



BANGKO SENTRAL NG PILIPINAS
BSP Working Paper Series

**Identifying Sectoral Vulnerabilities
and Strengths for the Philippines:
A Financial Social Accounting
Matrix Approach**

*Francisco G. Dakila, Jr.,
Veronica B. Bayangos and
Laura L. Ignacio*

Series No. 2013-01

July 2013

Center for Monetary and Financial Policy
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Extended Abstract

The recent global financial crisis has highlighted the greater integration of markets—between financial and real, and within and across national boundaries—and the part it played in propagating the impact of financial shocks. Understanding the nature and quantifying the extent of the integration of economic activities are crucial to clarifying our comprehension of the transmission mechanism of such shocks to the various sectors of the economy. In particular, it can be argued that models that take a richer view of the nature and extent of interrelationships and interdependencies among the various sectors of the economy can contribute significantly to the policy debate. Using the first financial social accounting matrix (FSAM) constructed for the Philippine economy, this paper introduces an alternative approach to identifying sectoral vulnerabilities and strengths for the economy. The paper presents an expanded multiplier analysis that incorporates three stages of interlinkages (direct, indirect and induced), backward and forward linkage indicators, and value added multipliers. The theoretical framework we introduce allows us, for any given changes in institutional and industrial structure as well as economic behaviors, to estimate multipliers quantifying both the sectoral and overall impact of such changes. We extend the multiplier analysis to estimate the impact of the global financial crisis on the productive sectors.

Findings indicate that the trade, transportation, storage and communication sector has significant linkages with other productive sectors of the economy, thus, suggesting that infrastructure is a crucial ingredient to sustainable growth. On the other hand, the agriculture and manufacturing sectors have relatively weak linkages with other productive sectors of the Philippine economy. Meanwhile, a deeper analysis of the interlinkages between household consumption and the productive sectors of the economy finds the role of consumption in broadening and amplifying the transmission of shocks across sectors of the economy to be significant.

The results have important implications for policy, clarifying, for example, our view on the capacity of Philippine industry, manufacturing in particular, to serve as the engine of economic growth, as well as on what factors underpin the observed resilience of the Philippine economy to external shocks. The findings also show the widespread linkages of the financial intermediation sector with other industries, thus underscoring the importance of efforts to safeguard financial stability.

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Identifying Sectoral Vulnerabilities and Strengths for the Philippines: A Financial Social Accounting Matrix Approach

*Francisco G. Dakila, Jr., Veronica B. Bayangos and Laura L. Ignacio*¹

1. Introduction

The recent global financial crisis has highlighted the role played by increased complexity of financial instruments, together with greater integration of markets, both financial and real, within and across national boundaries, in propagating the impact of financial shocks. Understanding the nature and quantifying the extent of the integration of economic activities are crucial to clarifying our comprehension of the transmission mechanism of such shocks to the various sectors of the economy. The issues create higher demands on the monetary authorities' toolkit of economic models. In particular, it can be argued that models that take a richer view of the nature and extent of interrelationships and interdependencies among the various sectors of the economy can contribute significantly to the policy debate.

Many papers have already been written about the interlinkages of various production sectors on the Philippine economy. The contribution of this paper is a comprehensive analysis of the structural roles and relative importance of not only industries but also of institutional economic decisionmakers, such as corporations, government and households, with respect to their contribution to gross domestic product (GDP), gross capital formation, final consumption and their financial transactions. Using the 2009 Financial Social Accounting Matrix for the Philippines (PFSAM2009), the paper performs an expanded multiplier analysis. It incorporates the multiplier analysis that distinguishes among three stages of interlinkages (direct, indirect and induced), backward and forward linkage indicators, and value added multipliers. The framework allows us, for any given changes in institutional and industrial structure as well as economic behaviors, to estimate multipliers quantifying both the sectoral and overall impacts of such changes.

A multiplier analysis decomposes the direct, indirect and induced impacts of an exogenous demand shock on the economy.² The direct impact corresponds to the expansion of production of other sectors that need intermediate inputs of the manufacturing process. For instance, agricultural expansion needs inputs of other activities. The indirect impact effects, meanwhile, occur because the original expansion generates further expansion of inputs to agricultural production and to the other industrial sectors as

¹ Francisco G. Dakila, Jr. (Director), Veronica B. Bayangos (Deputy Director) and Laura L. Ignacio (Bank Officer V) are from the Center for Monetary and Financial Policy (CMFP) of the Bangko Sentral ng Pilipinas (BSP). We are grateful to Dr. Viet Vu and Mr. Francisco Secretario who served as BSP's consultants in the construction of the 2009 Philippine Financial Social Accounting Matrix and to the members of the BSP Working Paper Review Committee for their comments and suggestions. This working paper should not be reported as representing the views of the BSP. The views expressed in this Working Paper are those of the authors and do not necessarily represent those of the BSP or BSP policy. BSP Working Papers describe research in progress by the authors and are published to elicit comments and to further debate.

² See Deb Pal, et al. (2012).

well. The induced impact arises because the production of each activity generates a feedback process from the incomes of the production factors to the expenditure of the institutional sector and to each activity's own productive process (the circular flow of income). Thus, corresponding to the foregoing concepts, we can derive three stages of multipliers (M1, M2 and M3), which we describe in detail in Section 4. The same assessment is then performed using value added multipliers as the measure of intersectoral linkages. In addition, backward and forward linkages are examined to look at sectoral impacts of said exogenous changes.

Given the available data in 2009, this paper first lays out the nature and characteristics of the PFSAM2009. The PFSAM2009 incorporates (a) supply and use tables (SUT) with twelve industries and commodities, and (b) an institutional structure with nine institutional sectors which are then aggregated into five major sectors, namely, the rest of the world, financial corporations, general government, household and non-profit institutions serving households. The paper then traces the estimated multipliers of a demand shock in each major sector of the economy. We distinguish three stages of multiplier analysis to examine the nature and extent of interlinkages between productive sectors and the rest of the economy.³ We then apply the model to an assessment of the impact of the 2008 to 2009 global financial crisis on the Philippine economy. This use of an FSAM to analyze interlinkages is a first for the Philippines.

Our main findings indicate that the trade, transportation, storage and communication sector has significant linkages with other productive sectors of the economy, thus, suggesting that infrastructure is a crucial ingredient to sustainable growth. On the other hand, the agriculture and manufacturing sectors have relatively weak linkages with other productive sectors of the Philippine economy.

When we expand the model to incorporate the role of the household sector, our results highlight the important role played by the household sector in broadening and amplifying the impact of shocks across the economy, even considering the impact within the production sectors themselves. This amplification is larger for those sectors that have a large compensation component in value added, as opposed to those with large operating surpluses, since compensation provides the link between production and consumption demand. In comparison, production interactions appear to play a more limited role. The results have important implications for policy, clarifying, for example, our view on the capacity of Philippine industry, manufacturing in particular, to serve as the engine of economic growth, as well as on what factors underpin the observed resilience of the Philippine economy to external shocks. The findings also show that the financial intermediation sector's linkages with other industries are relatively widespread and that the sector yields a relatively higher profits multiplier, thus underscoring the importance of the BSP's efforts to safeguard financial stability. Perhaps surprisingly, the interlinkages of the financial sector with the rest of the economy go beyond what could be gleaned from looking at its role in providing funding. Later on, we simulate the impact of the 2008 to 2009 global financial crisis on productive sectors and household income. Our results show that the effect

³ See Pyatt and Round (1979) and Civardi, et al. (2010).

appears to be relatively significant, but that production would have slowed down even without the global financial crisis.

The rest of the paper is organized as follows: section 2 traces the impact of financial intermediation on national income through a survey of empirical literature. Section 3 describes the nature, structure and data sources of the PFSAM2009. Section 4 identifies the intersectoral linkages and propagation channels of shocks through a multiplier analysis, while Section 5 simulates the impact of the global financial crisis on sectoral output. Section 6 derives lessons for development, monetary and financial policy. Section 7 concludes.

2. Survey of Empirical Literature: Tracing the Impact of Financial Intermediation on National Income

A SAM represents flows of all economic transactions that take place within an economy, either regional or national. It is a matrix representation of the System of National Accounts (SNA), and is an elaboration of the linkages between the traditional input-output tables and the institutional accounts. Because it provides a comprehensive description of the links and interrelationships among the sectors of the economy, a SAM can serve as an important basis for policy formulation. Official SAMs for the Philippine economy were compiled only for the years 1974, 1979 and 1990 because their compilation cannot be met by the regular manpower and financial resources of the National Statistical Coordination Board (NSCB).⁴ The accounts emphasized the links between the main types of institutional agents of the economy for the processes of production, income formation and capital accumulation. These principal institutional agents consist of households and unincorporated businesses, private corporations, public enterprises, the government, public and private financial institutions, and foreign agents (rest-of-the-world).⁵

On the other hand, a financial SAM (FSAM) incorporates the conventional SNA integrated institutional sector accounts (T-accounts) into a comprehensive matrix that integrates separate modules of transaction matrices, each of which shows “from whom-to-whom” transactions for every type of income and financial instrument in all accounts, including production accounts, primary and secondary income accounts, disposable income accounts, capital accounts and financial accounts. It is the inclusion of capital and financial that transforms a social accounting matrix into a financial social accounting matrix.

A financial social accounting matrix is a representation of the transactions and transfers between economic agents and institutions, or the incomes and expenditures flows accounts through an entire economic system. The main objective of FSAM is to connect the multi-industrial relationships in production to the multi-sectoral distribution of income, consumption, investment in fixed assets, non-produced assets and financial instruments in the economy as well as its interaction with the rest of the world. FSAM represents an

⁴ National Statistical Coordination Board (NSCB) Resolution No. 5, series of 1996. The said resolution designated the construction every five years. The compilation of the 1990 SAM was undertaken under the Philippine Institute of Development Studies (PIDS) Technical Resource Project (TRP) 00-95/02.

⁵ Compared to what comprised SAMs for most developing countries, social accounts for the Philippines had less detail in the breakdown of production activities. Because of the aggregate nature of these social accounts, they had been referred to as “Macroeconomic Social Accounting Framework. See Vos (1991), “A Macroeconomic Social Accounting Framework for the Philippines,” *Journal of Philippine Development*, No. 32, Vol. XVIII.

integration of data from a social accounting matrix (SAM), which depicts real sector data, with the Flow of Funds (FoF), which records more detailed financial activities in an economy.

FSAMs have been developed for some economies, such as Indonesia, the Euro area, Turkey, China, Pakistan, and Cameroon, for different purposes. We have identified three central banks, namely, Bank Indonesia, the European Central Bank and the Bank of Canada, which compiled FSAMs for their respective economies. The 2009 Philippine FSAM is the first attempt to construct an FSAM for the Philippine economy.

Indonesia's FSAM is a collaborative effort between Bank Indonesia and the BPS-Statistics Indonesia. By integrating financial sector performance into its economy's SAM, the FSAM helped trace financial transmission channels that may eventually affect monetary policy formulation.⁶

The Euro area's FSAM is known as the Euro Area Accounting Matrix (EAAM). The EAAM provides a framework describing the production structure, inter-institutions flows and financial flows within the Euro region.⁷ The first version of the annual EAAM was completed using 1999 data. The EAAM can be utilized to analyze economic structure, including the development of financial transactions. In addition, the EAAM helps provide a better understanding of the transmission mechanism of monetary policy in the Euro region.

The Bank of Canada and Statistics Canada built a detailed SAM for Canada for 2004 by adding income flows and financial flows to input-output data and used the SAM to assess real-financial linkages and financial flows to input-output data.⁸

Aslan (2005) developed an FSAM using 1996 data for Turkey. The FSAM was compiled using the input-output table, household income and consumer survey, income distribution survey, banking sector balance sheets, and the balance sheet of Turkey's central bank.⁹

Amani (2002) used FSAM to develop an Integrated Macroeconomic Model for Poverty Analysis (IMMPA) for Cameroon. The IMMPA is part of an integrated-quantitative model of macroeconomic analysis to help investigate the impact of external shocks and government policy on income distribution, job creation and poverty.¹⁰

Waheed and Mitsuo (2006) used 1999/2000 data to construct an FSAM for Pakistan. Their objective was to produce a core database for an FCGE model to analyze the behavior of public debt in their country.¹¹

⁶ BI-BPS Statistics Indonesia, 2009

⁷ See Jellema et al. (2004), "Developing a Euro Area Accounting Matrix: Issues and Applications". ECB Working Paper Series No. 356/May 2004.

⁸ See Leung, D. and O. Secrieru (2011), "Real-Financial Linkages in the Canadian Economy: An Input-Output Approach," Bank of Canada Working Paper 2011-14. May, also subsequently published in See Leung, D. and O. Secrieru (2012), "Real-Financial Linkages in the Canadian Economy: An Input-Output Approach," *Economic Systems Research*, 2012, Volume 24(2), June, pp.195-223.

⁹ See Aslan, M. (2005), "Turkish Financial Social Accounting Matrix", Social Science Journal of Anatolia University.

¹⁰ See Arnault Amani, C. (2002), "Designing the Financial Social Accounting Matrix Underlying the Integrated Macroeconomic Model for Poverty Analysis: The Cameroon Country-Case". University of Yaounde II, Cameroon and CREFA, Universite Laval, Quebec, Canada.

¹¹ See Waheed, A. and M. Ezaki (2006), "A Financial Social Accounting Matrix for Pakistan". Discussion Paper No. 141, Graduate School of International Development, Nagoya University, Japan.

Li (2008) conducted a broad review of changes in China's financial sector which resulted in the establishment of a consistent accounting system for the Chinese economy. The study used multiplier analysis and found that the links between real economy and financial sector contributed to the country's economic growth.¹²

Deb Pal et al. (2012) constructed a SAM for India to analyze interrelationships between the production structure and distribution of income of household groups. Their SAM disaggregated the energy sector for a more detailed analysis.¹³

Using a SAM for Vietnam, Civardi et al. (2010)¹⁴ extended Pyatt and Round's (2006) multiplier decomposition approach by dividing the impact of changes in exogenous variables into four different effects: direct-direct effect (D-D); direct-indirect effect (D-I); indirect-direct effect (I-D) and indirect-indirect effect (I-I).

Cardenete et al. (2008)¹⁵ introduced two innovations in their paper: (1) combining the backward and forward linkage indicators with the hypothetical extraction models; and (2) using these indicators on a SAM instead of an input-output matrix. Hypothetical extraction models determine the importance of a sector by evaluating an economy's output when the specific sector is "eliminated." Backward linkages show the use of inputs of production sectors and therefore, provide an indication of the extent of the "backward" impact of an increase in one sector's production. On the other hand, forward linkages refer to the usage of one sector's product in other production sectors. Together, backward and forward linkages give an indication of the importance of one sector in the economy. Backward and forward linkages are usually estimated using input-output matrices.

More recently, multisectoral approaches have proven to be a useful framework for analyzing contagion and propagation of financial crises. Tsujimura and Tsujimura (2011) followed Copeland (1947; 1949; and 1952) and Klein (1977) in emphasizing the interrelated balance sheets of economic entities, and applied an input-output framework to tracing the development of the subprime mortgage crisis in the US economy.¹⁶ Meanwhile, Ogawa et al. (2012) extended the input-output analysis to investigate the propagation mechanism of balance sheet deterioration in financial institutions and firms during the late 1990s and early 2000s (or the lost decade) in Japan by using a unique input-output table augmented by firm size dimension and linked to the balance sheet conditions of financial institutions and firms.

In this paper, we introduce a multisectoral approach to identifying vulnerabilities and strengths for the Philippine economy. The contribution of this paper is a comprehensive analysis of the structural roles and relative importance of not only industries but also institutional economic decision-makers, such as corporations, government and households

¹² See Li, J. (2008), "The Financial Social Accounting Matrix for China, 2002, and Its Application to a Multiplier Analysis". Graduate School of International Development, Nagoya University, Japan.

¹³ See Deb Pal et al. (2012) "Social accounting matrix for India," *Economic Systems Research*, 2012, Volume 24(1), March, pp.77-99.

¹⁴ Civardi, M., R.V. Pansini and R.T. Lenti (2010) "Extensions to the Multiplier Decomposition Approach in a SAM Framework: an application to Vietnam," *Economic Systems Research*, 2010, Volume 22(2), June, pp 111-128.

¹⁵ M. A. Cardenete, G. J. Llanes, M. C. Lima and C.R. Morilla (2008). "Detection of key sectors by using social accounting matrices: an alternative approach," *Journal of Applied Input-Output Analysis*, Volumes 13 and 14.

¹⁶ Tsujimura, M. and K. Tsujimura (2011) "Balance sheet economics of the subprime mortgage crisis," *Economic Systems Research*, 2011, Volume 23(1), March, pp 1-25.

with respect to their contribution to GDP, gross capital formation, final consumption and their financial transactions based on the 2009 Philippine PFSAM. We distinguish three stages of multiplier analysis to capture the interlinkages of the productive sectors and extend the multiplier analysis to estimate the effect of the global financial crisis on the productive sectors.

3. The 2009 Philippine FSAM: Nature, Structure and Data Sources

While FSAMs had been developed in some countries/regions as discussed above, the PFSAM2009 project undertaken by the BSP in 2012, with Dr. Viet Vu as primary consultant and Mr. Francisco Secretario as local consultant, is the first attempt to construct an FSAM for the Philippine economy.¹⁷ The PFSAM2009 is a comprehensive conceptual and accounting framework constructed on the basis of the United Nations' 1993 System of National Accounts to serve as a macroeconomic database suitable for analyzing and evaluating the performance of the Philippine economy, and was developed primarily as a database for a financial computable general equilibrium (CGE) model that will be developed by the BSP. In the construction of the PFSAM, the year 2009 was chosen as that year had the latest available Flow of Funds (FoF) Report at the beginning of the project.¹⁸

This section highlights the relevance of the contributions of PFSAM2009 to the Philippine Statistical System. The PFSAM2009 includes two innovative features as compared to the SNA: (1) one-to-one mappings from conventional T-accounts into a matrix form, and (2) the use of "from-whom-to-whom" transaction matrix for every kind of income and financial instrument in order to facilitate the integration in the system that guarantees consistency at the basic data level.¹⁹

The construction of the PFSAM2009 entailed the development of four major "building blocks":

- a. supply and use tables – these reflect the flow of goods and services to industries and institutional sectors;
- b. cross-classification matrix – with the help of surveys of establishments, data of industries are allocated into institutional sectors;
- c. SNA integrated institutional sector accounts – T-account representations of each sector's resources and uses of funds; and
- d. FSAM – matrix that is a representation of the SNA T-account showing expenditures of the column sectors and receipts of row sectors.²⁰

The PFSAM2009 includes twelve industries and commodities, nine institutional sectors (aggregated into five major sectors), twelve types of income flows and eight kinds of financial instruments (see Technical Appendix A for the classifications). Technical Appendix A (Table 2) also shows the rows and columns of the PFSAM2009.

¹⁷ Bank Indonesia is the only central bank in the region which is already compiling an FSAM.

¹⁸ The same set of worksheets can be used to produce similar database for subsequent years.

¹⁹ A transaction matrix shows the allocation of an income from payers to receivers. A consistency check requires that the sum of receivables is equal to the sum of the payables. It can be noted that for the PFSAM 2009, we have transaction matrices only for current transfers, property income and loans; and only the "from whom-to-whom" for loans was shown in the PFSAM2009.

²⁰ Details of the PFSAM construction are presented in Technical Appendix B.

The PFSAM2009 differentiates between activities or industries and commodities or products; thus, an industry/activity may produce more than one kind of product/commodity and a product may be produced by more than one industry/activity.

Table 1 below presents a simplified framework of the PFSAM2009. The PFSAM2009 has the following blocks: production accounts, primary distribution of income account, secondary distribution of income account, uses of disposable income account, capital accounts and financial accounts. Broadly, the columns represent expenditures and the rows represent receipts. Thus, each cell is a flow of funds from a column account to a row account. For example, consumption is a flow of fund from the institutions (column 4), such as households, to the products or commodities (row 1).

The institutions in the framework include financial and non-financial corporations, government, households and the foreign sector (rest of the world or ROW). Thus, “exports” is included in the consumption demand of institutions in column 4 and “imports” is a flow from products/commodities (column 1) to ROW under institutions (row 4). Compensation of employees and operating surplus are flows of funds from industries (column 2) to factors of production (row 3)—these are net value-added. Depreciation is a flow of fund from industries (column 2) to capital accounts (row 5). Net value-added with depreciation is the gross value-added.

Table 1: Basic Representation of PFSAM2009

Products (n)	Products (n)	Industries (n)	Factors of production (g)	Institutional sectors (k)		Capital accounts (k)	Financial accounts (k)	Total
		Intermediate consumption Use matrix transformed to coefficient matrix (n x n)		d (n x 1) Total demand vector	d ^e (n x 1) Total endogenous demand vector (includes HH consumption that may be transformed to n x k marginal propensities matrix C)	d ^x (n x 1) Total exogenous demand vector (such as exports)		Total demand $\sum d^x$ (n x 1)
Industries (n)	Output for domestic market Supply matrix transformed to coefficient matrix							Domestic demand for domestic output xi (n x 1)
Factors of production (g)		Net value added Primary income by industries matrix transformed to coefficient matrix		Factor income from ROW				Net value added yB (g x 1)
Institutional sectors (k)	Imports		Income of institutions Alloc' (k x g) Income allocation matrix transformed to coefficient matrix	Transfers/transactions among sectors				Income of institutions yi (k x 1)
Capital accounts (k)		Depreciation		Savings of institutions		Capital transfers among institutions	Financial liabilities	Capital availability
Financial accounts (k)						Financial assets		Total financial assets
Total	Total supply to domestic market	Domestic output	Net value added	Total expenditures of institutions		Capital expenditures	Total financial liabilities	

4. Identifying Intersectoral Linkages and Propagation Channels of Shocks through Multiplier Analysis

The advantage of using an input-output framework to analyze linkages between the real and financial sectors is that it yields a simple model based on relatively few assumptions, from which measures of the strength of such linkages can be derived, in the form of multipliers. Compared to dynamic stochastic general equilibrium (DSGE) models of the financial sector, an input-output framework imposes much less structure on the data. On the other hand, the main limitation of this framework is that the analysis is static and is based on restrictive assumptions on the production process, i.e., fixed coefficients.²¹ Thus, this model can be subject to Lucas' critique, that as shocks shift prices, agents cannot simply substitute commodities in their consumption baskets. However, we argue that this framework is appropriate when looking at short-term impact of policies and shocks, as this paper does.

As noted in Civardi, et al. (2010), the approach entails assuming that the coefficients of income distribution and expenditures are constant, which enables us to calibrate a Leontief linear model based on the PFSAM2009.²² The model can then be solved and used to quantify the response of each of the model's endogenous variables to changes in the model's exogenous variables. By considering unit changes in the exogenous variables, we derive the matrix of multipliers for the model.

In this study, we derived the impacts of the multipliers for some broad production sectors, namely, agriculture and fishing, forestry, mining and quarrying, manufacturing, construction, electricity, gas and water, trade, transportation and communication services, financial intermediation services, real estate, business services and ownership of dwellings, public administration and defense, compulsory social security, community, social and personal services.

It should be noted that different multipliers can be derived, depending on which of the model's variables are considered as exogenous. In this, we follow the approach of Pyatt and Round (1979) and Civardi, et al. (2010) in distinguishing between three kinds of multipliers, depending on the extent to which the impact of a change in a policy or other exogenous variable is allowed to work its way through the economy. In what follows, we derive the multipliers corresponding to the concepts introduced in the foregoing papers within the framework of the PFSAM2009.

The following notations are used to explain the derivation of the three kinds of multipliers:

n	Number of industries (products)
g	Number of primary income categories
k	Number of institutions
d	$n \times 1$ vector of total final demand
dⁿ	$n \times 1$ vector of endogenous final demand
d^x	$n \times 1$ vector of exogenous final demand

²¹ This is generally known as a Leontief technology. See Leung and Secrieru (2011).

²² Civardi, et al. (2010), p.112

Ause	$n \times n$ transformation matrix from product to industry
Asupply	$n \times n$ transformation matrix from industry to product
xi	$n \times 1$ output vector by industries
xp	$n \times 1$ output vector by products
yg	$g \times 1$ vector of primary incomes by category
yi	$k \times 1$ vector of incomes by institution
C	$n \times k$ matrix of propensities to consume by institutions
Alloc	$g \times k$ transformation matrix from income category to institutions income
Ag	$g \times n$ distribution matrix of primary income by industries

For a clearer perspective, the vectors and matrices are presented in the basic FSAM in Table 1 to show how they relate to the various accounts. Note that we have not introduced matrix representations for all of the components of the FSAM, but only for those we use subsequently in the specification of the input-output model.

4.1 Stage 1 Multiplier: M1

The first round multiplier matrix **M1** has been referred to variously as the *direct impact* or the *within group or transfer multiplier*, and described by Civardi, et al. (2010) as capturing the “transfer effects, i.e., the effects within each endogenous account that have been generated by direct transfers and that are independent from the closed loop process of income through the system, i.e., the multiplier captures the impact on accounts belonging to the same block due only to transfer effects within the same block.”²³

The PFSAM2009 differentiated between industries (or activities) and products (or commodities) and so there are distinct variables for output total by products, **xp**, and an output total by industries, **xi**. This generalization allows for multiple products per industry. The identity in equation (1) shows the equilibrium condition between supply, **xp**, and total demand, which is comprised of intermediate demand of goods by firms, **Ause xi**, and final demand by institutions, **d**. Equation (2) transforms output by product, **xp**, to output by industry, **xi**. Linear relationships between industries and products are assumed.

$$\mathbf{xp} = \mathbf{Ause} \mathbf{xi} + \mathbf{d} \quad (1)$$

$$\mathbf{xi} = \mathbf{Asupply} \mathbf{xp} \quad (2)$$

The immediate impacts of an exogenous shock (a positive shock in this discussion) in the final demand for a particular industry are on intermediate consumption by industry given by equation (3) as,

$$\Delta \mathbf{xi} = \mathbf{Asupply} \Delta \mathbf{d}, \quad (3)$$

which leads to a first round induced increase in intermediate output given in equation (4) as,

$$\Delta \mathbf{xp} = \mathbf{Ause} \Delta \mathbf{xi} = \mathbf{Ause} \mathbf{Asupply} \Delta \mathbf{d} \text{ (from equation (3))} \quad (4)$$

²³ Civardi, et al (2010), p.114

Combining equations (3) and (4) allows us to derive the first-round change in industry output as:

$$\Delta xi = A_{supply} \Delta xp = A_{supply} A_{use} A_{supply} \Delta d = A_{supply}^2 A_{use} \Delta d \quad (5)$$

Thus, the **stage 1 multiplier** is

$$M1 = A_{supply}^2 A_{use} \quad (6)$$

4.2 Stage 2 Multiplier: M2

The second stage multiplier matrix **M2**, is also often referred to in the literature as the *open loop multiplier*²⁴ or the *input-output multiplier*.²⁵ Civardi, et al. (2010) note that the second-stage multiplier “explicitly recognizes the interconnected character of the economic system, and captures how the effects of an exogenous injection into an account of one block (for example, into one production activity) are transmitted into the endogenous accounts of another block (for example, households) due to the circulation of income flows.”²⁶

In our model, the greater intermediate demands from the first round impacts induce further increases in the production levels of all sectors. Thus,

$$xi = A_{supply} xp = A_{supply} (A_{use} xi + d) \text{ (from equation (1))} \quad (7)$$

$$= (I - A_{supply} A_{use})^{-1} A_{supply} d \quad (8)$$

$$\Delta xi = (I - A_{supply} A_{use})^{-1} A_{supply} \Delta d \quad (9)$$

Thus the **stage 2 or open loop multiplier** is

$$M2 = (I - A_{supply} A_{use})^{-1} A_{supply} \quad (10)$$

Figure 1 illustrates the foregoing multiplier relationships in an economy with just three major production sectors: agriculture, manufacturing, and transportation, storage and communication (representing the services sector). Consider for example an increase in the final demand for agriculture. This brings about an increase in agricultural production, but for this to happen, there must be added inputs to agricultural production from the other sectors of the economy, as well as possibly from agriculture itself. The resulting additional increase in the production of other sectors, represented by the yellow arrows in the figure, corresponds to the concept of the direct impact of the increase in agricultural production, as discussed above. The matrix of such additional increases constitutes the first round or **M1** multiplier.

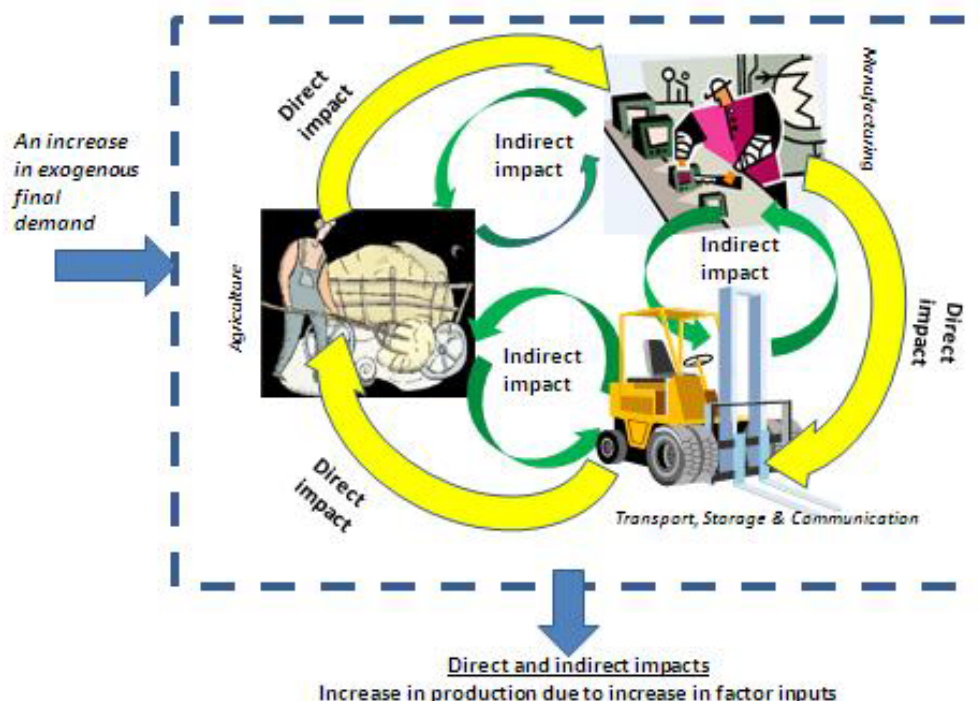
²⁴ See Civardi, et al (2010), p.115 and Miller and Blair (2009), p. 286.

²⁵ See Leung and Secrieru (2012), p.202

²⁶ See Civardi, et al. (2010), p.115

The process of economic expansion, however, does not stop here, as the aforementioned first round expansions in the three sectors of the economy necessitate further inputs from the various industries. There are, therefore, subsequent rounds of expansion of production brought on by the initial increase in final demand. These ripple effects of the initial stimulus are represented by the green arrows in Figure 1. The sum of the first round and subsequent round impacts, all due to interrelationships within the production sector, constitute the **M2** multiplier.

Figure 1. Impacts of an Exogenous Change in Final Demand: Open Loop Model



Source: Authors' representation

4.3 Stage 3 multiplier: M3

The stage 3 multiplier **M3** accounts for the circular structure of the economic system²⁷ and represents the “consequences of a change in **x** traveling around the entire system to reinforce the initial injection.”²⁸ It has also been referred to as the *closed loop multiplier*²⁹ or the *real SAM multiplier*³⁰. We account for the closed loop multiplier in our current study by expanding our model so as to endogenize GDP, household direct taxes, household gross disposable income, and household consumption (Figure 2). This then completes the feedback loop.

In this respect, we note that the increase in production induced by the earlier feedback processes would require more factors of production—labor and capital—and thus result in increased factor incomes. We introduce a matrix **Ag** that relates production to the

²⁷ Ibid., p.115

²⁸ Pyatt and Round (2006), p.239 as quoted in Civardi, et al. (2010).

²⁹ Miller and Blair (2009), p.286

³⁰ Leung and Secieru (2012), p.203

various primary incomes represented by the vector \mathbf{y}_g , which is transformed by matrix \mathbf{Alloc} into income by institutions \mathbf{y}_i .

$$\mathbf{y}_g = \mathbf{A}_g \mathbf{x}_i \quad (11)$$

$$\mathbf{y}_i = \mathbf{Alloc}' \mathbf{y}_g \quad (12)$$

The model differentiates between endogenous and exogenous demands (equation (11)). The increase in income from the higher production would induce an increase in consumption, which is the model's endogenous demand (equation (12)).

$$\mathbf{d} = \mathbf{d}^n (\mathbf{pr}) + \mathbf{d}^x (\mathbf{pr}) \quad (13)$$

$$\mathbf{d}^n = \mathbf{C} \mathbf{y}_i \quad (14)$$

Thus,

$$\mathbf{x}_i = \mathbf{A}_{supply} (\mathbf{A}_{use} \mathbf{x}_i + \mathbf{d}^n + \mathbf{d}^x) \quad (15)$$

$$\mathbf{x}_i = \mathbf{A}_{supply} (\mathbf{A}_{use} \mathbf{x}_i + \mathbf{C} \mathbf{Alloc}' \mathbf{A}_g \mathbf{x}_i + \mathbf{d}^x) \quad (\text{from equations (11)-(14)}) \quad (16)$$

$$\mathbf{x}_i = (\mathbf{A}_{supply} \mathbf{A}_{use} + \mathbf{A}_{supply} \mathbf{C} \mathbf{Alloc}' \mathbf{A}_g) \mathbf{x}_i + \mathbf{A}_{supply} \mathbf{d}^x \quad (17)$$

$$\mathbf{x}_i = (\mathbf{I} - \mathbf{A}_{supply} \mathbf{A}_{use} - \mathbf{A}_{supply} \mathbf{C} \mathbf{Alloc}' \mathbf{A}_g)^{-1} \mathbf{A}_{supply} \mathbf{d}^x \quad (18)$$

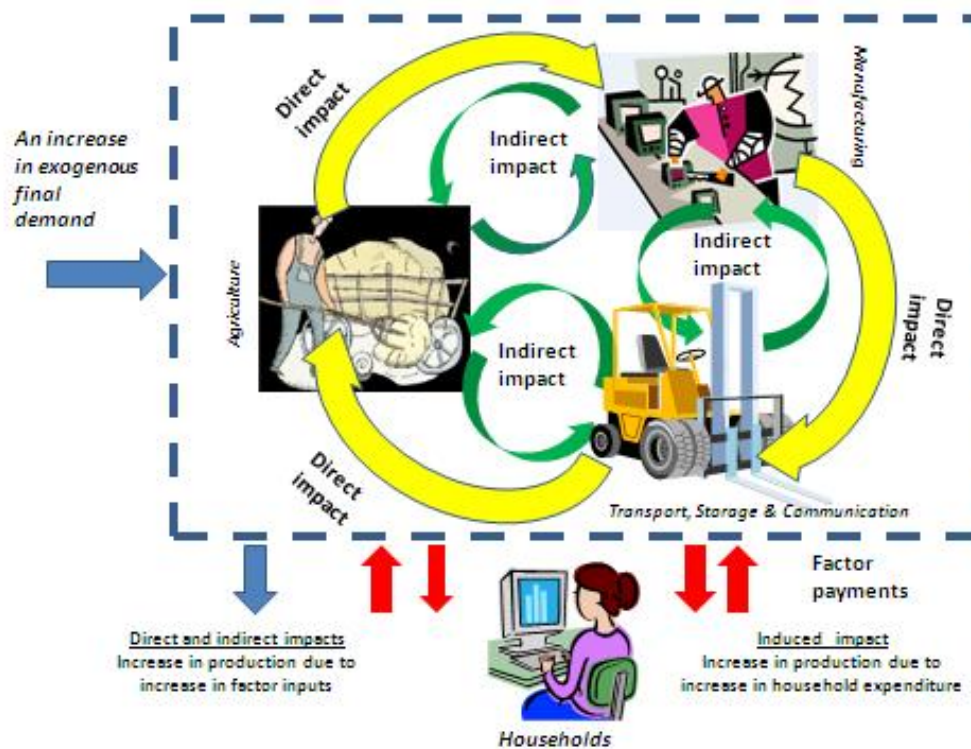
$$\Delta \mathbf{x}_i = (\mathbf{I} - \mathbf{A}_{supply} \mathbf{A}_{use} - \mathbf{A}_{supply} \mathbf{C} \mathbf{Alloc}' \mathbf{A}_g)^{-1} \mathbf{A}_{supply} \Delta \mathbf{d}^x \quad (19)$$

In this case, the change in output by industry is shown as an explicit outcome of a change in exogenous demand, such as exports. However, shocks are assumed to arise from exogenous variables. The closed loop multiplier is therefore:

$$\mathbf{M3} = (\mathbf{I} - \mathbf{A}_{supply} \mathbf{A}_{use} - \mathbf{A}_{supply} \mathbf{C} \mathbf{Alloc}' \mathbf{A}_g)^{-1} \mathbf{A}_{supply} \quad (20)$$

Figure 2 illustrates the additional linkages (relative to the M1 and M2 multipliers) that are taken into account in the closed loop multiplier concept.

Figure 2. Impacts of an Exogenous Change in Final Demand: Closed Loop Model

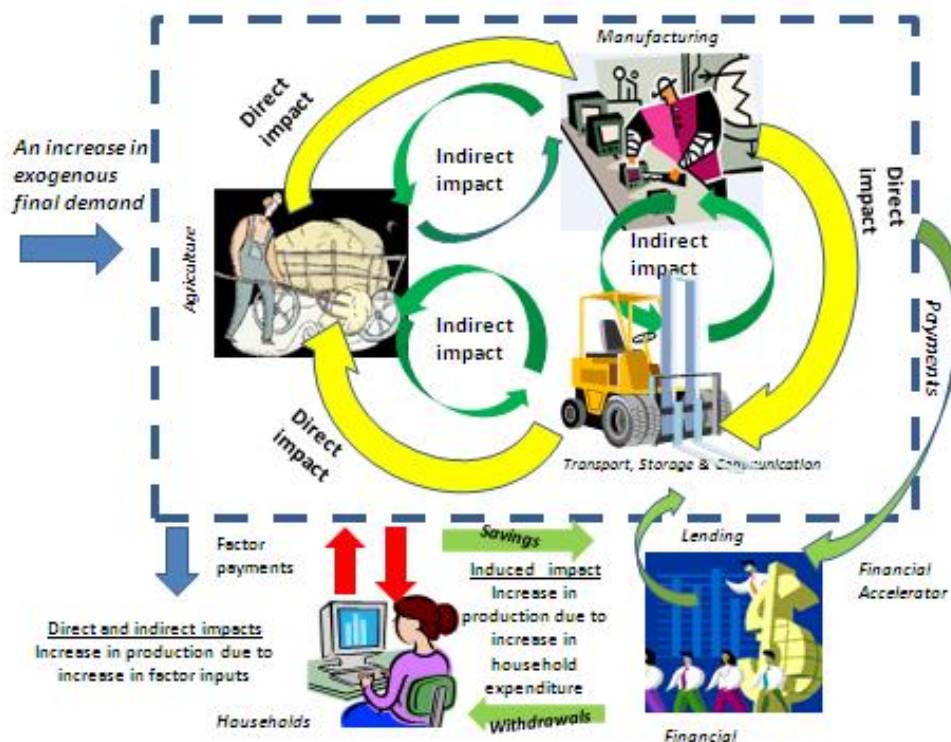


Source: Authors' representation

The financial sector plays a multifaceted role in the economy. On the one hand, similar to other production sectors, it demands intermediate inputs from the other sectors of the economy, and its output (the provision of financial services, including the granting of loans to other sectors of the economy) enters into the production processes of other industries. The implications of this activity of the financial sector are already accounted for in the second round multiplier **M2**. On top of the foregoing, however, the sector offers financial products that enter into the portfolio allocation decisions of households and firms. Modeling such requires a richer model than what we have currently developed. The approach yields an expanded closed loop multiplier, which we denote as the **M4** multiplier and which has been referred to by Leung and Secrieru (2012, p.205) as the *FSAM multiplier*. We plan to extend our analysis to cover these interlinkages, which are depicted graphically in Figure 3.

As noted by Leung and Secrieru (2012, p.204), the M4 multiplier may or may not be greater than the M3 multiplier. The reason is that, with the introduction of portfolio allocation decisions, savings may be used either for capital accumulation or the acquisition of financial instruments, some of which may be offered by foreign financial institutions.

**Figure 3. Impacts of an Exogenous Change in Final Demand:
Closed Loop Model with Financial Accelerator**



Source: Authors' representation

In summary, a change in exogenous shock is first reflected in a first round change in intermediate production (**M1**) that would result to a change in total production (**M2**). The change in production would affect the use of factors of production and their respective incomes that is translated to an increase in expenditures leading to a further increase in production (**M3**). It can also be noted that a change in exogenous shock feeding through the entire system can be heightened by large changes in financial markets and create a feedback loop. We consider this as an area for future research.

5. Simulation results

The backward linkage indicator (**BL**) analyzes the effect of a change in the final demand for a specific sector on the economy's total production, whereas the forward linkage indicator (**FL**) values the effect that a global change in the final demand of all sectors has on the production of a specific sector (Cardenete et al. 2008). In terms of the aforementioned multiplier matrices, a column sum of **M_{ij}** indicates total effects due to backward linkages, while a row sum indicates total effects due to forward linkages.

Thus, for any sector *i*, its total backward linkage is given by

$$\mathbf{BL}_i = (\partial x_1 / \partial f_i) + (\partial x_2 / \partial f_i) + \dots + (\partial x_n / \partial f_i) = \sum_{j=1}^n M_{ij} \quad (21)$$

while for any sector *j*, its total forward linkage is given by

$$\mathbf{FL}_j = (\partial x_j / \partial f_1) + (\partial x_j / \partial f_2) + \dots + (\partial x_j / \partial f_n) = \sum_{i=1}^n M_{ij} \quad (22)$$

Here the **M's** represent either open loop or closed loop multipliers, so that one can talk of open or closed loop total backward linkages of a sector, and similarly for the forward linkage measure.

In this section, we present the results of our multiplier analysis for some broad production sectors, namely, agriculture and fishing, forestry, mining and quarrying, manufacturing, construction, electricity, gas and water, trade, transportation and communication services, financial intermediation services, real estate, business services and ownership of dwellings, public administration and defense, compulsory social security, community, social and personal services.

Simulations show responses of various sectors to a PHP 1 million increase in final demand. For our particular examples, we introduced a PHP 1 million increase in the demand for exports.

5.1 Backward Linkages

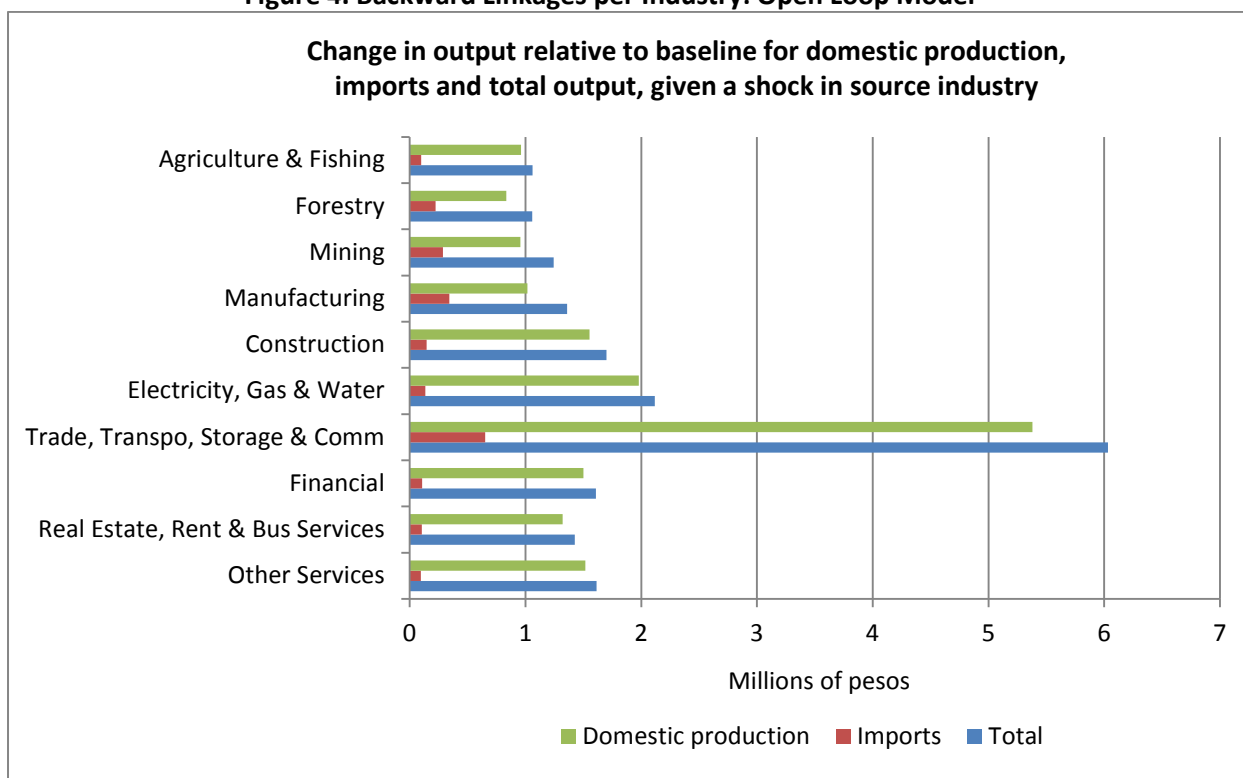
Figure 4 shows backward linkages generated by each sector using the open loop model, that is, backward linkages or increased outputs (millions of pesos) in domestic production, imports and aggregate (domestic outputs and imports), following a PHP 1 million increase in final demand of each source industry.³¹ The extent of backward linkages provides an indicator of each sector's integration into the Philippine economy (specifically with respect to productive activity). Some key findings are:

- *Backward linkages to other domestic industries.* From Figure 4, the stimulus originating from the trade, transportation, storage and communication sector ranks highest with PHP 5.38 million in additional output generated from the domestic production. This is followed by, second, electricity, gas and water; third, construction; fourth, other services (comprising public services such as education); fifth, financial intermediation services; and sixth, real estate renting, business services (including business process outsourcing) and ownership of dwellings. Significantly, the bottom sectors, as ranked in terms of having the least backward linkages, are first, forestry; second, mining; third, manufacturing; and fourth, agriculture and fishing.
- *Backward linkages to imports.* The sector with the highest backward linkage in imports is the trade, transportation, storage and communication sector (see Figure 4). A PHP 1 million increase in final demand from the sector would eventually lead to PHP 0.65 million increases in imports. It is to be noted that this increase in imports may either be direct (required by, for example, trade, transportation, storage and communication sector) or indirect (arising from the increase in demand of the other sectors). Other sectors with high backward linkages in imports are manufacturing; mining; forestry; construction; and electricity, gas and water sectors. Sectors with modest backward linkages in imports include agriculture and fishing; financial intermediation services; real estate, business services and ownership of dwellings; and other services. It may

³¹ For the simulations, the increases were assumed to be through higher exports.

be noted that the financial intermediation services sector recorded a low backward import linkage due to service charges imposed by foreign banks on residents in relation to import payments, foreign loans and other bank services.

Figure 4. Backward Linkages per Industry: Open Loop Model



It can be recalled that while the open loop model considers only the production side, the closed loop model takes into account the effects of endogenizing GDP, household direct taxes, household gross disposable income, and household consumption. It could, thus, be expected that a closed loop would generate greater backward linkages with the participation of households, than an open loop. This is verified in Figure 5 that compares backward linkages in production for closed and open loop approaches. Trade, transportation, storage and communication sector remains to be the sector with the greatest backward linkages; but with the inclusion of consumption, other sectors' linkages have noticeably increased and these are other services; real estate, renting and business services; construction; electricity, gas and water; financial intermediation services; agriculture; and forestry sectors. The results support the notion that indeed final demand in the form of household consumption has served as a main driver for economic growth, more so than induced intermediate demand arising from production interlinkages.

Figure 5. Backward Linkages: Comparison of closed and open loop models

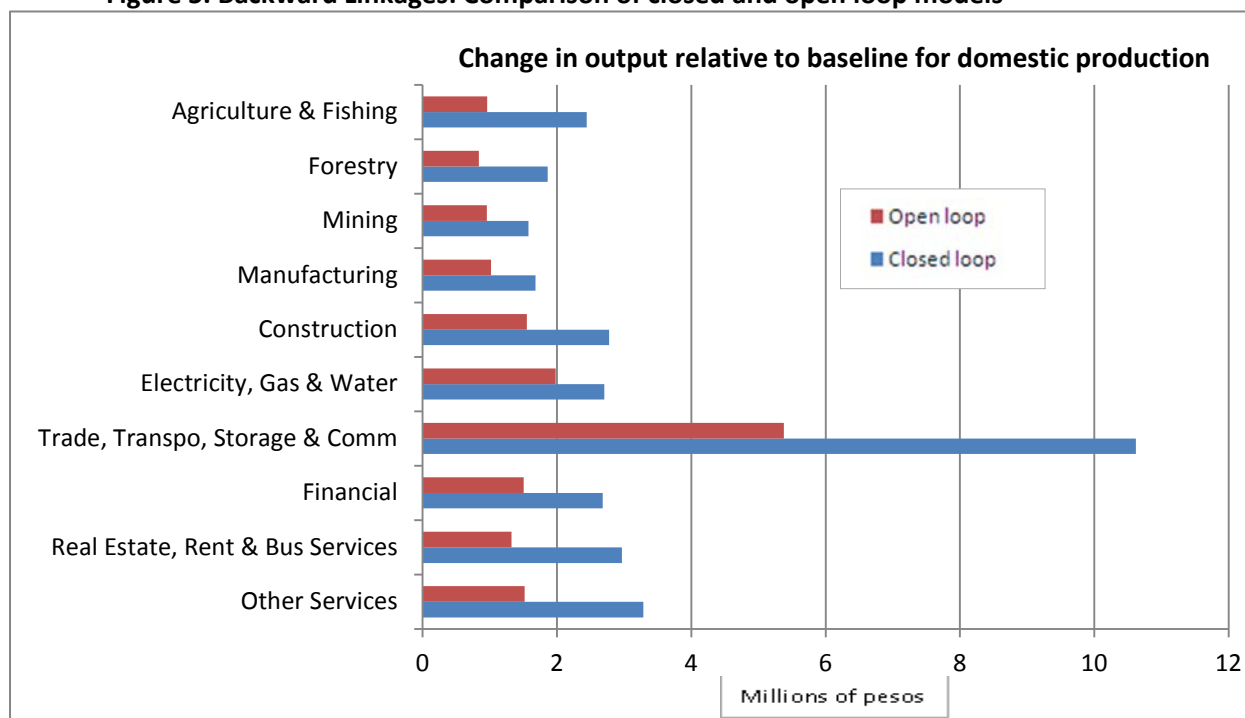
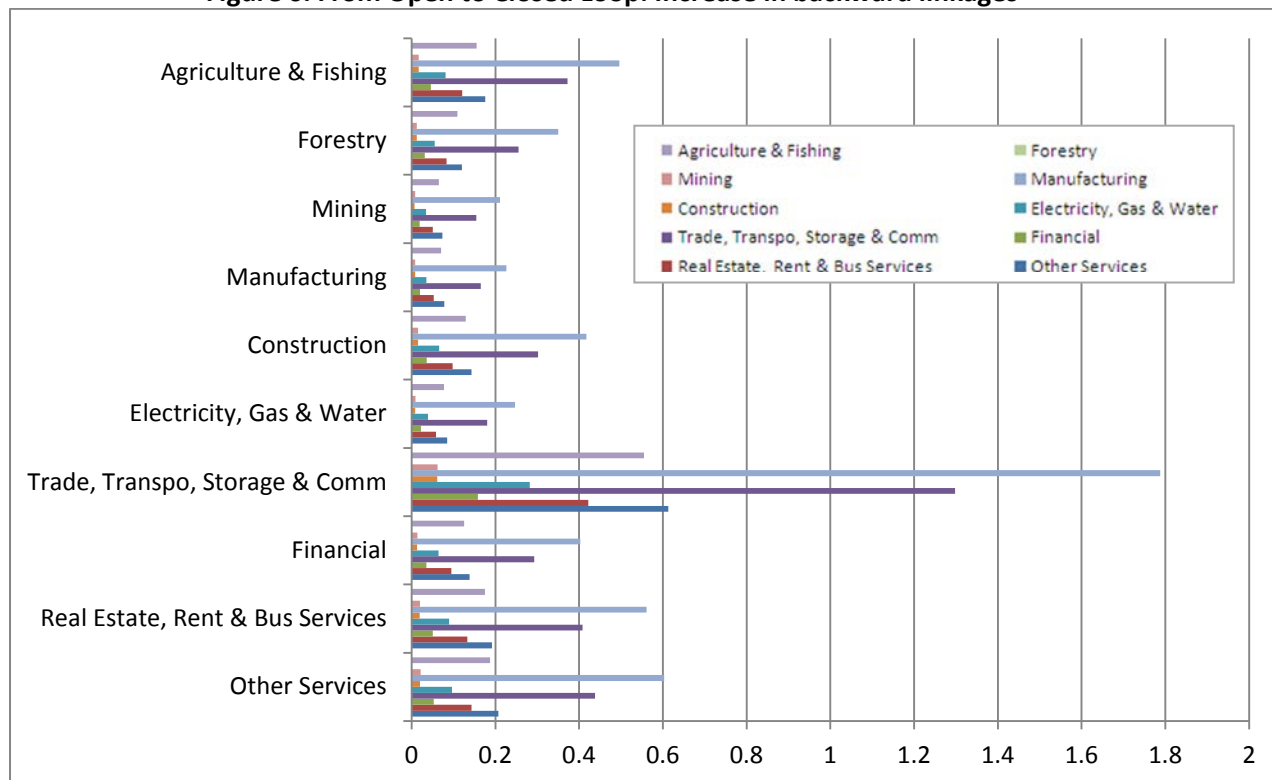


Figure 6 shows that the incorporation of consumption (from open loop to closed loop) had amplified shocks mainly through the manufacturing; and trade, transportation, storage and communication sectors.

5.2 Forward Linkages

Figure 7 shows total domestic forward linkages per sector for both closed and open loop models, following a PHP 1 million increase in global demand. The figure reveals that for the open loop model (red bars), the trade, transportation, storage and communication; and manufacturing sectors have the highest values (about PHP 4 million and PHP 3 million, respectively) in terms of their uses in other sectors. However, under the closed loop approach, the manufacturing sector exceeded (albeit marginal) the trade, transportation, storage and communication sector, both sectors with about PHP 8 million value of forward linkages. This is consistent with the results of Figure 6 that show the two sectors to be important inputs for the productive sectors.

Figure 6. From Open to Closed Loop: Increase in backward linkages



Similar to the backward linkage results, other sectors; agriculture and fishing; real estate, business services (including business process outsourcing) and ownership of dwellings sectors had greater linkages under the closed loop model.

Figure 7. Total Domestic Forward Linkages per Industry: Closed and Open Loop Models

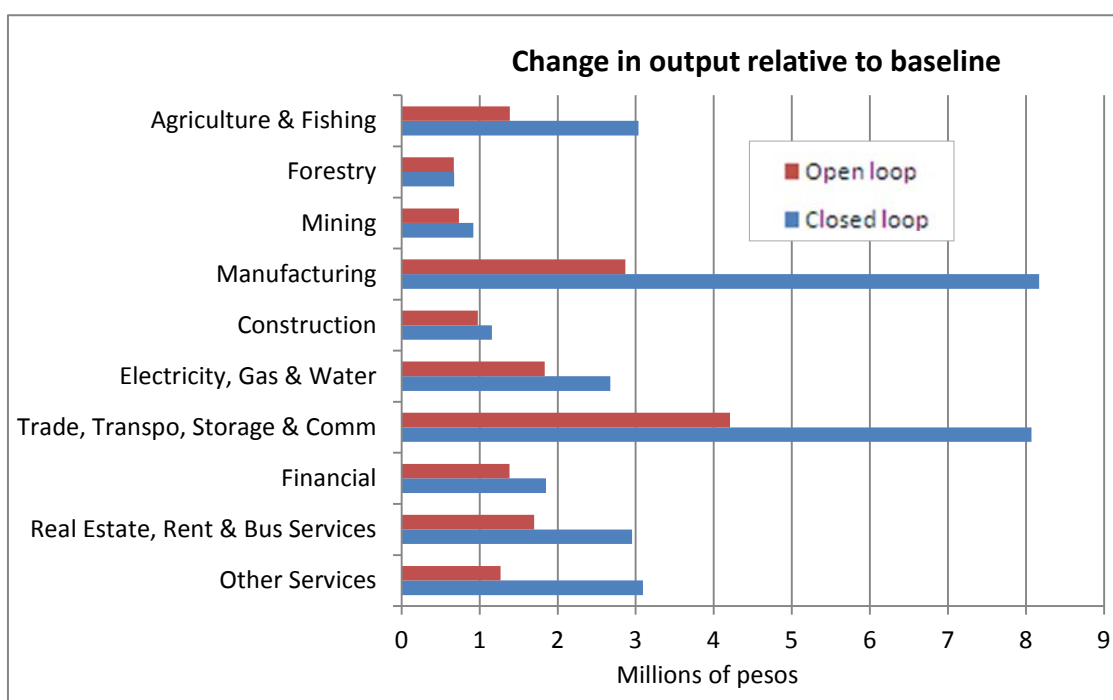
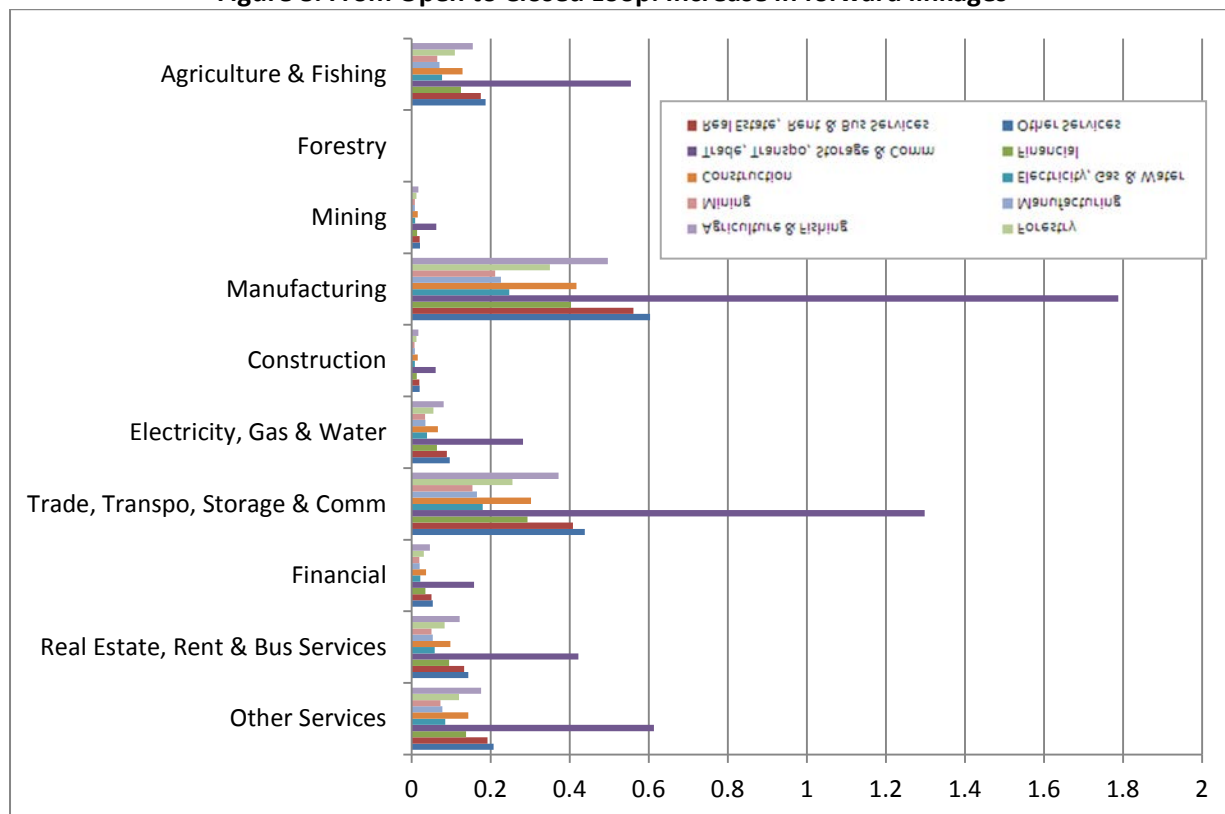


Figure 8, similar to Figure 6, shows the details of the increase in forward linkages with the inclusion of consumption. The figure shows the amplified impacts to be more broad-based across sectors, still with a prominent role for trade, transportation, storage and communication sector.

Figure 8. From Open to Closed Loop: Increase in forward linkages



5.3 Value added multipliers and income generation

It is also instructive to compare the assessment using value added multipliers as the measure of intersectoral linkages.³² The formulas are similar, but with the substitution of value added per sector (VA_j) in lieu of the sector's total output. Thus, for any sector j , its total value added linkage is given by

$$\mathbf{VAL}_j = (\partial VA_1 / \partial f_j) + (\partial VA_2 / \partial f_j) + \dots + (\partial VA_n / \partial f_j) = \sum_{i=1}^n VA_{ij} \quad (23)$$

Equivalently, since for each sector, value added equals total income of primary inputs, then the value added multiplier also provides the income generated by the sector for each unit increase in the sector's final demand. It can be seen that the measure is actually more relevant if the issues of concern involve the impacts of new final demand as measured by jobs created, increased household earnings, increased investment, and changes in the other components of value added.

³² Miller and Blair (2009), p. 250

Figure 9 shows the generation of incomes per sector using the open loop model measured in terms of millions of pesos of income generated for each PHP 1 million increase in final demand for the sector. A look at the figure shows that trade, transportation, storage and communication sector has generated the highest incomes. The sector is followed by financial intermediation services; real estate, business services and ownership of dwellings; other services; electricity, gas and water; construction; agriculture and fishing; and forestry and mining sectors. By contrast, the manufacturing sector posted the lowest income generation. Both output and value added multipliers therefore agree on the limited interlinkages of manufacturing to the rest of the economy.

It is also possible to decompose such income generation according to income type, as shown in Figure 10. The simulation exercises indicate significant variations in terms of which factor of production benefits the most from the sectoral expansion. By types of incomes, operating surplus was evident as the biggest component of income for the electricity, gas and water; financial intermediation services; and mining and construction sectors. Meanwhile, mixed incomes have been prevalent in trade, transportation, storage and communication; agriculture and fishing; forestry; manufacturing; and real estate, business services and ownership and dwelling sectors. It can be recalled that in the SNA, mixed income was introduced in 1993 as a concept to reflect better the actual perception of owners of household unincorporated enterprises who cannot distinguish between profits and wages from the incomes received. For other services, compensation of employees (wages and salaries) is significant in the generation of income.

Figure 9: Generation of income per industry: Open loop model

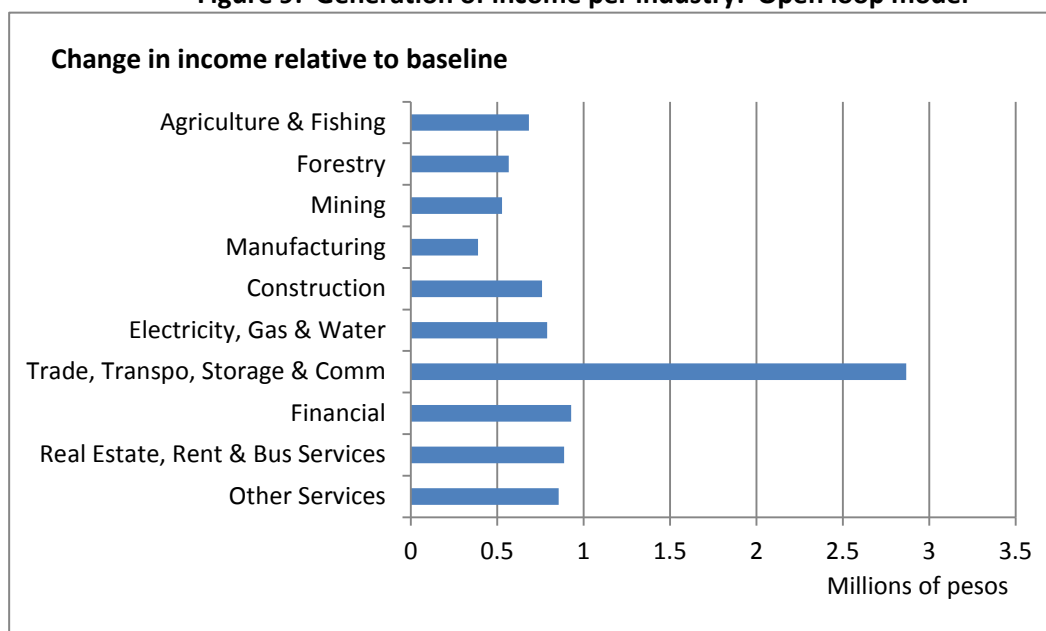


Figure 10. Decomposition of income generation per industry: Open loop model

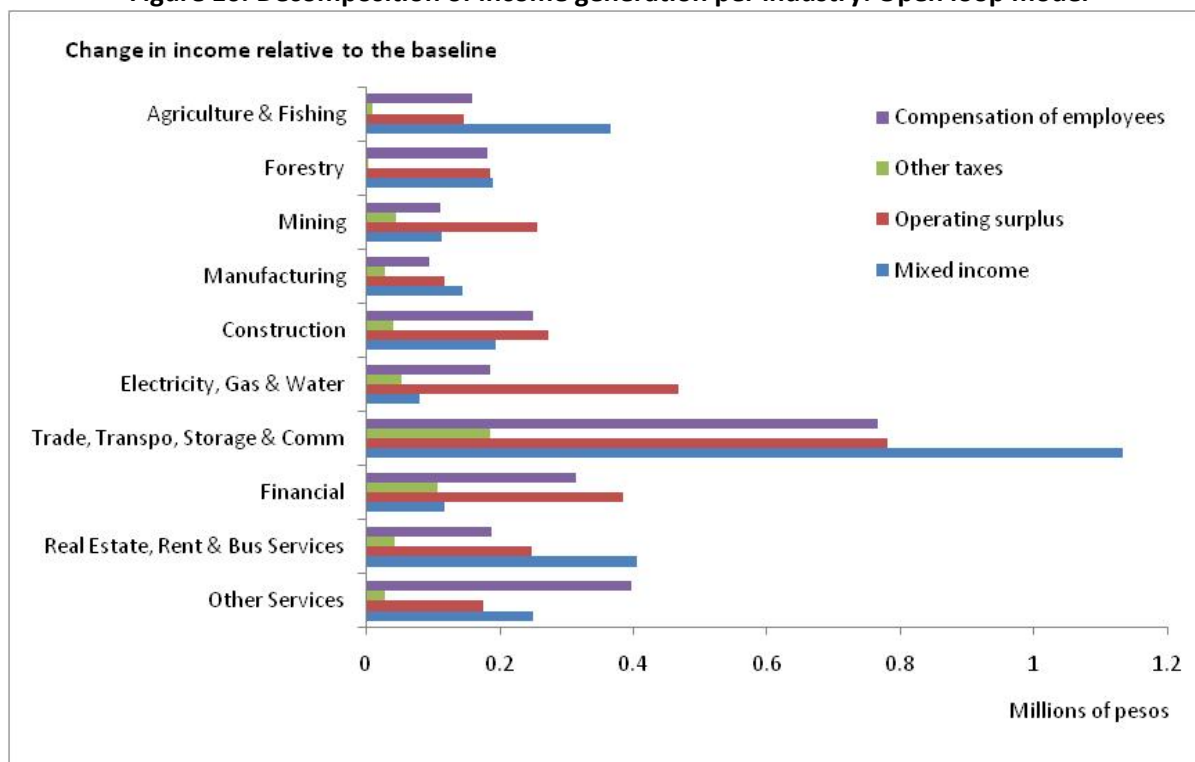
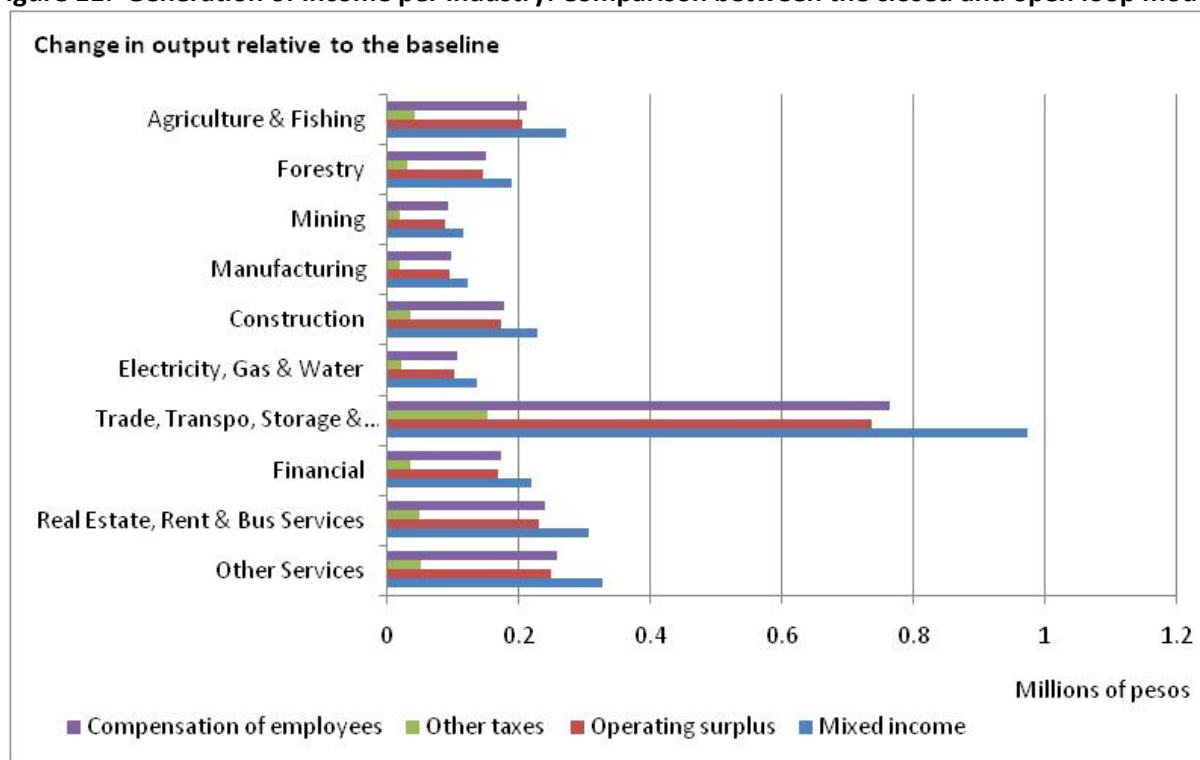


Figure 11: Generation of income per industry: Comparison between the closed and open loop models



We examine further how the closed loop model compares to the open loop model. Our results in Figure 11 show that the gap is larger for those sectors that have a large compensation component in value added, as opposed to those with large operating surpluses, since compensation provides the link between production and consumption demand. In particular, trade, transportation and storage sectors, real estate, business services and ownership of dwelling, other services, construction and financial intermediation services have larger gaps than the open loop model. This result implies that the role of labor is more complicated compared to the view that wage increases impact largely on the inflation side.

Our analysis reveals interesting findings: the interlinkages of the sectors are more pronounced and more even across sectors compared to the previous model which considered only production linkages. This calls attention to the role of consumption in the transmission of shocks (both good and bad) across sectors of the economy. The results support the notion that household consumption has served as the engine of growth for the economy, with limited role for production interlinkages.

5.4 Quantifying the impact of the global financial crisis

In the previous sections, we showed the extent of the impact of an initial increase on final demand in one sector on output in other sectors, and eventually on total production. In this section, we illustrate the use of framework by quantifying the impact of the 2008-2009 global financial crisis, through a counterfactual simulation of the multipliers based on the 2009 Philippine FSAM.

It may be recalled that by end-December 2009, the United States was already deep into the financial crisis—having had to bail out private institutions to save the financial system. The slowdown in the real estate sector had permeated the rest of the economy and the US unemployment rate was on its way up. Meanwhile, initial signs of the Euro zone troubles were showing up in Greece. For emerging market economies, in general, the economic slowdown of the advanced economies resulted in lower levels of exports and overseas remittances. Specifically, this section shares some insights on how the Philippine economy would have fared had the global financial crisis not occurred.

A simulation of the global financial crisis showed a loss of 14.50 percent in the level of remittances and 58.81 percent in exports (see Technical Appendix C). The export loss rate is much higher since the actual values for 2008 and 2009 declined, resulting in a greater catch-up. The calculated rates of losses are then used with the FSAM data for a counterfactual simulation,³³ that is, the exercise estimated what would have been the growth in the macroeconomic variables without the crisis. Thus, exports of goods received a positive shock of 58.8 percent and compensation from rest of the world (ROW, to represent impact on overseas remittances) a positive shock of 14.5 percent.

Isolated (export shock only or shock to ROW compensation only) and joint shocks were simulated. Table 4 shows that for the household sector, income goes up by 2.6 percent from the isolated export shock, 0.9 percent from the isolated ROW compensation shock,

³³ Counterfactual simulations are “what-would-have-been” scenarios; in this case, the exercise estimated the level of exports and remittances had the global financial crisis not occurred.

and 3.6 percent from the joint shocks. Percent changes in total sectoral outputs show the trade, transportation, storage and communication sector having the greatest increase (7.7 percent from the isolated export shock, 0.8 percent from the rest of the world (ROW) compensation shock, and 8.5 percent from the joint shocks). Meanwhile, the export shock has a greater effect due to its magnitude (58.8 percent) and direct impact on production; the impact on production is expected to lead to an increase in household income (labor and capital income).

Positive shock on exports has a higher impact on GDP (3.5 percent) than the shock to compensation from ROW (0.6 percent). The joint shocks raise the GDP to 4.1 percent, or to put it in another way, GDP would have grown by an additional 4.1 had the crisis not occurred. Therefore, the estimated impact of the global financial crisis in 2009 GDP is a reduction in the growth rate by 4.1 percent. Considering that the 2008 GDP growth rate was 4.2 percent, an additional 4.1 percent to the 2009 growth rate of 1.1 percent (for a growth rate of 5.2 percent) would have indicated a higher economic growth without the crisis.

Table 4. Impacts on output and household income (Million pesos; %)

	Base level	Increase in Exports (Million pesos; %)	Increase in Compensation from ROW (Million pesos; %)	Increase in Exports of Goods and Compensation from ROW (Million pesos; %)
GDP	7,543	7,806	7,589	7,852
<i>Growth from base level</i>		3.5%	0.6%	4.1%
HOUSEHOLD INCOME	6,374	6,543	6,434	6,603
<i>Growth from base level</i>		2.6%	0.9%	3.6%
SECTORAL OUTPUTS				
Agriculture and fishing	1,482	1,530	1,491	1,539
Forestry	4	4	4	4
Mining and quarrying	211	215	212	216
Manufacturing	5,276	5,398	5,306	5,428
Construction	746	749	747	750
Electricity gas and water	639	658	644	663
Trade, transportation, storage and communication	2,801	3,017	2,823	3,039
Financial intermediation	392	405	395	408
Real estate renting and business services	1,215	1,251	1,222	1,258
Other Services	1,993	2,024	2,003	2,035
TOTAL	14,759	15,251	14,848	15,340
<i>Growth from base level</i>		3.3%	0.6%	3.9%

Source of data: Authors' simulation exercise.

Note: (1) Export shock: Increase by 58.81%;
(2) ROW Compensation shock: Increase by 14.5%

6. Implications for Development, Monetary and Financial Policy

We use the results of the analysis in Section 5 to draw some implications for development, monetary and financial policy.³⁴

First, the trade, transportation, storage and communication sector has shown consistent and significant linkages with other productive sectors of the economy. This finding suggests that infrastructure is a key ingredient to economic growth. Llanto (2012) argued that, on average, the Philippines has invested in infrastructure around two percent of nominal GDP, lower than the five percent norm for other ASEAN countries.³⁵ This finding also underscores the need for the country's infrastructure to keep up with the growing requirements of the economy and the population. Inadequate infrastructure has also been a reason for the lack of attractiveness of the country as an investment destination, thus, it has also become a growth constraint (Llanto 2007).

Second, the finding that the manufacturing sector lags behind other productive sectors in terms of backward linkages implies that there is a significant need to strengthen the absorptive capacity³⁶ of domestic manufacturing firms. Aldaba and Aldaba (2012) claim that the experience of the Philippines shows that foreign direct investment (FDI) spillover effects are not automatically generated. This means that while the opening up of the economy to FDI has contributed to the country's exports of high-technology products and the overall economic growth, the spillover effects of FDI to domestic manufacturing firms have been limited due to firms' weak competitiveness and inability to absorb the technology or knowledge being transferred.

The overall export performance of the manufacturing sector has been a major driver of earnings of the sector. Based on the latest available data, about 87.3 percent of total exports were accounted for by the manufacturing industry in 2012.³⁷ This rate is more than double the manufacturing sector's share to total exports in 1980 at 34.5 percent and about eight percentage points higher than the 79.5 percent share in 1995.³⁸

However, the remarkable performance of the manufacturing sector is tempered by the continuing dependence on imports. In 2012, the merchandise trade deficit was recorded at US\$15.7 billion.³⁹ This phenomenon of increasing trade loss is in part ascribed to the apparent high import content of Philippine manufactured exports.⁴⁰ For instance, electronic products comprise about 50.1 percent of total export manufactures in 2012. However, in the case of electronics, the Philippines adds a modest value added to import components,

³⁴ For illustration purposes, important observations can be drawn from the database to demonstrate the usefulness of PFSAM in monitoring the performance of the economy even for one period of time. A time series of PFSAM will be more useful in monitoring the movement of the economy over time. This is quite possible given the collaboration of the BSP and NSCB in producing PFSAM annually or every few years.

³⁵ The ASEAN economies include Thailand, Indonesia, Viet Nam, Cambodia, and Lao PDR.

³⁶ This is defined as the ability of firms to absorb and implement investments so that their objectives are achieved. If issues arise at any stage in the process, having absorptive capacity implies finding the appropriate ways or adjustments to solve the problems.

³⁷ Based on the Schedule of Total Exports by Commodity Groups (Table 2.1) of the Balance of Payments (BoP). The level of total exports is based on BPM5.

³⁸ Cororaton and Abdula, 1999.

³⁹ Based on BPM6.

⁴⁰ Cororaton and Abdula, 1999; Balisacan and Hill, 2003.

and then re-exports them. Thus, the manufactured export sector is in effect an enclave with surprisingly limited linkages to the domestic economy.⁴¹ It is noteworthy that while Cororaton and Abdula pointed this out in 1999, the results are still validated for 2009 by the PFSAM, a span of exactly one decade.

Nonetheless, there are two ways to look at manufacturing as an engine of growth— as a user of other productive sectors and as an input to other productive sectors. The discussion above highlights the sector's limited use of domestic products yet significant forward linkages of the manufacturing sector attest to its valuable role as input to other sectors. An expansion, therefore, of the manufacturing sector would allow for greater expansion of other productive sectors; or, alternatively, a slump in the growth of the manufacturing sector would pose a constraint to the growth of other sectors as well.

The results underscore the importance of an economic environment and incentive structure that supports deepening of manufacturing firms' linkages with other productive sectors in the domestic economy. Aldaba and Aldaba (2012) maintain that human resource development and training, industrial and technology upgrading, deeper finance support programs for small and medium enterprises (SMEs), improvement in linkages and promotion of subcontracting and outsourcing activities of local firms, improvement of infrastructure and logistics and overall investment climate, and strengthening the capacity of the staff and providing adequate resources for the effective implementation of programs are some of the measures that could be used to improve competitiveness and linkages between manufacturing firms and foreign investors.

Third, the finding that agriculture sector also lags behind other productive sectors in terms of backward and forward linkages as well as in generating income suggests that the government has to prioritize infrastructure investments to address constraints in productivity. Because of infrastructure's important direct and indirect effects on agricultural productivity, the government has to pay special attention to infrastructure investments particularly in the rural sector. Increasing agricultural productivity is an essential component of the government's development strategy, especially because most of Philippine poverty is with the rural areas (Llanto 2012). Seneviratne and Sun (2013) noted that despite some improvement in recent years, the Philippines' infrastructure rankings remain relatively low among the ASEAN-5. In particular, there is room for improving infrastructure quality related to transportation and electricity.⁴²

Rural infrastructure, like other public investments, raises agricultural productivity, which in turn induces growth in the rural areas, bringing about higher agricultural wages and improved opportunities for non-farm labor. Meanwhile, the rise in agricultural productivity is expected to help reduce food prices, which benefits both urban and rural inhabitants who are net food buyers.

Fourth, the finding that financial intermediation services' marginal (backward) linkages with other industries are relatively widespread suggests a crucial role for the BSP to continuously promote financial inclusion and services to all. Financial inclusion, one of BSP's

⁴¹ Cororaton and Abdula, 1999.

⁴² Seneviratne, D. and Y. Sun (2013), "Infrastructure and Income Distribution in ASEAN-5: What are the links?", IMF Working Paper No. WP/13/41, February.

core advocacies, is a situation when the public has access to financial services such as banks, pawnshops, or even mobile banking platforms; and as such, financial inclusion has received growing recognition as a key ingredient for inclusive growth. Therefore, greater access to financial services together with the broad backward linkages of financial intermediation services would allow for greater boost to economic growth.

A recent BSP effort to take stock of progress made in promoting financial inclusion has found that the Philippine financial system has become more inclusive over the years.⁴³ The BSP has been at the forefront of efforts to promote inclusive growth through financial literacy and consumer protection.

Based on a recent BSP Report, a total of 23 percent of municipalities are “unserved” by any financial institution as of end-December 2011.⁴⁴ When access to banking services is included, the same Report noted that this number rises to 37 percent as of end-December 2011. In particular, the BSP has approved a regulatory framework for the establishment of microfinance offices in a bid to boost financial inclusion in the country. As of end-December 2011, a total of 187 microfinance institutions with total loan portfolio of ₱ 7 billion and savings amounting to ₱4 billion was established nationwide. There were also more applications for micro-banking offices (MBOs) or small banks established on far-flung areas and allowed to take in deposits, payments for bills and receive and sent remittances.

Meanwhile, the BSP undertakes various bank-related initiatives to improve the remittance environment and to guide remittances to productive endeavors. Through these initiatives, the BSP intends to maximize the benefits of remittances aimed at ensuring the smooth inflow of remittances and promoting their use for development by channeling them to the financial sector so that these funds can be mobilized for lending and other productive activities.⁴⁵ These initiatives helped in the promotion of a culture of savings among the beneficiaries of OFs and encouraged them to channel these savings into investments in financial instruments and business ventures.

Moreover, the significant backward linkages of the financial intermediation services with other industries underscore the importance of the BSP’s efforts to safeguard financial stability.

Fifth, value added multiplier simulations show financial intermediation services sector to have the second highest level of incomes generated, which is consistent with the observation that the banking system is relatively healthy, despite the global financial crisis in 2009. This finding also validates the efforts of banks to sustain profitable activities. Such a stance allowed capital adequacy ratio (CAR) of universal and commercial banks to remain

⁴³ In 2000, the BSP was mandated by the General Banking Law (or Republic Act No. 8791) to recognize microfinance as a legitimate banking activity and to set the rules and regulations for its practice within the banking sector (2005 Year-End Report on BSP Microfinance Initiatives).

⁴⁴ BSP (2012), Report on the State of Financial Inclusion in the Philippines, August. In particular, the municipalities that have no banks and other access points (about 23 percent) represent about 7.6 percent of the population. While municipalities that have no banking office (about 37) represent about 15.2 percent of the population.

⁴⁵ In particular, the BSP initiatives to improve the remittance environment are geared towards the following: (1) enhancing transparency and competition to lower remittance charges, (2) improving payments and settlements system to facilitate remittances and help further reduce remittance charges, (3) channeling remittances to financial investments, (4) relaxing access of bank clientele to financial services, and (5) increasing financial education of OFWs and beneficiaries.

robust despite the continued global difficulties. The universal and commercial banks registered average CARs of 16.9 percent on solo basis and 18.0 percent on consolidated basis as of end-June 2012. The banks' CAR continued to exceed both the statutory level set by the BSP at 10.0 percent and the Bank for International Settlements (BIS) at 8.0 percent. The Philippine banking system's CAR on a consolidated basis at 18.0 percent was higher than those of Thailand (15.0 percent), Malaysia (17.2 percent) and South Korea (14.0 percent) except for Indonesia (18.2 percent).⁴⁶

Sixth, the implication that banks were relatively healthy in the face of global difficulties points us to the broader role of financial institutions in intermediating saving and investing units in the economy. Typically, gross savings and net capital transfers are major sources of funds which can be used for gross capital formation or investment in financial instruments. In 2009, except for the central bank and the government, all sectors were net lenders whose gross savings provided basically all funds for gross capital formation. The financial sector was a net borrower from itself, suggesting that in 2009, financial institutions preferred to borrow from among the institutions, instead of borrowing from outside the financial system. The financial sector was a net borrower from among other financial institutions, although it was an important lender to the household sector. It should also be noted that financial corporations as a whole invested more in securities than in lending to the private sector.

Seventh, the role of the household sector in economic growth remains robust. In the 2009 FSAM, the household sector spent most of its disposable income on final consumption of goods and services (93 percent) and little went to gross saving (7 percent). Gross capital formation of the household sector was only 4 percent of its disposable income and 3.6 percent of GDP in 2009.

The 2011 BSP Report on the Flow of Funds showed that the household sector remained the prime saver in the economy. This could be attributed to the sustained inflow of remittances from overseas Filipinos, notwithstanding the global economic slowdown. This finding underscored the results of the Consumer Expectations Survey (CES) which depicted an increasing trend of overseas Filipino workers' households surveyed that used their remittances for savings since 2007. On the domestic front, favorable labor market conditions coupled with wage hikes further reinforced household savings during the year. Meanwhile, the implementation of the third tranche of the adjustment under the Salary Standardization Law (SSL) on 1 June 2011 augmented government employees' income stream.

In the same vein, gross capital accumulation continued to expand on the strength of investments of households and public non-financial corporations in 2011. Since 2009, the household sector was the biggest accumulator of capital, mainly in dwellings, accounting for 42.8 percent of the economy's capital accumulation in 2011.

⁴⁶ Sources are various central bank websites and financial stability reports, Indonesia (commercial banks, Q1 2012); Thailand (commercial banks Q1 2012); Malaysia (banking system, Q1 2012); and Korea (commercial banks, Q4 2011) and the BSP Report on the Economic and Financial Developments for the second quarter of 2012.

However, a deeper analysis of the interlinkages between household consumption and the productive sectors of the economy reveals the crucial role of consumption in the transmission of shocks across sectors of the economy.

Eighth, the impact of the combined shocks (reduction in exports and remittances) arising from the global financial crisis, on total and sectoral outputs as well as on household income in Section 5 appears to be relatively significant at roughly 4.0 percent from the base levels. This counterfactual level would have indicated a higher economic growth rate without the crisis.

7. Concluding Remarks

This paper introduces an alternative approach to identifying sectoral vulnerabilities and strengths for the Philippine economy. Following Deb Pal et al. (2012), we estimated multipliers comprising the direct, indirect and induced impacts of an exogenous demand shock on several broad productive sectors.

The results underscore that infrastructure is a key ingredient to sustainable growth as the trade, transportation, storage and communication sector has shown consistent and significant linkages with other productive sectors of the economy.

We noted the crucial role of the BSP to continuously and more frequently provide financial learning and services to all and to safeguard financial stability as financial intermediation services' (backward) linkages with other industries are relatively widespread. We also validated the efforts of banks to sustain profitable activities and remain healthy as we found that financial intermediation services sector generated higher profits in 2009.

We then extended the multiplier analysis to estimate the impact of the 2008 to 2009 global financial crisis on the productive sectors. We found that the effects of the combined shocks on total and sectoral outputs as well as on household income seemed to be significant, but economic growth would still have slowed down even without the global financial crisis.

The expanded multiplier analysis gave rise to consistent views of interlinkages, and strengths and vulnerabilities of sectors with the various multipliers validating each other's findings. The results, thus, provide a clearer perspective on scope of possible interventions in the economy.

- Robust results point out the lack of integration of agriculture and manufacturing sectors with rest of the economy. The agriculture sector not only lagged behind other productive sectors in backward and forward linkages but also in generating income. For the manufacturing sector, it may have limited backward linkages due to its continued dependence on imported inputs, but its significant forward linkages may yet strengthen its role as an engine for growth. Still there is a significant need to strengthen the absorptive capacity of domestic manufacturing firms and to deepen further the firms' linkages within the domestic economy.

- Considerable linkages and multipliers of the trade, transportation, storage and communication sector highlighted the key role of infrastructure. In the rural sector, infrastructure would boost agricultural productivity and income. For the manufacturing sector, improved infrastructure could provide the needed linkages with the other sectors.
- Household consumption has been found to amplify the propagation of shocks across economic sectors through the compensation and consumption channel. Thus, this more pronounced for those sectors that have a large compensation component in value added as opposed to those with large operating surpluses.
- The widespread linkages of the financial intermediation sector with other industries underscore the importance of efforts to safeguard financial stability.

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Technical Appendix A

Table 1. Classifications in the PFSAM 2009

12 industries and commodities:⁴⁷

1. Agriculture and fishing
2. Forestry
3. Mining and quarrying
4. Manufacturing
5. Construction
6. Electricity, gas and water
7. Trade services
8. Transportation and communication services
9. Financial Intermediation services
10. Real estate, business services and ownership of dwellings
11. Public administration and defense: compulsory social security
12. Community, social and personal services

8 types of financial instruments:

1. Currency and deposits
2. Securities other than shares
3. Derivatives
4. Loans
5. Shares and other equity
6. Insurance technical reserves
7. Other accounts receivable/payable
8. Unclassified items

9 institutional sectors (aggregated into 5 major sectors):

1. Rest of the world (ROW)
2. Nonfinancial corporations
3. Financial corporations
 - 3.1 Central Bank
 - 3.2 Depository corporations
 - 3.3 Insurance and pension
 - 3.4 Other financial services
4. General Government
 - 4.1 National and Local Government.
 - 4.2 Social Security
5. Households and Non-Profit Institutions Serving Households (NPISHs)

12 categories of income flows:

1. Gross operating surplus
2. Gross mixed income
3. Compensation of employees
 - 3.1 Wages and salaries
 - 3.2 Employers' social contributions
4. Other taxes on production
5. Taxes less subsidies on products
6. Current taxes on income
7. Property income
8. Social contributions
9. Social benefits other than in kind
10. Other current transfers

⁴⁷ In the multiplier analysis, sectors 7 and 8 were merged into one sector.

Table 2. Rows and columns of the Philippine FSAM

Items	Row and column codes
Product (CPC)	
Agriculture and fishing	2.1P
Forestry	2.2P
Mining and quarrying	2.3P
Manufacturing	2.4P
Construction	2.5P
Electricity, gas and water	2.6P
Transportation, Storage and Communication	2.7P
Trade and Repair of Motor Vehicles, Motorcycles, Personal and HH goods	2.8P
Financial Intermediation	2.9P
Real Estate, Renting and Business Services	2.10P
Public Administration and Defense: Compulsory Social Security	2.11P
Other Services	2.12P
Purchase at home by non-residents	S1
Industry (ISIC)	
Agriculture and fishing	2.1A
Forestry	2.2A
Mining and quarrying	2.3A
Manufacturing	2.4A
Construction	2.5A
Electricity, gas and water	2.6A
Transportation, Storage and Communication	2.7A
Trade and Repair of Motor Vehicles, Motorcycles, Personal and HH goods	2.8A
Financial Intermediation	2.9A
Real Estate, Renting and Business Services	2.10A
Public Administration and Defense: Compulsory Social Security	2.11A
Other Services	2.12A
Cif/fob adjustment	S3
Trade and transport margins	S4
Import duties	S5
Generation of incomes	
Compensation of employees	3a
Import duties	3b
Other taxes on production	3c
Operating surplus	3d
Mixed income	3e
Allocation of primary income	
Non-financial corporations	4a
Financial corporations	4b
Central banks	4b.1
Depository corporations	4b.2
Insurance and pension	4b.3
Other financial services	4b.4
Government	4c
National and local government	4c.1
Social Security	4c.2
Households and NPISHs	4d

Items	Row and column codes
Allocation of secondary income	
Non-financial corporations	5a
Financial corporations	5b
Central banks	5b.1
Depository corporations	5b.2
Insurance and pension	5b.3
Other financial services	5b.4
Government	5c
National and local government	5c.1
Social Security	5c.2
Households and NPISHs	5d
Use of disposable income	
Non-financial corporations	6a
Financial corporations	6b
Central banks	6b.1
Depository corporations	6b.2
Insurance and pension	6b.3
Other financial services	6b.4
Government	6c
National and local government	6c.1
Social Security	6c.2
Households and NPISHs	6d
Capital accounts	
Non-financial corporations	7a
Financial corporations	7b
Central banks	7b.1
Depository corporations	7b.2
Insurance and pension	7b.3
Other financial services	7b.4
Government	7c
National and local government	7c.1
Social Security	7c.2
Households and NPISHs	7d
Non-produced asset, capital transfers	
Net acquisition of non-produced assets	S6
Net acquisition of valuables	S7
Capital transfers, receivable (+)	S8
Capital transfers, payable (-)	S9
Financial accounts - Institutions	
Non-financial corporations	9a
Financial corporations	9b
Central banks	9b.1
Depository corporations	9b.2
Insurance and pension	9b.3
Other financial services	9b.4
Government	9c
National and local government	9c.1
Social Security	9c.2
Households and NPISHs	9d

Items	Row and column codes
Financial instruments	
Currency and deposits	10a
Securities other than shares	10b
Derivatives	10c
Loans	10d
Non-financial corporations	10d.1
Financial corporations	10d.2
Central banks	10d.3
Depository corporations	10d.4
Insurance and pension	10d.5
Other financial services	10d.6
Government	10d.7
National and local government	10d.8
Social Security	10d.9
Households and NPISHs	10d.10
Shares and other equity	10e
Insurance technical reserves	10f
Other accounts receivable/payable	10g
Unclassified items	10h

Technical Appendix B

Main building blocks of PFSAM2009

PFSAM2009 is built around four major structural blocks of economic data which serve as tools for economic analyses.

I. Supply and use tables (SUT)

SUT shows the supply and uses of all goods and services in the economy. It is compiled on the basis of the balance between supply and use of goods and services at purchaser's prices.

Output at producer's prices + Imports + Import duties + Trade and transport Margins = Intermediate consumption + Exports + Final consumption expenditures + Gross capital formation

SUT is a statistical tool that reflects the actual flows of goods and services to industries and institutional sectors for use. From SUT, it is possible to derive an input-output table (I-O). I-O table is an economic model that shows the use of products by production activities on the basis of a number of economic and technological assumptions. I-O table is not the subject matter for this project.

II. Cross classification matrix

Production data are collected through surveys with establishments as statistical units of observation to help identify types of industries; but these establishments are also identified as part of types of institutional sectors (for example types of nonfinancial, financial corporations, household unincorporated enterprises and general government). Thus the cross classification matrix allows the classification of establishments by both industries and institutional sectors. The shares in a survey year when more detailed data are collected can be used to allocate (or cross classify) industries into institutional sectors. Thus output, intermediate consumption and value added by industries can be cross-classified into the same categories as institutional sectors. Data from this matrix allows for the analysis of the institutional structure of industries with respect to value added, employment, compensation of employees and thus labor productivity.

III. SNA integrated institutional sector accounts (SNA)

SNA institutional sector accounts which is simply called **SNA** in the PFSAM2009, is the fundamental feature recommended by the United Nations System of National Accounts since 1993 and continues to be a main feature of SNA2008. Each sector is presented as T-account, where the right hand side is RESOURCES and the left hand side is USES.

In PFSAM2009, SNA institutional sector accounts (SNA) are built around 9 sectors as indicated previously. Each institutional sector has separate but similar groups of accounts, where main economic aggregates such as value added, GNI, GDI, gross saving, gross capital formation, net lending are derived as balancing items.

In general, within each sector, and within each group of accounts, which will be discussed later, total resources must equal total uses. **The balancing item** is the value that equates total resources to total uses. For example, gross saving is the balancing item between disposable incomes and final uses of incomes in a given sector to assure that “gross disposable income = final consumption + gross saving.”

Overall, across all sectors, **the system has to honor another balance of flows across all institutional sectors, which is also based on the equality between total uses and total resources**, such as loans provided by all institutions including ROW must equal loans received by all institutions. This principle of equality allows statisticians who compile the data to check on data consistency and to reduce discrepancies as much as actual data allows. Large discrepancy may signal that basic data need to be improved.

It is because of the second principle that the “from-whom-to-whom” transaction matrix among institutional sectors is built for any flow of income or financial instrument. SNA institutional sector accounts in PFSAM2009 also include “from-whom-to-whom” transaction matrices of current transfers, property income and loans that are not emphasized in SNA1993 or SNA2008. These transaction matrices are included to assure the complete links between SNA institutional sector accounts in T-accounts and FSAM in matrix form.

Groups of accounts in PFSAM2009 include the following:

1. **Production accounts** are represented by the supply and use tables that are cross-classified into institutional sectors. Value added is derived as the difference between output and intermediate consumption.
2. **Primary distribution of income** (for value added and property income) is where primary incomes are generated and then distributed. They consist of compensation of employees paid to owners of labor, and operating surplus retained or distributed as property income to owners of financial and nonfinancial assets that are used in production.
3. **Secondary distribution of income** shows payments and receipts of current transfers among institutional sectors. Current transfers include income taxes, social

contribution benefits, insurance premiums and claims, remittances, international assistance, etc.

4. **Use of disposable income account** shows final consumption expenditures and gross savings.
5. **Capital account** shows the use of gross savings and capital transfers for gross capital formation.
6. **Financial account** shows the acquisition or disposition of financial assets to manage net borrowing for gross capital formation or net lending when gross savings go beyond the capital required for gross capital formation. In other words, financial account allows for analysis of portfolios held by institutional sectors.
7. **Rest of the world account (ROW)** shows the transactions of the rest of the world with the total economy. It is constructed from the point of view of the rest of the world, so that imports of the economy are viewed as resources of ROW and exports of the economy uses of ROW.

The link or the effect of one account to the subsequent account is a **balancing item** which is calculated as a residual. For example, the link between production account and primary distribution of income is **value added**; the link between the primary distribution of income and the secondary distribution of income is **gross national income**; the link between the secondary distribution of income and use of income is **gross disposable income**; the link between use of income and capital accounts is **savings**; and finally the link between capital account and financial account is **net lending/net borrowing**.

IV. PFSAM2009 as one comprehensive matrix

IN PFSAM2009, FSAM as one comprehensive matrix, is the direct outcome of the SNA institutional sector accounts by arranging the same set of data in matrix form without any additional data compilation required. Thus PFSAM (in the sense of a block of output of the project) is a built-in by product of SNA (also in the sense of a block of output of the project). FSAM also shows discrepancies for its every single column and row, as the system requires that the sum total of each column must equal the sum total of each row, with the exception of rest of the world account. The row of discrepancies in FSAM facilitates the identification of problematic data that need to be checked. Discrepancies may be retained if all reasons for discrepancies are checked in order to show the weakness of basic data sources.

Data sources

Data sources used in PFSAM2009 are as follows:

1. The supply-use tables (SUT) by institutional sectors are derived from the conventional SUT of industry by product with the use of the cross classification schemes that are primarily based on the indicators derived from the special tabulation of the results of the 2008 Annual Survey of Philippine Business and Industries (ASPBI) of the National Statistics Office. This special tabulation, which is unpublished, cross classifies industry data by type of economic organization, such as: (1) corporations, public and private, (2) partnerships, and (3) single proprietorships, among others. The SUT Non-Financial sector consists of corporate enterprises that include partnerships and corporations.
2. The rest of the world (ROW) data are from the 2009 Balance of Payments (BOP) generated by the BSP.
3. With regard to the data block on allocation of primary account and secondary distribution on income account, some are based on actual data and the rest are based on indicators on investment and outstanding liabilities.
4. Capital and Financial Accounts are directly based from the Flow of Funds (FOF) except for the Non-financial and Household /NPISH. The coverage of SUT Non-Financial sector consists of corporate enterprises which include partnerships and corporations while the 2009 FOF non-financial sector only includes data on corporate enterprise. Therefore, the FOF non-financial sector for FSAM is adjusted in order to include the financial structure of quasi-corporate while the Household and NPISH were taken as a residual.
5. From whom-to-whom transactions in property incomes and current transfers of ROW, Central Bank, Depository Corporations, Insurance and Pension, are derived from income statements, annual reports of Commission on Audit, and Insurance Commission. On the other hand, from whom-to- whom transactions of non-financial and Household Sectors are taken as residuals. From whom to whom transaction in loans are based on FOF bridge tables. It should be noted that the use transactions reflect the asset side of the table while the receipt side are the liabilities.

Technical Appendix C

Calculation of counterfactual values

Year	Overseas Filipinos' Remittances				Exports of goods			
	Actual (USD millions) (1)	Growth rate (%) (2)	Estimated levels using average growth rates (3)	Percent difference of estimated levels to actual (4)	Actual (USD millions) (5)	Growth rate (%) (6)	Estimated levels using average growth rates (7)	Percent difference of estimated levels to actual (8)
2002	6,886.16				37,831			
2003	7,578.46	10.05			38,728	2.37		
2004	8,550.37	12.82			42,837	10.61		
2005	10,689.01	25.01			44,788	4.55		
2006	12,761.31	19.39			52,970	18.27		
2007	14,449.93	13.23			59,278	11.91		
2008	16,426.85	13.68	16,776.66	2.13	57,970	-2.21	64,934.60	12.01
2009	17,348.05	5.61	19,478.03	12.28	48,624	-16.12	71,130.99	46.29
Ave growth rate, 2002-2007		16.1				9.5		
Estimated percent loss				14.50				58.81

Source of actual data: Department of Economic Statistics

The table reports the counterfactual values when the impact of the global financial crisis is simulated, as indicated by overseas remittances and exports of goods. The average annual growth rates for 2002 to 2007 (bottom of columns 2 and 6) are used to calculate the levels of overseas remittances and exports of goods that would have been reached had the global financial crisis not occurred (columns 3 and 7). For overseas remittances, the counterfactual levels are about 2.1 and 12.3 percent for 2008 and 2009, respectively (column 4); for exports of goods, 12 and 46.3 percent (column 8). The percentages are added⁴⁸ to get the value of losses (bottom of columns 4 and 8).

⁴⁸ The 2008 rate was compounded using the 2009 average 91-day Treasury bill rate of 4.2 percent.