THE ECONOMIC INFLUENCE OF INFRASTRUCTURAL EXPENDITURE: A MULTIPLIER DECOMPOSITION AND STRUCTURAL PATH ANALYSIS

Andres Garcia

Assistant Research Professor, University of Copenhagen

Channing Arndt

Professor, University of Copenhagen

Stewart Ngandu

Senior Researcher, HSRC

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Produced by:	Andres Garcia, Channing Arndt, and Stewart Ngandu
Contact:	Miriam Altman Executive Director, CPEG
E-mail:	maltman@hsrc.ac.za
Tel:	+27 12 302 2402

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Abbreviation List

Production Activities

CAGRI	Agriculture
CCOAL	Coal
CGOLD	Gold
COTHM	Other mining
CFOOD	Food processing
CBEVT	Beverages and tobacco
CTEXT	Textiles
CAPPA	Wearing apparel
CLEAT	Leather products
CFOOT	Footwear
CWOOD	Wood products
CPAPR	Paper products
CPRNT	Printing and publishing
CPETR	Petroleum products
CBCHM	Chemical products
COCHM	Other chemical products
CRUBB	Rubber products
CPLAS	Plastic products
CGLAS	Glass products
CNMMP	Non-metallic metal products
CIRON	Basic iron and steel
CNFRM	Non-ferrous metals
CMETP	Metal products
CMACH	Machinery
CELMA	Electrical machinery
CCOME	Communication equipment
CSCIE	Scientific equipment
CVEHI	Vehicles
CTRNE	Transport equipment
CFURN	Furniture
COTHI	Other industries
CELEG	Electricity and gas
CWATR	Water
CCONS	Construction
CTRAD	Trade services
CHCAT	Hotels and catering
CTRAN	Transport services
CCOMM	Communication services
CFINS	Financial and real estate services
CBUSS	Business services
CMAOS	Medical and other services
COTHP	Other producers
CGOVS	Government services
DTCTRM	Import marketing margins
DTCTRE	Export marketing margins
DTCTRD	Domestic marketing margins

Factors

FLABHI	Labour - high skill
FLABLS	Labour - low skill
FLABSK	Labour – skilled
FCAP	Capital

Households

HENTRP	Enterprises
HHDLOW	Household - income decile 00-50
HHDMID	Household - income decile 50-90
HHDWHI	Household - income decile 90-100

Abstract

This paper is the result of a project that developed structural path analysis (SPA) as a tool for policy analysis. Using the planned infrastructural program, this paper demonstrates one of the many applications of SPA in answering a broad range of policy questions. The construction sector in South Africa is expected to play an important role in the upcoming years. This is especially so in the context of a global economy that is facing one of the worst downturns in world economic history. South Africa's GDP is expected to contract in 2009. The mining and manufacturing sectors are already adjusting for a decline in input and consumer demand. A R787 billion infrastructure investment program has been put in place and is viewed as a key component to promoting economic growth. The analysis indicates that the construction sector appears to be an excellent choice for a significant demand injection as it is large enough to accommodate a substantial stimulus and it also has significant linkages with nearly all other production activities and households at all income levels. The structural path analysis allowed us to get a better understanding of the sectorial composition of output, employment and household income. We were able to see which poles (production sectors, factors and households) are important transmitters of economic influence. Within the production sectors, business services, non-metallic metal products, mining and metal products are some of the most important sectors through which economic influence is transmitted to households via factor payments. Due to the economic downturn, most of these sectors are likely to be characterized by significant excess capacity. This implies that a demand injection into construction for infrastructure spending may be particularly well directed in terms of a stimulus to aggregate demand. The benefits of this intervention, with a few exceptions are distributed relatively evenly across the economy. Our results indicate that the planned infrastructure programme has the potential to significantly offset the contractionary effects of the global downturn. From the results it is clear that a "large" infrastructural investment program is highly recommended. Though our analysis does not say anything about the size of such an investment, the proposed R787 billion government infrastructural program is more than sufficient to generate the desired stimulus in the economy given the size of the multipliers in the construction sector and the paths through which its economic influence is transmitted throughout the economy. SPA provides policymakers with a tool that allows quick analysis of a given intervention based on the simple structural relationships of the economy built into the social accounting matrix.

1. Introduction

During 2008, South Africa's economy grew by 3.1%. This growth was below the estimated 3.7% due to poor performances during the third and fourth quarters (during the last quarter of 2008 GDP contracted by 1.8%). The global decline in the demand of raw materials has hit South Africa hard. In 2009, the economy is expected to contract, like in many other countries worldwide. The manufacturing and mining sectors have experienced particularly sharp declines. Overall, companies downscaled their production activities and capacity during the first quarter of 2009.

In response to the downturn, an infrastructure investment program is planned. It is hoped that the construction sector and other infrastructure related sectors will play an important role in boosting the South African economy. Specifically, the government plans on spending R787 billion on infrastructural investments over the next 3 years. The funds will be used for public transport, roads and rail networks; school buildings, clinics and other provincial infrastructure projects as well as municipal infrastructure and bulk water systems. In addition, Eskom and Transnet will get a large portion of the planned expenditure. A final allocation will support preparations for the 2010 World Cup.

We analyse the economic impact of the planned infrastructural investment program on the South African economy. In conducting this analysis, we hope to shed light on the mechanisms through which the infrastructural spending will stimulate the economy. In addition, we hope to develop and strengthen the use of Structural Path Analysis (SPA) as a tool for policy analysis in South Africa. The chosen topic demonstrates the usefulness of SPA framework. We believe that SPA can provide timely responses to policy questions on a range of issues.

The hypothesis underlying SPA, as Roberts (2005) points out, is that different sectors will be more or less important as 'connections' for transmitting influence between accounts in the economic system depending on the combination of expenditure patterns, and sourcing of inputs. This analysis focuses on the construction sector, which is the most likely to benefit directly from the increase in infrastructural expenditure. The distributional and employment impacts are also discussed.

The analysis seeks to provide answers to the following questions:

- Which sectors play an important role in the transmission of influence in the economy following an increase in infrastructural expenditure?
- The additional employment, by skill group, occurs in which sectors following an increase in the demand for construction services?
- Which other sectors in the economy are the primary beneficiaries of an increase in the demand for construction?
- How does this intervention affect the sectoral distribution of employment?
- And which household groups benefit the most?

2. Literature review

2.1. The importance of infrastructure expenditure

The provision of infrastructure confers a number of benefits to an economy. Infrastructure lowers the cost of production and consumption, and makes it easier for participants in the economy to enter into transactions. Increasing the efficiency of infrastructure will thus improve growth performance, service provision and development outcomes[1]. The importance of infrastructure is highlighted by Heymans and Thome-Erasmus (1998) who stress that the availability or absence of the 'right' infrastructure often affects the decisions producers and consumers about where to live or work, what to produce and also whether to produce. This in turn affects the ability of the economy as a whole to adjust to changes and external shocks. Most infrastructure has a fixed location. To use it, producers and consumers must be in the same place as the infrastructure facility. The availability of different types of infrastructure in a particular area often leads to agglomeration of economic activity in regions, cities and other localities. This results in enhanced production, consumption and trade. Given the importance and the role that this spending is going to have on the South African economy, it is natural to try and find out what influence the infrastructure program is going to have on the economy.

2.2. Empirical evidence

The application of the SPA decomposition has been relatively rare, and as such, this review will concentrate on the few papers that have been published to date. Roberts (2005) illustrated how SPA can be used to analyze the role of different types of households in rural economies. To be specific, she showed the extent to which different types of households transmit economic influence or act as connections within the local economic system. Her study was on a rural region of Scotland – the Western Isles. This region has several rural development problems such lagging per capita GDP, large trade deficits and a declining and aging population. In her analysis, the agricultural sector was selected as the origin account for each of the micro-level examples of path analysis. Each of the examples focused on the effects arising from a unit increase in demand for output from agriculture for another productive sector (the destination account). The three destination sectors were the banking, extraction and catering sectors, which were selected to illustrate the variety in the kind of paths that exist within the economy. Some indirect paths were shown to be more important than more direct paths because of the amplifying effect of adjacent circuits. Specifically, paths including the household accounts exhibited far higher multipliers than those contained within the production sphere of the economy. Furthermore, households with children were shown to play a more important role in generating the overall global influence than households with no children or retired households. Finally,

[1] Heymans and Thome-Erasmus (1998)

'other income' was shown to be the most important factor of production. This is not surprising, given that self-employment income as opposed to salaried employment dominates agriculture in the region and thus acts as the main transmitter of influence into the household sector.

Khan and Thorbecke (1989) also used SPA to analyze the macroeconomic effects of technology choice on output, employment and income distribution. This was done by looking at the impact of the gradual substitution of traditional technologies by modern technologies in Indonesia. The path analysis was able to reveal the entire network of paths through which the impact of a particular technology was transmitted to the disaggregated socioeconomic system. They multiplier decomposition exercise showed that an increase of 100 Rupiahs into the hand-pounded rice activity (traditional technology sector) led to an increase of 22 Rupiah in the income of agricultural employees. The path analysis went on to reveal that 44.1% of the additional income to agricultural employees followed a path consisting of three consecutive arcs from hand-pounded rice to other food crops, to income accruing to the labour group "agricultural paid rural workers" involved in paddy production to income of the household group headed by agricultural employees. In this case, the latter indirect path was greater than the direct contribution of hand-pounded rice to agricultural employees. This is a good example of some of the benefits of using SPA over conventional decomposition methods.

3. Methodology

Multiplier analysis is used to identify key sectors within an economy, particularly those that have the potential for generating high demand-led multiplier effects. The importance of a sector is based on the column sums of particular rows of the multiplier matrix from a closed input – output or SAM (Social Account Matrix) model. Sectoral multipliers are useful for considering the economy-wide impacts arising from exogenous increases in sector income.

Multiplier analysis can be complemented by multiplier decompositions and Structural Path Analysis (SPA). Multiplier decompositions are developed formally below. They allow for an additive decomposition of effects. SPA focuses on how individual elements lead to the global influence that we get from conventional SAM based decompositions by tracing the transmission of influence within an economic structure. It is a means of identifying the paths through which structural relationships in an economy lead to ultimate effects on endogenous variables. SPA reveals aspects of an economy that are not apparent from an examination of either direct transactions between accounts or an examination of the global influence which is the solution of conventional decompositions.[2]

[2] Roberts (2005)

Structural path analysis has two key objectives;

1) To identify the most important interactions or paths within an economic system

2) To identify which individual poles (sectors, factors or households) are important transmitters of economic influence.

SPA is designed to provide a more detailed picture of the effects of shocks to exogenous accounts. SAM-multipliers measure the cumulative effects from a shock, while the path analysis decomposes these multipliers into direct and indirect components. The SPA decomposition is, in this context, useful in coming to grips with the nature and strength of linkages that work through the economic sector. Multiplier analysis, multiplier decompositions, and structural path analysis are attractive methodologies that can help provide insights into a range of policy questions around government's employment targets, stimulus policy, issues related to industrial policy and many other policy questions.

In comparison to CGE models, SAM multiplier analysis has several advantages. The first is simplicity. The multipliers are easy to calculate and their presence allows us to easily rank sectors by strength of overall stimulating impact. SPA is somewhat more complex. It goes further allowing us to rank paths of influence. We can also quantify the direct influence, the path multiplier and the total influence. CGE models are still more complex. The results of a CGE model are closely linked to the specification of the experiment, the choice of behavioral parameters, and the assumptions that are used to close the model. The flexibility of CGE models can result in controversy over appropriate choices. SPA as a technique involves applying a set of mathematical formulas to a SAM and then pulling out the multipliers and decomposing them with the goal of helping us better to understand economic interlinkages.

3.1. Multiplier Decomposition

This project uses the 2003 SAM for South Africa (Table 1), which is the most recent accurate and consistent SAM available. A SAM provides a detailed snapshot of the economy at a point in time. Unlike input-output analysis, multiplier analysis in a SAM framework permits incorporation of feedback effects from household consumption. In addition, the detailed representation of households present in the 2003 SAM allows one to consider the distributional impacts of various types of demand injections. Some comments on the household disaggregation in the SAM are provided in Annex A.

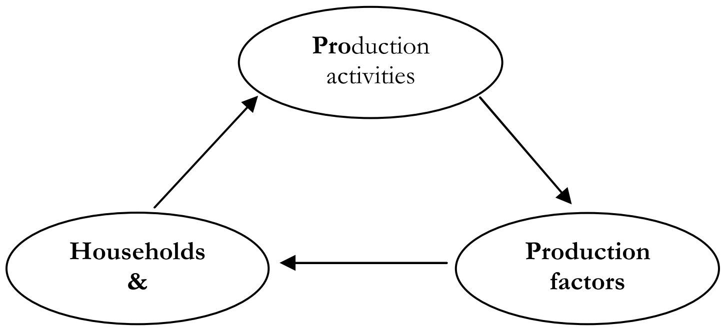
Using the 2003 SAM, we can measure the effects of various exogenous injections into the South African economy via multiplier decomposition and structural path analysis. In the next two subsections, we explain what each of these two methods encompass. However, before proceeding, it is important to highlight the limitations of multiplier analysis. Because multiplier decomposition and SPA are means of comprehending in greater detail the implications of the multipliers, they share these limitations.

In order for the results of multiplier analysis to strictly apply to the economy, two important assumptions must hold simultaneously. First, supply side constraints to economic expansion are not binding. As a result, the level of demand determines the level of economic activity. Second, one must either assume that prices are constant or that preferences and technology are of the Leontief form. In other words, consumers consume in fixed proportions and producers use inputs in fixed proportions either because fixed relative prices provide no incentives to change those proportions or because preferences and technology are specified in that way.

Ordinarily, these assumptions are considered highly onerous. Multiplier analysis is often viewed as providing useful insights into demand forces on the economy that may be important for the nature and rate of economic growth; however, the interpretation of results is usually tempered by a more realistic view of supply side, prices, preferences, and technology. However, in the context of the current economic downturn, the assumptions behind multiplier become more plausible. With economic contraction in process, supply side constraints are clearly less problematic. At the same time, while prices, preferences, and technology almost surely maintain some flexibility, fixed proportions preferences and technology provide a valuable first order approximation to the effects of demand shifts within the South African economy.

The 2003 SAM includes a total of 73 accounts, which can be divided into endogenous and exogenous accounts. The endogenous accounts include 46 commodities, 4 factors, and 15 institutions (enterprises and households). On the other hand, the exogenous accounts include 4 types of taxes, government, savings-investment balance, changes in stocks, and the rest of the world. In a multiplier decomposition, as proposed by Pyatt and Round (1979) and Defourny and Thorbecke (1984), the effect of injections from exogenous accounts can be tracked on the economy (endogenous accounts). Under the assumptions mentioned above (fixed prices and no supply restrictions), multiplier decomposition can reveal the interaction between and across the categories shown in Figure 1.

Figure 1 – Interrelationship among SAM Categories



Source: Adapted from Defourny and Thorbecke (1984)

Figure 1 represents the triad that disciplines the flow of expenditure within the economic system. Expenditure flows from production activities to factors of production as factor payments. These are then mapped on to households as household income and this income is then used to purchase goods and services from production activities completing the circular flow of income. SPA is also conditioned by this relationship, in other words when choosing the poles of analysis it is not possible to have a direct flow from production activities to households.

The multiplier decomposition method presented here draws heavily on the work by Pyatt and Round (1979), Defourny and Thorbecke (1984), and Stone (1985). Multiplier decomposition is concerned not only with output levels and the level of factor and household incomes, but also with the structure of production, the distribution of factor incomes, and the distribution of disposable income both among households and between them and enterprises (Pyatt and Round, 1979).

Initially, the SAM (S) is partitioned into endogenous and exogenous accounts. The endogenous accounts include production activities (*a*), factors (*f*), and institutions (*i*) (enterprises and households). On the other hand, the exogenous accounts (*x*) include the government, capital, and the rest of the world.

(1)
$$\mathbf{S} = \begin{bmatrix} \mathbf{S}_{aa} & \mathbf{S}_{af} & \mathbf{S}_{ai} & \mathbf{S}_{ax} \\ \mathbf{S}_{fa} & \mathbf{S}_{ff} & \mathbf{S}_{fi} & \mathbf{S}_{fx} \\ \mathbf{S}_{ia} & \mathbf{S}_{if} & \mathbf{S}_{ii} & \mathbf{S}_{ix} \\ \mathbf{S}_{xa} & \mathbf{S}_{xf} & \mathbf{S}_{xi} & \mathbf{S}_{xx} \end{bmatrix}$$

Once the SAM has been partitioned, average expenditure shares for each column are calculated. Submatrix ($\mathbf{A}_n$) only includes endogenous accounts.

(2)
$$\mathbf{A}_n = \begin{bmatrix} \mathbf{A}_{aa} & \mathbf{A}_{af} & \mathbf{A}_{ai} \\ \mathbf{A}_{fa} & \mathbf{A}_{ff} & \mathbf{A}_{fi} \\ \mathbf{A}_{ia} & \mathbf{A}_{if} & \mathbf{A}_{ii} \end{bmatrix}$$

With this matrix, the accounting multiplier matrix can be obtained.

(3)
$$\mathbf{M}_a = (\mathbf{I} - \mathbf{A}_n)^{-1}$$

Matrix $\mathbf{A}_n$ is then decomposed into Matrixes B and C.

(4a)
$$\mathbf{A}_n = \begin{bmatrix} \mathbf{A}_{aa} & \mathbf{A}_{af} & \mathbf{A}_{ai} \\ \mathbf{A}_{fa} & \mathbf{A}_{ff} & \mathbf{A}_{fi} \\ \mathbf{A}_{ia} & \mathbf{A}_{if} & \mathbf{A}_{ii} \end{bmatrix} = \begin{bmatrix} \mathbf{A}_{aa} & 0 & 0 \\ 0 & \mathbf{A}_{ff} & 0 \\ 0 & 0 & \mathbf{A}_{ii} \end{bmatrix} + \begin{bmatrix} 0 & \mathbf{A}_{af} & \mathbf{A}_{ai} \\ \mathbf{A}_{fa} & 0 & \mathbf{A}_{fi} \\ \mathbf{A}_{ia} & \mathbf{A}_{if} & 0 \end{bmatrix}$$

(4b)
$$\mathbf{A}_n = \mathbf{B} + \mathbf{C}$$

Matrix B is the partition which includes all the interactions within each group of endogenous accounts (activities, factors, and institutions), and matrix *C* includes the coefficients of interactions across groups of endogenous accounts.

If we denote the vector of totals of all the endogenous accounts by *y* and the vector of the sums of the income elements into these accounts from all the exogenous accounts by *x*, then:

(5) $\mathbf{y} = \mathbf{A}\mathbf{y} + \mathbf{x}$

$= \mathbf{B}\mathbf{y} + \mathbf{C}\mathbf{y} + \mathbf{x}$

$= (\mathbf{I} - \mathbf{B})^{-1}\mathbf{C}\mathbf{y} + (\mathbf{I} - \mathbf{B})^{-1}\mathbf{x}$

$= [[\mathbf{I} - (\mathbf{I} - \mathbf{B})]^{-1}\mathbf{C}]^{-1} (\mathbf{I} - \mathbf{B})^{-1}\mathbf{x}$

$= (\mathbf{I} - \mathbf{D})^{-1}(\mathbf{I} - \mathbf{B})^{-1}\mathbf{x}$

$= (\mathbf{I} + \mathbf{D})(\mathbf{I} - \mathbf{D}^2)^{-1}(\mathbf{I} - \mathbf{B})^{-1}\mathbf{x}$

$= \mathbf{M}_3\mathbf{M}_2\mathbf{M}_1\mathbf{x}$

$= \mathbf{M}_a\mathbf{x}$

where $\mathbf{D} = (\mathbf{I} - \mathbf{B})^{-1}\mathbf{C}$

From equation (5), the accounting multiplier is decomposed into Matrixes $\mathbf{M}_1$, $\mathbf{M}_2$, and $\mathbf{M}_3$.

$\mathbf{M}_1$ captures the within account effects, which is the multiplier effect into a category (production activities, factors, or households). For the production activities sector, $\mathbf{M}_1$ represents the input-output multiplier.

(6) $\mathbf{M}_1 = (\mathbf{I} - \mathbf{B})^{-1}$

$\mathbf{M}_2$ captures the cross/spillover effects, where the injection into a category has an effect on another category with no reverse effects.

(7) $\mathbf{M}_2 = (\mathbf{I} + \mathbf{D} + \mathbf{D}^2)$

Lastly, $\mathbf{M}_3$ captures the between effects net of the within-account multipliers. $\mathbf{M}_3$ shows the full circular effect.

(8) $\mathbf{M}_3 = (\mathbf{I} - \mathbf{D}^3)^{-1}$

As $\mathbf{M}_1$, $\mathbf{M}_2$, and $\mathbf{M}_3$ enter the decomposition in a multiplicative fashion, $\mathbf{M}_a$ is better expressed and understood in terms of additive components.

(9) $\mathbf{M}_a = \mathbf{I} + (\mathbf{M}_1 - \mathbf{I}) + (\mathbf{M}_2 - \mathbf{I})\mathbf{M}_1 + (\mathbf{M}_3 - \mathbf{I})\mathbf{M}_2\mathbf{M}_1$

where *I* is a matrix of injections. Equation (9) satisfies

(10) $\mathbf{M}_a = \mathbf{N}_1 + \mathbf{N}_2 + \mathbf{N}_3$

$\mathbf{N_1}$ represents the own-effects. It captures the within category effects, including the direct effects from an increase in exogenous demand and the interaction effects within categories (activities, factors, or households). The submatrix that only includes activities is the same as the Leontief inverse of the input-output table.

(11) $$\mathbf{N_1 = M_1}$$

$\mathbf{N_2}$ represents the incremental open loop linkages. It captures the between effects of endogenous variables and the resulting within category effects. It includes the effects from additional demand across categories. Additionally, it includes the indirect effect within categories

(12) $$\mathbf{N_2 = (M_2 - I)M_1}$$

$\mathbf{N_3}$ represents the closed loop effects. It captures the additional feedback effects, which were not included, as N_2 only included within categories indirect effects.

(13) $$\mathbf{N_3 = (M_3 - I)M_2M_1}$$

N_1 and N_2 together represent the part of the multiplier effects from exogenous demand increases and the adjacent spill-over into other categories. N_3 represents the importance of the market for intermediate goods.

3.2. Structural Path Analysis

While the SAM multipliers measure the cumulative effects from an exogenous injection, the structural path analysis decomposes these multipliers and tracks the movement of a given injection across specific endogenous accounts.

Structural path analysis was developed by Defourny and Thorbecke (1984) based on the concepts of economic influence and structural analysis from Lantmer (1974) and Gazon (1976 and 1979). The following sections draw heavily on Defourny and Thorbecke (1984).

The building blocks of structural path analysis are the average expenditure propensities a_{ij} (which come from matrix A). They reflects the intensity of arc(i,j). The intensity that links two poles of the structure and oriented in the direction of the expenditure is to be interpreted as the magnitude of the influence transmitted from pole i to pole j. There are three types of influence: direct, total and global.

3.2.1. Direct influence

The direct influence of i on j is only the change of j induced by a unitary change in i. This influence can be measured along an arc (14) or along an elementary path p (15).

(14) $$\mathbf{I^D_{(i\rightarrow j)_p} = a_{ji}}$$

(15) $$I^{D}_{(i...j)_p} = a_{jn} \cdots a_{mi}$$

3.2.2. Total influence

Using the concept of total influence developed by Lantner (1974), the indirect effects within the structural path can be identified. These indirect effects induced by the adjacent circuits amplify the direct influence in the elementary path.

(16) $$I^{T}_{(i \to j)_p} = I^{D}_{(i \to j)_p} M_p$$

where $I^{D}_{(i \to j)_p}$ is the direct influence along path *p* and M_p the path multiplier. The path multiplier captures the indirect effects on adjacent feedback circuits.

(17) $$M_{p(j,i)} = \frac{\Delta_{p(j,i)}}{\Delta}$$

where Δ Δ is the determinant of the matrix $(I - A)$ and $\Delta_{p(j,i)}$ is the determinant of the structure excluding the poles (both rows and columns) constituting path *p*.

3.2.3. Global influence

Global influence measures the total effects on income or output of the destination pole *j* consequent to an injection of one unit of output or income in the origin pole *i*. Global influence corresponds to the *j,i* element of the accounting multiplier matrix M_a (3).

Global influence accounts for all direct and indirect influences transmitted by all elementary paths linking the origin and destination poles. Thus, the global influence can be decomposed into the total influences transmitted along all elementary paths between the origin and destination.

(18) $$I^{G}_{(i \to j)_p} = \sum_{p=n}^{n} I^{T}_{(i \to j)_p} = \sum_{p=n}^{n} I^{D}_{(i \to j)_p} M_p$$

4. Results

4.1. Multipliers

Multiplier decomposition and structural path analysis provide the tools to assess the impact of an exogenous increase in the demand for construction in the South African economy. Our first step is to calculate the accounting multipliers (Table 2). These multipliers measure the global effect of an exogenous increase in the demand of a sector. When construction is stimulated via, for example, a government infrastructure investment program, demand for intermediate inputs used by construction expands. For example, construction is a significant user of non-mineral metal products. Non-mineral metal products, in turn, is both produced domestically and imported. In the multiplier analysis, the financial flows to imports and to taxes are examples of flows to exogenous accounts which are "leakages" from the system. Purchases of domestically produced non-mineral metal products remain within the system. The stimulus to the non-metal mineral products sector stimulates further intermediate demand for commodities.

At the same time, expansion of the construction sector requires increased use of factors of production—labour and capital. These resources are presumed to be unemployed and thus available to be used in the construction sector. In the South African case, unemployment of unskilled and semi-skilled labour has been a reality for decades. However, supply side constraints have been evident with respect to highly skilled labour and capital. Nevertheless, within the context of the current economic contraction, these constraints are likely to be far less binding. Increased factor income is distributed to households (with taxes and savings representing leakages). Household, in turn, expand consumption of commodities.

These internal loops persist resulting in a larger increase in aggregate demand than the initial stimulus into the construction sector. Assuming that the R787 billion infrastructure project over three years is entirely used in construction activities and the division of financing is roughly equal per year, the activity multiplier of nearly 5 implies that the initial increase will swell to nearly R1.3 trillion worth of sales as the secondary effects are felt throughout the South African economy. This means that a one unit increase in construction demand (via, for example, a government infrastructure investment program) results in nearly four additional units of sales in construction and other industries. Similarly, factor incomes (GDP at factor cost) expand by more than R333 billion and household incomes expand by nearly R250 billion on an annual basis.

These numbers are clearly too large in the context of an economy where GDP was valued at R1.26 trillion in 2003, which is the base year for the SAM.[3] This result

[3] World Development Indicators (World Bank, 2009)

highlights the need for appropriate consideration of results. Nevertheless, the results show that expansion of the construction sector has considerable potential to provide demand side stimulus. To the extent that supply side constraints within the overall economy remain non-binding, the stimulus has potential to significantly push the economy towards the production possibilities frontier.

4.1.1. Production activities

The stimulus in the construction sector generates motion in all other productive activities. Within the productive activities, the largest sales stimulus (outside of construction) is received by the business services sector (0.52). Only one sector, furniture, provides a larger impetus to sales by domestic producers, with an activity multiplier over 5.

4.1.2. Factors

As mentioned above, the initial stimulus to construction also increases factor usage (capital and employment) and factor income. These factor earnings are then passed to households, though some of the incremental income leaks to factor taxes, corporate taxes, and retained earnings. The net result is that, even though value added represents only about 20% of total construction costs, the overall stimulus to factors (value added) amounts to 1.32 once all indirect effects are accounted for. The impact on total household income is less at 0.95 due to the leakages mentioned above. Retained earnings and corporate taxes are the main elements that account for the differences for two reasons. First, the construction sector is reasonably capital intensive with a share of capital in value added of 41%. While less than the economy-wide average capital intensity of 48%, the share still implies that significant payments are directed to capital. Second, these payments to capital are subject to corporate and factor taxes as well as retained earnings. These leakages represent nearly 50% of capital income.

4.1.3. Institutions

Given the resulting stimulus on all production activities, enterprises receive, directly and indirectly, a large portion (65%) of the investment from the infrastructure program. The households in the SAM were previously grouped by income deciles, with the first group representing households with incomes between the 0 and 10 percentile, and the last one for the household with incomes between 98.75 to 100 percentile. Nonetheless, by grouping these households into only three categories, the results can be more easily explained. The distribution was made as follows: low (0-50), medium (50-90), and high (90-100).

The distribution of benefits of augmented construction spending across households is not as favourable as one might like. The incomes of middle and upper income households each increase by 0.42 while lower income households benefit from a 0.11 stimulus. However, this is more a feature of the South African economy than of the construction sector. Relatively few sectors provide a greater stimulus to overall household income than construction and even fewer provide a larger stimulus to lower income households. The low multipliers for low income households reflect a high degree of dependence of these households on government transfers as a source of income. For households in the lower 50% of the income distribution, government transfers represent a bit less than 33% of income. The small shares of factor earnings garnered by low income households imply relatively low multipliers for these households.

Overall, the multiplier effect of construction spending on factor incomes is generally strong relative to other sectors, though not as strong as with respect to activities. Sectors with larger shares of value added in total sales and higher labour intensities, such as government services, produce larger multipliers with respect to factor incomes. Nevertheless, the construction multiplier is relatively high.

4.2. Multiplier Decomposition

The total effects presented by the accounting multipliers can be decomposed as suggested in equations (11), (12), and (13). We divide the effects into two sets. The first one represents the part of the multiplier effects from exogenous demand increase and the adjacent spill-over into other categories (own and loop effects), while the second represents the additional feedback effects across categories (closed loop effects). Table 3 presents the own and loop effects as a share of total effects, while Table 4 the share of closed loop effects. The different composition between these sets can be explored by comparing the composition of the global effects of a demand increase on construction versus an increase on food processing. As expected, agriculture receives most of the benefits directly when the food processing sector is stimulated. Conversely, most of the benefits for agriculture come from indirect effects (74%) when the construction activities are stimulated.

4.2.1. Production activities

We can now decompose the effects observed in Table 2 for key sectors. The values in Table 3 for production activities are for own effects (N_1). In the iron and steel sector, 80% of the income generated was through direct effects (within the activities category). Electricity and gas had 50%, as the indirect effects with other categories (factors and consequently, households) create an additional demand for electricity and gas. Aside from construction, the sector with the largest direct effect (98%) was gold. On the other hand, we can observe in Table 4 that sectors such as wearing apparel, agriculture, beverages and tobacco receive most of the benefits from closed loop effects as they are indirectly related to the construction sector.

4.2.2. Factors

In South Africa, the construction sector is a significant user of both capital and labour. The shares presented in Table 3 represent open loop effects (N_2) only. This is due to the fact that open loop effects capture the effects that the infrastructure programme has on both factors and institutions (enterprises and households). More than half of the income received by factors comes from spillover effects, with low skilled labour receiving the largest share (75%). Capital, skilled labour, and high skilled labour receive a significant share of the generated income through closed loop effects.

4.2.3. Institutions

Last of all, we decompose the multipliers for both enterprises and households. As with factors, the values in Table 3 are from open loop effects (N_2) only. More than half of the multipliers for low, medium, and high income households come from open loop effects. Low income households benefit more directly than other households, as most of their members are low skilled workers, which have a greater demand from the construction sector.

4.3. Structural Path Analysis

This section presents the results of the SPA which goes a step further than the multiplier decomposition presented in the previous section. The previous multiplier decomposition gave us the global influences that exist between the construction sector and other poles (that is, production activities, factors, and institutions). Using structural path analysis, we now proceed to identify various paths, through which economic influence is transmitted from the construction sector (the pole of origin) to the other poles in the economy. The results for the structural path analysis in Tables 5 to 7 only show the ten most important paths in each case. These are not exhaustive since in any given SAM, there are thousands of possible paths.

4.3.1. Production activities

Table 5 shows the path analysis of construction on other production activities. Unlike conventional multiplier analysis SPA gives us the sectorial distribution of output following an intervention into a given sector. Case I in Table 5 shows the impact of such an injection in construction on basic iron and steel. Ordinary multiplier analysis only gives us the overall impacts, in this case it tells us that an injection of R1 billion into the construction sector generates an increase of R86 million in the income of basic iron and steel. Structural path analysis then shows us that only 27.1 % of this additional production is caused directly by the demand for basic iron and steel inputs by the construction sector through the path linking the two without any other sectors, households or factors. The other paths reveal that a significant part of the global influence of construction on basic iron is exercised indirectly through the metal products sector (33.1%) and this is actually greater than the direct influence. This means interventions should not simply be concerned with pouring money into a sector but should look at other sectors that contribute in delivering the influence of the targeted sector. Therefore policy should be more holistic in its approach and path analysis helps in identifying these important supporting sectors. This is not the case with conventional multiplier analysis which focuses on the global effects there by creating narrowly defined interventions. Path analysis therefore enables us to see exactly which sectors benefit by revealing the different paths through which economic influence is transmitted from construction to basic iron and steel. It can also be seen that the most important sector in transmitting this influence between the two sectors is the metal products sector since it appears in the 10 most significant paths between construction and basic iron and steel.

In Case V: Table 5, we see the paths between construction and the electricity and gas sector, the table indicates that the global influence of construction on the electricity and gas sector means that a R1 billion increase in the exogenous demand for construction output will lead to an estimated total increase in the value of electricity and gas output of R59 million. Twenty eight percent of this is as a result of the direct demand for electricity and gas from the construction sector itself. The path analysis reveals that there is a general increase in the demand for electricity from other sectors in the economy and that this increase is spread across activities, factors, and institutions. For example, the increase in the demand for non-metallic metal products represents 2.8% of the total increase. Households also increase their energy consumption. Low skilled households represent a larger share of the global influence, with 1.65% coming from medium income, 1.46% from low income households, while high skilled labour in high income households represents 0.89%.

Other paths that we consider are the ones with non-metallic metals and metal products as destinations. The construction sector spends about 11% of its budget on non-metallic metals. This activity benefits from a global influence of 0.16. Almost 95% is explained via a direct path. We also find sectors such as agriculture to play a role in this global influence, via a direct path between the two sectors. The global influence for metal products shows us that R1 billion invested in construction will lead to an increase of R119.5 million. Almost 75% of this comes from the direct path linking these two sectors. A smaller portion comes from indirect paths via the increased spending on iron, electrical machinery, and non-metallic products.

4.3.2. Factors

The increase in income following the exogenous expenditure on construction can be interpreted as a rise in the employment of the destination factor. Thus, with path analysis, we can establish the sectoral sources of additional employment following an increase in construction services. Conventional multiplier decomposition only tells us the overall impact without saying from which sectors the additional employment will come from and the problem with computable general equilibrium models is that the results depend greatly on the experiment being modeled and the rules used to close the model. This gives SPA a distinctive advantage over these techniques since it enables us get results based on the structural relationships within the SAM. Case II: Table 6 shows us the sectors where the additional employment of low skilled workers will come from following an increase in the expenditure on construction. It can be seen that 49% comes directly from the construction sector itself and the rest comes from other sectors, with non-metal products, other mining and gold being some of the top contributors to the increase in employment. The path analysis also shows that, out of the top 10 paths, other mining plays the most important role in transmitting the economic influence from construction to low skilled workers.

These are important results. The infrastructure program is expanding employment for unskilled workers in sectors that are suffering particularly weak demand in the context of the global economic contraction. This implies that, via this channel at least, the infrastructure program is likely to be effective in (at least partially) counteracting the slump in demand. In addition, the multiplier effects are less likely to encounter supply side constraints.

With respect to skilled and highly skilled labour, the business services sector stands out. The effect of the contraction on the demand for business services is less clear. Hence, constraints to the expansion of business services may limit the propagation of the demand injection from construction. Beyond business services, the sources of additional employment for skilled and high skilled labour seem to be evenly distributed without any one sector dominating as an important transmitter of influence. Specifically, the additional employment for high skilled labour comes from a more diverse combination of sectors. The construction sector spends about 9% of its budget on capital, and 13% on labour (5.6% on low skilled, 2.5% on skilled, and 4.5% on high skilled labour). We previously found that the construction sector has a multiplier effect of effect on capital, with a R1 billion injection in the construction sector generating almost R700 million of factor income. Path analysis shows us that the direct demand for capital by the construction sector represents only 21.3% of this total influence. The rest of the influence is transmitted indirectly through paths which flow past other production activities as the increase in capital income also comes from business services (5.9%), non-metallic metal products (4.5%), and metal products (1.09%), among others.

Low skilled labour has the highest budget share, but the lowest multiplier (0.16). On the other hand, high skilled labour has a relatively high multiplier (0.26). Almost half of the increase on low skilled labour income comes from its direct path with construction. Other sectors that employ additional units of labour are metal products, non-metallic metals, other metals, and gold. Conversely, business services, and financial and real estate services play an important role in the increase of high skilled labour income.

4.3.3. Institutions

Lastly, as in the case with labour, path analysis can also give us a better sense of the distribution of additional income for institutions (households and enterprises). Cases II, III and IV: Table 7 show us that the income of all households comes from a combination of diverse sectors; furthermore, path analysis tells us that the additional income of middle income households comes mainly from three sources: the business services, metal products and non-metal products sectors. This is revealed by the fact that these sectors appear an equal number of times in the paths that connect construction and middle income households. Path analysis also shows us that enterprises receive most of their income through the direct path via capital, which explains 21.3% of the total income generated (Case I: Table 6). The remaining share comes indirectly through capital but initially going from construction to business services (5.9%), non-metallic metal products (4.5%), other mining (2.27%) metal products (1.09%), and electricity and gas (0.93%), among others.

Low income households receive 23.2% of the income generated through low skilled labour, 5.6% from skilled, and 2.15% from high skilled labour. They also receive 4.36% of the income generated by construction, through capital invested in enterprises. Medium income households follow a similar pattern, but with a more even distribution among the paths explained above, where the income coming from low skilled labour represents 12.4% of the global influence. Last but not least, high income households receive 11.2% of their income from capital invested in enterprises, followed by 10.7% from high skilled labour. Production activities that consistently participate in the paths of income generation for enterprises and households are non-metallic metal products, metallic products, and business services. These results show that South African households have relatively strong links to the industrial sector, and that many of the sectors involved in construction hire labour with different sets of skills.

4.3.4. A graphical representation

The analyses presented above relied only on the quantitative results generated by SPA. Nonetheless, SPA is a construct of relationships within the economy and a graphical representation allows a potentially more straightforward interpretation of this construct. These figures showcase the 10 most important paths, with a maximum length of three arcs for Figures 1-3, and four paths for Figures 4-6. The thickness of the lines connecting the accounts represents the strength of the connection between the corresponding accounts. The thicker the line, the greater the relative volume of flow along the path. It is important to note that the thickness is not related to income magnitudes as the importance of the path also relates to both its influence and the path multiplier of adjacent circuits.

In Figure 1, we begin by looking at the movement of the influence generated by the injection in the construction sector. The four sectors below construction are sectors with paths connected to more than one factor. For example, metal production uses labour at all skill levels (together with construction), while business services mainly uses skilled and high skilled labour. Low skilled labour receives income from seven out of the ten production activities, and generates income for all households. High skilled labour is similarly benefited, whereas skilled labour is the least connected factor.

In order to put these relationships, created by an injection in the construction sector, into perspective, we also model in Figure 2, the effect from a direct injection in the production of electricity and gas, and in Figure 3 with respect to transport services. In the electricity and gas sector, we can observe that less production activities benefit in the top 10 paths. Business services do not have a strong effect on high skilled labour, and do not generate income for skilled labour, when compared to the construction case. The households with more connections in this case are middle income households. Lastly, with an injection in transport services, lower income households present strong ties to skilled labour. Skilled labour seems to be the most important factor, receiving their income from trade services, business services, transportation services, other producers, communication services, and transportation services. When comparing Figures 1, 2, and 3, we can see that an injection of income in construction generates much more activity than injections in either transport services or electricity and gas.

So as to better understand the distributional effects caused by the infrastructure programme, we generate three set of figures (showing up to four arcs) with corresponding effects on low income (Figure 4), middle income (Figure 5), and high income households (Figure 6). As expected, low income households benefit from stronger ties with low skilled workers. Nonetheless, they also receive income from enterprises. The skilled labour in low income households obtained their additional income primarily from construction, and indirectly from financial services used by business services.

In the case of middle income households, there was a large flow between construction and business services, which in turn used financial services, capital, skilled and high skilled workers. Invested capital in enterprises created a lot of income activity with this household. Only four production activities are present in the top 10 paths, with business services being the most connected sector. This household enjoyed a more evenly distributed influence from all factors.

Our last figure showcases how income travels to high income households. These households are highly connected to enterprises and high skilled labour. The structure of this case resembles the one observed for middle income households, but with the other mining sector having greater importance and metal products no longer present. Enterprises in this case receive income from a greater number of activities including business services, non-metallic products, and other mining.

The results from the structural path analysis show that an infrastructure programme that generates income in the construction sector generates movement in a large number of production activities, factors, and institutions. The business services sector appears to be an important actor in this economy, together with non-metallic metal products. Income received by low income households comes from a very diverse set of activities, whereas high income households received capital rents from a larger set of activities, which is thereafter invested in enterprises.

4.3.5. Discussion

The results show that SPA is an important compliment to standard multiplier decomposition analysis and allows us to go beyond global effects. It allows us to get a better understanding of the sectorial composition of output, employment and household income. It also allows us to see which poles (production sectors, factors and households) are important transmitters of economic influence. As mentioned above unlike computable general equilibrium techniques that are better suited to counterfactual analysis and whose results depend heavily on the circumstances being modeled SPA provides policymakers with a tool that allows quick analysis of any intervention on the economy.

5. Conclusions

This paper analyzed the impact of the proposed infrastructure program using conventional multiplier decomposition and structural path analysis. Assuming that the R787 billion infrastructure project over three years is entirely used in construction activities, the total effect during the first year generates an increase of over R1.3 trillion in the income of all production activities and R250 billion of household income. These are implausibly large numbers within the context of the South African economy. From the results it is clear that a "large" infrastructural investment program is highly recommended. Though our analysis does not say anything about the size of such an investment the proposed R787 billion government infrastructural program is more than sufficient to generate the desired stimulus in the economy given the size of the multipliers in the construction sector. The path analysis which allowed us to a get a better sense of the sectorial distributions of output, employment and household income tells us that benefits of this intervention will be distributed relatively evenly across the economy. The income generated creates significant economic influence that is propagated throughout the economy through various paths that reach all households through production activities that are directly and indirectly related to the infrastructure programme. Within production activities, business services, non-metallic metal products, mining and metal products are some of the most important sectors through which income is transmitted to households via factor payments. It is the sheer size of the proposed expenditure that leads to the large effects. It can be argued that, our analysis shows that government could get away with a smaller stimulus in the construction sector precisely because the multiplier effects are both large and reasonably well targeted. In addition, it should be pointed out that multiplier effects are not the only criterion for evaluating infrastructure spending. Even in the context of an economic downturn, the availability of useful projects is another important criterion. It would be unwise to explicitly or implicitly support infrastructure spending on white elephants because of demand side spillovers.

The distribution of benefits across households is not as favourable as one might like, with lower income households receiving only a fourth of the stimulus when compared to middle or upper income households. However, this is more a feature of the South African economy than of the construction sector as relatively few sectors provide a greater stimulus to overall household income than construction and even fewer provide a larger stimulus to lower income households.

Due to the economic downturn, most of these sectors are likely to be characterized by significant excess capacity. This implies that a demand injection into construction for infrastructure spending may be particularly well directed in terms of a stimulus to aggregate demand. A potential exception is business services where the effects of the contraction to date have been less pronounced.

Based on our results, the planned infrastructure programme has the potential to significantly offset the contractionary effects of the global downturn. The construction sector is an excellent choice for demand injection because it is large and thus able to accommodate a significant stimulus, it stimulates all other production activities and households at all income levels, and it results in infrastructure which should provide an improved foundation for growth into the future.

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Table 1 – A Social Account Matrix for South Africa, 2003

	CAGRI	CCOAL	CGOLD	COTHM	CFOOD	CBEVT	CTEXT	CAPPA	CLEAT	CFOOT	CWOOD	CPAPR	CPRNT	CPETR	CBCHM	COCHM	CRUBB	CPLAS	CGLAS	CNMMP	CIRON	CNFRM	CMETP	CMACH	CELMA	CCOME	CSCIE	CVEHI	CTRNE	CFURN	COTHI	CELEG	CWATR	CCONS	CTRAD	CHCAT	CTRAN	CCOMM
CAGRI	2882	16	16	5	42472	8498	1428	10	1	63	4418	3400	21	10	346	467	798	138		136	40	19	27	34	65		12	883	3	279	197	18		1173	20	1058	5	
CCOAL	2	1	15	205	188	18	45	35	12		8	12	2	5421	27	154	74		2	32	5599	289	273	48							3	5841	159	200		76	21	
CGOLD				374																		110												1466		47		
COTHM	286	39	1843	44	109						7	261		25241	6160	597		111	469	4054	22461	4534	338	189	123			871	14	4	9668	10	6	5399		26	288	
CFOOD	6695	3	3		19899	2906	26		1973	60		306	1	2	309	1680				10			26								65	46			1593	4571	77	
CBEVT		15	15	3	726	4958										12																			1620	1787	221	
CTEXT	1359	40	75	86			5204	7062	81	143	21	35	41		261	184	295	617		39			35	28	32		35	5438	29	595	283			240	132	125	652	422
CAPPA		213	271	294			116	2132	50	6					39	9		54												49	9	44			1503	77	394	1412
CLEAT		18	7	12	2		4	151	832	1095			2															702		319	5				123			45
CFOOT		21	49	119				1	5	703													7								2		6	448	71			770
CWOOD	274	42	917	138	49	10	13	6	2	10	4888	1188	9	10	203	42	6	36	8	92	51	10	163	53	163	3	15	186	26	4377	679	67	17	2532	553	71	482	
CPAPR	479	34	40	73	1329	1669	328	293	5	47	729	12428	5666	98	200	413	166	1241	207	242	181	40	160	184	148	15	85	205	23	386	112	29	26	336	5413	23	1102	256
CPRNT	6	7	8	17	23	7	6	4			3	1003	1553	7	34	891	4	4	3	4	18	6	5	28	6	2	1	1	3	3	12	20	46	64	5264	110	222	1940
CPETR	4309	532	211	1278	1122	157	155	84	11	15	68	141	51	6039	11035	2922	546	443	41	226	1301	1945	396	794	456	49	70	518	48	42	375	239	75	2892	5124	266	21091	2736
CBCHM	4430	92	326	467	781	360	3221	128	201	207	359	3662	170	2273	13338	12375	2001	10038	106	1734	276	332	348	195	2444	8	44	1049	21	366	466	39	180		969	151	83	27
COCHM	4030	1237	1403	2734	1284	15	235	36	204	28	613	1648	1549	256	3599	21177	44	933	82	102	222	207	858	427	258	6	484	2855	144	408	1412	105	261	1205	3228	579	1507	384
CRUBB	133	312	116	518						134		3	2		26	64	24			1			31	159	24	1	52	2396	21	64	21	2	22		98		3055	164
CPLAS	154	98	100	133	2705	577	997	79	94	313	162	818	243	233	1775	3488	163	3279	133	195	255	92	356	735	1971	137	75	3951	205	400	1943	3	5	1234	2545		103	
CGLAS	6	11	12	14	622	188	262	2			46	3	3	51	3	558	101	489	653	83	7		97	102	142	5	7	1555	28	61	34	30	10	283	24	51	41	45
CNMMP	277	192	347	255	91	10	10	22	5	2	10	12	9	150	46	86	33	9	8	1798	33	30	167	219	491	2		5	12	11	33	24	34	13116	1147	455	865	47
CIRON	40	37	121	144	35		21			3	45	15	11	159	14	54	71	95		529	7419	300	17421	6604	1824	96	57	5090	588	857	1030	175	43	1898	44		474	
CNFRM	10	10	60	40	157		3				35	133	8	129	259	259	108	43	3	40	2508	7741	3703	1439	3924	193	108	1949	348	117	2623		16		73		9	
CMETP	589	483	712	885	896	257	420	341	48	32	198	15	20	189	43	1342	254	641	81	203	8655	315	4405	5303	806	43	19	5167	327	488	353	300	123	7160	1367	110	237	552
CMACH	1693	1326	1262	2794	925	131	169	149	20	8	58	302	915	1020	492	1392	333	124	50	404	622	242	1293	8333	274	72	26	1808	731	72	179	415	287	1460	2010	55	627	1729
CELMA	141	427	270	441			12				5				11			19			8	11	865	2098	5444	1389	802	5237	356	4	202	2149	161	7979	638	73	716	481
CCOME		15	6	12																				12	461	1754	74								131		80	5949
CSCIE		42	56	74			0									60		49							118		462		85	29		14	99		225	47	12	149
CVEHI	2092	713	94	1152	830	62	695	35	5	6	71	120	46	138	341	306	149	67	535	216	373	54	655	1711	1012	42	58	55919	181	28	95	207			4833		9925	757
CTRNE	362	66	460	473																	27							174	3539		13				39		7436	
CFURN		6	8	18			37	22			41							129					7		6	7		157					15	723	1067	78	237	511
COTHI		20	22	19	78	19	30	11	255	8	97	32	78	73	444	254	68	1133	11	19	49	21	48	73	243	8	441	11	8	6	1199	11	365		582	63	1515	
CELEG	470	374	1494	1338	938	152	185	181	33	11	77	164	57	1066	365	1851	318	45	39	254	681	2841	527	308	121	29	41	52	53	94	142	2219	552	1460	1614	1014	1877	1400
CWATR	251	25	111	348	255	178	63	36	3	2	28	24	6	312	106	449	41	6	7	18	42	11	33	59	10	4	7	8	17	12	8	209	5643	101	360	340	495	249
CCONS	340	257	420	683																												3210		25903	3846	113	1520	
CTRAD	217	109	48	223	283	21	60	12	2	2	8	41	16	47	116	104	14	21	9	35	104	19	54	109	32	14	4	9	22	6	32	58	15	162	6682	33	2939	3905
CHCAT	6				16	3	5	2			1	3	1	7	12	17	3	2	2	2	11	4	4	8	2	1				1	1	106	12		1722	17	1954	
CTRAN	4469	5265	123	18230	1289	68	102	55	13	6	44	202	63	3772	4273	250	67	47	64	1314	5357	67	154	283	114	36	12	32	43	32	87	405	215	525	11325	56	1358	4988
CCOMM	22	49	51	202	284	80	77	50	12	6	34	132	52	83	375	183	46	48	40	58	220	67	189	256	72	22	16	25	31	35	75	194	99	1187	18644	333	3607	27780
CFINS	654	151	73	424	725	379	135	147	23	21	176	286	205	324	259	273	56	208	38	138	190	85	575	400	192	65	39	349	98	41	92	882	326	135	3581	140	743	660
CBUSS	1484	665	1258	1757	6267	2260	1991	1559	219	124	555	2852	802	1163	6952	5372	870	1206	576	1454	4618	886	1915	3493	1514	476	337	459	421	324	1294	1810	397	10328	57996	6354	26693	3439
CMAOS	810																															8					157	
COTHP	668	2063	2235	5363	3684	1701	1136	1359	146	32	219	1128	427	1422	2426	3873	458	359	482	691	1863	420	733	1302	590	228	74	136	143	276	567	34	45	1423	1792	297	3682	990
CGOVS																																15					192	
TCTRM	854	87		3836	2289	395	1095	1104	55	700	233	344	553	2690	1667	3708	446	281	173	335	543	365	735	8535	1682	1889	2741	7001	1586	465	2858	1		25				
TCTRE	934	264		966	1783	831	555	1376	67	35	266	647	33	370	589	1232	202	97	56	90	2926	175	411	1978	295	71	480	3081	200	1344	3354							
TCTRD	7031	665		2644	35428	14455	6650	17823	281	3335	1556	5137	2509	17273	2505	23729	1598	1482	642	1305	6519	800	3057	14343	6290	1651	7589	16702	1401	7955	23588							
CAP	31228	8324	9445	27671	10557	8941	1497	1122	391	454	1562	5056	732	14108	7598	6294	669	2020	797	4138	9069	7171	4067	2970	1989	834	601	7889	591	599	13086	13016	3221	10974	73074	6527	35178	28813
LABLS	5222	2736	8805	9700	3314	778	1529	2207	209	299	1922	1229	504	249	740	1339	597	2087	310	736	1516	525	3314	1484	1355	406	175	2507	595	965	999	1248	180	6750	7087	291	4009	1279
LABSK	3021	1945	1888	3269	3225	904	387	628	28	51	1333	1487	2032	337	999	1807	363	1270	172	407	1475	510	2459	2191	900	230	99	2299	546	527	1293	1856	302	3112	33080	2920	16250	8625
LABHI	3317	2324	1955	4527	3498	1992	609	847	58	94	823	1569	3350	957	2839	5136	694	2427	314	745	1954	676	2462	2943	2142	513	221	4848	1151	502	1223	5798	1092	5405	29962	1362	8874	5337
ENTRP																																						
HHD0																																						
HHD1																																						
HHD2																																						
HHD3																																						
HHD4																																						
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HHD91																																						
HHD921																																						
HHD922																																						
HHD923																																						
HHD924																																						
IMPTAX	310			1	648	431	804	672	140	378	47	261	48	7	241	355	364	249	94	191	108	43	346	476	428	370	46	670	27	89	425							
COMTAX	1650	207		155	5963	10910	640	1292	140	511	176	153	925	16283	386	2459	211	354	91	544	-23	-47	924	2464	1033	2260	676	5988	2445	576	1716	1525	337	3362	9734	2716	1985	2297
ACTTAX	-782	412	574	553	287	315	16	36	10	18	102	129	103	132	301	129	22	39	9	74	123	94	203	208	116	7	36	7	24	63	-23	290	-77	432	3200	324	1146	353
INSTAX																																						
GOV																																						
S-I																																						
DSTK																																						
ROW	5692	836		37032	7862	1302	4001	2417	425	1979	1517	1824	3036	11222	14513	13743	2400	2153	1053	2546	3391	3415	5264	42908	8138	13058	7464	41774	12339	1215	7944	9		295	195	9954	23952	7500
TOTAL	**98118**	**32826**	**37325**	**131746**	**162916**	**65939**	**34972**	**43525**	**6058**	**10942**	**22561**	**48206**	**25853**	**113325**	**86266**	**121087**	**14678**	**34090**	**7361**	**25230**	**90793**	**34425**	**59109**	**115488**	**47449**	**25996**	**23585**	**189963**	**28471**	**24084**	**79777**	**42685**	**14314**	**121388**	**304333**	**42694**	**188090**	**115992**

Table 1 – A Social Account Matrix for South Africa, 2003 (continuation)

	CFINS	CBUSS	CMAOS	COTHP	CGOVS	TCTRM	TCTRE	TCTRD	CAP	LABLS	LABSK	LABHI	ENTRP	HHD0	HHD1	HHD2	HHD3	HHD4	HHD5	HHD6	HHD7	HHD8	HHD91	HHD921	HHD922	HHD923	HHD924	IMPTAX	COMTAX	ACTTAX	INSTAX	GOV	S-I	DSTK	ROW	TOTAL
CAGRI		52	117	191	359									748	990	1235	1464	1661	1864	2207	2633	2984	1700	427	516	580	1148							-4599	12882	98118
CCOAL		73	66	5	80									13	15	16	17	20	23	29	40	61	43	12	13	13	16							582	12925	32826
CGOLD		39																																907	34381	37325
COTHM		312	3	200	395																													1487	46195	131746
CFOOD		2357	311	4034	797									3981	5271	6575	7802	8853	9947	11784	14076	15987	9155	2310	2790	3139	6199							-504	7800	162916
CBEVT		674	4	939	84									1906	2524	3147	3733	4233	4752	5626	6711	7606	4334	1087	1315	1478	2926							-81	3583	65939
CTEXT	8	426	151	619	367									83	138	230	309	412	561	834	1048	1272	699	260	268	290	516							258	2634	34972
CAPPA	5	990	596	479	951									536	879	1311	1759	2277	2851	3652	4448	5130	3250	774	877	1072	1481							235	3299	43525
CLEAT		78		45	22									22	36	54	73	95	118	152	185	213	135	32	36	44	62							-27	1368	6058
CFOOT		64	17	146	161									145	239	356	478	618	774	992	1208	1393	882	210	238	291	402							10	115	10942
CWOOD		335	32	684	359									1	2	4	7	11	16	23	30	33	18	6	8	7	9						42	80	3461	22561
CPAPR	773	2467	330	1761	809									1	2	6	7	8	23	52	125	286	338	135	168	200	410							284	5609	48206
CPRNT	2190	3824	562	1315	1209									6	15	37	81	114	187	346	569	968	789	236	339	343	893						98	95	299	25853
CPETR	369	4702	1311	4251	2614									155	183	237	304	457	764	1579	3142	6590	5052	2150	2372	2530	4631							1	2129	113325
CBCHM	1	1444	239	2666	124									6	8	10	12	13	16	19	23	27	17	5	5	6	8							772	17577	86266
COCHM	169	5458	7829	2433	8589									561	745	1032	1261	1578	2050	2936	4456	6318	4721	1479	1753	1921	3152							1100	5789	121087
CRUBB	38	211	127	120	270									2	3	11	20	44	93	232	495	1084	839	370	408	436	816						84	-246	1778	14678
CPLAS		518	5	521	32									9	15	26	36	50	70	109	147	202	123	48	52	55	98							323	1905	34090
CGLAS		432		162	149									3	5	9	12	15	20	30	37	46	25	10	10	11	20							105	629	7361
CNMMP	7	1477	50	680	875									2	4	7	9	11	16	27	42	71	65	26	30	35	72						20	-28	1672	25230
CIRON		1559		2903	87																													2599	38331	90793
CNFRM		499		224	20																													431	7204	34425
CMETP	26	1781	43	887	780									6	12	23	36	58	90	132	185	251	194	70	84	93	149						4351	-203	6682	59109
CMACH	29	2176	23	1367	2697									21	39	73	131	202	315	503	784	1216	1091	407	446	551	1086						53141	90	15298	115488
CELMA	13	1242	137	557	1332									4	8	16	25	42	68	113	175	282	200	81	93	98	166						10510	207	2144	47449
CCOME		117		367	900									15	23	36	76	123	179	266	402	581	526	197	172	244	421						11616	157	1084	25996
CSCIE	291	2646	2250	499	2117									0	1	9	16	11	30	138	376	810	974	431	421	628	1502						7409	44	1459	23585
CVEHI	242	2605	406	5070	12454									7	11	36	59	150	385	979	2549	6861	6725	2384	2867	3787	8159						17574	196	32934	189963
CTRNE		190		106	4109									10	16	24	51	83	121	179	270	391	354	133	116	164	284						5159	136	3986	28471
CFURN	175	1056	308	862	287									62	147	276	418	673	1021	1478	1863	2106	1138	385	490	469	556						3170	158	3916	24084
COTHI	1045	2740	712	970	599									114	178	344	628	933	1581	2696	4945	9136	9761	3824	4262	5350	10533						305	934	10874	79777
CELEG	357	1015	370	700	560									587	692	735	786	885	1040	1283	1806	2745	1936	533	594	598	717							58	247	42685
CWATR	124	941	299	141	527									80	103	134	159	180	220	257	315	361	226	64	74	78	114							37		14314
CCONS	230	7766	476	349	2511																												73893	-189	59	121388
CTRAD	305	3919	702	6901	557	26881	22187	210309						121	168	223	278	338	412	534	696	901	608	187	216	249	453							3291	8311	304333
CHCAT	96	2104	363	6215	879									110	199	313	507	813	1061	1672	2563	4338	3654	1271	1405	1835	3547							-60	5881	42694
CTRAN	820	5665	941	918	3335	20085	2521	25632						610	942	1541	2231	3150	4104	5492	7130	8246	4981	1521	1892	1930	3589							-465	16477	188090
CCOMM	1508	13146	2109	2429	3684									334	564	1031	1582	2339	3108	4191	5415	6040	3572	1071	1362	1362	2538							-378	4252	115992
CFINS	2727	139889	126	278	1015									48	87	137	221	355	464	730	1119	1894	1596	555	614	801	1549							-635	6982	173838
CBUSS	49806	43840	12732	15685	15876	2306								91	155	304	509	809	1804	3273	5436	15043	16721	7088	9168	9023	26662						12918	-1003	5979	416361
CMAOS	812	779	74	895	2785									439	695	1072	1495	2261	3170	5423	8826	13295	9689	2912	3351	3538	4320							-121	1110	67795
COTHP	444	5549	444	1257	951									306	556	874	1416	2270	2964	4670	7157	12114	10202	3550	3923	5124	9906							-274	584	118452
CGOVS		423	2050		18483									13	21	32	45	68	95	163	265	399	291	87	100	106	130					239053		-423		261608
TCTRM																																				49271
TCTRE																																				24708
TCTRD																																				235941
CAP	52680	86656	11295	8061	20725																														20635	562325
LABLS	364	379	958	3873	3633																															88403
LABSK	24404	12337	1995	12600	41904																															197467
LABHI	17836	22907	10444	19307	98472																															283506
ENTRP									518510																							44437			-165	562782
HHD0										2906	2598	860	1285																			3508			13	11171
HHD1										3615	2697	612	1680																			7205			28	15836
HHD2										5573	6051	1495	2819																			6004			36	21977
HHD3										6980	6477	1587	5104																			9105			56	29308
HHD4										8666	12284	4479	7932																			5362			70	38794
HHD5										9958	15327	9111	11000																			4886			66	50347
HHD6										11854	21401	16969	17744																			3563			44	71574
HHD7										13038	29953	29170	28760																			2745			33	103699
HHD8										11615	43610	65529	37664																			2526			33	160976
HHD91										6476	28070	61602	30416																			949			-36	127477
HHD921										2308	9288	24737	6315																			134			-17	42766
HHD922										1861	7236	24911	15772																			247			-17	50009
HHD923										2112	7480	25388	22652																			223			-21	57834
HHD924										1442	3920	15779	92874																			68			-50	114031
IMPTAX																																				8269
COMTAX	8064	11317	5228	1430	-446																															108614
ACTTAX	2694	7818	820	655	2528																															23519
INSTAX													70356	3	121	397	1198	2418	3756	6181	11161	21878	18806	5745	6353	8440	12995									169807
GOV													5860															8269	108614	23519	169807					316069
S-I													204550	9	24	44	59	165	213	591	848	1816	2052	690	811	915	1797					-20200			11246	205630
DSTK																																	5340			5340
ROW	5186	7365	741	1694					43815		1075	1277																				6256				371780

Table 2 – Accounting Multipliers

	CAGRI	CAPPA	CBCHM	CBEVT	CBUSS	CCOAL	CCOME	CCOMM	CCONS	CELEG	CELMA	CFINS	CFOOD	CFOOT	CFURN	CGLAS	CGOLD	CGOVS	CHCAT	CIRON	CLEAT	CMACH	CMAOS	CMETP	CNFRM	CNMMP	COCHM
CAGRI	1.13	0.10	0.07	0.23	0.08	0.09	0.03	0.08	0.11	0.09	0.07	0.08	0.39	0.09	0.15	0.08	0.11	0.12	0.13	0.08	0.19	0.05	0.09	0.08	0.07	0.08	0.09
CAPPA	0.04	1.09	0.03	0.03	0.04	0.05	0.02	0.05	0.04	0.04	0.03	0.04	0.04	0.03	0.05	0.04	0.06	0.06	0.03	0.04	0.05	0.03	0.05	0.04	0.03	0.03	0.04
CBCHM	0.12	0.09	1.25	0.07	0.06	0.07	0.03	0.05	0.09	0.06	0.14	0.05	0.09	0.09	0.10	0.09	0.08	0.07	0.05	0.06	0.13	0.05	0.08	0.07	0.06	0.14	0.22
CBEVT	0.06	0.07	0.05	1.13	0.06	0.07	0.02	0.06	0.06	0.07	0.05	0.07	0.07	0.05	0.07	0.06	0.08	0.09	0.09	0.06	0.06	0.04	0.06	0.06	0.05	0.05	0.06
CBUSS	0.39	0.53	0.44	0.41	1.59	0.43	0.20	0.38	0.52	0.44	0.40	0.70	0.47	0.40	0.50	0.46	0.45	0.54	0.46	0.46	0.45	0.33	0.61	0.44	0.36	0.42	0.48
CCOAL	0.02	0.02	0.02	0.01	0.01	1.02	0.01	0.02	0.03	0.16	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.09	0.02	0.02	0.02	0.05	0.04	0.02	0.02
CCOME	0.01	0.01	0.01	0.01	0.01	0.01	1.08	0.08	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CCOMM	0.11	0.15	0.10	0.11	0.15	0.12	0.05	1.41	0.13	0.12	0.11	0.13	0.13	0.11	0.14	0.11	0.12	0.16	0.10	0.12	0.12	0.09	0.16	0.12	0.09	0.10	0.12
CCONS	0.03	0.03	0.02	0.03	0.05	0.04	0.01	0.02	1.30	0.13	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.03	0.03
CELEG	0.04	0.05	0.04	0.04	0.04	0.05	0.02	0.05	0.06	1.10	0.05	0.04	0.05	0.03	0.05	0.04	0.09	0.05	0.05	0.05	0.05	0.03	0.05	0.06	0.15	0.05	0.06
CELMA	0.02	0.02	0.02	0.02	0.02	0.04	0.07	0.03	0.12	0.09	1.15	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.04	0.02	0.04	0.02	0.02	0.02
CFINS	0.16	0.22	0.17	0.17	0.57	0.18	0.08	0.16	0.21	0.20	0.17	1.28	0.20	0.16	0.20	0.19	0.18	0.22	0.18	0.19	0.19	0.13	0.23	0.19	0.15	0.17	0.19
CFOOD	0.23	0.16	0.12	0.19	0.15	0.17	0.06	0.14	0.16	0.16	0.13	0.16	1.31	0.17	0.17	0.14	0.20	0.22	0.24	0.14	0.58	0.10	0.16	0.15	0.13	0.13	0.16
CFOOT	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.02	0.01	0.01	0.01	0.01	1.08	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CFURN	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.03	0.02	0.01	0.02	0.02	0.01	1.02	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.02
CGLAS	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	1.10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
CGOLD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
CGOVS	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	1.08	0.00	0.01	0.00	0.00	0.04	0.01	0.00	0.00	0.00
CHCAT	0.04	0.04	0.03	0.03	0.04	0.04	0.02	0.04	0.04	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.05	0.06	1.03	0.04	0.04	0.03	0.05	0.04	0.03	0.03	0.04
CIRON	0.03	0.03	0.02	0.02	0.03	0.04	0.02	0.03	0.09	0.04	0.08	0.02	0.03	0.02	0.08	0.03	0.04	0.04	0.02	1.16	0.03	0.11	0.03	0.39	0.04	0.05	0.03
CLEAT	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.13	0.02	0.00	0.01	0.01	0.00	0.00	1.16	0.00	0.00	0.00	0.00	0.00	0.00
CMACH	0.05	0.04	0.04	0.04	0.04	0.08	0.02	0.05	0.06	0.05	0.04	0.03	0.05	0.03	0.04	0.04	0.08	0.05	0.03	0.05	0.04	1.10	0.04	0.07	0.04	0.05	0.05
CMAOS	0.07	0.07	0.05	0.06	0.07	0.07	0.03	0.06	0.07	0.07	0.05	0.08	0.07	0.05	0.07	0.06	0.08	0.11	0.05	0.06	0.06	0.04	1.07	0.06	0.06	0.06	0.06
CMETP	0.03	0.04	0.03	0.03	0.03	0.05	0.02	0.03	0.12	0.05	0.05	0.03	0.04	0.03	0.06	0.04	0.05	0.04	0.02	0.15	0.04	0.08	0.03	1.15	0.04	0.04	0.04
CNFRM	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.04	0.02	0.14	0.01	0.02	0.01	0.03	0.02	0.02	0.02	0.01	0.06	0.02	0.04	0.02	0.12	1.31	0.02	0.02
CNMMP	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.16	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01	1.09	0.01
COCHM	0.15	0.11	0.14	0.09	0.11	0.15	0.04	0.09	0.12	0.11	0.10	0.10	0.12	0.09	0.14	0.11	0.16	0.17	0.09	0.11	0.15	0.07	0.24	0.12	0.10	0.10	1.31
COTHI	0.07	0.07	0.06	0.06	0.08	0.08	0.03	0.07	0.07	0.08	0.07	0.08	0.07	0.06	0.08	0.07	0.08	0.10	0.06	0.07	0.11	0.05	0.09	0.07	0.06	0.06	0.07
COTHM	0.07	0.06	0.17	0.05	0.06	0.07	0.03	0.05	0.16	0.07	0.10	0.05	0.06	0.05	0.08	0.13	0.12	0.07	0.04	0.34	0.07	0.07	0.06	0.17	0.24	0.24	0.08
COTHP	0.12	0.15	0.13	0.13	0.12	0.18	0.05	0.11	0.14	0.13	0.11	0.12	0.14	0.10	0.14	0.18	0.19	0.15	0.10	0.15	0.14	0.09	0.13	0.13	0.12	0.14	0.15
CPAPR	0.05	0.07	0.04	0.08	0.05	0.04	0.02	0.04	0.05	0.04	0.04	0.05	0.06	0.05	0.08	0.08	0.05	0.05	0.04	0.04	0.05	0.03	0.05	0.04	0.03	0.05	0.05
CPETR	0.16	0.12	0.26	0.10	0.11	0.14	0.05	0.13	0.15	0.11	0.12	0.10	0.13	0.10	0.13	0.11	0.12	0.14	0.09	0.13	0.12	0.08	0.13	0.12	0.17	0.12	0.15
CPLAS	0.03	0.04	0.05	0.04	0.03	0.03	0.02	0.02	0.05	0.03	0.08	0.02	0.05	0.06	0.05	0.05	0.03	0.03	0.02	0.03	0.06	0.03	0.03	0.04	0.03	0.03	0.07
CPRNT	0.02	0.04	0.02	0.03	0.04	0.03	0.01	0.05	0.03	0.03	0.02	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.02	0.04	0.03	0.02	0.02	0.04
CRUBB	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CSCIE	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.03	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01
CTEXT	0.04	0.23	0.03	0.03	0.03	0.03	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.06	0.03	0.04	0.04	0.03	0.03	0.05	0.02	0.03	0.03	0.02	0.03	0.03
CTRAD	0.35	0.73	0.29	0.47	0.25	0.31	0.21	0.28	0.30	0.26	0.40	0.23	0.52	0.56	0.66	0.35	0.30	0.33	0.22	0.37	0.43	0.36	0.30	0.35	0.26	0.29	0.50
CTRAN	0.21	0.23	0.22	0.17	0.15	0.32	0.10	0.19	0.19	0.18	0.18	0.14	0.21	0.20	0.23	0.18	0.18	0.20	0.12	0.28	0.18	0.16	0.17	0.20	0.17	0.23	0.20
CTRNE	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
CVEHI	0.13	0.12	0.10	0.10	0.11	0.15	0.05	0.11	0.11	0.12	0.12	0.10	0.12	0.09	0.12	0.21	0.12	0.21	0.08	0.12	0.10	0.10	0.11	0.12	0.09	0.11	0.11
CWATR	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.02
CWOOD	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.05	0.02	0.02	0.01	0.01	0.01	0.25	0.01	0.05	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01
DTCTRD	0.30	0.67	0.23	0.43	0.19	0.24	0.15	0.19	0.24	0.21	0.33	0.19	0.47	0.51	0.58	0.29	0.24	0.27	0.19	0.28	0.37	0.27	0.24	0.28	0.20	0.24	0.44
DTCTRE	0.03	0.06	0.02	0.03	0.02	0.03	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.08	0.03	0.02	0.02	0.02	0.06	0.04	0.03	0.02	0.04	0.02	0.02	0.03
DTCTRM	0.05	0.07	0.06	0.04	0.03	0.04	0.09	0.04	0.05	0.04	0.08	0.03	0.05	0.10	0.06	0.06	0.04	0.05	0.03	0.05	0.05	0.11	0.04	0.06	0.05	0.05	0.07
FCAP	0.81	0.66	0.58	0.67	0.81	0.77	0.26	0.75	0.70	0.83	0.55	0.82	0.72	0.54	0.67	0.61	0.78	0.66	0.58	0.71	0.65	0.42	0.70	0.64	0.75	0.67	0.61
FLABHI	0.21	0.26	0.21	0.21	0.27	0.27	0.11	0.22	0.26	0.33	0.23	0.29	0.24	0.19	0.26	0.23	0.26	0.62	0.18	0.23	0.21	0.17	0.36	0.24	0.19	0.21	0.26
FLABLS	0.12	0.13	0.07	0.08	0.06	0.15	0.05	0.07	0.16	0.11	0.10	0.05	0.10	0.09	0.14	0.11	0.31	0.09	0.06	0.11	0.12	0.06	0.07	0.14	0.09	0.10	0.08
FLABSK	0.18	0.23	0.16	0.18	0.23	0.23	0.08	0.23	0.20	0.20	0.17	0.29	0.21	0.17	0.24	0.18	0.21	0.35	0.19	0.20	0.18	0.15	0.20	0.21	0.15	0.17	0.19
HENTRP	0.75	0.61	0.54	0.62	0.75	0.71	0.24	0.69	0.65	0.77	0.51	0.75	0.66	0.50	0.62	0.56	0.72	0.61	0.54	0.65	0.60	0.39	0.65	0.59	0.69	0.62	0.57
HHDLOW	0.10	0.11	0.07	0.08	0.09	0.11	0.04	0.09	0.11	0.10	0.08	0.10	0.09	0.08	0.11	0.09	0.16	0.12	0.07	0.09	0.09	0.06	0.09	0.10	0.08	0.08	0.08
HHDMID	0.38	0.41	0.30	0.33	0.40	0.44	0.16	0.38	0.42	0.44	0.33	0.44	0.38	0.31	0.42	0.36	0.51	0.60	0.31	0.38	0.35	0.25	0.41	0.39	0.33	0.34	0.36
HHDWHI	0.40	0.40	0.33	0.36	0.44	0.44	0.16	0.40	0.42	0.48	0.34	0.47	0.40	0.31	0.41	0.36	0.46	0.62	0.32	0.39	0.36	0.26	0.46	0.39	0.37	0.36	0.38

Table 2 – Accounting Multipliers (continuation)

	COTHI	COTHM	COTHP	CPAPR	CPETR	CPLAS	CPRNT	CRUBB	CSCIE	CTEXT	CTRAD	CTRAN	CTRNE	CVEHI	CWATR	CWOOD	DTCTRD	DTCTRE	DTCTRM	FCAP	FLABHI	FLABLS	FLABSK	HENTRP	HHDLOW	HHDMID	HHDWHI
CAGRI	0.08	0.07	0.12	0.20	0.06	0.09	0.11	0.13	0.06	0.13	0.09	0.08	0.04	0.07	0.08	0.36	0.09	0.09	0.09	0.06	0.13	0.18	0.15	0.07	0.24	0.15	0.11
CAPPA	0.04	0.03	0.05	0.04	0.03	0.04	0.04	0.03	0.03	0.04	0.05	0.04	0.02	0.03	0.04	0.04	0.05	0.05	0.04	0.03	0.07	0.08	0.07	0.03	0.10	0.08	0.05
CBCHM	0.07	0.05	0.10	0.20	0.07	0.46	0.11	0.23	0.05	0.20	0.07	0.06	0.03	0.08	0.08	0.11	0.07	0.07	0.06	0.03	0.07	0.08	0.08	0.04	0.09	0.08	0.07
CBEVT	0.06	0.05	0.08	0.06	0.04	0.06	0.06	0.05	0.04	0.06	0.07	0.06	0.03	0.04	0.06	0.07	0.07	0.07	0.07	0.05	0.10	0.14	0.12	0.05	0.20	0.12	0.08
CBUSS	0.42	0.32	0.60	0.52	0.32	0.46	0.46	0.44	0.38	0.48	0.62	0.50	0.22	0.31	0.43	0.45	0.61	0.61	0.62	0.25	0.54	0.50	0.51	0.28	0.47	0.49	0.59
CCOAL	0.02	0.02	0.02	0.02	0.06	0.02	0.02	0.03	0.01	0.02	0.02	0.02	0.01	0.02	0.04	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
CCOME	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
CCOMM	0.12	0.09	0.16	0.13	0.09	0.12	0.12	0.11	0.11	0.12	0.20	0.12	0.06	0.09	0.12	0.12	0.19	0.19	0.17	0.07	0.16	0.17	0.17	0.08	0.19	0.18	0.14
CCONS	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.05	0.04	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.01	0.03	0.03	0.03	0.02	0.03	0.03	0.03
CELEG	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.06	0.03	0.04	0.05	0.05	0.02	0.03	0.10	0.05	0.05	0.05	0.05	0.02	0.05	0.06	0.06	0.03	0.08	0.06	0.05
CELMA	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.03	0.03	0.06	0.04	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
CFINS	0.17	0.13	0.24	0.21	0.13	0.19	0.19	0.18	0.15	0.19	0.25	0.20	0.09	0.13	0.21	0.19	0.24	0.24	0.24	0.10	0.22	0.21	0.21	0.11	0.20	0.20	0.24
CFOOD	0.14	0.12	0.22	0.17	0.11	0.15	0.16	0.14	0.11	0.14	0.17	0.14	0.07	0.11	0.15	0.19	0.17	0.17	0.16	0.12	0.25	0.34	0.30	0.13	0.48	0.30	0.20
CFOOT	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.03	0.02	0.01
CFURN	0.02	0.01	0.03	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.03	0.03	0.03	0.01	0.03	0.03	0.02
CGLAS	0.01	0.00	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01
CGOLD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CGOVS	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01
CHCAT	0.04	0.03	0.10	0.04	0.03	0.04	0.04	0.04	0.03	0.04	0.05	0.05	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.03	0.06	0.06	0.06	0.03	0.06	0.06	0.07
CIRON	0.04	0.03	0.06	0.03	0.02	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.05	0.08	0.04	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03
CLEAT	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01
CMACH	0.04	0.05	0.05	0.05	0.04	0.04	0.08	0.06	0.03	0.04	0.04	0.04	0.05	0.04	0.07	0.04	0.04	0.04	0.04	0.02	0.05	0.05	0.05	0.02	0.05	0.05	0.05
CMAOS	0.06	0.05	0.09	0.07	0.05	0.07	0.07	0.06	0.05	0.06	0.07	0.06	0.03	0.05	0.07	0.07	0.07	0.07	0.07	0.06	0.12	0.13	0.13	0.06	0.11	0.14	0.12
CMETP	0.03	0.03	0.04	0.03	0.03	0.05	0.03	0.05	0.02	0.04	0.03	0.03	0.03	0.07	0.05	0.04	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.02	0.04	0.03	0.03
CNFRM	0.06	0.01	0.02	0.02	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.03	0.04	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
CNMMP	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
COCHM	0.12	0.10	0.14	0.17	0.08	0.16	0.19	0.10	0.10	0.11	0.12	0.10	0.05	0.10	0.14	0.16	0.12	0.12	0.11	0.07	0.15	0.16	0.15	0.08	0.17	0.16	0.14
COTHI	1.08	0.06	0.09	0.07	0.05	0.11	0.08	0.07	0.07	0.07	0.08	0.07	0.03	0.05	0.12	0.08	0.08	0.08	0.08	0.06	0.13	0.11	0.12	0.07	0.09	0.11	0.15
COTHM	0.19	1.05	0.08	0.08	0.28	0.11	0.06	0.08	0.05	0.07	0.06	0.08	0.04	0.07	0.07	0.07	0.06	0.06	0.07	0.03	0.07	0.07	0.07	0.04	0.07	0.07	0.07
COTHP	0.11	0.13	1.14	0.15	0.11	0.14	0.14	0.14	0.08	0.14	0.13	0.12	0.06	0.09	0.12	0.13	0.13	0.13	0.13	0.09	0.18	0.18	0.18	0.09	0.17	0.18	0.19
CPAPR	0.05	0.03	0.07	1.40	0.03	0.10	0.36	0.06	0.04	0.06	0.07	0.04	0.02	0.04	0.04	0.10	0.07	0.07	0.06	0.02	0.05	0.05	0.05	0.03	0.06	0.05	0.05
CPETR	0.11	0.10	0.16	0.14	1.15	0.17	0.12	0.16	0.09	0.13	0.13	0.21	0.06	0.09	0.11	0.13	0.14	0.14	0.16	0.07	0.15	0.15	0.15	0.07	0.14	0.15	0.15
CPLAS	0.05	0.02	0.04	0.06	0.02	1.15	0.05	0.04	0.03	0.07	0.04	0.03	0.02	0.06	0.03	0.04	0.04	0.04	0.03	0.02	0.03	0.04	0.04	0.02	0.04	0.04	0.03
CPRNT	0.03	0.02	0.04	0.06	0.02	0.03	1.10	0.03	0.03	0.03	0.05	0.03	0.01	0.02	0.03	0.03	0.05	0.05	0.04	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.04
CRUBB	0.01	0.02	0.02	0.01	0.01	0.01	0.01	1.01	0.01	0.01	0.01	0.03	0.01	0.03	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02
CSCIE	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	1.03	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.03
CTEXT	0.03	0.02	0.04	0.03	0.02	0.05	0.03	0.05	0.02	1.20	0.03	0.03	0.02	0.07	0.03	0.04	0.03	0.03	0.03	0.02	0.04	0.05	0.05	0.02	0.05	0.05	0.04
CTRAD	0.56	0.24	0.38	0.44	0.35	0.35	0.41	0.38	0.57	0.49	1.29	0.26	0.22	0.37	0.27	0.40	1.18	1.19	0.82	0.16	0.34	0.38	0.36	0.17	0.43	0.36	0.32
CTRAN	0.21	0.27	0.19	0.20	0.21	0.19	0.18	0.18	0.20	0.20	0.19	1.15	0.11	0.16	0.18	0.19	0.30	0.29	0.58	0.10	0.21	0.23	0.22	0.10	0.26	0.23	0.19
CTRNE	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.06	1.15	0.01	0.01	0.01	0.02	0.02	0.03	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
CVEHI	0.10	0.10	0.18	0.12	0.09	0.11	0.11	0.11	0.09	0.13	0.13	0.17	0.06	1.50	0.10	0.12	0.14	0.13	0.14	0.08	0.16	0.14	0.15	0.08	0.12	0.14	0.18
CWATR	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.01	1.66	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.03	0.02	0.02
CWOOD	0.02	0.01	0.02	0.06	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	1.29	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
DTCTRD	0.48	0.18	0.26	0.37	0.31	0.29	0.35	0.31	0.48	0.42	0.22	0.20	0.16	0.29	0.22	0.33	1.22	0.22	0.21	0.13	0.28	0.32	0.30	0.14	0.37	0.30	0.26
DTCTRE	0.06	0.02	0.02	0.04	0.02	0.03	0.03	0.03	0.04	0.04	0.02	0.02	0.02	0.04	0.02	0.04	0.02	1.02	0.02	0.01	0.03	0.03	0.03	0.01	0.03	0.03	0.03
DTCTRM	0.07	0.06	0.04	0.05	0.06	0.06	0.06	0.07	0.15	0.07	0.04	0.04	0.08	0.08	0.04	0.05	0.04	0.04	1.04	0.02	0.04	0.05	0.05	0.02	0.05	0.05	0.04
FCAP	0.72	0.59	0.67	0.73	0.58	0.62	0.58	0.57	0.49	0.60	0.80	0.66	0.28	0.46	0.87	0.69	0.78	0.78	0.74	1.27	0.59	0.62	0.60	0.30	0.67	0.60	0.58
FLABHI	0.21	0.18	0.38	0.26	0.17	0.28	0.34	0.23	0.18	0.22	0.30	0.22	0.14	0.19	0.31	0.25	0.29	0.29	0.26	0.10	1.22	0.23	0.22	0.11	0.24	0.22	0.22
FLABLS	0.08	0.12	0.11	0.11	0.07	0.14	0.09	0.11	0.06	0.12	0.09	0.08	0.06	0.08	0.08	0.19	0.08	0.08	0.08	0.03	0.07	1.08	0.08	0.04	0.09	0.08	0.07
FLABSK	0.19	0.15	0.29	0.22	0.14	0.20	0.26	0.18	0.16	0.19	0.28	0.23	0.11	0.15	0.19	0.25	0.27	0.27	0.26	0.08	0.18	0.19	1.18	0.09	0.20	0.18	0.18
HENTRP	0.66	0.55	0.62	0.67	0.54	0.57	0.53	0.52	0.45	0.56	0.74	0.61	0.26	0.43	0.80	0.64	0.72	0.72	0.69	1.18	0.54	0.57	0.56	1.27	0.62	0.55	0.54
HHDLOW	0.08	0.09	0.11	0.10	0.07	0.10	0.10	0.09	0.06	0.09	0.10	0.09	0.05	0.07	0.09	0.13	0.10	0.10	0.10	0.07	0.11	0.39	0.23	0.07	1.09	0.08	0.07
HHDMID	0.35	0.32	0.48	0.41	0.28	0.40	0.43	0.34	0.27	0.36	0.45	0.36	0.19	0.27	0.41	0.45	0.44	0.44	0.41	0.31	0.75	0.87	0.89	0.33	0.36	1.33	0.32
HHDWHI	0.38	0.32	0.49	0.42	0.30	0.40	0.43	0.35	0.29	0.36	0.47	0.38	0.19	0.28	0.47	0.42	0.46	0.46	0.43	0.44	0.88	0.52	0.63	0.47	0.38	0.35	1.34

Table 3 – Own and Open Loop Share of Total Effects

	CAGRI	CAPPA	CBCHM	CBEVT	CBUSS	CCOAL	CCOME	CCOMM	CCONS	CELEG	CELMA	CFINS	CFOOD	CFOOT	CFURN	CGLAS	CGOLD	CGOVS	CHCAT	CIRON	CLEAT	CMACH	CMAOS	CMETP	CNFRM	CNMMP	COCHM
CAGRI	94	20	19	73	10	9	9	7	26	7	13	5	82	34	48	14	11	7	56	9	66	11	13	9	7	18	22
CAPPA	6	97	11	9	12	19	10	35	7	8	9	5	9	17	15	9	16	10	12	10	29	11	25	7	7	8	11
CBCHM	69	56	98	55	34	41	49	28	54	30	77	18	59	69	61	60	40	24	45	42	73	46	49	46	49	77	84
CBEVT	4	7	5	96	6	4	6	2	3	2	5	2	13	7	6	5	2	2	51	4	9	6	3	3	3	4	6
CBUSS	32	48	51	43	82	30	46	31	45	29	43	56	44	46	42	47	24	24	54	43	46	47	52	39	33	44	48
CCOAL	43	41	64	36	31	99	43	41	59	93	59	16	45	39	47	40	46	20	53	89	52	63	39	79	80	55	57
CCOME	17	32	26	26	33	21	100	90	29	18	66	18	26	31	28	26	13	32	23	24	26	32	32	22	18	22	28
CCOMM	24	43	36	36	45	22	37	94	33	19	34	27	36	43	39	34	14	21	33	32	35	40	44	29	24	29	38
CCONS	47	54	51	48	69	54	50	35	99	86	49	43	51	54	51	46	56	45	56	51	49	52	57	45	59	47	53
CELEG	33	35	43	31	26	40	37	45	50	97	49	16	39	33	36	37	57	15	59	49	43	42	34	52	83	47	54
CELMA	41	40	42	36	46	64	93	57	89	84	99	23	40	39	39	47	52	42	45	50	39	79	44	69	55	42	43
CFINS	33	47	49	43	80	31	46	32	43	35	43	90	44	46	42	46	24	23	52	42	46	47	49	41	34	43	47
CFOOD	39	8	11	38	8	5	5	3	5	3	6	3	89	36	12	7	4	4	55	5	78	6	9	5	4	6	19
CFOOT	4	8	8	6	9	10	6	51	36	7	6	4	6	99	7	7	13	7	5	9	16	7	9	7	6	7	7
CFURN	11	24	17	17	25	12	20	34	39	10	17	14	17	21	99	17	9	10	23	15	17	18	31	13	10	14	19
CGLAS	38	48	44	62	40	37	44	32	61	36	67	18	66	45	59	100	28	31	53	35	56	52	36	51	27	63	72
CGOLD	44	47	67	42	62	47	55	33	98	77	71	35	46	47	49	57	100	35	82	78	48	60	48	71	94	71	53
CGOVS	11	9	11	9	26	8	10	6	8	11	8	12	10	10	8	9	4	99	10	10	9	10	87	7	7	9	9
CHCAT	12	21	21	17	21	18	18	10	13	13	16	9	18	19	17	22	12	11	98	19	19	19	22	14	14	18	21
CIRON	43	46	46	41	46	54	65	40	80	55	83	22	46	44	77	56	52	31	38	99	51	90	34	96	65	73	53
CLEAT	12	58	14	13	16	24	14	39	23	9	16	6	15	98	81	23	13	12	10	15	100	17	13	12	10	13	15
CMACH	57	43	54	42	38	68	47	56	59	49	51	19	51	41	44	50	61	35	37	58	49	99	32	65	54	62	58
CMAOS	13	2	3	4	7	2	2	1	2	1	2	8	6	2	3	3	1	11	3	2	4	2	94	2	2	2	3
CMETP	51	57	46	49	44	61	55	46	85	57	73	22	54	52	70	63	60	33	45	89	62	87	38	99	62	61	63
CNFRM	38	38	56	34	40	47	84	38	71	54	94	20	43	39	61	50	45	29	34	86	50	84	35	92	99	53	55
CNMMP	53	53	52	48	60	62	54	36	96	69	76	33	52	52	50	50	64	43	75	53	52	61	47	56	52	99	53
COCHM	48	26	57	29	29	42	22	19	33	19	33	14	39	34	41	36	38	32	36	30	53	30	66	34	29	31	95
COTHI	6	10	20	8	17	8	11	5	8	5	19	13	9	20	11	11	5	5	10	9	50	11	19	8	7	10	15
COTHM	50	38	83	37	34	41	47	34	76	37	68	18	43	43	49	74	60	23	36	90	51	65	36	78	87	87	60
COTHP	22	38	44	36	22	44	32	20	31	17	32	11	34	25	28	52	39	9	24	39	41	32	21	32	31	40	43
CPAPR	44	59	48	71	48	32	47	44	44	23	51	39	58	59	67	71	26	25	41	42	52	50	45	41	33	54	56
CPETR	53	37	77	38	30	41	39	42	46	25	48	15	45	42	38	37	22	19	32	46	43	43	38	40	61	46	56
CPLAS	44	53	72	57	30	39	65	28	60	31	81	15	65	77	65	68	32	22	37	42	72	59	38	50	39	54	76
CPRNT	30	49	40	43	55	26	42	63	32	20	39	52	42	48	46	41	19	28	41	35	41	44	51	32	27	34	58
CRUBB	33	26	36	23	19	59	30	32	23	23	32	10	28	69	38	33	30	19	16	40	25	42	29	31	27	34	31
CSCIE	14	21	22	18	47	20	21	22	19	14	35	29	18	20	24	20	19	39	29	19	19	20	76	16	14	18	24
CTEXT	49	90	34	25	18	24	19	35	25	12	26	8	31	57	60	28	19	17	29	19	57	23	26	18	13	25	28
CTRAD	50	75	51	67	26	35	66	39	36	21	62	14	66	75	71	54	22	18	37	53	62	68	37	49	40	46	67
CTRAN	49	52	61	45	28	62	58	45	39	32	49	15	50	57	50	45	22	19	29	62	46	57	32	47	44	59	51
CTRNE	54	41	51	38	25	56	47	34	34	25	40	12	44	45	40	37	60	63	25	55	39	46	28	39	38	50	41
CVEHI	39	32	33	28	21	40	33	26	24	21	45	10	35	30	29	65	16	40	18	34	30	46	23	35	23	35	30
CWATR	45	38	48	51	42	30	31	42	36	49	32	25	46	35	36	37	37	28	69	38	42	37	53	33	36	39	57
CWOOD	46	42	53	43	38	37	40	32	82	44	57	21	43	47	96	47	76	26	45	41	44	43	37	48	34	56	43
DTCTRD	51	77	49	70	22	32	61	27	35	20	63	12	69	77	73	53	21	17	39	49	64	65	35	47	37	45	69
DTCTRE	56	75	58	64	24	49	51	26	41	25	58	13	62	50	83	57	25	19	35	78	69	75	32	66	51	49	61
DTCTRM	52	65	70	46	28	42	90	41	48	29	75	15	58	82	60	67	32	27	34	56	61	86	42	59	59	62	72
FCAP	63	52	59	61	61	56	54	61	54	58	53	58	58	56	52	55	50	30	59	58	57	53	54	53	64	60	55
FLABHI	47	55	57	54	57	53	58	50	54	61	58	55	53	53	54	56	43	72	51	52	52	57	67	53	49	52	60
FLABLS	68	71	58	58	31	72	66	47	75	60	67	19	64	68	71	69	84	34	48	67	71	62	46	73	63	67	57
FLABSK	49	58	53	54	58	54	56	61	51	47	55	64	56	57	59	54	44	60	62	54	53	59	49	56	47	51	56
HENTRP	63	52	59	61	61	56	54	61	54	58	53	58	58	56	52	55	50	30	59	58	57	53	54	53	64	60	55
HHDLOW	60	62	57	57	53	62	59	57	63	56	59	54	59	61	62	60	69	51	57	60	61	59	52	62	58	59	57
HHDMID	56	58	57	57	56	57	57	57	57	56	57	57	57	57	58	57	58	58	57	57	57	58	57	58	56	57	57
HHDWHI	57	55	57	58	58	55	56	57	55	58	56	58	56	56	55	56	51	57	57	56	56	56	59	55	58	57	57

Table 3 – Own and Open Loop Share of Total Effects (continuation)

	COTHI	COTHM	COTHP	CPAPR	CPETR	CPLAS	CPRNT	CRUBB	CSCIE	CTEXT	CTRAD	CTRAN	CTRNE	CVEHI	CWATR	CWOOD	DTCTRD	DTCTRE	DTCTRM	FCAP	FLABHI	FLABLS	FLABSK	HENTRP	HHDLOW	HHDMID	HHDWHI
CAGRI	15	8	24	61	9	20	30	51	13	47	11	11	9	24	6	76	11	11	11	54	54	64	60	54	72	60	45
CAPPA	12	13	14	8	12	11	6	9	14	20	17	12	8	10	5	5	16	17	15	55	55	62	60	55	67	62	46
CBCHM	52	39	54	81	60	92	63	85	50	83	36	39	44	66	51	62	37	37	37	57	57	58	57	57	59	58	56
CBEVT	6	3	16	5	5	3	4	5	8	6	10	6	4	5	2	3	10	10	9	54	54	65	60	54	74	60	43
CBUSS	41	32	45	46	39	41	37	46	49	49	50	49	40	40	31	33	50	50	53	59	58	53	55	59	46	53	62
CCOAL	44	48	43	39	89	46	31	66	41	49	31	55	52	56	75	36	34	34	42	57	57	58	57	57	59	58	56
CCOME	28	20	39	24	26	20	20	25	54	29	40	30	26	29	19	17	39	39	36	57	57	56	57	57	53	59	56
CCOMM	38	24	36	33	34	28	28	34	47	39	53	39	33	35	26	24	52	52	48	56	57	59	58	56	59	60	53
CCONS	51	54	47	46	53	40	38	51	58	52	61	60	45	47	44	38	61	61	61	57	57	56	57	57	56	56	58
CELEG	38	43	33	34	51	31	28	58	37	39	29	42	38	37	71	30	30	30	34	56	56	60	58	56	65	59	52
CELMA	47	51	49	35	47	35	31	45	84	44	41	54	78	85	69	31	43	43	47	58	58	55	56	58	52	56	59
CFINS	40	32	43	45	40	41	39	46	48	49	49	47	41	40	42	36	49	49	52	58	58	53	55	58	47	53	62
CFOOD	6	5	24	16	5	6	7	9	7	10	8	6	4	8	3	14	7	7	7	54	54	64	60	54	73	60	44
CFOOT	8	14	15	5	9	5	4	6	8	7	10	6	5	6	10	4	10	10	9	55	55	62	60	55	67	62	46
CFURN	18	13	36	15	16	30	12	16	22	25	26	19	14	24	16	20	25	25	24	56	57	59	59	56	56	63	50
CGLAS	41	32	47	39	39	84	34	75	42	79	29	41	56	86	39	53	31	31	35	57	57	58	57	57	59	57	56
CGOLD	70	91	48	46	77	50	36	54	54	49	50	56	55	58	41	37	51	51	53	58	58	55	56	58	52	56	59
CGOVS	8	9	11	9	9	7	6	9	11	10	8	27	8	8	5	7	10	10	17	57	57	56	57	57	48	60	56
CHCAT	17	18	59	16	19	14	13	19	21	21	21	33	15	15	11	11	22	22	26	58	58	54	56	58	46	56	60
CIRON	63	50	68	40	50	55	40	62	53	54	37	51	83	85	54	46	38	38	43	58	58	55	56	58	51	56	60
CLEAT	16	16	25	12	16	11	12	14	19	21	21	17	13	73	9	9	21	21	20	55	56	61	59	55	64	61	49
CMACH	43	62	47	50	61	44	68	65	42	49	39	42	77	62	64	41	39	39	40	57	57	56	57	57	53	57	58
CMAOS	2	2	11	3	2	2	2	3	2	3	2	4	2	2	1	4	2	2	3	57	57	56	57	57	48	60	55
CMETP	53	53	53	41	51	66	40	68	49	65	43	46	75	83	58	55	43	43	44	57	57	56	57	57	55	57	58
CNFRM	85	41	49	51	47	55	39	68	70	47	33	45	85	84	54	44	34	34	38	58	58	54	56	58	47	55	61
CNMMP	50	54	59	45	58	41	39	57	56	51	57	62	49	49	52	41	57	57	59	57	57	56	57	57	55	56	58
COCHM	39	37	34	53	31	50	57	33	45	37	26	27	30	45	38	46	26	26	26	57	57	58	57	57	57	58	56
COTHI	95	7	15	11	10	41	11	16	35	13	9	18	9	11	40	13	10	10	12	59	59	49	54	59	31	51	65
COTHM	82	97	47	52	91	66	36	60	46	52	32	57	54	63	40	39	35	35	44	58	58	54	56	58	49	55	60
COTHP	26	42	90	36	37	32	30	40	23	42	17	29	25	24	16	23	18	18	22	58	58	55	56	58	49	56	59
CPAPR	49	32	55	98	43	73	92	59	59	61	58	45	43	51	33	71	57	57	54	57	57	57	57	57	57	57	58
CPETR	39	42	43	43	95	56	31	59	43	47	33	67	35	42	28	36	39	38	51	58	58	55	56	58	50	57	59
CPLAS	70	33	44	68	43	98	59	62	56	76	45	36	63	79	32	52	44	44	41	57	57	58	57	57	59	57	56
CPRNT	44	27	51	69	39	36	98	40	52	45	58	35	37	40	37	33	57	57	52	58	58	55	56	58	49	56	59
CRUBB	30	52	25	23	41	22	18	99	46	29	20	70	36	76	31	20	30	29	49	58	58	52	55	58	38	55	61
CSCIE	17	18	35	18	18	25	14	19	99	21	22	20	46	17	52	13	22	22	23	59	59	49	54	59	33	51	65
CTEXT	30	21	33	26	19	56	21	60	28	98	18	33	25	77	10	27	20	20	24	56	56	60	58	56	61	60	52
CTRAD	71	39	42	57	63	48	53	58	78	67	84	37	61	66	28	49	83	83	77	57	57	59	58	57	61	58	55
CTRAN	54	67	30	43	64	43	37	48	63	50	36	91	52	52	34	36	59	58	80	56	56	59	58	56	61	60	53
CTRNE	45	65	29	35	56	34	28	39	51	41	28	86	100	49	25	33	47	46	71	57	57	57	57	57	56	59	56
CVEHI	28	35	45	27	33	25	21	37	35	46	29	55	37	96	14	26	32	32	41	59	59	50	54	59	36	52	64
CWATR	32	47	35	36	55	32	28	51	37	47	32	47	37	32	99	38	34	34	39	56	56	61	59	56	65	59	52
CWOOD	67	39	57	85	38	52	61	43	48	45	43	47	45	49	40	99	43	43	44	57	57	57	58	57	55	59	55
DTCTRD	72	32	31	59	65	48	55	58	79	68	22	32	54	65	27	50	86	23	26	56	56	59	58	56	62	58	54
DTCTRE	80	51	35	65	49	51	44	65	74	68	23	33	65	77	31	61	24	99	27	57	57	57	57	57	58	57	57
DTCTRM	71	68	38	53	71	59	62	71	89	72	27	44	87	81	36	52	29	29	98	57	57	56	57	57	55	57	58
FCAP	61	58	45	57	62	50	44	53	56	54	56	57	48	54	62	50	56	56	57	78	0	0	0	57	57	57	57
FLABHI	51	48	64	55	51	59	65	58	56	54	56	52	61	58	60	49	56	56	55	0	82	0	0	57	56	57	57
FLABLS	59	75	56	64	61	72	56	69	56	71	49	55	68	66	50	77	50	50	51	0	0	93	0	56	61	58	55
FLABSK	56	50	61	57	52	54	61	55	59	55	62	62	57	56	45	58	62	62	62	0	0	0	84	57	56	57	57
HENTRP	61	58	45	57	62	50	44	53	56	54	56	57	48	54	62	50	56	56	57	78	0	0	0	78	0	0	0
HHDLOW	58	63	57	59	58	61	57	60	57	61	57	58	60	59	53	65	57	57	57	47	30	80	66	47	92	0	0
HHDMID	57	57	58	57	56	58	58	57	57	58	57	57	58	57	56	58	57	57	57	51	57	61	63	51	0	75	0
HHDWHI	57	55	56	56	58	55	56	56	57	55	57	56	55	56	59	53	57	57	57	63	61	31	45	63	0	0	75

Table 4 – Closed Loop as a Share of Total Effects

	CAGRI	CAPPA	CBCHM	CBEVT	CBUSS	CCOAL	CCOME	CCOMM	CCONS	CELEG	CELMA	CFINS	CFOOD	CFOOT	CFURN	CGLAS	CGOLD	CGOVS	CHCAT	CIRON	CLEAT	CMACH	CMAOS	CMETP	CNFRM	CNMMP	COCHM
CAGRI	6	80	81	27	90	91	91	93	74	93	87	95	18	66	52	86	89	93	44	91	34	89	87	91	93	82	78
CAPPA	94	3	89	91	88	81	90	65	93	92	91	95	91	83	85	91	84	90	88	90	71	89	75	93	93	92	89
CBCHM	31	44	2	45	66	59	51	72	46	70	23	82	41	31	39	40	60	76	55	58	27	54	51	54	51	23	16
CBEVT	96	93	95	4	94	96	94	98	97	98	95	98	87	93	94	95	98	98	49	96	91	94	97	97	97	96	94
CBUSS	68	52	49	57	18	70	54	69	55	71	57	44	56	54	58	53	76	76	46	57	54	53	48	61	67	56	52
CCOAL	57	59	36	64	69	1	57	59	41	7	41	84	55	61	53	60	54	80	47	11	48	37	61	21	20	45	43
CCOME	83	68	74	74	67	79	0	10	71	82	34	82	74	69	72	74	87	68	77	76	74	68	68	78	82	78	72
CCOMM	76	57	64	64	55	78	63	6	67	81	66	73	64	57	61	66	86	79	67	68	65	60	56	71	76	71	62
CCONS	53	46	49	52	31	46	50	65	1	14	51	57	49	46	49	54	44	55	44	49	51	48	43	55	41	53	47
CELEG	67	65	57	69	74	60	63	55	50	3	51	84	61	67	64	63	43	85	41	51	57	58	66	48	17	53	46
CELMA	59	60	58	64	54	36	7	43	11	16	1	77	60	61	61	53	48	58	55	50	61	21	56	31	45	58	57
CFINS	67	53	51	57	20	69	54	68	57	65	57	10	56	54	58	54	76	77	48	58	54	53	51	59	66	57	53
CFOOD	61	92	89	62	92	95	95	97	95	97	94	97	11	64	88	93	96	96	45	95	22	94	91	95	96	94	81
CFOOT	96	92	92	94	91	90	94	49	64	93	94	96	94	1	93	93	87	93	95	91	84	93	91	93	94	93	93
CFURN	89	76	83	83	75	88	80	66	61	90	83	86	83	79	1	83	91	90	77	85	83	82	69	87	90	86	81
CGLAS	62	52	56	38	60	63	56	68	39	64	33	82	34	55	41	0	72	69	47	65	44	48	64	49	73	37	28
CGOLD	56	53	33	58	38	53	45	67	2	23	29	65	54	53	51	43	0	65	18	22	52	40	52	29	6	29	47
CGOVS	89	91	89	91	74	92	90	94	92	89	92	88	90	90	92	91	96	1	90	90	91	90	13	93	93	91	91
CHCAT	88	79	79	83	79	82	82	90	87	87	84	91	82	81	83	78	88	89	2	81	81	81	78	86	86	82	79
CIRON	57	54	54	59	54	46	35	60	20	45	17	78	54	56	23	44	48	69	62	1	49	10	66	4	35	27	47
CLEAT	88	42	86	87	84	76	86	61	77	91	84	94	85	2	19	77	87	88	90	85	0	83	87	88	90	87	85
CMACH	43	57	46	58	62	32	53	44	41	51	49	81	49	59	56	50	39	65	63	42	51	1	68	35	46	38	42
CMAOS	87	98	97	96	93	98	98	99	98	99	98	92	94	98	97	97	99	89	97	98	96	98	6	98	98	98	97
CMETP	49	43	54	51	56	39	45	54	15	43	27	78	46	48	30	37	40	67	55	11	38	13	62	1	38	39	37
CNFRM	62	62	44	66	60	53	16	62	29	46	6	80	57	61	39	50	55	71	66	14	50	16	65	8	1	47	45
CNMMP	47	47	48	52	40	38	46	64	4	31	24	67	48	48	50	50	36	57	25	47	48	39	53	44	48	1	47
COCHM	52	74	43	71	71	58	78	81	67	81	67	86	61	66	59	64	62	68	64	70	47	70	34	66	71	69	5
COTHI	94	90	80	92	83	92	89	95	92	95	81	87	91	80	89	89	95	95	90	91	50	89	81	92	93	90	85
COTHM	50	62	17	63	66	59	53	66	24	63	32	82	57	57	51	26	40	77	64	10	49	35	64	22	13	13	40
COTHP	78	62	56	64	78	56	68	80	69	83	68	89	66	75	72	48	61	91	76	61	59	68	79	68	69	60	57
CPAPR	56	41	52	29	52	68	53	56	56	77	49	61	42	41	33	29	74	75	59	58	48	50	55	59	67	46	44
CPETR	47	63	23	62	70	59	61	58	54	75	52	85	55	58	62	63	78	81	68	54	57	57	62	60	39	54	44
CPLAS	56	47	28	43	70	61	35	72	40	69	19	85	35	23	35	32	68	78	63	58	28	41	62	50	61	46	24
CPRNT	70	51	60	57	45	74	58	37	68	80	61	48	58	52	54	59	81	72	59	65	59	56	49	68	73	66	42
CRUBB	67	74	64	77	81	41	70	68	77	77	68	90	72	31	62	67	70	81	84	60	75	58	71	69	73	66	69
CSCIE	86	79	78	82	53	80	79	78	81	86	65	71	82	80	76	80	81	61	71	81	81	80	24	84	86	82	76
CTEXT	51	10	66	75	82	76	81	65	75	88	74	92	69	43	40	72	81	83	71	81	43	77	74	82	87	75	72
CTRAD	50	25	49	33	74	65	34	61	64	79	38	86	34	25	29	46	78	82	63	47	38	32	63	51	60	54	33
CTRAN	51	48	39	55	72	38	42	55	61	68	51	85	50	43	50	55	78	81	71	38	54	43	68	53	56	41	49
CTRNE	46	59	49	62	75	44	53	66	66	75	60	88	56	55	60	63	40	37	75	45	61	54	72	61	62	50	59
CVEHI	61	68	67	72	79	60	67	74	76	79	55	90	65	70	71	35	84	60	82	66	70	54	77	65	77	65	70
CWATR	55	62	52	49	58	70	69	58	64	51	68	75	54	65	64	63	63	72	31	62	58	63	47	67	64	61	43
CWOOD	54	58	47	57	62	63	60	68	18	56	43	79	57	53	4	53	24	74	55	59	56	57	63	52	66	44	57
DTCTRD	49	23	51	30	78	68	39	73	65	80	37	88	31	23	27	47	79	83	61	51	36	35	65	53	63	55	31
DTCTRE	44	25	42	36	76	51	49	74	59	75	42	87	38	50	17	43	75	81	65	22	31	25	68	34	49	51	39
DTCTRM	48	35	30	54	72	58	10	59	52	71	25	85	42	18	40	33	68	73	66	44	39	14	58	41	41	38	28
FCAP	37	48	41	39	39	44	46	39	46	42	47	42	42	44	48	45	50	70	41	42	43	47	46	47	36	40	45
FLABHI	53	45	43	46	43	47	42	50	46	39	42	45	47	47	46	44	57	28	49	48	48	43	33	47	51	48	40
FLABLS	32	29	42	42	69	28	34	53	25	40	33	81	36	32	29	31	16	66	52	33	29	38	54	27	37	33	43
FLABSK	51	42	47	46	42	46	44	39	49	53	45	36	44	43	41	46	56	40	38	46	47	41	51	44	53	49	44
HENTRP	37	48	41	39	39	44	46	39	46	42	47	42	42	44	48	45	50	70	41	42	43	47	46	47	36	40	45
HHDLOW	40	38	43	43	47	38	41	43	37	44	41	46	41	39	38	40	31	49	43	40	39	41	48	38	42	41	43
HHDMID	44	42	43	43	44	43	43	43	43	44	43	43	43	43	42	43	42	42	43	43	43	42	43	42	44	43	43
HHDWHI	43	45	43	42	42	45	44	43	45	42	44	42	44	44	45	44	49	43	43	44	44	44	41	45	42	43	43

Table 4 – Closed Loop as a Share of Total Effects (continuation)

	COTHI	COTHM	COTHP	CPAPR	CPETR	CPLAS	CPRNT	CRUBB	CSCIE	CTEXT	CTRAD	CTRAN	CTRNE	CVEHI	CWATR	CWOOD	DTCTRD	DTCTRE	DTCTRM	FCAP	FLABHI	FLABLS	FLABSK	HENTRP	HHDLOW	HHDMID	HHDWHI
CAGRI	85	92	76	39	91	80	70	49	87	53	89	89	91	76	94	24	89	89	89	46	46	36	40	46	28	40	55
CAPPA	88	87	86	92	88	89	94	91	86	80	83	88	92	90	95	95	84	83	85	45	45	38	40	45	33	38	54
CBCHM	48	61	46	19	40	8	37	15	50	17	64	61	56	34	49	38	63	63	63	43	43	42	43	43	41	42	44
CBEVT	94	97	84	95	95	97	96	95	92	94	90	94	96	95	98	97	90	90	91	46	46	35	40	46	26	40	57
CBUSS	59	68	55	54	61	59	63	54	51	51	50	51	60	60	69	67	50	50	47	41	42	47	45	41	54	47	38
CCOAL	56	52	57	61	11	54	69	34	59	51	69	45	48	44	25	64	66	66	58	43	43	42	43	43	41	42	44
CCOME	72	80	61	76	74	80	80	75	46	71	60	70	74	71	81	83	61	61	64	43	43	44	43	43	47	41	44
CCOMM	62	76	64	67	66	72	72	66	53	61	47	61	67	65	74	76	48	48	52	44	43	41	42	44	41	40	47
CCONS	49	46	53	54	47	60	62	49	42	48	39	40	55	53	56	62	39	39	39	43	43	44	43	43	44	44	42
CELEG	62	57	67	66	49	69	72	42	63	61	71	58	62	63	29	70	70	70	66	44	44	40	42	44	35	41	48
CELMA	53	49	51	65	53	65	69	55	16	56	59	46	22	15	31	69	57	57	53	42	42	45	44	42	48	44	41
CFINS	60	68	57	55	60	59	61	54	52	51	51	53	59	60	58	64	51	51	48	42	42	47	45	42	53	47	38
CFOOD	94	95	76	84	95	94	93	91	93	90	92	94	96	92	97	86	93	93	93	46	46	36	40	46	27	40	56
CFOOT	92	86	85	95	91	95	96	94	92	93	90	94	95	94	90	96	90	90	91	45	45	38	40	45	33	38	54
CFURN	82	87	64	85	84	70	88	84	78	75	74	81	86	76	84	80	75	75	76	44	43	41	41	44	44	37	50
CGLAS	59	68	53	61	61	16	66	25	58	21	71	59	44	14	61	47	69	69	65	43	43	42	43	43	41	43	44
CGOLD	30	9	52	54	23	50	64	46	46	51	50	44	45	42	59	63	49	49	47	42	42	45	44	42	48	44	41
CGOVS	92	91	89	91	91	93	94	91	89	90	92	73	92	92	95	93	90	90	83	43	43	44	43	43	52	40	44
CHCAT	83	82	41	84	81	86	87	81	79	79	79	67	85	85	89	89	78	78	74	42	42	46	44	42	54	44	40
CIRON	37	50	32	60	50	45	60	38	47	46	63	49	17	15	46	54	62	62	57	42	42	45	44	42	49	44	40
CLEAT	84	84	75	88	84	89	88	86	81	79	79	83	87	27	91	91	79	79	80	45	44	39	41	45	36	39	51
CMACH	57	38	53	50	39	56	32	35	58	51	61	58	23	38	36	59	61	61	60	43	43	44	43	43	47	43	42
CMAOS	98	98	89	97	98	98	98	97	98	97	98	96	98	98	99	96	98	98	97	43	43	44	43	43	52	40	45
CMETP	47	47	47	59	49	34	60	32	51	35	57	54	25	17	42	45	57	57	56	43	43	44	43	43	45	43	42
CNFRM	15	59	51	49	53	45	61	32	30	53	67	55	15	16	46	56	66	66	62	42	42	46	44	42	53	45	39
CNMMP	50	46	41	55	42	59	61	43	44	49	43	38	51	51	48	59	43	43	41	43	43	44	43	43	45	44	42
COCHM	61	63	66	47	69	50	43	67	55	63	74	73	70	55	62	54	74	74	74	43	43	42	43	43	43	42	44
COTHI	5	93	85	89	90	59	89	84	65	87	91	82	91	89	60	87	90	90	88	41	41	51	46	41	69	49	35
COTHM	18	3	53	48	9	34	64	40	54	48	68	43	46	37	60	61	65	65	56	42	42	46	44	42	51	45	40
COTHP	74	58	10	64	63	68	70	60	77	58	83	71	75	76	84	77	82	82	78	42	42	45	44	42	51	44	41
CPAPR	51	68	45	2	57	27	8	41	41	39	42	55	57	49	67	29	43	43	46	43	43	43	43	43	43	43	42
CPETR	61	58	57	57	5	44	69	41	57	53	67	33	65	58	72	64	61	62	49	42	42	45	44	42	50	43	41
CPLAS	30	67	56	32	57	2	41	38	44	24	55	64	37	21	68	48	56	56	59	43	43	42	43	43	41	43	44
CPRNT	56	73	49	31	61	64	2	60	48	55	42	65	63	60	63	67	43	43	48	42	42	45	44	42	51	44	41
CRUBB	70	48	75	77	59	78	82	1	54	71	80	30	64	24	69	80	70	71	51	42	42	48	45	42	62	45	39
CSCIE	83	82	65	82	82	75	86	81	1	79	78	80	54	83	48	87	78	78	77	41	41	51	46	41	67	49	35
CTEXT	70	79	67	74	81	44	79	40	72	2	82	67	75	23	90	73	80	80	76	44	44	40	42	44	39	40	48
CTRAD	29	61	58	43	37	52	47	42	22	33	16	63	39	34	72	51	17	17	23	43	43	41	42	43	39	42	45
CTRAN	46	33	70	57	36	57	63	52	37	50	64	9	48	48	66	64	41	42	20	44	44	41	42	44	39	40	47
CTRNE	55	35	71	65	44	66	72	61	49	59	72	14	0	51	75	67	53	54	29	43	43	43	43	43	44	41	44
CVEHI	72	65	55	73	67	75	79	63	65	54	71	45	63	4	86	74	68	68	59	41	41	50	46	41	64	48	36
CWATR	68	53	65	64	45	68	72	49	63	53	68	53	63	68	1	62	66	66	61	44	44	39	41	44	35	41	48
CWOOD	33	61	43	15	62	48	39	57	52	55	57	53	55	51	60	1	57	57	56	43	43	43	42	43	45	41	45
DTCTRD	28	68	69	41	35	52	45	42	21	32	78	68	46	35	73	50	14	77	74	44	44	41	42	44	38	42	46
DTCTRE	20	49	65	35	51	49	56	35	26	32	77	67	35	23	69	39	76	1	73	43	43	43	43	43	42	43	43
DTCTRM	29	32	62	47	29	41	38	29	11	28	73	56	13	19	64	48	71	71	2	43	43	44	43	43	45	43	42
FCAP	39	42	55	43	38	50	56	47	44	46	44	43	52	46	38	50	44	44	43	22	100	100	100	43	43	43	43
FLABHI	49	52	36	45	49	41	35	42	44	46	44	48	39	42	40	51	44	44	45	100	18	100	100	43	44	43	43
FLABLS	41	25	44	36	39	28	44	31	44	29	51	45	32	34	50	23	50	50	49	100	100	7	100	44	39	42	45
FLABSK	44	50	39	43	48	46	39	45	41	45	38	38	43	44	55	42	38	38	38	100	100	100	16	43	44	43	43
HENTRP	39	42	55	43	38	50	56	47	44	46	44	43	52	46	38	50	44	44	43	22	100	100	100	22	100	100	100
HHDLOW	42	37	43	41	42	39	43	40	43	39	43	42	40	41	47	35	43	43	43	53	70	20	34	53	8	100	100
HHDMID	43	43	42	43	44	42	42	43	43	42	43	43	42	43	44	42	43	43	43	49	43	39	37	49	100	25	100
HHDWHI	43	45	44	44	42	45	44	44	43	45	43	44	45	44	41	47	43	43	43	37	39	69	55	37	100	100	25

Table 5 – Structural Path Analysis: Selected Activities

Case	(1) Origin	(2) Destination	(3) Global Influence	(4) Path	(5) Direct Influence	(6) Path Multiplier	(7) Total Influence	(8) Proportion	(9) Accumulated Proportion
I	CCONS.	CIRON.	0.09	CCONS. CMETP. CIRON.	0.0174	1.64	0.0286	33.1	33.1
				CCONS. CIRON.	0.0156	1.50	0.0234	27.1	60.2
				CCONS. CELMA. CIRON.	0.0025	1.72	0.0043	5.0	65.2
				CCONS. CNMMP. CIRON.	0.0023	1.62	0.0037	4.3	69.4
				CCONS. CMACH. CIRON.	0.0007	1.65	0.0011	1.3	70.8
				CCONS. CBUSS. CIRON.	0.0003	2.34	0.0007	0.9	71.6
				CCONS. CELMA. CMETP. CIRON.	0.0003	1.88	0.0006	0.7	72.3
				CCONS. COTHP. CIRON.	0.0003	1.70	0.0005	0.6	72.9
				CCONS. CNMMP. CMETP. CIRON.	0.0003	1.78	0.0005	0.5	73.4
				CCONS. CFURN. CIRON.	0.0002	1.52	0.0003	0.4	73.8
				CCONS. CMACH. CMETP. CIRON.	0.0002	1.80	0.0003	0.3	74.1
II	CCONS.	CNFRM.	0.03	CCONS. CELMA. CNFRM.	0.0054	1.94	0.0105	30.5	30.5
				CCONS. CMETP. CNFRM.	0.0037	1.93	0.0071	20.7	51.3
				CCONS. CMETP. CIRON. CNFRM.	0.0005	2.13	0.0010	3.0	54.2
				CCONS. CIRON. CNFRM.	0.0004	1.95	0.0008	2.4	56.7
				CCONS. CNMMP. CNFRM.	0.0002	1.84	0.0003	0.9	57.6
				CCONS. CMACH. CNFRM.	0.0001	1.87	0.0003	0.8	58.4
				CCONS. CBUSS. CNFRM.	0.0001	2.66	0.0003	0.8	59.2
				CCONS. CIRON. CMETP. CNFRM.	0.0001	2.13	0.0002	0.6	59.7
				CCONS. CMETP. CELMA. CNFRM.	0.0001	2.21	0.0002	0.5	60.2
				CCONS. CELMA. CIRON. CNFRM.	0.0001	2.23	0.0002	0.5	60.7
				CCONS. CELMA. CMETP. CNFRM.	0.0001	2.21	0.0002	0.5	61.1
III	CCONS.	CMETP.	0.12	CCONS. CMETP.	0.0590	1.49	0.0878	73.4	73.4
				CCONS. CIRON. CMETP.	0.0015	1.64	0.0024	2.1	75.5
				CCONS. CELMA. CMETP.	0.0011	1.70	0.0019	1.6	77.1
				CCONS. CNMMP. CMETP.	0.0009	1.61	0.0014	1.2	78.3
				CCONS. CMACH. CMETP.	0.0006	1.63	0.0009	0.8	79.0
				CCONS. CBUSS. CMETP.	0.0004	2.32	0.0008	0.7	79.7
				CCONS. COTHM. CMETP.	0.0003	1.55	0.0005	0.4	80.1
				CCONS. CELMA. CIRON. CMETP.	0.0002	1.88	0.0005	0.4	80.5
				CCONS. CNMMP. CIRON. CMETP.	0.0002	1.78	0.0004	0.3	80.8
				CCONS. CWOOD. CMETP.	0.0002	1.92	0.0004	0.3	81.1
				CCONS. CGOLD. CMETP.	0.0002	1.49	0.0003	0.3	81.4
IV	CCONS.	CMACH.	0.06	CCONS. CMACH.	0.0120	1.43	0.0172	29.3	29.3
				CCONS. CNMMP. CMACH.	0.0017	1.55	0.0027	4.6	33.9
				CCONS. CMETP. CMACH.	0.0013	1.63	0.0021	3.6	37.4
				CCONS. COTHM. CMACH.	0.0009	1.49	0.0014	2.4	39.8
				CCONS. CBUSS. CMACH.	0.0004	2.24	0.0010	1.7	41.5
				CCONS. CELMA. CMACH.	0.0004	1.64	0.0006	1.1	42.6
				CCONS. CNMMP. COTHM. CMACH.	0.0004	1.62	0.0006	1.0	43.6
				CCONS. CGOLD. CMACH.	0.0004	1.43	0.0006	1.0	44.6
				CCONS. FLABHI. HHDWHI. CMACH.	0.0002	2.03	0.0004	0.8	45.3
				CCONS. FLABLS. HHDMID. CMACH.	0.0002	1.93	0.0004	0.7	46.0
				CCONS. CPETR. CMACH.	0.0002	1.63	0.0004	0.6	46.6
V	CCONS.	CELEG.	0.06	CCONS. CELEG.	0.0120	1.42	0.0170	28.5	28.5
				CCONS. CNMMP. CELEG.	0.0011	1.54	0.0017	2.8	31.3
				CCONS. FLABLS. HHDMID. CELEG.	0.0005	1.89	0.0010	1.7	33.0
				CCONS. CELMA. CNFRM. CELEG.	0.0004	2.10	0.0009	1.6	34.6
				CCONS. FLABLS. HHDLOW. CELEG.	0.0005	1.59	0.0009	1.5	36.0
				CCONS. CMETP. CELEG.	0.0005	1.62	0.0009	1.4	37.5
				CCONS. CGOLD. CELEG.	0.0005	1.42	0.0007	1.2	38.6
				CCONS. FLABHI. HHDMID. CELEG.	0.0003	2.01	0.0007	1.1	39.7
				CCONS. COTHM. CELEG.	0.0005	1.48	0.0007	1.1	40.9
				CCONS. CMETP. CNFRM. CELEG.	0.0003	2.10	0.0006	1.1	41.9
				CCONS. FLABHI. HHDWHI. CELEG.	0.0003	1.99	0.0005	0.9	42.8

Table 6 – Structural Path Analysis: Factors

Case	(1) Origin	(2) Destination	(3) Global Influence	(4) Path	(5) Direct Influence	(6) Path Multiplier	(7) Total Influence	(8) Proportion	(9) Accumulated Proportion
I	CCONS.	FCAP.	0.70	CCONS. FCAP.	0.0904	1.65	0.1489	21.3	21.3
				CCONS. CBUSS. FCAP.	0.0177	2.34	0.0414	5.9	27.2
				CCONS. CNMMP. FCAP.	0.0177	1.78	0.0316	4.5	31.7
				CCONS. CBUSS. CFINS. FCAP.	0.0087	2.39	0.0207	3.0	34.7
				CCONS. COTHM. FCAP.	0.0093	1.70	0.0159	2.3	36.9
				CCONS. CMETP. FCAP.	0.0041	1.87	0.0076	1.1	38.0
				CCONS. CNMMP. COTHM. FCAP.	0.0036	1.83	0.0067	1.0	39.0
				CCONS. CELEG. FCAP.	0.0037	1.77	0.0065	0.9	39.9
				CCONS. CAGRI. FCAP.	0.0031	1.80	0.0055	0.8	40.7
				CCONS. CCOMM. FCAP.	0.0024	2.25	0.0055	0.8	41.5
				CCONS. CPETR. FCAP.	0.0030	1.83	0.0054	0.8	42.3
II	CCONS.	FLABLS.	0.16	CCONS. FLABLS.	0.0556	1.40	0.0777	49.0	49.0
				CCONS. CMETP. FLABLS.	0.0033	1.59	0.0053	3.3	52.3
				CCONS. CNMMP. FLABLS.	0.0032	1.51	0.0048	3.0	55.3
				CCONS. COTHM. FLABLS.	0.0033	1.45	0.0048	3.0	58.3
				CCONS. CGOLD. FLABLS.	0.0028	1.40	0.0040	2.5	60.8
				CCONS. CWOOD. FLABLS.	0.0018	1.80	0.0032	2.0	62.8
				CCONS. CELMA. FLABLS.	0.0019	1.60	0.0030	1.9	64.7
				CCONS. CNMMP. COTHM. FLABLS.	0.0013	1.57	0.0020	1.3	66.0
				CCONS. CPLAS. FLABLS.	0.0006	1.59	0.0010	0.6	66.6
				CCONS. CAGRI. FLABLS.	0.0005	1.55	0.0008	0.5	67.1
				CCONS. CPETR. COTHM. FLABLS.	0.0004	1.61	0.0006	0.4	67.5
III	CCONS.	FLABSK.	0.20	CCONS. FLABSK.	0.0256	1.53	0.0393	19.4	19.4
				CCONS. CBUSS. CFINS. FLABSK.	0.0040	2.32	0.0093	4.6	23.9
				CCONS. CBUSS. FLABSK.	0.0025	2.27	0.0057	2.8	26.8
				CCONS. CMETP. FLABSK.	0.0025	1.75	0.0043	2.1	28.9
				CCONS. CNMMP. FLABSK.	0.0017	1.66	0.0029	1.4	30.3
				CCONS. CWOOD. FLABSK.	0.0012	1.97	0.0024	1.2	31.5
				CCONS. CELMA. FLABSK.	0.0012	1.75	0.0022	1.1	32.6
				CCONS. COTHP. FLABSK.	0.0012	1.68	0.0021	1.0	33.6
				CCONS. COTHM. FLABSK.	0.0011	1.59	0.0018	0.9	34.5
				CCONS. CCOMM. FLABSK.	0.0007	2.11	0.0015	0.8	35.2
				CCONS. CGOLD. FLABSK.	0.0006	1.53	0.0009	0.5	35.7
IV	CCONS.	FLABHI.	0.26	CCONS. FLABHI.	0.0445	1.58	0.0702	26.8	26.8
				CCONS. CBUSS. FLABHI.	0.0047	2.30	0.0108	4.1	30.9
				CCONS. CBUSS. CFINS. FLABHI.	0.0029	2.36	0.0069	2.6	33.6
				CCONS. CNMMP. FLABHI.	0.0032	1.71	0.0055	2.1	35.6
				CCONS. CELMA. FLABHI.	0.0030	1.80	0.0053	2.0	37.7
				CCONS. CMETP. FLABHI.	0.0025	1.80	0.0044	1.7	39.4
				CCONS. COTHP. FLABHI.	0.0019	1.71	0.0033	1.3	40.6
				CCONS. CELEG. FLABHI.	0.0016	1.70	0.0028	1.1	41.7
				CCONS. COTHM. FLABHI.	0.0015	1.63	0.0025	1.0	42.6
				CCONS. CWOOD. FLABHI.	0.0008	2.03	0.0015	0.6	43.2
				CCONS. CPLAS. FLABHI.	0.0007	1.79	0.0013	0.5	43.7

Table 7 – Structural Path Analysis: Institutions

Case	(1) Origin	(2) Destination	(3) Global Influence	(4) Path	(5) Direct Influence	(6) Path Multiplier	(7) Total Influence	(8) Proportion	(9) Accumulated Proportion
I	CCONS.	HENTRP.	0.65	CCONS. FCAP. HENTRP.	0.0834	1.65	0.1373	21.3	21.3
				CCONS. CBUSS. FCAP. HENTRP.	0.0163	2.34	0.0382	5.9	27.2
				CCONS. CNMMP. FCAP. HENTRP.	0.0163	1.78	0.0291	4.5	31.7
				CCONS. COTHM. FCAP. HENTRP.	0.0086	1.70	0.0146	2.3	34.0
				CCONS. CMETP. FCAP. HENTRP.	0.0037	1.87	0.0070	1.1	35.1
				CCONS. CELEG. FCAP. HENTRP.	0.0034	1.77	0.0060	0.9	36.0
				CCONS. CAGRI. FCAP. HENTRP.	0.0028	1.80	0.0051	0.8	36.8
				CCONS. CCOMM. FCAP. HENTRP.	0.0022	2.25	0.0050	0.8	37.6
				CCONS. CPETR. FCAP. HENTRP.	0.0027	1.83	0.0050	0.8	38.3
				CCONS. CELMA. FCAP. HENTRP.	0.0025	1.88	0.0048	0.7	39.1
				CCONS. CGOLD. FCAP. HENTRP.	0.0028	1.65	0.0046	0.7	39.8
II	CCONS.	HHDLOW.	0.11	CCONS. FLABLS. HHDLOW.	0.0174	1.47	0.0257	23.2	23.2
				CCONS. FLABSK. HHDLOW.	0.0039	1.60	0.0063	5.7	28.9
				CCONS. FCAP. HENTRP. HHDLOW.	0.0028	1.73	0.0048	4.4	33.2
				CCONS. FLABHI. HHDLOW.	0.0014	1.68	0.0024	2.2	35.4
				CCONS. CMETP. FLABLS. HHDLOW.	0.0010	1.68	0.0017	1.6	37.0
				CCONS. CNMMP. FLABLS. HHDLOW.	0.0010	1.59	0.0016	1.4	38.4
				CCONS. COTHM. FLABLS. HHDLOW.	0.0010	1.52	0.0016	1.4	39.8
				CCONS. CGOLD. FLABLS. HHDLOW.	0.0009	1.47	0.0013	1.2	41.0
				CCONS. CWOOD. FLABLS. HHDLOW.	0.0006	1.90	0.0011	1.0	41.9
				CCONS. CELMA. FLABLS. HHDLOW.	0.0006	1.68	0.0010	0.9	42.8
				CCONS. CBUSS. FLABSK. HHDLOW.	0.0004	2.35	0.0009	0.8	43.6
III	CCONS.	HHDMID.	0.42	CCONS. FLABLS. HHDMID.	0.0292	1.77	0.0517	12.4	12.4
				CCONS. FLABHI. HHDMID.	0.0190	1.88	0.0356	8.5	20.9
				CCONS. FCAP. HENTRP. HHDMID.	0.0141	1.95	0.0275	6.6	27.5
				CCONS. FLABSK. HHDMID.	0.0143	1.82	0.0261	6.3	33.7
				CCONS. CBUSS. FLABHI. HHDMID.	0.0020	2.60	0.0052	1.2	35.0
				CCONS. CBUSS. FLABSK. HHDMID.	0.0014	2.56	0.0036	0.9	35.8
				CCONS. CMETP. FLABLS. HHDMID.	0.0017	2.01	0.0035	0.8	36.7
				CCONS. CNMMP. FLABLS. HHDMID.	0.0017	1.91	0.0032	0.8	37.4
				CCONS. COTHM. FLABLS. HHDMID.	0.0017	1.82	0.0031	0.8	38.2
				CCONS. CMETP. FLABSK. HHDMID.	0.0014	2.07	0.0028	0.7	38.9
				CCONS. CNMMP. FLABHI. HHDMID.	0.0014	2.03	0.0028	0.7	39.5
IV	CCONS.	HHDWHI.	0.42	CCONS. FCAP. HENTRP. HHDWHI.	0.0249	1.87	0.0466	11.2	11.2
				CCONS. FLABHI. HHDWHI.	0.0239	1.86	0.0444	10.7	21.9
				CCONS. FLABLS. HHDWHI.	0.0089	1.81	0.0162	3.9	25.7
				CCONS. FLABSK. HHDWHI.	0.0073	1.90	0.0138	3.3	29.1
				CCONS. CBUSS. FLABHI. HHDWHI.	0.0025	2.53	0.0064	1.5	30.6
				CCONS. CNMMP. FLABHI. HHDWHI.	0.0017	2.01	0.0034	0.8	31.4
				CCONS. CELMA. FLABHI. HHDWHI.	0.0016	2.12	0.0034	0.8	32.2
				CCONS. CMETP. FLABHI. HHDWHI.	0.0013	2.11	0.0028	0.7	32.9
				CCONS. COTHP. FLABHI. HHDWHI.	0.0010	1.96	0.0020	0.5	33.4
				CCONS. CBUSS. FLABSK. HHDWHI.	0.0007	2.56	0.0018	0.4	33.8
				CCONS. CELEG. FLABHI. HHDWHI.	0.0009	1.99	0.0017	0.4	34.2

Figure 1 – Construction: Structural Path to all Institutions[1]

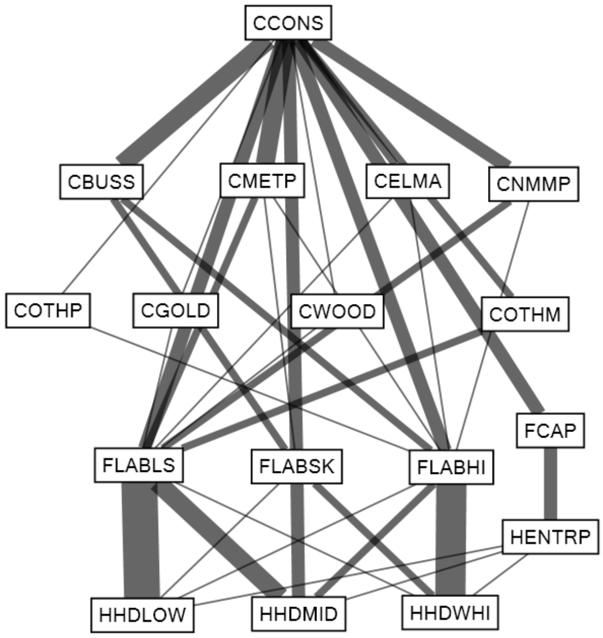
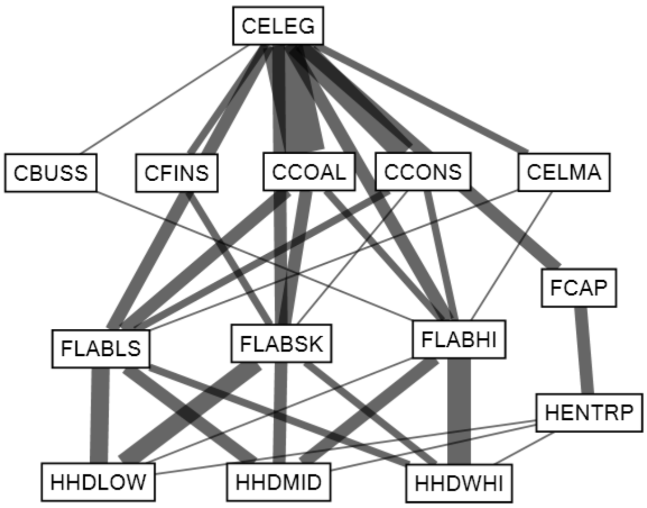


Figure 2 – Electricity and Gas: Structural Path to all Institutions



[1] All figures created using the weighted graph scheme of NodeXL.

Figure 3 –Transportation: Structural Path to all Institutions

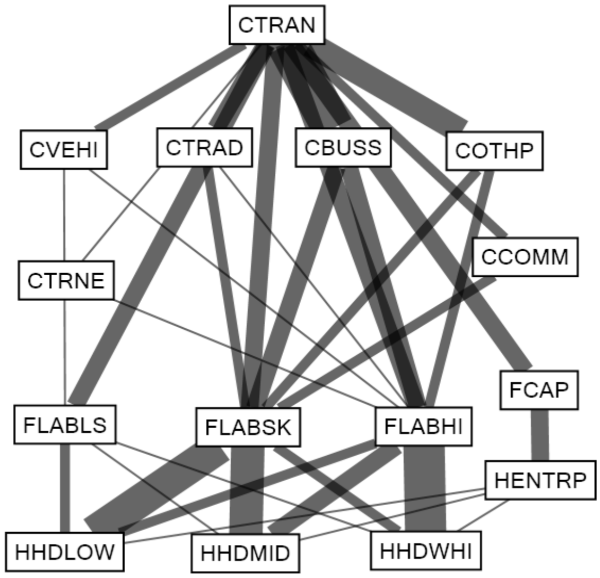


Figure 4 – Construction: Structural Path to Lower Income Households

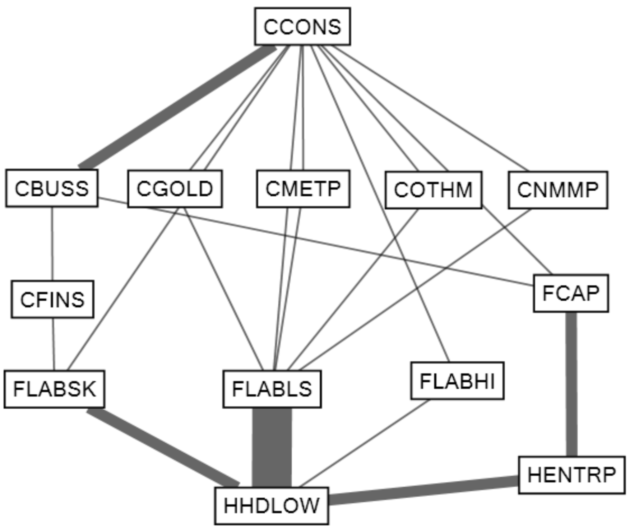


Figure 5 – Construction: Structural Path to Middle Income Households

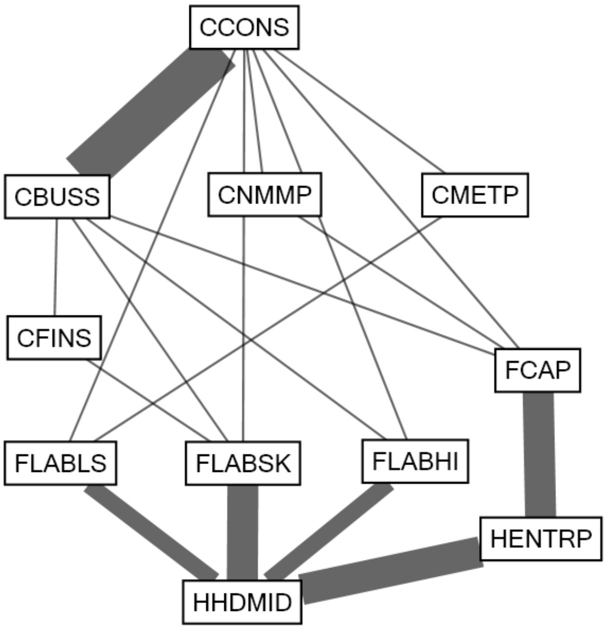
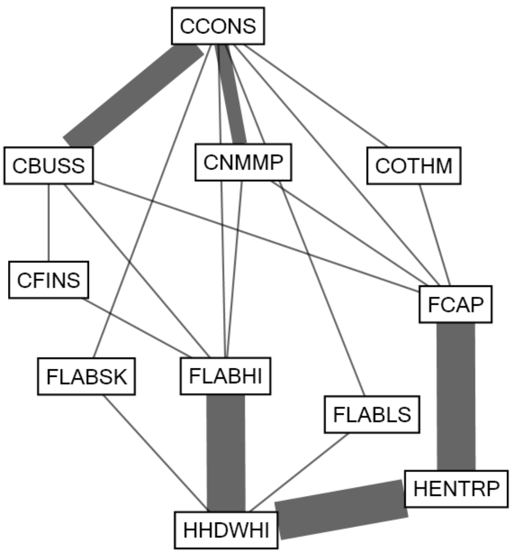


Figure 6 – Construction: Structural Path to Higher Income Households



6. Annex A: SAM Household Classification

This study used a SAM where households were classified by income. Income level (e.g. division by income deciles) has sometimes been avoided as a classification criterion, because households are potentially mobile between income groups making ex ante and ex post comparisons and policy-targeting difficult (Pyatt and Thorbecke, 1976). Many different criteria have been attempted; however, three main criteria appear important in classifying households: a) location; b) resource endowment and wealth; and c) occupation of the head of the household. Location, particularly between rural and urban areas, is a crucial criterion largely on the grounds that policy often has a locational element and often an urban bias. Resource endowment is important at several levels. Access to land is a critical consideration in rural areas and the landless can be affected quite differently from the smallholder, or large farmers, by development policy. Likewise, the better educated in both the urban and rural areas are able to land jobs in formal and organized activities, whereas the uneducated are limited to employment opportunities largely in traditional agriculture and informal urban activities. The endowment of land and human capital is a crucial determinant of the ultimate income distribution and standards of living of the various socioeconomic household groups. It is with these considerations in mind that future work should try and use a classification that is in line with the above three criteria.