# Global economic crisis, gender and poverty in the Philippines

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## 1. Introduction

The 2008-09 global economic contraction has brought renewed concerns regarding economic security and welfare in the developing world. This is because although developing countries may be affected differently—owing to their heterogeneity and varying linkage to the global economy—fears of possible reversals of economic progress, susceptibility to greater instability and higher risk have been expressed (Lin 2008). Indeed, apart from the projected short-term financing requirement of about $270 to $700 billion dollars—not to mention a myriad of negative economic effects—developing countries also confront the possibility of facing a higher spread on their own issued sovereign bonds in the long term.

Whereas global economic activity is expected to recover by 2010, the rebound is projected to be sluggish and may not be enough to counter the rise in unemployment and poverty levels that the global contraction has additionally inflicted (IMF 2009). Estimates confirm that a significant number of people have been affected. The International labour organization (ILO 2009) reported a reduction in global employment of 1.4 percent in 2008 and expects additional unemployment to increase between 39 and 59 million people in 2009. Chen and Ravallion (2009) estimate that because of the crisis, 64 million people have additionally fallen into poverty based on $2 a day poverty line. More importantly, the crisis is expected not only to slow down the progress of achieving the Millennium Development Goals (MDGs) for developing countries, but also increase the cost of achieving them. For instance in Latin America, countries must additionally spend about 1.5 to 2 percent of GDP per year between 2010 and 2015 in order to meet their MDGs (Sanchez and Vos 2009).

The Philippines like most developing economies has not been spared from the global economic contraction. Although the country's financial sector remained stable, owing to reforms

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instituted after the 1997 Asian financial crisis and limited exposure to US assets, it still suffered a dramatic deceleration in economic growth. This deceleration is attributed to slowdown in international trade, reduction foreign direct investment, cutback in household consumption and moderate increase in unemployment (Yap *et al.* 2009).

The evidence so far suggests that export demand and investment are the two principal channels with which the global economic contraction has affected the Philippine economy. Weak global demand resulted in Philippine exports falling dramatically by 25 percent in July 2009 or a fall of roughly US$1 billion dollars in export earnings when compared to the same period in 2008. Electronic products which account for almost 57 percent of total Philippine export revenue fell by 26 percent resulting in foregone export earnings of about US$600 million dollars in 2008. Moreover, 8 out of 10 key exports earners registered a significant reduction ranging from 14 percent in wiring products to as high as 65 percent reduction in copper exports. Foreign direct investments to the Philippines also contracted due to uncertainty and risk aversion, compounded by the fact that the United States is the biggest investor in the country. In 2008, net foreign direct investments from January to November stood at US$1.7 billion dollars, roughly 41 percent below 2007 levels, whereas net inflow of equity capital in 2008 reached US$1 billion dollars, which is 50 percent less than those obtained in 2007 (Diokno 2008). Fortunately, remittance from Overseas Filipino workers (OFWs), which accounts for about 10 percent of the Gross National Product (GNP), remained buoyant albeit growing at a marginal 3 percent relative to 2008 levels (BSP 2009)—since a majority of OFWs are working in the Middle East.

Analyses based on a community based monitoring system (CMBS) household survey—which was conducted on a sample of 2082 households to capture the impact of the crisis on Filipino households in 2009—reveals that households have been affected by changes in both domestic and international environment (Reyes *et al.* 2009). Out of 415 households with a household member working abroad: 16 percent had a member who was retrenched and has since gone back to the country; and 9 percent reported a fall in remittances received owing to a wage reduction experienced by the household member working abroad. On the domestic front and based on the full sample of households: 2.8 percent reported having members experienced a reduction in wages; 2.2 confirmed that members working hours have been reduced; and less than a percent reported a reduction in benefits. Some households have likewise reported that a member has been laid off while others saw a reduction or a cessation in their entrepreneurial activity.

While recent assessments on the impact of global crisis on the Philippines have been made (cf. Diokno 2008; Yap *et al.* 2009; Reyes *et al.* 2009), no study has so far assessed the economy-wide effects and the poverty and inequality impacts of the crisis on the Philippine economy. Furthermore, no analysis

has been undertaken to understand how the crisis may have affected women and gender in the Philippines. To the extent that most women in the Philippines work in export-oriented industries such as textiles and semi-conductors, as well as in service related industries like trade and business process outsourcing, it is important that an analysis that accounts for the differential impact on men and women be undertaken. Indeed, past experience confirm that as a result of the 1997 Asian financial crisis, women labor market participation and working hours have increased relative to men.

Using a computable general equilibrium model linked to a micro-simulation module, this paper analyzes the economy-wide effects of a reduction in export demand facing the Philippine economy. We pay particular emphasis on the exports channel relative to the foreign direct investment (FDI) since investment inflows into the Philippines declined since the turn of the century. Hence, FDI has not been a significant source of economic growth unlike the country's East Asian neighbors. The analysis traces the transmission channels from the macro-economic to the microeconomic level: from gross domestic product to output and factor supplies and demands; from commodity and factor prices to employment by gender and household incomes to levels of poverty and income distribution.

The remaining sections are organized as follows: Section 2 describes the database while section 3 describes the model. Section 4 enumerates the simulations, describes the mechanism employed to capture reduction in export demand volume facing the Philippines, and analyzes the simulation results. Section 5 concludes and provides suggestions for further research.

## 2. The Database

This section explains the database and describes the economic structure of the Philippine economy based on the year 2000 input–output table (I-O), labor force survey (LFS) and the family income and expenditure survey (FIES). Figure 1 presents the schematic representation of the database, which reveals an absorption matrix showing detailed purchases made by agents in the economy. Each economic agent/demander corresponds to a column vector while each row vector distinguishes the type of outlay incurred. Agents are classified into industries, investments, households, exports, government, and inventories; outlays are categorized into basic flows (commodities by sources at basic prices), margins, taxes, labor, capital, land, production tax and other costs.

**Figure 1: Schematic representation of the Database**

| | | Absorption Matrix | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| | | Producers | Investors | Household | Export | Other | Change in Inventories |
| | Size | ← I → | ← I → | ← H → | ← 1 → | ← 1 → | ← 1 → |
| Basic Flows | ↑ C×S ↓ | V1BAS | V2BAS | V3BAS | V4BAS | V5BAS | V6BAS |
| Margins | ↑ C×S×M ↓ | V1MAR | V2MAR | V3MAR | V4MAR | V5MAR | n/a |
| Taxes | ↑ C×S ↓ | V1TAX | V2TAX | V3TAX | V4TAX | V5TAX | n/a |
| Labor | ↑ O ↓ | V1LAB | | | | | |
| Capital | ↑ 1 ↓ | V1CAP | | | | | |
| Land | ↑ 1 ↓ | V1LND | | | | | |
| Other Costs | ↑ 1 ↓ | V1OCT | | | | | |

*C = 35 commodities*
*I = 35 industries*

*S = 2 sources: domestic and imported*
*O = 6 occupation types*

*M = 3 commodities used as margins.*
*H = 42,094 household*

Source: Adapted from Horridge (2007)

The dimension of the database is determined by the number of industries (I), commodities (C), sources (S), margin commodities (M), occupation types (O) and households (H). In this application, there are 35 industries and commodities, 2 sources, 3 margins services, 6 occupation types classified by skill and gender, and all 42,094 from the household survey. Each of the **C** commodities can be obtained from two sources **S**, either locally or imported from abroad. **M** of the domestically produced goods is also classified as margin commodities, which are responsible for transferring commodities from their sources to their users.

A salient feature of this database is its ease of reference—the different outlays are additionally identified by a three letter acronym, and agents correspondingly represent a number based on the column they occupy. Thus, each cell in the absorption matrix names the corresponding data matrix and these names follow a pattern. For example, V1BAS, which lies at the intersection of the first column and first row, is a 3-dimensional array showing the cost of commodity flows from sources **S** to producers. Similarly, V1MAR, the intersection of the first column and second row, is a 4-dimensional array showing the value of margin services type **M** used to deliver each basic flow of good **C**, from sources **S,** to investors.

Let us now explore the individual sub-matrices found in the database. The first row

termed "BAS", with dimension **C**x**S,** reports the value of source specific commodities at basic prices. When traced to each agent's column, it reveals that commodities are: used by industries as intermediate inputs to current production (V1BAS) and capital formation (V2BAS); consumed by households (V3BAS) and the government (V4BAS); exported (V5BAS); added to or subtracted from inventories (V6BAS). Note that V5BAS only appear in the export column. The second row "MAR" with dimension **C**x**S**x**M** corresponds to value of payments of margins by each agent (V1MAR to V5MAR) from purchasing locally produced and imported commodities. Margin services are assumed to be domestically produced and are valued at basic prices. Associated with agents' purchase are commodity sales tax payments to the government "TAX", shown along the third row, with dimension **C**x**S** as sales taxes are assessed by commodity and sources. Hence, the costs of margin services together with sales taxes account for the difference between the basic prices (received by producers and importers) and purchasers' prices (paid by users).

The remaining rows, which only span along the industries' column relate to additional costs incurred by industries for current production. These are the use of primary factors such as labor (classified by **O** occupations), fixed capital, agricultural land; production taxes which include output taxes or subsidies that are not user-specific; and 'other costs' categories that covers other miscellaneous taxes on firms. Finally, the database includes two satellite matrices, representing the **MAKE** matrix and import tariff data. The former shows the value of output of each commodity by each industry[2], while the latter records the tariffs levied on imports, which vary by user. The revenue obtained from this tariff is represented by the tariff vector **V0TAR**. Database consistency is likewise ensured. First, for each industry, the total cost of production is equal to the value of output (column sum of the MAKE matrix). Second, for each commodity, the total value of sales is equal to the value of total output (row sum of MAKE). Third, aggregate demand for domestic and imported goods is equal to their aggregate supply.[3]

Table 1 presents the production and trade structure of the Philippines in the year 2000. The manufacturing sector accounts for 51 percent of total output followed by services and agriculture with 40.4 and 8.6 percent respectively. Similarly, the manufacturing sector

[2] Multi-production is allowed suggesting that in principle, each industry is capable of producing any of the C commodity types. However, due to lack of data, this study assumes that each industry only produces one commodity, resulting in a diagonal MAKE matrix.

[3] A caveat of this database however, is that unlike a Social Accounting Matrix (SAM) direct tax or transfers are not accounted for.

dominates international trade. Indeed, it accounts for roughly 90 percent of exports, outperforming the services and agricultural sectors with 8.7 and 1.6 percent shares, respectively. Even with food processing sub-sectors included, agriculture only contributes about 5 percent of total exports. The principal industrial exports are semiconductors, electric appliances and garments, while all processed food exports account for a combined 4 percent share. On the other hand, agriculture exports primarily originate from fruits and vegetables, and fishing and forestry. The most export intensive sectors are semiconductors, machineries, electric appliances, garments and footwear for manufacturing; fruits and vegetables, and fishing and forestry in agriculture; and business process outsourcing for services.

**Table 1: Production and trade structure of industries**

| | Shares | | | | Intensity | | Tariff on |
|---|---|---|---|---|---|---|---|
| **Sectors** | **Output** | **Domestic** | **Exports** | **Imports** | **Export** | **Imports** | **Imports** |
| Paddy Rice | 1.3 | 1.7 | - | - | - | - | 50.0 |
| Corn | 0.4 | 0.5 | 0.0 | 0.1 | 0.1 | 8.4 | 40.2 |
| Coconut | 0.3 | 0.4 | 0.0 | - | 0.2 | - | 10.6 |
| Fruits and Vegetables | 1.4 | 1.5 | 0.9 | 0.3 | 14.6 | 6.1 | 31.2 |
| Raw Sugar and Sugar cane | 0.2 | 0.3 | 0.0 | - | 0.0 | - | 41.7 |
| Other Crops | 0.4 | 0.5 | 0.0 | 1.3 | 2.8 | 44.1 | 4.7 |
| Livestock | 1.4 | 1.8 | 0.0 | 0.1 | 0.1 | 2.2 | 14.1 |
| Poultry | 1.1 | 1.4 | 0.0 | 0.0 | 0.0 | 0.4 | 24.8 |
| Fishing and Forestry | 1.9 | 2.3 | 0.7 | 0.0 | 8.0 | 0.3 | 10.4 |
| Other Agriculture | 0.2 | 0.3 | - | 0.0 | - | 0.1 | - |
| **AGRICULTURE** | **8.6** | **10.5** | **1.7** | **1.9** | **4.3** | **5.1** | **24** |
| Mining | 0.5 | 0.5 | 0.3 | 8.8 | 14.7 | 83.3 | 2.0 |
| Processed Meat and Fish | 4.2 | 5.0 | 1.2 | 1.8 | 6.1 | 9.7 | 16.9 |
| Other Processed food | 3.1 | 3.5 | 1.9 | 1.6 | 12.9 | 11.8 | 11.5 |
| Rice and Corn Milling | 2.2 | 2.9 | 0.0 | 0.3 | 0.0 | 3.0 | 85.7 |
| Sugar Milling | 0.2 | 0.3 | 0.0 | 0.0 | 0.4 | 2.4 | 9.2 |
| Tobacco and Alcohol | 1.3 | 1.6 | 0.1 | 0.3 | 1.3 | 5.6 | 11.6 |
| Textiles | 1.3 | 1.4 | 1.0 | 2.8 | 16.8 | 36.7 | 11.9 |
| Garments and Footwear | 3.1 | 2.0 | 7.2 | 2.4 | 50.5 | 26.5 | 6.0 |
| Paper and Wood products | 2.1 | 2.2 | 1.9 | 1.8 | 19.5 | 19.2 | 9.4 |
| Chemicals | 2.4 | 2.8 | 0.9 | 5.5 | 8.0 | 36.3 | 5.9 |
| Petroleum | 2.4 | 2.8 | 1.2 | 1.9 | 10.9 | 16.4 | 3.6 |
| Cement and Metal | 3.4 | 3.6 | 2.4 | 4.7 | 15.3 | 27.7 | 9.1 |
| Machineries | 3.4 | 0.8 | 12.6 | 9.1 | 81.3 | 76.8 | 3.0 |
| Electric related and Appliances | 7.9 | 2.8 | 26.2 | 17.0 | 71.8 | 63.7 | 8.2 |
| Semi-conductors | 6.3 | 0.4 | 27.7 | 18.4 | 95.0 | 93.1 | 4.4 |
| Transport Machineries | 1.9 | 2.0 | 1.7 | 3.4 | 19.5 | 33.2 | 9.5 |
| Other Manufacturing | 1.5 | 1.1 | 2.9 | 2.0 | 42.0 | 35.0 | 7.2 |
| Construction | 3.7 | 4.6 | 0.3 | 0.3 | 1.5 | 1.9 | - |
| **MANUFACTURING** | **51.0** | **40.3** | **89.6** | **82.3** | **38.1** | **37.4** | **10.1** |
| Utilities | 2.4 | 3.1 | - | - | - | - | - |
| Transport and Communications | 6.5 | 7.8 | 1.7 | 8.1 | 5.7 | 23.3 | - |
| Wholesale and Retail Trade | 10.0 | 12.5 | 0.8 | 0.6 | 1.7 | 1.5 | - |
| Public Services | 5.7 | 7.2 | 0.1 | 0.0 | 0.4 | 0.2 | - |
| Professional and Business Services | 2.2 | 2.5 | 1.0 | 2.2 | 9.7 | 20.4 | - |
| Business Process Outsourcing | 0.0 | 0.0 | 0.1 | - | 91.8 | - | - |
| Other Services | 13.6 | 16.0 | 5.0 | 4.7 | 7.9 | 8.0 | - |
| **SERVICES** | **40.4** | **49.2** | **8.7** | **15.7** | **4.7** | **8.6** | |
| **TOTAL** | **100.0** | **100.0** | **100.0** | **100.0** | | | |

Notes: Export Intensity is computed as the ratio of exports to total output; Import Intensity is the ratio of imports to total domestic absorption (where absorption is the sum of Domestic and Imports).

Similarly, 82 percent of total imports accrue to the industrial sector with the

remainder going to the agricultural sector and services (Table 1). This enormous share stems from the low valued added, import-intensive and assembly-type operation nature of the manufacturing sector, particularly in the semiconductor and electric appliances subsectors (Table 2). Hence, it is not surprising that these two sub-sectors are likewise the foremost importers with 18.4 and 17 percent share in total imports respectively, and the most import-intensive sub-sectors. Other import-intensive sub-sectors are mining (83 percent, mainly due to crude-oil imports), machineries, and textiles.

Table 1 also shows the average weighted tariff rates for all sectors, with agriculture enjoying a much higher tariff protection relative to manufacturing (24 vs. 10 percent). Tariff rates are generally higher in agriculture and food processing sub-sectors, with rice and corn milling enjoying the highest protection at 85 percent. Within agriculture, high tariff rates are also imposed on corn, fruits and vegetables, poultry, and livestock. Notably, paddy rice and raw sugar benefit from prohibitive tariff rates resulting in zero imports for both sub-sectors.

Table 2 reports the sales disposition for all industries. On the whole, 62 percent of total agricultural commodities are sold as intermediate inputs while only 4 percent are destined towards the export market. The low export share was due to decreased competitiveness of the agricultural sector, which used to be the main export earner in the 1980s (David 2008). In contrast, only 30 percent of total manufacturing commodities are sold for intermediate purposes with the remaining shares destined toward final demand categories—exports, household demand and investments accounting for 38.1 and 19.4 and 9.8 percent shares respectively.

The sales dispositions of services differ from those of agriculture and manufacturing with intermediate inputs and margin sales accounting for a combined 40 percent share. Household demand for commodities is likewise significant. This is particularly so for agriculture and agro-industrial products such as fishing and forestry, fruits and vegetables, all processed food commodities, and tobacco and alcohol. Finally, commodities which are export intensive are business process outsourcing, semi-conductors, machineries, appliances, garments, and fruits and vegetables.

**Table 2: Sales dispositions**

| | Intermediate | Investment | Households | Exports | Government | Stocks | Margins | Total |
|---|---|---|---|---|---|---|---|---|
| Paddy Rice | 97.7 | - | - | - | - | 2.3 | - | 100 |
| Corn | 85.3 | - | 14.5 | 0.1 | - | 0.2 | - | 100.0 |
| Coconut | 79.3 | 1.9 | 18.6 | 0.2 | - | - | - | 100.0 |
| Fruits and Vegetables | 28.4 | 4.3 | 53.4 | 13.9 | - | - | - | 100.0 |
| Raw Sugar and Sugar cane | 99.7 | - | 0.3 | - | - | - | - | 100.0 |
| Other Crops | 68.9 | 7.3 | 5.2 | 1.6 | - | 17.0 | - | 100.0 |
| Livestock | 80.1 | 14.5 | - | 0.1 | - | 5.3 | - | 100.0 |
| Poultry | 66.2 | 2.8 | 30.9 | - | - | - | - | 100.0 |
| Fishing and Forestry | 31.1 | 0.4 | 60.5 | 8.0 | - | 0.1 | - | 100.0 |
| Other Agriculture | 100.0 | - | - | - | - | - | - | 100.0 |
| **AGRICULTURE** | 62.7 | 3.9 | 27.4 | 4.3 | - | 1.8 | - | 100.0 |
| Mining | 95.6 | - | 1.3 | 2.8 | - | 0.3 | - | 100.0 |
| Processed Meat and Fish | 28.0 | - | 65.3 | 5.6 | - | 1.1 | - | 100.0 |
| Other Processed food | 49.0 | - | 38.2 | 11.6 | - | 1.3 | - | 100.0 |
| Rice and Corn Milling | 24.5 | - | 77.9 | - | - | - 2.4 | - | 100.0 |
| Sugar Milling | 69.5 | - | 23.4 | 0.4 | - | 6.7 | - | 100.0 |
| Tobacco and Alcohol | 31.6 | - | 62.9 | 1.3 | - | 4.3 | - | 100.0 |
| Textiles | 71.6 | - | 16.8 | 11.4 | - | 0.3 | - | 100.0 |
| Garments and Footwear | 32.6 | - | 23.1 | 42.8 | - | 1.5 | - | 100.0 |
| Paper and Wood products | 70.4 | - | 10.9 | 16.4 | - | 2.4 | - | 100.0 |
| Chemicals | 69.1 | - | 23.9 | 5.2 | - | 1.7 | - | 100.0 |
| Petroleum | 78.6 | - | 12.4 | 9.3 | - | - 0.2 | - | 100.0 |
| Cement and Metal | 85.1 | 0.8 | 1.1 | 11.6 | - | 1.4 | - | 100.0 |
| Machineries | 25.4 | 21.5 | 0.1 | 50.1 | - | 2.9 | - | 100.0 |
| Electric related and Appliances | 35.3 | 7.2 | 6.1 | 48.1 | - | 3.3 | - | 100.0 |
| Semi-conductors | 39.8 | - | - | 56.9 | - | 3.2 | - | 100.0 |
| Transport Machineries | 29.8 | 42.4 | 12.9 | 14.0 | - | 1.0 | - | 100.0 |
| Other Manufacturing | 34.1 | 10.3 | 18.5 | 32.0 | - | 5.1 | - | 100.0 |
| Construction | 6.7 | 91.9 | - | 1.5 | - | - | - | 100.0 |
| **MANUFACTURING** | 31.6 | 9.8 | 19.4 | 38.1 | - | 1.0 | - | 100.0 |
| Utilities | 65.6 | - | 34.4 | - | - | - | - | 100.0 |
| Transport and Communications | 23.8 | 1.5 | 51.8 | 4.5 | - | - | 18.4 | 100.0 |
| Wholesale and Retail Trade | 12.4 | 0.9 | 19.4 | 1.7 | - | - | 65.6 | 100.0 |
| Public Services | - | - | 0.5 | 0.4 | 99.2 | - | - | 100.0 |
| Professional and Business Services | 81.4 | - | 10.7 | 7.9 | - | - | - | 100.0 |
| Business Process Outsourcing | 8.2 | - | - | 91.8 | - | - | - | 100.0 |
| Other Services | 17.1 | - | 72.1 | 7.3 | - | - | 3.4 | 100.0 |
| **SERVICES** | 20.5 | 0.4 | 39.1 | 4.7 | 13.9 | - | 21.5 | 100.0 |

Table 3 lays out the cost structure for all industries. Both agriculture and services are primary factor intensive relative to industry which uses more intermediate inputs. Agro-industrial industries are the most domestic intermediate input intensive owing to prohibitive tariff imposed on intermediate agriculture inputs. Apart from the petroleum sector which relies on imported oil, both semiconductor and electric appliances subsectors are the foremost imported intermediate input user due to their low valued added, import-intensive and assembly-type operation nature.

## Table 3: Cost structure for industries

| | IntDom | IntImp | Margins | ComTax | Labor | Capital | Land | OCT | Total |
|---|---|---|---|---|---|---|---|---|---|
| Paddy Rice | 16.7 | 4.5 | 0.8 | 0.5 | 38.4 | 28.5 | 10.5 | 0.0 | 100 |
| Corn | 16.6 | 3.6 | 0.6 | 0.7 | 45.2 | 24.3 | 9.0 | 0.0 | 100 |
| Coconut | 8.2 | 2.2 | 0.6 | 0.2 | 38.2 | 37.0 | 13.7 | 0.0 | 100 |
| Fruits and Vegetables | 14.8 | 4.2 | 0.9 | 0.3 | 28.2 | 36.3 | 15.3 | 0.0 | 100 |
| Raw Sugar and Sugar cane | 21.9 | 6.9 | 0.7 | 0.8 | 24.6 | 32.9 | 12.2 | 0.0 | 100 |
| Other Crops | 17.7 | 3.8 | 0.7 | 0.4 | 24.0 | 37.3 | 16.0 | 0.0 | 100 |
| Livestock | 30.6 | 2.7 | 0.8 | 0.4 | 23.5 | 31.8 | 10.3 | 0.0 | 100 |
| Poultry | 32.4 | 5.3 | 1.1 | 0.5 | 20.9 | 29.5 | 10.3 | 0.0 | 100 |
| Fishing and Forestry | 18.3 | 2.1 | 0.7 | 0.6 | 18.9 | 56.2 | 3.1 | 0.0 | 100 |
| Other Agriculture | 10.8 | 3.0 | 1.2 | 0.3 | 35.8 | 36.2 | 12.7 | 0.0 | 100 |
| **AGRICULTURE** | 20.6 | 3.6 | 0.8 | 0.5 | 27.1 | 37.4 | 10.0 | 0.0 | 100 |
| Mining | 28.8 | 6.9 | 1.2 | 1.4 | 13.6 | 47.5 | 0.5 | 0.0 | 100 |
| Processed Meat and Fish | 67.6 | 4.1 | 2.3 | 1.2 | 6.0 | 18.7 | 0.0 | 0.0 | 100 |
| Other Processed food | 57.5 | 7.7 | 4.2 | 1.0 | 7.2 | 22.4 | 0.0 | 0.0 | 100 |
| Rice and Corn Milling | 64.6 | 1.5 | 1.6 | 2.2 | 10.4 | 19.9 | 0.0 | 0.0 | 100 |
| Sugar Milling | 38.5 | 34.3 | 2.0 | 1.4 | 8.4 | 15.5 | 0.0 | 0.0 | 100 |
| Tobacco and Alcohol | 45.4 | 8.3 | 3.1 | 2.7 | 12.2 | 28.1 | 0.0 | 0.2 | 100 |
| Textiles | 34.4 | 23.8 | 3.7 | 0.8 | 12.5 | 24.8 | 0.0 | 0.0 | 100 |
| Garments and Footwear | 31.5 | 17.4 | 5.3 | 0.6 | 13.6 | 31.6 | 0.0 | 0.0 | 100 |
| Paper and Wood products | 42.0 | 15.6 | 2.6 | 0.7 | 11.5 | 27.7 | 0.0 | 0.0 | 100 |
| Chemicals | 34.8 | 20.0 | 3.0 | 1.1 | 10.7 | 30.3 | 0.0 | 0.0 | 100 |
| Petroleum | 13.2 | 69.2 | 0.7 | 2.5 | 5.1 | 9.1 | 0.0 | 0.2 | 100 |
| Cement and Metal | 37.0 | 18.7 | 5.1 | 1.3 | 9.9 | 28.1 | 0.0 | 0.0 | 100 |
| Machineries | 21.0 | 34.7 | 8.9 | 0.5 | 4.0 | 30.9 | 0.0 | 0.0 | 100 |
| Electric related and Appliances | 20.9 | 38.4 | 7.0 | 0.4 | 8.4 | 24.9 | 0.0 | 0.0 | 100 |
| Semi-conductors | 12.9 | 56.9 | 5.0 | 0.3 | 8.5 | 16.5 | 0.0 | 0.0 | 100 |
| Transport Machineries | 37.8 | 20.7 | 8.8 | 0.9 | 8.4 | 23.4 | 0.0 | 0.0 | 100 |
| Other Manufacturing | 32.6 | 13.6 | 5.4 | 0.7 | 15.7 | 32.0 | 0.0 | 0.0 | 100 |
| Construction | 31.4 | 9.4 | 5.5 | 0.7 | 24.6 | 28.4 | 0.0 | 0.0 | 100 |
| **MANUFACTURING** | 33.6 | 26.3 | 4.8 | 0.9 | 10.1 | 24.3 | 0.0 | 0.0 | 100 |
| Utilities | 19.5 | 9.1 | 1.4 | 1.6 | 12.5 | 55.8 | 0.0 | 0.0 | 100 |
| Transport and Communications | 32.1 | 11.1 | 1.3 | 1.9 | 13.4 | 40.2 | 0.0 | 0.0 | 100 |
| Wholesale and Retail Trade | 23.1 | 7.3 | 2.7 | 0.8 | 17.6 | 48.5 | 0.0 | 0.0 | 100 |
| Public Services | 22.6 | 3.9 | 0.7 | 0.5 | 68.9 | 3.3 | 0.0 | 0.0 | 100 |
| Professional and Business Services | 35.3 | 7.3 | 1.1 | 1.2 | 27.0 | 28.2 | 0.0 | 0.0 | 100 |
| Business Process Outsourcing | 31.1 | 2.5 | 0.7 | 1.2 | 30.9 | 33.6 | 0.0 | 0.0 | 100 |
| Other Services | 28.9 | 4.8 | 0.8 | 0.7 | 16.7 | 48.1 | 0.0 | 0.0 | 100 |
| **SERVICES** | 26.9 | 6.7 | 1.4 | 1.0 | 24.0 | 40.0 | 0.0 | 0.0 | 100 |

Notes: IntDom - Intermediate inputs from domestic sources; IntImp – Imported intermediate inputs; Margins – Trade and Transport margins; ComTax – Commodity Tax; OCT – Other costs such as licensing and permits.

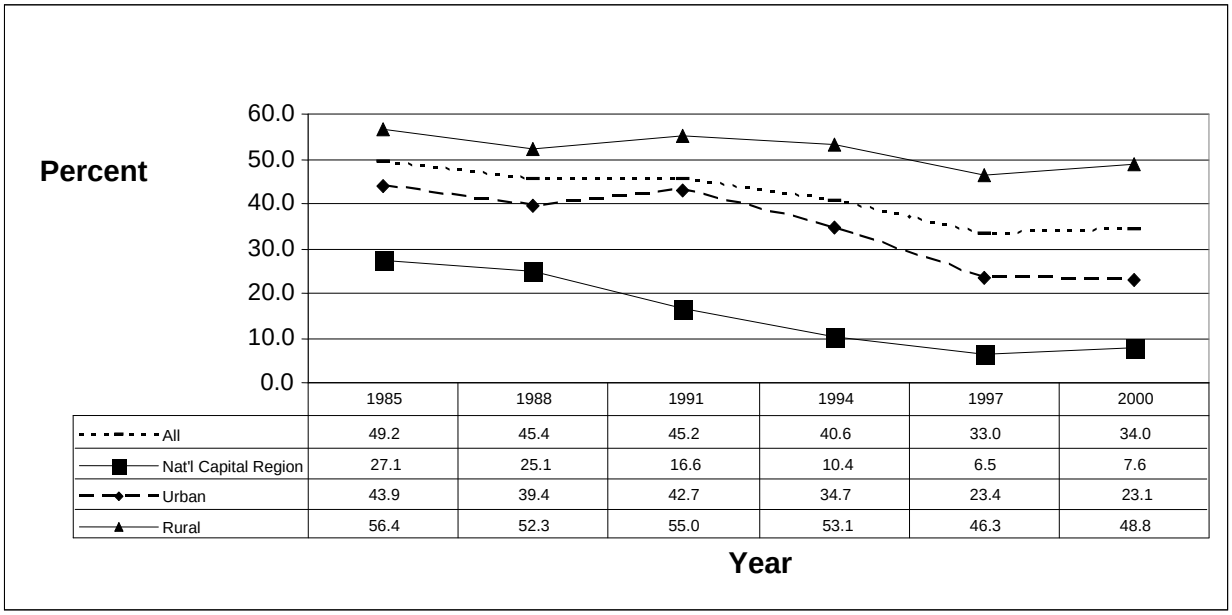
Table 4 shows the primary factor use for each industry. Agriculture sectors generally have a higher primary factor to output ratio compared to industry and services, although their contribution to economy-wide primary factor use (value added or GDP) is quite small. Indeed, agriculture only contributes 13.6 percent to GDP, whereas industry and services contribute 35 and 52 percent respectively. The services sector is the main labor employer, particularly, public services, 'other services' and wholesale and retail trade sub-sectors representing a combined 46 percent share in total labor employment in the country. Other major employers are construction, semi-conductors, electric appliances, paddy rice and fruits and vegetables.

## Table 4: Primary factor usage

| | Economy-wide Shares | | | | Ratio | Primary Factor share$_i$ | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sector** | Labor | Capital | Land | All Factors | Prim/Output | Labor | Capital | Land | TOTAL |
| Paddy Rice | 2.9 | 1.2 | 16 | 2.0 | 77.5 | 49.6 | 36.8 | 13.6 | 100 |
| Corn | 1 | 0.3 | 3.9 | 0.6 | 78.5 | 57.6 | 31 | 11.5 | 100 |
| Coconut | 0.8 | 0.4 | 5.5 | 0.6 | 88.9 | 43 | 41.6 | 15.4 | 100 |
| Fruits and Vegetables | 2.3 | 1.6 | 24.7 | 2.2 | 79.7 | 35.3 | 45.5 | 19.2 | 100 |
| Raw Sugar and Sugar cane | 0.3 | 0.2 | 3.1 | 0.3 | 69.7 | 35.4 | 47.2 | 17.5 | 100 |
| Other Crops | 0.5 | 0.4 | 7 | 0.6 | 77.3 | 31 | 48.3 | 20.7 | 100 |
| Livestock | 1.9 | 1.4 | 16.5 | 1.8 | 65.5 | 35.9 | 48.5 | 15.7 | 100 |
| Poultry | 1.3 | 1 | 12.8 | 1.3 | 60.7 | 34.4 | 48.5 | 17.1 | 100 |
| Fishing and Forestry | 2.1 | 3.4 | 7 | 3.0 | 78.2 | 24.2 | 71.8 | 4 | 100 |
| Other Agriculture | 0.5 | 0.3 | 3.4 | 0.4 | 84.7 | 42.3 | 42.7 | 15 | 100 |
| **AGRICULTURE** | **13.6** | **10.2** | **99.7** | **12.9** | **74.5** | | | | |
| Mining | 0.4 | 0.7 | 0.3 | 0.7 | 61.6 | 22 | 77.2 | 0.8 | 100 |
| Processed Meat and Fish | 1.5 | 2.5 | 0 | 2.1 | 24.7 | 24.4 | 75.6 | 0 | 100 |
| Other Processed food | 1.3 | 2.2 | 0 | 1.9 | 29.7 | 24.4 | 75.6 | 0 | 100 |
| Rice and Corn Milling | 1.4 | 1.4 | 0 | 1.4 | 30.2 | 34.3 | 65.7 | 0 | 100 |
| Sugar Milling | 0.1 | 0.1 | 0 | 0.1 | 23.8 | 35.1 | 64.9 | 0 | 100 |
| Tobacco and Alcohol | 0.9 | 1.1 | 0 | 1.0 | 40.3 | 30.4 | 69.6 | 0 | 100 |
| Textiles | 1 | 1 | 0 | 1.0 | 37.3 | 33.6 | 66.4 | 0 | 100 |
| Garments and Footwear | 2.5 | 3.1 | 0 | 2.8 | 45.3 | 30.1 | 69.9 | 0 | 100 |
| Paper and Wood products | 1.4 | 1.9 | 0 | 1.7 | 39.2 | 29.4 | 70.6 | 0 | 100 |
| Chemicals | 1.5 | 2.3 | 0 | 2.0 | 41.0 | 26.1 | 73.9 | 0 | 100 |
| Petroleum | 0.7 | 0.7 | 0 | 0.7 | 14.2 | 36.2 | 63.8 | 0 | 100 |
| Cement and Metal | 1.9 | 3 | 0 | 2.6 | 38.0 | 26.1 | 73.9 | 0 | 100 |
| Machineries | 0.8 | 3.3 | 0 | 2.4 | 34.9 | 11.5 | 88.5 | 0 | 100 |
| Electric related and Appliances | 3.9 | 6.2 | 0 | 5.3 | 33.3 | 25.2 | 74.8 | 0 | 100 |
| Semi-conductors | 3.1 | 3.3 | 0 | 3.2 | 25.0 | 34.1 | 65.9 | 0 | 100 |
| Transport Machineries | 0.9 | 1.4 | 0 | 1.2 | 31.8 | 26.3 | 73.7 | 0 | 100 |
| Other Manufacturing | 1.4 | 1.5 | 0 | 1.4 | 47.7 | 32.9 | 67.1 | 0 | 100 |
| Construction | 5.3 | 3.3 | 0 | 3.9 | 53.0 | 46.5 | 53.5 | 0 | 100 |
| **MANUFACTURING** | **30** | **39** | **0.3** | **35.2** | **34.3** | | | | |
| Utilities | 1.8 | 4.3 | 0 | 3.4 | 68.3 | 18.3 | 81.7 | 0 | 100 |
| Transport and Communications | 5.1 | 8.2 | 0 | 7.0 | 53.6 | 25 | 75 | 0 | 100 |
| Wholesale and Retail Trade | 10.2 | 15.2 | 0 | 13.2 | 66.1 | 26.6 | 73.4 | 0 | 100 |
| Public Services | 22.7 | 0.6 | 0 | 8.2 | 72.2 | 95.4 | 4.6 | 0 | 100 |
| Professional and Business Services | 3.4 | 1.9 | 0 | 2.4 | 55.2 | 48.8 | 51.2 | 0 | 100 |
| Business Process Outsourcing | 0.1 | 0 | 0 | 0.0 | 64.5 | 47.8 | 52.2 | 0 | 100 |
| Other Services | 13.2 | 20.6 | 0 | 17.7 | 64.8 | 25.8 | 74.2 | 0 | 100 |
| **SERVICES** | **56.5** | **50.8** | **0** | **51.9** | **27.7** | | | | |
| **Total** | **100** | **100** | **100** | **100** | | | | | |

Figure 1 presents the evolution of the poverty-headcount index and the Gini coefficient from 1985 to 2000. The poverty headcount index dropped continuously from 49 percent in 1985 to 33 percent in 1997, but then climbed to 34 percent in 2000 as a result of the 1998 El Niño and the Asian financial crisis. On the other hand, income inequality steadily increased over this period as the Gini coefficient went from 0.45 in 1985 to 0.48 in 2000.

**Figure 1: Trends in poverty indices, the Philippines, 1985 to 2000**




| | 1985 | 1988 | 1991 | 1994 | 1997 | 2000 |
|---|---|---|---|---|---|---|
| All | 49.2 | 45.4 | 45.2 | 40.6 | 33.0 | 34.0 |
| Nat'l Capital Region | 27.1 | 25.1 | 16.6 | 10.4 | 6.5 | 7.6 |
| Urban | 43.9 | 39.4 | 42.7 | 34.7 | 23.4 | 23.1 |
| Rural | 56.4 | 52.3 | 55.0 | 53.1 | 46.3 | 48.8 |

Source: NSO (various years).

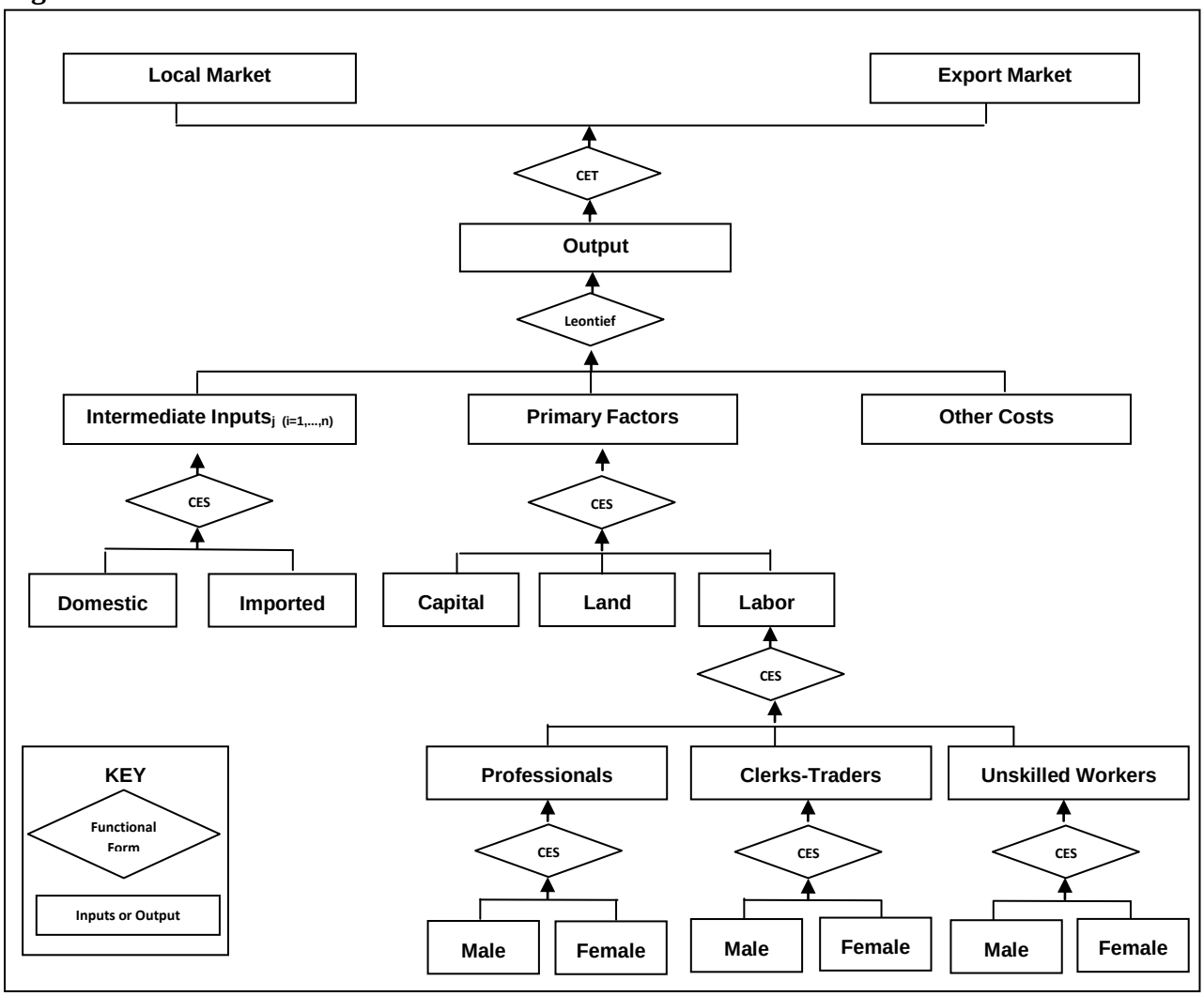
## 4. Model Structure

As mentioned previously, there are 35 producing sectors and commodities. They are composed of 10 sub-sectors in agriculture, fishing and forestry, 17 in industry, and 8 in services, including government services (Table ). Figure 2 illustrates the basic production structure of the model assuming constant returns. Separability assumptions are likewise imposed to allow producer input and output decisions to be divided into a series of nests. In this structure, industry output is determined via a four-stage optimization process. The initial stage involves the optimal determination of male and female labour, using a Constant Elasticity (CES) function, to form a composite labour for each skill category (professionals, clerks and trade, and unskilled workers). Then, the skill categories are combined using a CES function to form a composite of labour input in the second stage. The optimal labour input is then combined with land and capital to form a CES aggregate of primary factors in the third stage. At the same time, each domestic and imported commodity is combined using an Armington-CES function to form an intermediate input composite. Finally, industry output is determined through a Leontief (linear) determination of primary factor composites, intermediate input composites and other costs.

As shown in the top-most nest of Figure 2, output for each industry is then allocated to domestic production between export supply and domestic sales are governed by a constant

elasticity of transformation (CET) function. It should be noted that, although all industries share this common structure, input proportions and behavioural parameters vary between industries.

**Figure 2: Production structure of industries**



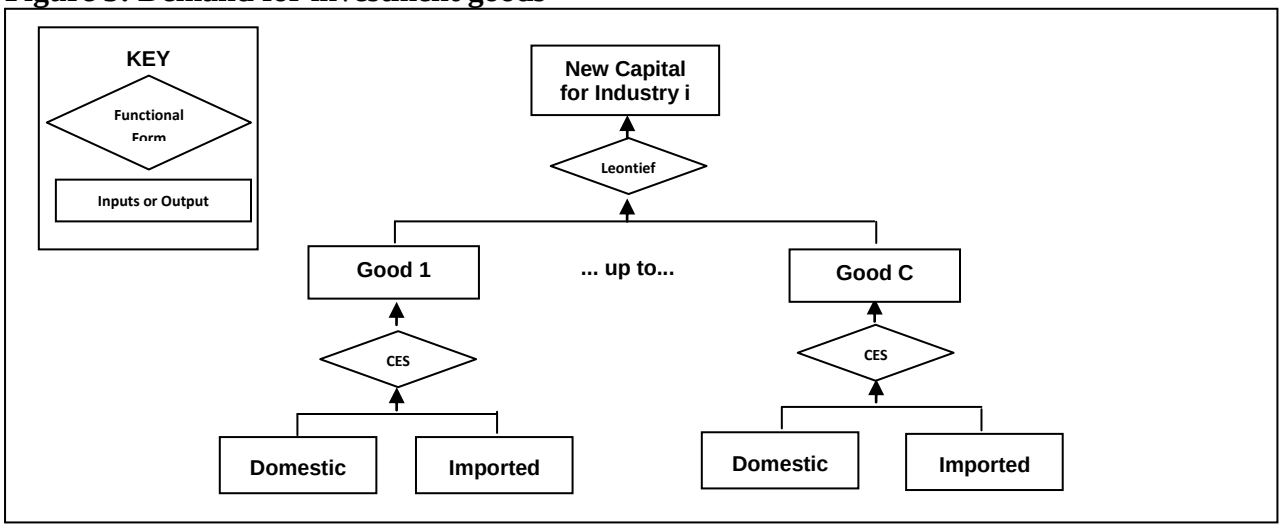

Notes: Figure adapted from Horridge (2007); CES-Constant Elasticity of Substitution; CET- Constant Elasticity of Transformation

Figure 3 presents the nested production structure of production of new units of investment goods. Similar to intermediate inputs, each domestic and imported commodity is combined using an Armington-CES function. Then, new units of capital are produced using a Leontief aggregation of composite commodities.

The database integrates all 42,094 households from the year 2000 Family Income and Expenditure Survey (FIES) of the Philippines. This allows for an explicit treatment all households thereby capturing their heterogeneity and distribution. Figure 4 illustrates the

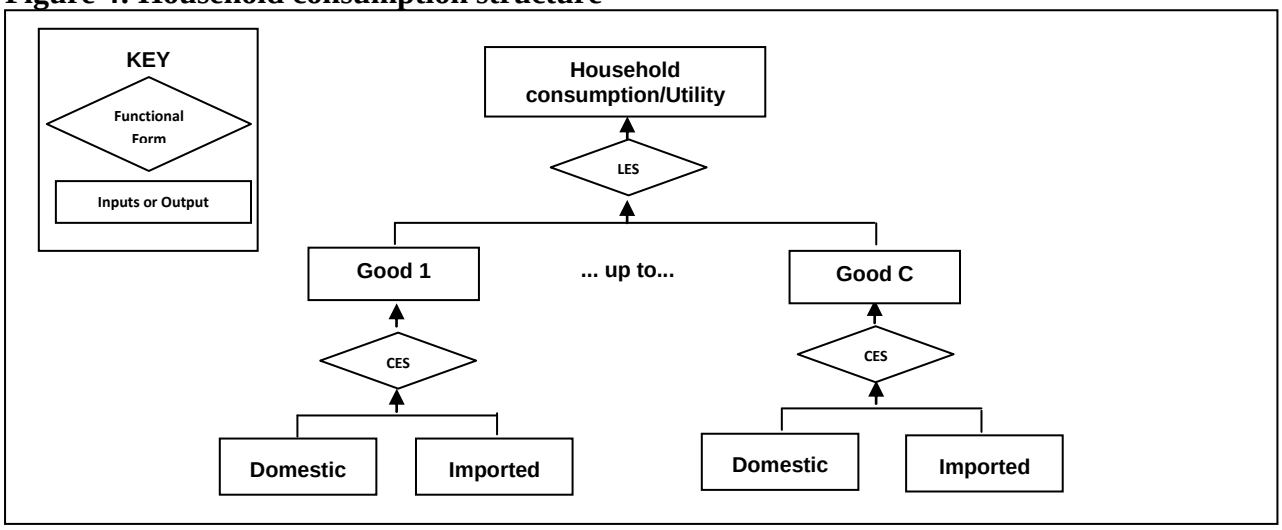
nesting structure for household demands. It is similar to demand for investment goods, except that the commodity composites are aggregated by a Linear Expenditure System (LES) utility function. The LES structure imposes the property that each consumer requires a minimum level of consumption which is purchased regardless of the price. Any residual is then devoted for luxury or supernumerary expenditure, which are consequently allocated to each good based on marginal budget shares.

**Figure 3: Demand for investment goods**




Notes: Figure adapted from Horridge (2007); CES-Constant Elasticity of Substitution; CET- Constant Elasticity of Transformation

**Figure 4: Household consumption structure**




Notes: Figure adapted from Horridge (2007); CES-Constant Elasticity of Substitution; LES- Linear Expenditure System

Export goods are classified into individual export commodity and collective exports—the former include all main export commodities and are modelled individually, while the

latter include exports which do not mainly to respond on the export price, like service commodities. Foreign demand for individual export commodity is assumed to be inversely related to that commodity's price. In contrast, the commodity composition of aggregate collective exports is exogenised by treating collective exports as Leontief aggregate. Demand for this aggregate is related to its average price via a constant elasticity of demand (CED) curve, similar to those for individual exports.

Other final demands are modelled differently. Government demand level and composition of government demand is exogenously determined. In this application, aggregate government consumption moves with household consumption. Inventories are assumed to follow domestic production. That is, the percentage change in the volume of each commodity—domestic or imported—going to inventories, is the same as the percentage change in the domestic production of that commodity. On the other hand, margin demands are determined as proportional to the commodity flows with which margins are associated.

In summary, the model behaves under a neo-classical framework. The demand side assumes cost minimization, whereas the supply side assumes profit maximization. Hence, both their first-order conditions generate the necessary demand functions (import, export and domestic) as well as the necessary supply and input demand functions.

## 5. Simulations and analysis of results

The actual reduction in Philippine export volumes as a result of the economic crisis is shown in Table 5. We use these values as policy shocks to simulate a reduction in export demand volume facing the Philippine economy. The shock is applied into the export demand equation:

$$\mathbf{X4(c)} = \mathbf{F4Q(c)}\left[\frac{\mathbf{P4(c)}}{\mathbf{PHI} * \mathbf{F4P(c)}}\right]^{\mathbf{EXP_{ELAST}(c)}} \qquad (1)$$

Where: c – Commodity; X4 – Export volume; F4Q – Export quantity shifter; P4 – Price of export; PHI – Exchange rate; F4P – Export price shifter; $EXP_{ELAST}$ – Export elasticity;

From this equation, exports of particular commodities may be fixed or shocked by making the corresponding elements of the vector x4 exogenous, while at the same time endogenising matching elements of the vector f4q. To have an idea of the order of magnitude, results based on a short-run and long-run perspective are likewise analyzed.

## Table 5: Reduction in exports (% change)

| **Sector** | Reduction in exports |
|---|---|
| Paddy Rice | -68.1 |
| Corn | -17.51 |
| Coconut | -40.59 |
| Fruits and Vegetables | -7.02 |
| Raw Sugar and Sugar cane | 19.99 |
| Other Crops | -26.23 |
| Livestock | -17.51 |
| Poultry | -17.51 |
| Fishing and Forestry | -12.99 |
| Other Agriculture | -17.51 |
| Mining | -41.2 |
| Processed Meat and Fish | -11.44 |
| Other Processed food | -11.44 |
| Rice and Corn Milling | -68.1 |
| Sugar Milling | 30 |
| Tobacco and Alcohol | 54.59 |
| Textiles | -23.255 |
| Garments and Footwear | -28.73 |
| Paper and Wood products | -10.66 |
| Chemicals | -14.64 |
| Petroleum | -76.62 |
| Cement and Metal | -25.93 |
| Machineries | -10.87 |
| Electric related and Appliances | -22.2 |
| Semi-conductors | -26 |
| Transport Machineries | -10.87 |
| Other Manufacturing | -9.35 |

Source: National Statistical Office (2010)