thorbecke (1998)

Table 2. A Simplified Framework of FSAM in Terms of Endogenous and Exogenous Accounts

	Endogenous Accounts					**Exogenous Accounts**	**Total**
	Production	**Factors**	**Institutions (Household, Company)**	**Capital Account**	**Financial Account**	**Other Accounts**	
Production	T_{11}	0	T_{13}	T_{14}	0	$\bar{f}_1$	$\bar{y}_1$
Factors	T_{21}	0	0	0	0	$\bar{f}_2$	$\bar{y}_2$
Institutions (Household, Company	0	T_{32}	T_{33}	0	0	$\bar{f}_3$	$\bar{y}_3$
Capital Account	0	0	T_{43}	T_{44}	T_{45}	$\bar{f}_4$	$\bar{y}_4$
Financial Account	0	0	0	T_{54}	0	$\bar{f}_5$	$\bar{y}_5$
Other Accounts	$\bar{l}'_1$	$\bar{l}'_2$	$\bar{l}'_3$	$\bar{l}'_4$	$\bar{l}'_5$	$\bar{l}$	$\bar{y}_x$
Total	$\bar{y}'_1$	$\bar{y}'_2$	$\bar{y}'_3$	$\bar{y}'_4$	$\bar{y}'_5$	$\bar{y}'_x$	

Source: Research findings.

Based on Tables 1 and 2, the following three general observations can be made: The first observation is the endogeneity of the economic circular flow concept of the real sector shown in Table 1. Production account (T_{11}) generates value added (T_{21}) in factor account. Factor account allocates income to institutional accounts in the form of income destruction (T_{32}), which is further used by the institutional sectors (households) to consume commodities produced by the production account (T_{13}). Such a circular flow of economic transactions forms the basis of the RSAM analysis to facilitate the study of interdependency among the real sector components.

The second observation is the linkage between the real and financial sectors that are endogenous in Table 2. As shown in Table 2, saving-investment accounts play a bridging role in linking the real and financial sectors. For instance, the fourth accounting identity depicts the capital accounts and requires that, for each institutional type (household and/or companies), saving equals investment. For instance, the total gross saving, row sum ($\bar{y}_4$) includes domestic institutional savings (T_{43}), capital transfer among domestic institutions (T_{44}) and change in financial liabilities (T_{45}). The row sum ($\bar{y}_4$) must be equal to the corresponding column sum ($\bar{y}'_4$) which include investment for capacity creation of the different sectors of the economy (T_{14}), capital transfers among domestic institutions (T_{44}), the change in financial assets (T_{45}) and investment in imported goods ($\bar{l}'_4$).

The third observation is the other accounts of Tables 1 and 2. Following the literature (Thorbecke and Jung, 1996; Thorbeck, 1998; Li, 2008), f_1, f_2 *and* f_3 are standard exogenous accounts in RSAM. f_1 comprises general government expenditure, capital formation, and the rest of the world. Exogenous variable in f_2 is factor income from abroad and f_3 encompasses government transfers to institutions as well as institutional receives from abroad. In FSAM, $\bar{f}_1$ includes general government expenditure and the rest of the world. Items comprising $\bar{f}_2$ and $\bar{f}_2$ are similar to the counterparts f_2 and f_3. $\bar{f}_4$ indicates capital transfers (capital inflow) and $\bar{f}_5$ shows lending.

For the classification of endogenous and exogenous accounts of RSAM and FSAM, the first step is to convert Tables 1 and 2 into the multiplier model as follows:

Table 3. A Simplified Framework of RSAM Multiplier Model

		Expenditure		Total
		Endogenous Accounts	Exogenous Accounts	
Receipts	Endogenous Accounts	$T = A_e\hat{y}_e$	F	$y_e = T + f = A_e\hat{y}_e + f$
	Exogenous Accounts	$L = A_l\hat{y}_e$	R	$y_x = l + r = A_l\hat{y}_e + r$
Total		y_e'	y_x'	

Source: Research findings.

Table 4. A Simplified Framework of FSAM Multiplier Model

		Expenditure		**Total**
		Endogenous Accounts	**Exogenous Accounts**	
Receipts	Endogenous Accounts	$\bar{T} = \bar{A}_e\hat{\bar{y}}_e$	$\bar{F}$	$\bar{y}_e = \bar{t} + \bar{f}$ $= \bar{A}_e\hat{\bar{y}}_e + \bar{f}$
	Exogenous Accounts	$\bar{L} = \bar{A}_l\hat{\bar{y}}_e$	$\bar{R}$	$\bar{y}_x = \bar{l} + \bar{r}$ $= \bar{A}_l\hat{y}_e + \bar{r}$
Total		y_e'	y_x'	

Source: Research findings.

Notes:

1. Capital letters show matrices, while small letters refer to the row/column sum vectors of corresponding matrices. A hat indicates a diagonal matrix.
2. Letters with bars show the FSAM multiplier model.
3. $T\ and\ \bar{T}$: Matrices of transaction among endogenous accounts of RSAM and FSAM respectively.

$F\ and\ \bar{F}$: Matrices of injections from exogenous accounts into endogenous accounts of respective RSAM and FSAM.

$L\ and\ \bar{L}$: Matrices of leakage from endogenous accounts to exogenous accounts of RSAM and FSAM respectively.

$A_e\ and\ \bar{A}_e$: The respective matrices of endogenous average expenditure propensities of RSAM and FSAM.

$A_l\ and\ \bar{A}_l$: Matrices of average expenditure propensities to leak for RSAM and FSAM respectively.

Based on Tables 3 and 4, if we assume that there exists an excess capacity in the economy that would allow prices and expenditure propensities of endogenous accounts to remain constant, we can convert RSAM and FSAM to economy-wide computable models by following two steps: first partitioning all the accounts into endogenous accounts and exogenous accounts, and then rearranging the respective RSAM and FSAM similar to Tables 1 and 2. Second, dividing each cell entry in the transaction matrices of endogenous accounts by its corresponding column sum to obtain the matrices of average expenditure propensities of matrices $A_e$and $\bar{A}_e$ in Tables 3 and 4.

With the above notations, the balance equation in RSAM can be expressed as follows:

$$y_e = A_e y_e + f \quad (1)$$

$$y_e - A_e y_e = f \quad (2)$$

$$y_e = (I - A_e)^{-1} f \quad (3)$$

where $(I - A_e)^{-1}$ is known as the matrix of the accounting multiplier (Pyatt and Round, 2006; Civardi et al., 2010). Equation (3) reveals that any changes in the exogenous accounts, i.e. one-unit increase of injection in the system can be traced through the changes in the endogenous accounts of the real sector of the economy. Expressing Equation (3) in matrix framework:

$$\begin{bmatrix}\Delta y_P\\ \Delta y_F\\ \Delta y_I\end{bmatrix} = \begin{bmatrix}\alpha_{11} & \alpha_{12} & \alpha_{13}\\ \alpha_{21} & \alpha_{22} & \alpha_{23}\\ \alpha_{31} & \alpha_{32} & \alpha_{33}\end{bmatrix}\begin{bmatrix}\Delta f_1\\ \Delta f_2\\ \Delta f_3\end{bmatrix} \quad (4)$$

where $(I - A_e)^{-1} = \alpha_{ij}$, $i,j = 1,2,3$ shows the three endogenous accounts of RSAM: production account, factor account, and institutional account (households and company).

$\Delta y_e = \begin{bmatrix}\Delta y_P\\ \Delta y_F\\ \Delta y_I\end{bmatrix}$ stands for changes in the three endogenous accounts. $\Delta f_1 = \Delta f_2 = \Delta f_3 = 1$, which indicates a unit change in each of the three exogenous accounts. Now if we assume that one unit increase in exports, i.e. $\Delta f_1 = 1$ and assuming $\Delta f_2 = \Delta f_3 = 0$, then its direct and indirect impacts on the three endogenous accounts are obtained as follows:

$$\Delta y_{P_j} = \sum_i (\alpha_{11})_i \ , \Delta y_{F_j} = \sum_i (\alpha_{21})_i \ and \ \Delta y_{I_j} = \sum_i (\alpha_{31})_i$$

where i indicates the number of sectors, number of factors of production, and number of institutions. $\Delta y_{P_j}, \Delta y_{F_j} and \ \Delta y_{I_j}$ show the changes in respective output, factor, and institutional income multipliers of jth sector. One of the limitations of the eq. (4) is that the higher multipliers indicate for instance industries with more linkages with other industries but not necessarily those that contribute most to GDP. The main reason is that such multipliers double-count intermediate inputs. To remove this limitation, GDP multipliers are used. It measures the changes in the final demand (exogenous accounts) of production on output by weighting the contribution of each industry by its value added-to-output ratio. The following equation shows the GDP multipliers in RSAM.

$$\begin{bmatrix}\Delta y_P^{GDP}\\ \Delta y_F^{GDP}\\ \Delta y_I^{GDP}\end{bmatrix} = \begin{bmatrix}\alpha_{11} & \alpha_{12} & \alpha_{13}\\ \alpha_{21} & \alpha_{22} & \alpha_{23}\\ \alpha_{31} & \alpha_{32} & \alpha_{33}\end{bmatrix}\begin{bmatrix}\kappa\\ 0\\ 0\end{bmatrix}\begin{bmatrix}\Delta f_1\\ \Delta f_2\\ \Delta f_3\end{bmatrix} \quad (5)$$

where $\kappa = \left(\frac{va}{x}\right)_i$ refers to the value added-to-output ratio of the ith sector in the production account. GDP multipliers in the jth sector of the production account can be estimated by assuming a unit increase in the exogenous account of the production account.

$$(\Delta y_P^{GDP})_j = \sum_i \alpha_{ij}(\kappa)_i \Delta f_1 \quad (5\text{-}1)$$

Similarly, GDP multipliers of factor account and institutional account can be obtained as follows

$$(\Delta y_F^{GDP})_j = \sum_i \alpha_{21}(\kappa)_i \Delta f_1 \quad (5\text{-}2)$$
$$(\Delta y_I^{GDP})_j = \sum_i \alpha_{31}(\kappa)_i \Delta f_1 \quad (5\text{-}2)$$

Since GDP multipliers net out intermediate inputs, they are typically much lower than their conventional multiplier counterparts. i.e.$(\Delta y_P^{GDP})_j < (\Delta y_P)_j$,$(\Delta y_F^{GDP})_j < (\Delta y_F)_j$ *and* $(\Delta y_I^{GDP})_j < (\Delta y_I)_j$

Similar to the two types of multipliers in RSAM, two corresponding multipliers in FSAM can be estimated. First of all, the precondition for such estimation is to partition the FSAM matrix into four blocks using Miyazawa's method (Myazawa, 1976) which was also used by other researchers (Sonis and Hewings, 1999). Applying Miyazawa's method has two main advantages: The first is the identification of the linkages between real and financial sectors. The second is that internal and external multipliers can assess the growth role of the financial sector.

Based on Table 4, the balance equation of FSAM can be expressed as follows:

$$\bar{y}_e = \bar{A}_e \bar{y}_e + \bar{f} \quad (6)$$
$$\bar{y}_e - \bar{A}_e \bar{y}_e = \bar{f} \quad (7)$$
$$\bar{y}_e = (I - \bar{A}_e)^{-1} \bar{f} \quad (8)$$

where $(I - \bar{A}_e)^{-1}$ is known as FSAM multipliers. $\bar{y}_e$ and $\bar{f}$ are the respective endogenous and exogenous accounts of combined real and financial sectors. To see the relationship between RSAM and FSAM, Leung and Sercieru (2012) have partitioned $\bar{A}_e$ matrix as presented below:

$$\bar{A}_e = \begin{bmatrix} A^{SAM} & A_{12} \\ A_{21} & 0 \end{bmatrix}$$

where A_{12} and A_{21} are the matrices of A^{SAM} when extended to the financial sector. To be more specific, A_{12} includes the change in financial liabilities for all instruments and all endogenous agents like currency and deposit, securities (except equity), loans, stock, technical reserves in insurance, special drawing rights (SDR), and other financial flows.

The A_{21} matrix consists of changes in financial assets for all instruments and all endogenous accounts such as currency and deposit, securities (except equity), loans, stock, technical reserves in insurance, special drawing rights (SDR), and other financial flows.

$$(I - \bar{A}_e)^{-1} = \begin{bmatrix} (I - A^{SAM}) & -A_{12} \\ -A_{21} & I \end{bmatrix}^{-1} = \begin{bmatrix} F_{11} & F_{12} \\ F_{21} & F_{22} \end{bmatrix} \quad (9)$$

Where [6]

$$F_{11} = [I - (I - A^{SAM})^{-1} A_{12} A_{21}]^{-1} (I - A^{SAM})^{-1} \quad (9\text{-}1)$$
$$F_{12} = [I - (I - A^{SAM})^{-1} A_{21} A_{12}]^{-1} (I - A^{SAM})^{-1} A_{12} \quad (9\text{-}2)$$
$$F_{21} = [I - A_{21}(I - A^{SAM})^{-1} A_{12}] A_{21} (I - A^{SAM})^{-1} \quad (9\text{-}3)$$
$$F_{22} = [I - A_{21}(I - A^{SAM})^{-1} A_{12}]^{-1} \quad (9\text{-}4)$$

Substituting the above-partitioned matrix in equation (9), we get a new equation, expressed as follows:

$$\begin{bmatrix} y_{SAM} \\ y_{FI} \end{bmatrix} = \begin{bmatrix} F_{11} & F_{12} \\ F_{21} & F_{22} \end{bmatrix} \begin{bmatrix} f_{SAM} \\ f_{FI} \end{bmatrix} \quad (10)$$

y_{SAM}, y_{FI}, f_{SAM} and f_{FI} indicate endogenous and exogenous accounts of RSAM and FSAM respectively.

Equations 9-1 to 9-4 describe the relationship between RSAM and FSAM multipliers through Miyazawa's internal and external multipliers. For instance, eq. (9-1) show that FSAM multipliers can be estimated by a unit increase in exogenous accounts of FSAM which passes first by the internal multiplier matrix, $(I - A^{SAM})^{-1}$, by a factor of $[I - (I - A^{SAM})^{-1}A_{12}A_{21}]^{-1}$. This factor is referred to as the external multiplier based on equations (9-1) to (9-4) and/or in the general eq. (10). The FSAM multipliers can be explained as follows: an exogenous unit increase in FSAM ($\Delta f_{SAM} = 1$) causes the output of sectors to increase. The increase in the output of sectors generates income to the factor of production that is then allocated to domestic institutions (households and companies). The domestic institutions, in turn, spend the accumulated income on consumption and investment in different sectors. In FSAM, there is an additional loop; saving and investment which is not used for investment in the different sectors of the economy and is invested in financial instruments. These assets become liabilities of other institutions and cause further increases in their source of funds for capital formation. Now, if we apply the value added-to-output ratio in eq. (10), we can then derive the GDP multipliers in FSAM using the following equation.

$$\begin{bmatrix} (y_{SAM}^{GDP})_j \\ (y_{FI}^{GDP})_j \end{bmatrix} = \begin{bmatrix} F_{11} & F_{12} \\ F_{21} & F_{22} \end{bmatrix} \begin{bmatrix} (\frac{va}{x})_i \\ 0 \end{bmatrix} \begin{bmatrix} \Delta f_{SAM} \\ \Delta f_{FI} \end{bmatrix} \quad (11)$$

As GDP multipliers net out intermediate inputs, they are smaller than the corresponding conventional multiplier, i.e. $(y_{SAM}^{GDP})_j < (y_{SAM})_j$ and $(y_{FI}^{GDP})_j < (y_{FI})_j$.

4. Statistical Basis for Construction of the FSAM for Iran

The data to construct FSAM for Iran in the year 2016 all come from official sources including input-output tables, results of various census schemes, seasonal national accounts, institutional economic sector of the Central Bank of Iran that provides integrated real and financial sectors, budget performance report, etc. The estimation process for each of the six accounts in FSAM is briefly described below:

1- Production Account: Input-output table, 2011, which complied with the Statistical Center of Iran, was used for updating the input-output table for the year 2016 via the GRAS method. To achieve this goal, the data of national accounts of the Statistics Center of Iran and the census of industrial enterprises with 10 employees and above, the results of the household income-expenditure survey, budget performance, seasonal national accounts of the Statistics Center of Iran, the economic balance sheet of the Central Bank (to calculate the export-import vector), the performance of the budget, census of mines in operation, cattle and poultry census and the plan of industrial

enterprises with 10 employees and above (to calculate the capital formation vector) have been used. Also, the national accounts and the Census of Population and Housing of the Statistics Center of Iran are the basis for calculating the components of the value-added matrix.

2- Factor Account: In addition to calculating the components of the value-added matrix, receiving income from abroad for domestic factors and paying for foreign factors have been extracted from national accounts which provided institutional economic sectors published by the Central Bank for 2016 (Central Bank of Iran, 2019).

3- Institutional account: In addition to calculating the final consumption of institutions explained earlier, it is necessary to calculate the allocation matrix and the current transfer matrix between institutions. The allocation matrix has been calculated using income-expenditure of households published by the Statistical Center of Iran and Institutional Accounts of Central Bank. The current transfer matrix of institutions, which is the main challenge for calculating SAM, has been obtained using a wide range of data and statistics, especially the government financial balance in 2016, income expenditure of households, budget performance, and national accounts with disaggregation of the institutional and economic sectors. Receipts and payments of institutions from/to abroad have been calculated using the national accounts with the disaggregation of the institutional accounts.

4- Saving-Capital Accounts: The statistical bases for calculating capital formation were expressed before in the production account. Savings of each institution are also obtained by subtracting the total income from the expenditures/consumption and current transfer between institutions.

5- Financial Account: The report of institutional accounts of the Central Bank provides the financial institution account of households, the general government, and financial and non-financial corporations. For each of these institutions, a separate T-account is given in terms of net changes in financial liabilities and assets. The financial instruments for each of the liabilities and assets are: cash and deposit, bonds expect shares, loans, share and similar assets, technical insurance funds, other payable accounts, and net lending and borrowing.

6- Rest of the world: the required data for the calculation of these accounts is extracted from Institutional Accounts, published by the Central Bank of Iran.

The size of the 2016 FSAM of Iran is 45*45 including 27 economic sectors, 3 production factors (labor, mixed-income, capital), 3 institutional current accounts (households, non-financial enterprises, financial institutions), 3 institutional capital accounts (households, non-financial enterprises, and financial institutions), financial account (comprises 7 financial instruments: currency and deposit, securities except stocks, loans, stocks, technical insurance reserves, other financial accounts), 2 exogenous accounts (government and rest of the world).

Table 5 is an aggregated FSAM of Iran which has six accounts. Five accounts (production, factors, institutions, capital, and rest of the world accounts) are common in both RSAM and FSAM. Capital account (saving) plays an important role as a bridge to a financial account. We observe that in a row of capital accounts, the total saving is

11,475 thousand billion Rials which comprises domestic savings (5,161 thousand billion Rials), liabilities (3,263 thousand billion Rials), and inflow of capital from abroad (3.050 thousand billion Rials). Out of total savings, 4,498 thousand billion Rials is capital formation (physical investment) in production account, 3,359 thousand billion Rials assets, and a 3,618 thousand billion Rials outflow of capital abroad. In addition to that, the difference between savings and investment is 96 thousand billion Rials which is equal to the differences between changes in assets and changes in liabilities. The obtained figure must also be equal to the net lending of the country.

Table 5. Aggregate FSAM for Iran in 2016 (Billion Rials in Current Prices)

Accounts (Billion Rials)	Production Activities	Factors	Current Account of Institutions	Capital Account of Institutions	Financial	Rest of World	Total
Production Activities	8,328,829	0	8,591,989	4,497,745	0	2,946,412	24,364,974
Factors	14,707,053	0	0	0	0	96,594	14,803,647
Current Account of Institutions	0	14,747,356	4,196,320	0	0	21,555	18,965,231
Capital Account of Institutions	0	0	5,161,185	0	3,263,269	3,050,573	11,475,026
Financial	0	0	0	3,359,096	0	53,626	3,412,722
Rest of World	1,329,093	56,291	1,015,737	3,618,185	149,454	0	6,168,759
Total	24,364,974	14,803,647	18,965,231	11,475,026	3,412,722	6,168,759	0

Source: Research findings.

5. Empirical Results and Analysis of Conventional and GDP Multipliers of RSAM and FSAM

To assess the importance of linkages between the real and financial sectors, conventional and GDP multipliers have been estimated. The former cannot reveal the growth performance, whereas the latter can provide the role of growth of the financial system in the entire economy both for planners as well as policymakers. To analyze how the financial sectors, channelize the financial resources for capacity creation in the different sectors of the economy, they have been classified into service sectors and commodity-producing sectors. The average conventional multiplier of RSAM and FSAM and their respective corresponding GDP multipliers are estimated. The results are organized in Tables 6 to 9.

Tables 6 and 7 show the results of the average conventional multipliers of all sectors including service sectors and commodity-producing sectors for the three endogenous accounts of RSAM and FSAM respectively. From the figure, we can make the following general observations:

a- The average multipliers in FSAM are larger than those in RSAM. The differences between the two sets of multipliers can be related to the role of the financial system in the Iranian economy.

b- in Table 6, we observe that when the financial system is exogenous, the average multipliers of the commodity-producing sector are larger than the corresponding figure

in service sectors, 2/504 unit to 2/308 unit. This means that an average unit increase in the final demand of productions account causes an average increase of 2/504 and 2/308 units in commodity and service sectors respectively.

Table 6. 2016 RSAM Average Conventional Multipliers

	Average Multipliers of All Sectors	**Average Multipliers of Service Sectors**	**Average Multipliers of Commodity Sectors**
Production Accounts	2/424	2/308	2/504
Factor Accounts	1/408	1/535	1/321
Institution Accounts	1/374	1/603	1/467

Source: Research findings.

Table 7. 2016 FSAM Average Conventional Multipliers

	Average Multipliers of All Sectors	**Average Multipliers of Service Sectors**	**Average Multipliers of Commodity Sectors**
Production Accounts	3/659	3/701	3/670
Factor Accounts	2/103	2/316	1/978
Institution Accounts	2/193	2/423	2/058

Source: Research findings.

c- when the financial sector is considered endogenous in Table 7, we observe that the average multipliers in services (3/701 unit) edge over to the corresponding average multipliers in commodity-producing sectors (3/670 unit) which on average suggests that the financial system of Iran favoring more resources to service than to non-service sectors. The findings are not only in consonance with the prevailing view in Iran but also provide an appropriate picture for both planners and policymakers in Iran.

d- in the sequence of accounts, producers pay for the factors of production. Their incomes are allocated to domestic institutions. Therefore, a unit increase in final demand, not only increases the production but also generates additional income for the factors of production as well as domestic institutional incomes. The results in Table 7 shows that compared to the commodity-producing sectors, the service sectors generate more additional incomes for both factors of production and domestic institutions. However, the average multipliers of the two accounts in FSAM are larger than the average multipliers in RSAM which indicate the importance of the linkage between the real side and the financial side of the economy.

The above results and analysis are based on the output multipliers which double-count intermediate inputs. This means that the sectors which have higher multipliers with more linkages with other sectors of the economy are not necessarily those which contribute most to GDP. GDP multipliers correct this double counting. They measure the total impact of an exogenous change in final demand by weighting the share of each industry by its value added-to-output ratio.

The average RSAM and FSAM GDP multipliers of all sectors, service sectors, and commodity-producing sectors have been estimated and the results are presented in Tables 8 and 9 respectively. From the Tables, the following observations can be discerned:

1- All of the figures in Table 9 are larger than the corresponding figure in Table 8. The differences between the two indicate the role of the growth performance of the financial system in the Iranian economy.

2- The average GDP multipliers in the service sectors are larger than the corresponding figures in the commodity-producing sectors which on average suggest that the financial system of Iran directs more resources to services than to non-service sectors.

Table 8. 2016 RSAM Average GDP Multipliers

	Average Multipliers of All Sectors	**Average GDP Multipliers of Service Sectors**	**Average GDP Multipliers of Commodity Sectors**
Production Accounts	1/299	1/648	1/059
Factor Accounts	0/801	1/116	0/584
Institutional Accounts	0/834	1/166	0/606

Source: Research findings.

Table 9. 2016 FSAM Average GDP Multipliers

	Average Multipliers of All Sectors	**Average GDP Multipliers of Service Sectors**	**Average GDP Multipliers of Commodity Sectors**
Production Accounts	2/000	2/617	1/576
Factor Accounts	1/195	1/661	0/875
Institutional Accounts	1/247	1/736	0/911

Source: Research findings.

The above results and analysis are aggregated and therefore, cannot reveal the functioning role of the financial system at the sectoral level. Tables 10 and 11 show the FSAM and RSAM conventional and their corresponding GDP multipliers for 27 sectors.

Table 10. 2016 RSAM and FSAM Sectoral Conventional Multiplier

	Activities	RSAM			FSAM		
		Production Multiplier	**Factors of product Multiplier**	**Institutions Multiplier**	**Production Multiplier**	**Factors of product Multiplier**	**Institutions Multiplier**
1	Agriculture and forestry	2/718	1/598	1/688	4/061	2/354	2/479
2	Fishing	2/562	1/556	1/631	3/900	2/308	2/418
3	Mining and quarrying	1/454	1/217	1/218	2/657	1/891	1/923
4	Man. of Food, Beverages, and Tobacco	3/042	1/465	1/542	4/286	2/165	2/275
5	Man. of textiles, wearing apparel and leather and related products	2/356	1/304	1/375	3/457	1/924	2/023
6	Man. of Wood and Wood products	2/698	1/371	1/436	3/880	2/036	2/132
7	Man. of coke, refined petroleum products, and chemical products	2/362	1/209	1/224	3/520	1/859	1/903
8	Man. of other non-metallic mineral products.	2/350	1/281	1/333	3/478	1/915	1/996
9	Man. of pharmaceuticals, medicinal chemicals, and botanical products.	2/549	1/209	1/249	3/639	1/821	1/889
10	Man. of other non-metallic mineral products	2/446	1/393	1/442	3/695	2/095	2/176
11	Man. of basic metals	2/632	1/252	1/286	3/780	1/896	1/960
12	Man. of fabricated metal products, except machinery and equipment	2/789	1/319	1/372	3/954	1/975	2/057
13	Man. of computer, electronic and optical products.	2/327	1/222	1/274	3/394	1/822	1/902
14	Man. of electrical equipment	2/610	1/197	1/245	3/663	1/789	1/864
15	Man. of machinery and equipment n.e.c. and other transport equipment	2/592	1/149	1/194	3/610	1/722	1/792
16	Man. of furniture and other manufacturing	2/566	1/394	1/467	3/751	2/061	2/164
17	Electricity, Gas, and Water	1/830	1/298	1/317	3/065	1/991	2/041
18	Construction	2/639	1/357	1/412	3/836	2/030	2/115
19	Wholesale and retail trade and repair of motor vehicles and motorcycles	2/359	1/648	1/731	3/769	2/441	2/560
20	Accommodation and food service activities	2/410	1/485	1/546	3/717	2/220	2/314
21	Transportation and storage and Information and communication	2/383	1/523	1/590	3/711	2/270	2/371
22	Financial and insurance activities	2/233	1/447	1/497	3/529	2/176	2/259
23	Real estate activities, Professional, scientific and technical activities	2/277	1/721	1/816	3/731	2/540	2/672
24	Public administration and defense; compulsory social security	2/298	1/583	1/661	3/652	2/345	2/457
25	Education	2/473	1/771	1/877	3/935	2/594	2/737
26	Human health and social work activities	2/163	1/531	1/600	3/490	2/278	2/380
27	Other service activities	2/316	1/518	1/585	3/641	2/263	2/363

Source: Research findings.

Table 11. 2016 RSAM and FSAM Sectoral GDP Multiplier

	Activities	RSAM			FSAM		
		Production Multiplier	Factors of product Multiplier	Institutions Multiplier	Production Multiplier	Factors of product Multiplier	Institutions Multiplier
1	Agriculture and forestry	1/491	0/877	0/926	2/227	1/291	1/359
2	Fishing	1/581	0/960	1/006	2/406	1/424	1/492
3	Mining and quarrying	1/350	1/129	1/131	2/466	1/755	1/785
4	Man. of Food, Beverages, and Tobacco	0/786	0/378	0/398	1/107	0/559	0/588
5	Man. of textiles, wearing apparel and leather and related products	1/116	0/618	0/651	1/637	0/911	0/958
6	Man. of Wood and Wood products	1/065	0/541	0/567	1/532	0/804	0/841
7	Man. of coke, refined petroleum products, and chemical products	0/573	0/293	0/297	0/854	0/451	0/462
8	Man. of other non-metallic mineral products.	1/118	0/609	0/634	1/654	0/911	0/949
9	Man. of pharmaceuticals, medicinal chemical, and botanical products	0/867	0/411	0/425	1/237	0/619	0/642
10	Man. of other non-metallic mineral products	1/200	0/683	0/707	1/812	1/027	1/067
11	Man. of basic metals	0/858	0/408	0/419	1/232	0/618	0/639
12	Man. of fabricated metal products, except machinery and equipment	1/001	0/473	0/492	1/419	0/708	0/738
13	Man. of computer, electronic and optical products.	1/019	0/535	0/558	1/486	0/798	0/833
14	Man. of electrical equipment	0/846	0/388	0/404	1/188	0/580	0/605
15	Man. of machinery and equipment n.e.c. and other transport equipment	0/841	0/373	0/387	1/172	0/559	0/582
16	Man. of furniture and other manufacturing	1/226	0/666	0/701	1/792	0/985	1/034
17	Electricity, Gas, and Water	1/417	1/005	1/019	2/373	1/541	1/580
18	Construction	1/083	0/557	0/579	1/574	0/833	0/868
19	Wholesale and retail trade and repair of motor vehicles and motorcycles	1/816	1/268	1/332	2/902	1/879	1/971
20	Accommodation and food service activities	1/545	0/952	0/991	2/383	1/423	1/484
21	Transportation and storage and Information and communication	1/575	1/006	1/051	2/453	1/500	1/567
22	Financial and insurance activities	1/456	0/943	0/976	2/300	1/418	1/472
23	Real estate activities, Professional, scientific and technical activities	2/097	1/586	1/673	3/437	2/340	2/461
24	Public administration and defense; compulsory social security	1/775	1/223	1/283	2/821	1/812	1/898
25	Education	2/066	1/480	1/568	3/287	2/168	2/287
26	Human health and social work activities	1/720	1/217	1/272	2/775	1/811	1/892
27	Other service activities	1/579	1/035	1/080	2/482	1/543	1/611

Source: Research findings.

Table 12. Sectoral Ranking of RSAM and FSAM Conventional, and GDP Multipliers

No.	Activities	Conventional Multiplier				GDP Multiplier			
		RSAM (1)	Rank (2)	FSAM (3)	Rank (4)	RSAM (5)	Rank (6)	FSAM (7)	Rank (8)
1	Agriculture and forestry	2/718	3	4/061	2	1/491	10	2/227	13
2	Fishing	2/562	10	3/900	5	1/581	6	2/406	9
3	Mining and quarrying	1/454	27	2/657	27	1/350	13	2/466	7
4	Man. of Food, Beverages, and Tobacco	3/042	1	4/286	1	0/786	26	1/107	26
5	Man. of textiles, wearing apparel and leather and related products	2/356	18	3/457	24	1/116	17	1/637	17
6	Man. of Wood and Wood products	2/698	4	3/880	6	1/065	19	1/532	19
7	Man. of coke, refined petroleum products, and chemical products	2/362	16	3/520	21	0/573	27	0/854	27
8	Man. of other non-metallic mineral products	2/350	19	3/478	23	1/118	16	1/654	16
9	Man. of pharmaceuticals, medicinal chemical, and botanical products	2/549	11	3/639	18	0/867	22	1/237	22
10	Man. of other non-metallic mineral products	2/446	13	3/695	14	1/200	15	1/812	14
11	Man. of basic metals	2/632	6	3/780	8	0/858	23	1/232	23
12	Man. of fabricated metal products, except machinery and equipment	2/789	2	3/954	3	1/001	21	1/419	21
13	Man. of computer, electronic and optical products.	2/327	20	3/394	25	1/019	20	1/486	20
14	Man. of electrical equipment	2/610	7	3/663	15	0/846	24	1/188	24
15	Man. of machinery and equipment n.e.c. and other transport equipment	2/592	8	3/610	19	0/841	25	1/172	25
16	Man. of furniture and other manufacturing	2/566	9	3/751	10	1/226	14	1/792	15
17	Electricity, Gas, and Water	1/830	26	3/065	26	1/417	12	2/373	11
18	Construction	2/639	5	3/836	7	1/083	18	1/574	18
19	Wholesale and retail trade and repair of motor vehicles and motorcycles	2/359	17	3/769	9	1/816	3	2/902	3
20	Accommodation and food service activities	2/410	14	3/717	12	1/545	9	2/383	10
21	Transportation and storage and Information and communication	2/383	15	3/711	13	1/575	8	2/453	8
22	Financial and insurance activities	2/233	24	3/529	20	1/456	11	2/300	12
23	Real estate activities, Professional, scientific and technical activities	2/277	23	3/731	11	2/097	1	3/437	1
24	Public administration and defense; compulsory social security	2/298	22	3/652	16	1/775	4	2/821	4
25	Education	2/473	12	3/935	4	2/066	2	3/287	2
26	Human health and social work activities	2/163	25	3/490	22	1/720	5	2/775	5
27	Other service activities	2/316	21	3/641	17	1/579	7	2/482	6

Source: Research findings.

To identify the direction of resource mobilization and also to assess the growing role of the financial system, the results of Tables 10 and 11 are organized in Table 12. Table 12 has eight columns. Columns 1 to 4 provide the conventional multipliers of RSAM and FSAM for 27 sectors that have been ranked in ascending order. Columns 5 to 8 show the corresponding RSAM and FSAM GDP multipliers. Looking at the figures, we can make the following observations:

First- the overall results show that the higher sectoral conventional multipliers, which indicate more linkages with the other sectors, do not necessarily contribute most to GDP. These findings confirm the observations made by Leung and Secrieu (2012). For instance, if we compare the top 10 sectors which have the highest RSAM and FSAM conventional multipliers with corresponding figures in GDP multipliers, we find that in both cases, commodity-producing sectors appear to have the highest conventional multipliers (Columns 3 and 4).

Second- in the case of RSAM conventional multipliers, all commodity-producing sectors (Col. 2) fall in the category of top 10 sectors whereas in the case of FSAM conventional multipliers, out of ten sectors, seven sectors are commodity-producing sectors and only three sectors fall in the category of services (Col. 4). Now if we take the differences between FSAM and RSAM conventional multipliers, the overall results suggest that the financial system of Iran mobilizes more resources to the commodity producing sectors than to services.

Third- RSAM and FSAM GDP multipliers provide us with a different picture. For instance, in the case of RSAM GDP multipliers (Col. 5), the results show that out of 10 top sectors, eight sectors are sub-services sectors that have the highest GDP multipliers among the 27 sectors. Only fishing and other agricultural activities with ranks of 6 and 10 appear in this category. As far as the rankings of FSAM GDP multipliers are concerned, results show that out of 10 sectors, the GDP multipliers of eight sectors are sub-services sectors and only mining and fishing sectors appear to be non-services (Col. 8)

Fourth- compared to RSAM and FSAM sectoral conventional multipliers, the sectoral RSAM and FSAM GDP multipliers show that three sub-service sectors contribute most to GDP: Real estate activities, education, wholesale and retail trade. Compared to conventional multipliers, GDP multipliers can potentially reveal three facts regarding the functioning of the financial system in the Iranian economy. First, they generally confirm the prevailing opinions in Iran that the financial sector channelizes more financial resources to services than to commodity-producing sectors. Second, they can reveal the growth performance of the financial sector. Third, the direction of resource mobilization is concentrated on three sub-services sectors like real estate activities, wholesale and retail estate activities trade, and education. Out of the three sub-service sectors, wholesale and retail trade appears to have the highest contribution to GDP which suggests the tendency of resource mobilization of the financial sector towards the distributive services.

6. Conclusion

In this paper, we tried to evaluate quantitatively the existing opinions that the financial sector of Iran provides more financial resources to service sectors than to commodity-producing sectors. Iranian researchers have grossly overlooked this issue. To fill this lacuna, we applied the multipliers approach. We observe that RSAM and FSAM conventional multipliers have limitations and therefore cannot reveal the role of growth performance as well as the direction of resources of the financial system for capacity creation in different sectors of the economy. The main reason is that the conventional multipliers not only double-count the intermediate inputs, but also cannot depict the sectors that are identified to have higher multipliers with more linkages to the other sectors of the economy, not necessarily those that contribute most to GDP. As an alternative, GDP multipliers are proposed. GDP multipliers not only correct the limitations of conventional multipliers but also can reveal the functioning of resource direction of the financial system for Iranian planners as well as policymakers. Considering the results of average and sectoral multipliers, the overall findings are as follows:

First- the average conventional and GDP multipliers in FSAM are larger than the corresponding figures in RSAM. The differences between them indicate the role of the financial sector in the economy.

Second- GDP multipliers are smaller than the conventional multipliers, for the obvious reason that GDP multipliers net out the double counting.

Third- in RSAM, the average conventional multipliers of commodity-producing sectors are larger than those of services, whereas FSAM provides a different picture.

Fourth- the results of RSAM and FSAM GDP multipliers show that average GDP multipliers in services are larger than the multipliers in commodity-producing sectors which indicates that as compared to commodity-producing sectors, services attract more resources. These findings vindicate the prevailing opinions in Iran.

The above analyses and observations are aggregated and therefore could not reveal the growth performance concerning resource mobilization of the financial sector at the sectoral level. For this purpose, conventional and GDP multipliers for 27 sectors are worked out and then ranked in ascending orders. Focusing first on the top highest RSAM and FSAM conventional multipliers, we observe that in the case of RSAM all of the 10 sectors fell in the category of commodity-producing sectors whereas in the case of FSAM 7 out of the 10 sectors appeared in commodity-producing sectors. These results showed the direction of resource mobilization of financial sectors towards commodity-producing sectors. RSAM and FSAM GDP multipliers provide us with a different picture. For instance, the results showed that in both cases, 8 out of 10 sectors are sub-service sectors that contribute most to GDP. Three out of eight sub-service sectors were wholesale and retail trade, real estate activities, and education with 54/7%, 38/9%, and 37/1% having the highest contributions to GDP.

In addition to that and comparing our results with the findings of Bazzazan and Seifi-Shahpar (2015), two further general observations can be presented which reveal the changing role of the functioning of the financial sector during the past two decades in

Iran. First, concerning RSAM and FSAM conventional multipliers, Bazzazan and Seifi-Shahpar's results show that the role of the financial sector in mobilizing resources to service and non-service sectors is negligible. The estimated average conventional multipliers in RSAM for both sectors are 2.445 and 2.725 whereas the corresponding figures in FSAM show a slight increase to 2.485 and 2.785. Considering the results in 2016, it is observed that the role of the financial sector in directing resources has drastically changed. For instance, in the case of RSAM average conventional multipliers, the estimated figures are 2.504 and 2.308 which do not show many differences from the corresponding results in 1999. However, when FSAM is considered the differences are significantly high to 3.607 and 3.701 respectively. Second, the results of 1999 show that financial sectors favor more non-services than service sectors whereas the opposite trend is observed in 2016 which confirms the prevailing views among Iranian researchers.

The above observations not only suggest the true functioning of the financial sector during the two past decades but also its prominent role of directing resources to services than to non-service sectors. GDP multipliers further reconfirm such observations. It seems that one of the main reasons is the misimplementation of the granting licenses to establish private banks that originated in the third five-year plan.

Footnotes

[1] The real sector of the economy which is often termed the real side of the economy includes the production accounts (goods and services), factor accounts (generation value added), and institutional accounts encompass the disposable income for final consumption, capital formation, and external accounts (UNSD, 2002).

[2] The term real social accounting matrix which explains the real side of the economy has been introduced by Li (2008) and subsequently used by Leung and Secrieru to distinguish the real multipliers from FSAM multipliers (Leung and Secrieru, 2012).

[3] The term loanable funds markets have a variety of different assets including currency, demand deposit, time deposit, government debt, domestic bounds, foreign bonds, equity, real capital, and working capital. Robinson has incorporated the loanable funds' markets to illustrate how they work in FSAM CGE modeling (Robinson, 1991).

[4] Based on the recommendation of the 1993 SNA, the Central Bank of Iran has compiled the satellite institutional Accounts for the Iranian economy during 1996-2016 (Central Bank of Iran, 2006; 2019)

[5] In contrast to the accounting multipliers that are estimated based on the average expenditure propensities, there is a fixed price multipliers approach that is calculated from marginal expenditure propensities. Compared to the former, the latter approach has two advantages; one is that this approach relaxes the assumption of the unit elasticity of households' behavior according to the observed income and expenditure elasticity of the different agents under the assumption that prices remain fixed (Pyatt and Round, 1979; Thorbecke, 1998; Defourney and Thorbecke, 1984).

[6] Mathematical derivation of inverting partitioned matrix is provided by Miller and Blair (2009), as seen in Appendix A.

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