# 7. The SADC Trade Liberalisation in a Demand- driven System: The Post- Keynesian/ Structuralist Model

An alternative approach to study the Mozambican participation into SADC is a structuralist CGE model. Starting from some Keynesian propositions, they move further to analyze the structure of the economic system as Baghirathan R. et al. (2004) states: "[…]*concentrated on structure in the sense of analyzing economic issues within a framework of institutions and agents interacting with each other through mechanisms that themselves complete and make the society a sustainable system*". Traces of this theory may be seen trough out the whole 20th century. Its evolution passes through at least two main phases: early Structuralism and late Structuralism. The former focused on "r*igidities and frictions in local economies*"; the latter, instead, accounts "*for macro-foundations of behavior*" and "*global foundations that is the constraints the evolution of the global system itself imposes on the players*" (Gibson, 2002).

Early Structuralism was divided between Latin American, with a more economic perspective, and European Early Structuralism, which provided for philosophical and methodological bases. In other words, it was mainly a philosophical, sociological, and anthropological phenomenon, whose main representatives were Foucalt, Levi-Strauss, and Godelier. They stressed the role of empirical research in science and they formalized three concepts at the basis of the philosophical construction of the movement.

From an economic point of view, the seedbed of late Structuralism was the ECLA in Santiago, Chile under the guidance of Raoul Prebisch. These pioneers observed "*the nature of the problems facing small, low-income countries were fundamentally different from those of the larger, industrialized countries*" (Gibson, 2002). Nowadays, Structuralism is referred to the works of Lance Taylor and his followers who continues the research line of Prebisch and the pioneers.

In this context we introduce our empirical problem that is an in- depth study of the trade liberalization process in Mozambique. Already applied in the construction of a Neoclassical and a "Bastard Keynesian" model, we continue in our aim to find the better model to answer our question on the possibility of gains, losses, and their quantification. This time, we will apply a typical Structuralist/ Post- Keynesian model for open economies.

**II. The structuralist theory**

As previously cited, economic Structuralism grounded in the ECLA and its pioneers were Lewis, Prebisch, Singer, and Myrdal among the others. They developed a theory called "the Southern Cone". It was an approach that studied trade and its advantages in a global system, where he US and Europe were already industrialized and they attempted to block the efforts of Latin American countries to gain in the manufactured goods' trade. The strategy should be increasing returns to scale in capital and wage goods.

But, this has several implications: firstly, a non-competitive position in the majority of markets, then, the erection of trade barriers in the industrialized countries, and finally, a large dependence on imported capital goods. The interactions of these three elements caused the slow industrialization process in the post-war Third World. Formally this leads to "dual economy two gaps models", which capture the essential structure both of the domestic market (i.e. the presence of a dual economic structure) and of the international markets (i.e. a centre-periphery system of the World economy[1]).

The French pedagogue Piaget identified three major themes in the structuralist method that are nowadays translated in an economic perspective. The first concept is "wholeness[2]". It is referred both to the scope and to the method of investigation. Traditionally, Structuralism debates on social and political institutions, and their dynamics. Undoubtedly, this analysis may not be focused on a system isolated from he whole World system. In other words, context is a main ingredient. From an economic point of view, this concept justifies the "North- South models" where growth and distribution in the two World's poles are affected by each other. Wholeness is also applied in the investigation on agents and institutions: there is no assumption of "sharing a common preference ordering" among agents, which are uniform, small, or price-takers. Instead, there is a wide variety of social classes with different behaviors.

[1] In a Neoclassical model there is a different modelling of internal and external economy. The central variable is the endowment of capital per unit of labour, and therefore labour productivity. Income per capita in each country increases by the same means and independently. The external context, instead, is the extrapolation of the mechanisms ruling perfect competition. This means each country, advanced and developing ones, pursues its own interest exploiting its comparative advantages.

[2] Wholeness is a common feature of Ricardo and Marx's works. For instance, Ricardo's analysis of distributive conflicts between landlords and peasants, industrialists and workers may be interpreted as phenomenon affecting the entire economy (Baghirathan R. *et al.*, 2004).

Another concept is "transformation". Gibson (2002) tries to explain this concept using the example of a Markov chain. In each time a system $X$ depends on a transformational matrix $M$ according to the rule:

$$X_t = MX_{t-1}$$

where ($t$-1) is the immediately previous period.

From a Structuralist perspective, $M$ is inadequate since it is not time dependent and it is a matrix. This system could generate steady states if $X$ is an eigenvector of $M$. In this way the system becomes non-transformational. This kind of analysis is irrelevant for Structuralist purposes, since long- run steady- state dynamic models are static in nature and not interested in capturing changes over time. Instability, instead, may be more interesting. It means some "givens", such as institutional parameters, change due to an economic phenomenon. For this reason, Structuralist models have a medium- run horizon (3- 10 years) to capture transformation and not to contradict the wholeness principle[3].

Moreover, transformation could be applied in studying the concept of technology. Along Schumpeterian lines technology is by definition a continuous transformation process through time. To stress this point, Schumpeter himself recognized in the "institutionalization of innovative process" the cause of the slowdown of technological advance.

Finally, the last principle is "self- regulation", that may be summed up in this way "*no external forces drive the system along a determinate path*".

Structuralist models are based on some Keynesian lines. Firstly, they accept the idea that effective demand affects output determination: "*The reconciliation of the identity between saving and investment with the apparent "free- will" of the individual to save what he chooses irrespective of what he or others may be investing, essentially depends on saving being, like spending, a two- sided affair. For although the amount of his own saving is unlikely to have any significant influence on his own income, the reactions of his consumption on the incomes of others makes it impossible for all individuals simultaneously to save any given sums. Every such attempt to save more by reducing consumption will so affect incomes that the attempt necessarily defeats itself*[4]" (the so- called "paradox of thrift") (Keynes, 1936). Moreover, they accept the saving- investments relation which goes from exogenous real investment to savings

[3] In this case it is not a spatial wholeness but a kind of "wholeness over time".

[4] This quotation is an example of the heterodox idea on how macro level economic behaviour derives from micro interactions.

and the inefficacy of wage cutting in stimulating income growth. The link between macro aggregates and the aggregate demand level is a crucial variable: *u*. It is defined as "capacity utilization level" and, formally speaking, it is the ratio between the sectoral output *X* and the total sectoral capital stock *K*. This concept implies two theories: one of the production function and one of aggregate demand effects. The former is the exploitation of the Leontief production function in the Structuralist theory. This means the factors of production (capital in this specific context, but the same reasoning could be applied for labor) is employed in fixed proportions respect to the level of output. It is an accommodating variable which changes in response to movements in aggregate demand.

The Structuralist economic theory differs from the Neoclassical one at least in five aspects: the production function and technique, the monetary phenomena, like inflation, distributive patterns, international trade and the macro causality among variables.

The production function, as previously described, is a Leontief production function where there is no possibility of substitutability between factors. In fact, labor and capital are employed in fixed proportions for each sectoral output level. Moreover, as cited above, production is tightly linked to the concept of technological innovation along Schumpeterian lines. So, the production function in each time is nothing else than the "state of the art" in that time. In a dynamic perspective it may change and reaches new frontiers with different combinations of capital and labor. Neoclassical functions, instead, exploit a certain degree of substitutability (the isoquant curve) as it is likely to have the same level of output choosing a labor/ capital combination instead of another (see Varian, 1984).

Although for Neoclassicals money and monetary phenomena have no implication on the real side of the economy, Structuralist macroeconomics interprets these events as strongly dependent on the real side of the economy (i.e. inflation). Both the doctrines recognize the role of social conflicts on inflation but in two different contexts. The orthodox theory of inflation interprets conflict claims as a pressure element through the political process on fiscal and monetary policies. Monetary policy, mainly, affects inflation and then, in an indirect way, conflict claims affect inflation. Structuralist point of view suppose a passive monetary policy, and directly conflicts affect inflation through different market powers that ultimately result on price formation and income distribution (Ros, 1989). Formally, the mechanism is the lagged wage indexation. Nominal wages are set in bargainings for the whole economy and they change at discrete time length. However, in that period inflation may change and erodes part of the purchasing power of workers. In this situation, obviously, workers claim for higher wages. This puts pressure on the price level since prices are formed as a mark- up rate over

variable costs. And ultimately inflation speeds up. Moreover, Structuralists have two views of steady inflation: the inertial view and the conflict view. In the former distributional conflicts have no role in perpetuating inflation but the adaptive mechanism is the determination of the target real wage, or the desired real wage that guarantees a certain purchasing power. Aspirations are the elements that accelerate the inflation process. This theory explains better low and medium inflation processes.

Instead the latter gives a fundamental role to distributional conflicts not only as original inflationary pressure but also as factor of perpetuating it. The mechanism is an adaptation gap (between target and average real wage) that is usually present when workers' aspirations are not fully met.

According to Ros (1989), we may have a taxonomy of inflation models based on the market where there is disequilibrium (i.e. the commodity or the labor market), on which kind of adjustment mechanism (i.e. quantity or price adjustment) is employed, and on the dynamic of the disequilibrium (i.e. transitionary or permanent).

He recognizes four situation. The two extremes are the inertial inflation, where expectations and indexation play a role, the disequilibrium is only temporary, and the conflict inflation with its permanent disequilibrium. Then, he discusses two other intermediate situations, defined as Joan Robinson's "inflation barrier" and the Keynesian one. The former is characterized by a disequilibrium condition in the commodity market in a price-adjustment model, while the latter presents a persistent disequilibrium in the labor market. The two dynamics differ greatly. In the first case, workers defend their real wages and so profits and savings decrease. Investment could not be balanced and finally there is an excess investment demand. In the other one, instead, output is at full employment level, then increasing profit margins get savings higher. Obviously consumption declines. In this model inflation is driven by a disequilibrium between workers' aspirations and the real wage implied by firms' profit margins.

As described above, income distribution plays a crucial role in the economy and it is the mechanism through which the system changes. Although in the Neoclassical theory there is a well defined rule for distribution, since factors are paid according to their marginal productivity, in Structuralism nominal wages are set fixed institutionally across the economy. Functional distribution and effective demand jointly determine economic activity level. Moreover, according to the role of profits and wages inside the economy, we have two different regimes: a profit- or a wage- led system. This means the economy has a different reaction to a distribution change. Following Barbosa-Filho and Taylor (2003), the growth regime is evident

if we study the effective demand schedule in a capacity utilization- wage share plane. A positive slope means it is a wage- led system. In this case, along to Keynesian ideas the originary force is the increase in the wage share. Since this class of models supposes higher workers' consumption than rentiers' one, this means an increase in demand and a higher level of capacity utilization. Assuming an investment function depending on an accelerator term (function of the capacity utilization level) and a profitability term (function of the actual profit share or profit rate) as in Marglin- Bhaduri (1989), the wage-led system faces a stronger accelerator response respect to the negative one on profitability. If the effective demand has a negative slope the system is profit- led. A higher profit share due to a redistribution towards rentiers stimulate the investment function in the profitability term more than the decrease in the accelerator term.

Describing a system as profit- or wage- led is a fundamental step in a Structuralist framework since it affects the outcomes of different policy choices. For instance, if a country faces an increase in its exports, the effects in the two systems will differ greatly. More exports due to an increased competitiveness in the international arena mean lower labor costs and a higher profit share. In a profit- led system this will stimulate growth. In the case of a wage-led system, instead, the same increase in exports means lower labor costs and a devaluation. But, this means real wages will be cut and the result will be an output contraction.

Since our aim is to study a liberalization process through a Structuralist model, it is useful to deeply discuss the international trade context. There is not a unique model to study it but a wide variety of models addressing different issues. We may look at employment and poverty issues through a "tradable/ non-tradable" model, or we may compare different countries and their interactions using a "North/South" model, or finally, we may analyze the relation between trade and growth in a Keleckian multi-sector model.

Instead of a Heckscher- Ohlin or a Ricardo- Viner trade model, most of the Structuralist scholars present international trade in terms of a "fix- price/ flex- price" model[5], although it is not implemented in CGE models[6].

They exploit a variety of market imperfections and rigidities as the context of imperfect competition in the productive sectors and the introduction of fixed capital and labor in the short run. It is worth consider the assumptions of this model. There are two kind of goods:

[5] The "fix- price/flex- price" model is employed in different context. Inside a country, it well depicts the dichotomy between agriculture and industry, then between sectors it is nothing else than the model we discuss in the text, and finally between nations in the World grouped into economic blocks it becomes a "North/ South" model.

[6] See Gunter et al. (2005), Taylor (1983, 1991b, 2001).

traded goods and non- traded goods. The former is mainly produced using skilled labor and capital while the latter with unskilled labor and capital.

Both of them acts as a monopolist and they decide a mark- up rate over variable costs (interpreted as imported intermediates and productivity level of unskilled labor). Then, traded goods price level is stable due to the stable mark- up and the relative output level is determined by effective demand. The non- traded goods market, instead, exhibits decreasing returns to labor. A higher output level is the result of a greater unskilled employment. However, firms decide to employ more workers only at a lower wage. In this way, the fundamental variable in the sector is the price- wage ratio that is free to move.

In this context it is possible to evaluate changes in the employment level in the two sectors and the poverty impact of trade liberalization. Typically, this model contradicts the traditional trade models: they focus on an increasing inequality between skilled and unskilled workers as a consequence of the workplace reorganization inside the traded- goods sector that after a current account liberalization competes with more convenient imports.

Another recurrent theme since the Latin scholars is the North- South trade model. The basic hypothesis is e differentiation among countries in the World system. The simplest textbook version, extensively and algebraically discussed in Taylor (1983), presents a three countries model: North, South, and a third country, whose behavior differs greatly from the other two. It sells intermediates to the North choosing the price at it own will. Then, the North presents a Keynesian growth where output level depends upon the aggregate demand[7]. Investment demand and saving supply are function of the local rate of profit. Obviously, the macroeconomic balance is obtained through the identity between savings and investments. But in this context the growth rate, the profit rate and the output level are determined only by domestic conditions. Moreover, the Engel elasticity of the North respect to the Southern exports is less than one.

A different situation characterized the South. Here, output is constrained by supply. In the labor market there is a labor surplus[8] that in the model is translated in a fixed real wage. Then, investments and growth are function of the available savings that is composed of both domestic saving and fixed capital inflows form the North in the short- run. Finally, the South is dependent on the Northern supply of capital goods.

The consequences of these assumptions are quite strong. Firstly, the system recognizes "*there are no enough degrees of freedom in the international system to allow the South to choose*

[7] Moreover, in a Keynesian economy firms are on their labour demand curve and labour could be hired at the current nominal wage as it is necessary.

[8] In other words there is an infinitely elastic labour supply.

*its own growth rate or terms of trade*" (Taylor, 1983). This means that the Southern growth rate depends on the Northern conditions. Macroeconomic equilibrium depends on investments in the North and capital inflows. Then, changes in productivity reduce the demand in the North that faces a slower growth rate and consequently worse Southern terms of trade. To restore the aggregate demand, nominal wages should rise. As we have previously discussed, increases in nominal wages speed up inflation. Any inflationary process is beneficial to the South. Moreover, faster capital inflows are a great advantage for the Southern growth. This is the consequence of the basic assumptions of the Keynesian growth in the North while in the South there is a labor surplus and, therefore, capital inflows are necessary to shape saving supply in the South. Finally, a greater productivity in the South is negative for its own growth and its terms of trade depending on the hypothesis of a Northern Engel elasticity for consumption of Southern exports lower than one.

The last model we want to consider is a Kaleckian model where using Taylor's words: "*trade and industrial strategy should be designed to fit the structure and institutions of the economy at hand*" (Taylor, 1990b). This kind of model considers three markets, one for the home goods, one for exports, and the last one is the intermediates' sector. Each of them has fixed capital stock and has an independent investment demand. Then there are many differences among them. The home goods' sector acts with excess capacity utilization and a mark- up pricing rule while the export sector uses all the available sectoral capital stock acting at full capacity. Intermediates, instead, are a composite (formally a CES function) of domestic intermediates and tariff- ridden imported intermediates. As usual, consumption patterns differ among social classes and in the simplest case all wage income is devoted to consumption purposes while from profit income a fraction is saved. This consumption good is domestically produced.

Given these assumptions, growth induced by trade depends in the short run on changes in the sectoral profit rates that influence the investment functions and shifts in sectoral investments.

Macro causality means how variables inside a model are interrelated, which is the starting sector and how they interact. To focus on this aspect we may follow Taylor (1983,1991b). Causality is "*influenced by microeconomic detail*" (Taylor, 1991b). He defines "injections", that are elements which increases the aggregate demand and are predetermined variables (i.e. investments, exports, fiscal demand), and "leakages", that create savings supply (i.e. income, import, and output flows). So we can move from the former to the latter group through a change in income and wealth distribution. These macro adjustment processes are nothing else than the historical processes of capital accumulation, technical process, or the effect of exogenous shocks.

From a methodological aspect, a Structuralist model is based on the country's reality of a base year. So, National Accounts are boiled down into a SAM, which captures the primary distribution. What really matters is income distribution which, in turns, is affected by social conflicts among classes. Moreover, another startling feature is the presence of a financial sector inside the SAM itself.

Baghirathan R. et al. (2004) state "*Structuralism uses a mode of inference similar to that of abduction or retroduction. It starts with observed phenomenon, what is out there, and then works backward to a theory. The focus is not on prediction but description and explanation*". This means the SAM is the starting point but it is only numbers, then the modeler looks at the reality and translate it into economic relations that are country- specific and time- dependent. This is tightly connected to the concept of closure rules of the model. As we have analyzed in our previous models, the choice of closure rules is crucial in identifying the causal chain. In this class of models we have two options: a so- called "artificial" or a "temporal" rule. As we have declared before, the idea of Structuralism is an adherence to the country reality in an exact period of time. So, the idea is a temporal closure rule, since the causal chain relies on how the country- specific and time- dependent model is closed.

Surely, as Foley and Taylor (2004) stated Structuralist or "heterodox" models share a common characteristic: "*the avoidance of model closures that imply full employment of a given labor force*".

In conclusion we may cite two quotations which sum up the Heterodox methodology. Following Baghirathan R. et al. (2004): "*the methodological framework of Structuralist economics remains a tool and not and end chosen for the sake of generating esthetically pleasing formal solutions to theoretically complex problems. Structuralist methodology is often criticized as being ad hoc*[9]*. We accept that criticism by replying that indeed, our methodology is in many instances tailored to serve best the final purpose of economic analysis, which is the understanding of economic processes that are the engines of change of the capitalist system*". Instead, using Palma's words: "*Structuralism is basically a method of enquiry which challenges the assumptions of empiricism and positivism. The principal characteristic of structuralism is that it takes as its object of investigation a "system," that is, the reciprocal relations among parts of a whole, rather than the study of the different parts in isolation*".

[9] Precisely the critique is motivated on the basis that the Structuralist models do not exploit optimization procedures and transversality conditions in a dynamic perspective.

**III. A Structuralist/ Post- Keynesian model vs. a Neoclassical model**

A Structuralist/ Post- Keynesian model differs respect to mainstream Neoclassical models at least in two aspects: the former is about the nature of the model itself and the latter is the treatment and modelling of foreign trade. Here we will discuss both aspects before presenting the relations constituting the Mozambican model.

Firstly, a Structuralist/ Post- Keynesian model (here to SPK) has a macroeconomic perspective. As already explained, it emphasizes the role of the effective demand. It influences at the macro level the economy performance so that an SPK is a macroeconomic model in spirit. There is another aspect to detect. When a policy shock, and in this specific case a trade liberalization, has been studied according to the Neoclassical paradigm the objective of the simulation is the quantitative evaluation of effects that are already supposed *a priori*. For instance, a tariff cut is supposed to have a positive effect via the price fall on private consumption. However, we have already demonstrated there are other effects not considered from mainstream AGEs. Probably the most important one is the fiscal effect which reduces public expenditures. Neoclassical exercises assume that consumption gains are bigger. They only want to know how much. A Structuralist analysis, instead, recognizes these double effects on the different demand components and, moreover, it assumes the existence of a labour supply multiplier. Already described in chapter 6, it is the balancing item in a demand- driven system, both Keynesian and Post- Keynesian. We have argued its role both in labour supply determination and its effect on fiscal revenue (i.e. direct taxation) in the previous chapter.

Although a Neoclassical model is more a "computational" exercise, where we know *a priori* that, supposing the usual closure rule of fixed saving sources, the positive price effect on consumption is predominant and that the only objective is to quantify the gain, a SPK model is a "true" exercises where not only quantitative changes has to be evaluated but also which effect is predominant. There is nothing *a priori* in a SPK model.

Secondly, international trade is modelled differently. Both the Neoclassical and the "Bastard Keynesian" models adopt an Armington specification of foreign trade. Structuralist/ Post- Keynesian macroeconomics, instead, avoids that representation preferring establishing explicit functions for imports and exports like the ones presented in chapter 2. Moreover, they are particularly interested in decomposing production costs in order to highlight imported intermediates' role in the determination of prices. For this reason in this SPK model we have to model three functions: one for exports, one for final imports and the last one for intermediate imports.

This different interpretation of foreign trade has consequences not only on the model structure but also on the accounting framework. Precisely, the SAM presented in Appendix A is intrinsically based on the Armington assumption. Here, we need a macro- SAM, where only the sectoral decomposition is useful for the structuralist analysis (Taylor, 2011) which follows the prescriptions above.

**IV. The accounting framework**

As already described, the accounting framework for a truly Structuralist/ Post- Keynesian model is a SAM comprehending both the real and the financial side. The idea is that one affects the other; a new concept respect to mainstream macroeconomics where money and monetary events are totally independent of the real side of the economy. Here, we consider only the real side of the economy although we know that an SPK analysis should contain both elements.

To build this structuralist SAM we start from the same data of the traditional SAM. However, we have to correct them and make some assumptions to break down data especially for imports. We must abandon the Armington assumption so that we can't speak in terms of "aggregate commodity" or an "aggregate supply". We have to consider separately imports for intermediate and final uses, domestic output and exports. We have data on intermediate consumption respect to a bowl of imported and domestic goods but no criterion on how to break it down. This is only one example; there is another problem when we have to define how much is imported for final uses and how much is domestically produced, how to allocate taxes on imports. Only a personal criterion may be applied.

Coherently to what is the Armington assumption, we assume that in the composite good the two components are proportional to imports and domestic output in the total supply. This criterion will be abandoned only if we have specific information from statistical data. The same idea is applied to give taxes to the different import uses.

In the following page there is the macro- structuralist SAM for Mozambique, the symbolic SAM, and then we will present each entry, how we derive the values, if they differ from the macro- IFPRI SAM, and the criterion adopted for their calculation.

**Table 65: The macro- Structuralist SAM for Mozambique, 2003 (real side)**

| | | Production costs | Domestic Market | Transaction margins | Firms' income uses | Current spending by income type | | | Foreign income uses | Capital formation | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Rural hhds | Urban hhds | Government | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A | Sales | | 148,354 | | | 26,224 | | | | | **174,578** |
| B | Domestic sales | 57,120 | | 21,034 | | 9,165 | 25,154 | 14,745 | 30,526 | 14,061 | **171,805** |
| C | Wages | 69,041 | | | | | | | | | **69,041** |
| D | Profits | 32,281 | | | | | | | | | **32,281** |
| E | Atax | -190 | | | | | | | | | **-190** |
| F | VAT-reb | -3,178 | | | | | | | | | **-3,178** |
| G | Mtax | 650 | | | | 282 | 773 | | | 432 | **2,137** |
| H | VATBorder | 1,608 | | | | 697 | 1,914 | | | 1,070 | **5,289** |
| I | Stax | | 2,468 | | | | | | | | **2,468** |
| J | VATDomestic | | 4,027 | | | | | | | | **4,027** |
| K | Direct taxes | | | | 925 | 133 | 2,071 | | | | **3,129** |
| L | TMD | | 15,783 | | | | | | | | **15,783** |
| M | TMM | 1,240 | | | | 538 | 1,475 | | | 825 | **4,078** |
| N | TME | | 1,173 | | | | | | | | **1,173** |
| O | Foreign income | 16,006 | | | 3,833 | 6,938 | 19,043 | | | 10,645 | **56,465** |
| P | Rural hhds income | 44,422 | | | | | | | | | **44,422** |
| Q | Urban hhds income | 52,267 | | | | | | | | | **52,267** |
| R | Government income | 13,784 | | | | | | | | | **13,784** |
| S | Firms income | 32,427 | | | | | | | | | **32,427** |
| T | Savings | | | | 1,673 | 445 | 1,837 | -1,518 | 24,596 | | **27,033** |
| U | Social transfers | | | | | | | 557 | | | **557** |
| V | Remittances | | | | | | | | 1,343 | | **1,343** |
| W | Distributed profits | | | | 25,996 | | | | | | **25,996** |
| X | Totals | **174,578** | **171,805** | **21,034** | **32,427** | **44,422** | **52,267** | **13,784** | **56,465** | **27,033** | |

**Source:** ***Author's own calculation, based on Taylor (1990a)***

**Table 66: The symbolic macro- Structuralist SAM for Mozambique (real side)**

| | | Production costs | Domestic Market | Margin | Firms' income uses | Current spending by income type | | | Foreign income uses | Capital formation | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Rural hhds | Urban hhds | Gov't | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A | Sales | | $P_y \cdot dm0$ | | | $P_y \cdot hc_{rh}$ | | | | | $P_y Y$ |
| B | Domestic sales | $a_0 PY$ | | $P \cdot MRG$ | | $P \cdot ch0_{rh}$ | $P \cdot ch0_{uh}$ | $P \cdot G0$ | $P \cdot X0$ | $P \cdot \beta_0 I$ | $P \cdot A$ |
| C | Wages | $wbY$ | | | | | | | | | $Y_w$ |
| D | Profits | $rP_k K$ | | | | | | | | | $rP_k K$ |
| E | Activity tax | $atx0 \cdot P_y dm0$ | | | | | | | | | $Atax$ |
| F | VAT-reb | $vtreb0 \cdot \left[a_0 P + a_1 Pim\right] \cdot Y$ | | | | | | | | | $VATreb$ |
| G | Mtax | $tm0 \cdot a_1 eP^* Y$ | | | | $tm0 \cdot \left(eP^* fch0_{rh}\right)$ | $tm0 \cdot \left(eP^* fch0_{uh}\right)$ | | | $tm0 \cdot \beta_1 eP_i^* I$ | $Tar$ |
| H | VATBorder | $vtb0 \cdot \left[\left(1+tm0\right) \cdot \left(a_1 eP^* Y\right)\right]$ | | | | $vtb0 \cdot \left[\left(1+tm0\right) \cdot \left(eP^* fch0_{rh}\right)\right]$ | $vtb0 \cdot \left[\left(1+tm0\right) \cdot \left(eP^* fch0_{uh}\right)\right]$ | | | $vtb0 \cdot \left[\left(1+tm0\right) \cdot \left(eP_i^* \beta_1 I\right)\right]$ | $VATb$ |
| I | Sales tax | | $stx0 \cdot PA$ | | | | | | | | $Stax$ |
| J | VATDomestic | | $vtd0 \cdot dm0$ | | | | | | | | $VATd$ |
| K | Direct taxes | | | | $dtx0_e \cdot Y_e$ | $dtx0_{rh} \cdot Y_{rh}$ | $Y_f \quad dtx0_{uh} \cdot Y_{uh}$ | | | | $Dir$ |
| L | TMD | | $P_t \cdot TMD$ | | | | | | | | $P_t \cdot TMD$ |
| M | TMM | $P_t \cdot mrm \cdot a_1 eP^* Y$ | | | | $P_t \cdot mrm \cdot \left(eP^* fch0_{rh}\right)$ | $P_t \cdot mrm \cdot eP^* fch0_{uh}$ | | | $P_t \cdot mrm \cdot eP_i^* \beta_1 I$ | $P_t \cdot TMM$ |
| N | TME | | $P_t \cdot TME$ | | | | | | | | $P_t \cdot TME$ |
| O | Remittances | | | | | | | | $eR$ | | $eR$ |
| P | Social transfers | | | | | | | $Tran$ | | | $Tran$ |
| Q | Savings | | | | $S_e$ | $S_{rh}$ | $S_{uh}$ | $S_g$ | $S_f$ | | $S_{tot}$ |

**(Table 66 continues)**

| | | Production costs | Domestic Market | Transaction margins | Firms' income uses | Current spending by income type | | | Foreign income uses | Capital formation | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Rural hhds | Urban hhds | Gov't | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| R | Foreign income | $a_1 eP^* Y$ | | | $eF$ | $eP^* fch0_{rh}$ | $eP^* fch0_{uh}$ | | | $eP_i^* \beta_1 I$ | $Y_f$ |
| S | Rural hhds income | $Y_{rh}$ | | | | | | | | | $Y_{rh}$ |
| T | Urban hhds income | $Y_{uh}$ | | | | | | | | | $Y_{uh}$ |
| U | Gov't income | $Y_g$ | | | | | | | | | $Y_g$ |
| V | Firms income | $Y_e$ | | | | | | | | | $Y_e$ |
| W | Totals | $P_y Y$ | $P \cdot A$ | $P \cdot MRG$ | $Y_e$ | $Y_{rh}$ | $Y_{uh}$ | $Y_g$ | $Y_f$ | $P_{inv} I$ | |

**Definitions:**

$Pim = e \cdot (1 + tm) \cdot (1 + vtb0)$ $\quad$ $P_{inv} = \beta_0 eP_i^* + \beta_1 P$

**Source:** ***author's own SAM based on Taylor (1990a)***

The notation for the macro- Structuralist SAM cell entries is **[row account, column account]**. Here we briefly describe them. All values are in 2003 Billion of MT, unless otherwise specified.

**1. Domestic intermediate consumption [domestic sales, production costs]**: 557,120. This feature is the value of intermediate consumption of domestic goods gross of indirect taxes and transaction margins. In the original SAM we have only the value of the composite (domestic + imported) intermediate. We have to decompose it into the two components. The reasoning applied is simple and realistically fit the Armington assumption at the basis of the IFPRI SAM building. We suppose that each demand component of the composite good is composed partly of domestic and partly of imported goods. The two shares are fixed and represent how much of domestic and imported commodities enter the Armington supply. Practically, in the original dataset gross imports and total supply were 60,058 Billion MT and 235,941 Billion MT respectively, we suppose that each demand component has a [1-(60,058/ 235,941)] percentage of gross domestic intermediates.

**2. Labour value added [wages, production costs]**: 69,041. This feature comprehends labour and land, which in the IFPRI model was aggregated to capital.

**3. Capital value added [profits, production costs]**:32,281. As in the IFPRI SAM of chapter 4.

**4. Activity subsidies [Activity tax, production costs]**: -190. As the original SAM.

**5. VAT rebate [VAT-reb, production costs]**: -3,178. This value does not change; however, in the model implementation we should break it down into two components: the VAT rebate for domestic intermediates and for imported intermediates. These two values are 2,369 and 809 respectively.

**6. Import tax on imported intermediates [Mtax, production costs]**: 650. We have decomposed import duties respect to final and intermediate imports. After having derived the value of net imported intermediates we apply the same import tax rate of the original dataset.

**7. VAT collected at borders on intermediate imports [VATBorder, production costs]**: 1,608. The reasoning is straightforward and very close to the one of the import tax. Given the values of net imported intermediates and related import taxes, VAT collected at borders is obtained as the starting rate by imports gross of tariffs.

**8. Margins applied on intermediate imports [TMM, production costs]**: 1,240. The value is derived as in the case above.

**9. Net intermediate imports [foreign income, production costs]**: 16,006. The gross value of imported intermediates is given as (60,058/ 235,941) percentage of composite intermediate in the original SAM.

Then to obtain net values we apply tax rates, and transport margin per unit of import as in the dataset and we use the formula:

$$M0net = \frac{M0gross}{mrm0 + \left[(1+vtb0)\cdot(1+tm0\right]}$$

It ultimately states that net value is a positive function of gross value of imports and a negative function of *mrm0*, unitary transportation margin (which is applied on net imports), *vtb0*, rate of the VAT collected at borders (which is applied on imports gross of import tariffs), and *tm0*, import tariff rate (applied on net imports).

**10. Domestic sales [sales, domestic market]**: 148,354. As in the SAM in chapter 4.

**11. Margins on domestic commodities [TMD, domestic market]**: 15,783. As in the IFPRI SAM.

**12. Margins on exports [TME, domestic market]**: 1,173. As in the SAM in chapter 4.

**13. Sales tax [Sales tax, domestic market]**: 2,468. As in the IFPRI SAM.

**14. VAT domestically collected [VATDomestic, domestic market]**: 4,027. As in the SAM in chapter 4.

**15. Total marketing margins demand [domestic sales, margin]**: 21,034. As in the SAM in chapter 4.

**16. Corporate income tax [direct taxes, firm's uses of income]**: 925. As in the IFPRI SAM.

**17. Firm's payments to foreigners [foreign income, firm's uses of income]**: 3,833. As in the original SAM.

**18. Corporate savings [savings, firm's uses of income]**: 1,673. As in the IFPRI SAM in chapter 4.

**19. Total distributed profits [distributed profits, firm's uses of income]**: 25,996. This is the total value of distributed profits. In the SAM in chapter 4 it is broken down in its two components: distributed profits accruing to households, and distributed profits accruing to government.

**20. Home consumption [sales, current spending by income type]**. It is a vector with only one entry for rural households, 26,224, as in the IFPRI SAM.

**21. Foreign final consumption [foreign income, current spending by income type]**. It is a vector whose entries are 6,938, and 19,043 for rural and urban households respectively. The element corresponding to government consumption is nil, according to the SU table.

The distinction of the final uses of imports depends on a modeller assumption. Firstly, we have the total net final imports (the value in the dataset minus net imported intermediates), then we allocate it across final uses (households consumption and capital formation) according to the composite good allocation. For instance, in the original SAM rural household

consumption is 17,620 while the sum of the three components (composed both of domestic and imported goods) is 93,012. Therefore, we suppose that (17,620/ 93,012) percent of final imports is devoted to rural household consumption. The same reasoning is applied for urban household consumption and capital formation since we have no other information from the SU table.

**22. Domestic final consumption [domestic sales, current spending by income type]**. It is a vector composed of 9,165, 25,154, and 14,745 for rural household consumption, urban household consumption, and government expenditures, respectively. The decomposition for private consumption is derived as the difference between the original composite values and imported final consumption (gross of taxes and margins). Government expenditures are totally counted as domestic goods according to the SU table.

**23. Import tax on foreign final consumption [Mtax, current spending by income type]**. It is a vector with two entries 282, 773 respectively for rural and urban import final consumption. having the net values, we apply the import tax rate of the original SAM.

**24. VAT collected at borders on foreign final consumption [VATBorder, current spending by income type]**. It is a two- entry vector: 697 and 1,914. The decomposition follows the criterion applied for import taxes on foreign final consumption.

**25. Margins applied on foreign final uses [TMM, current spending by income type]**. It is the vector 538, 1,475. The reasoning is close to the one applied for taxes on final import uses.

**26. Personal direct taxes [Direct taxes, current spending by income type]**. The vector's entries are 133, and 2,071 for rural and urban households, respectively. Data are the same of the SAM in chapter 4.

**27. Rural household saving [savings, rural hhds]**: 445. As the value in the IFPRI SAM.

**28. Urban household saving [savings, urban hhds]**: 1,837. As the feature in the original SAM.

**29. Public deficit [savings, gov't]**: -1,518. As in the SAM of chapter 4.

**30. Social transfers [social transfers, gov't]**: 557. This value collects social contributions to households and enterprises. In the IFPRI SAM they are disaggregated across receivers. However, the total value is unchanged.

**31. Exports [domestic sales, foreign income uses]**: 30,526. As in the IFPRI SAM.

**32. Foreign savings [savings, foreign income uses]**: 24,596. As in the SAM in chapter 4.

**33. Remittances from abroad [remittances, foreign income uses]**: 1,343. As in the IFPRI SAM.

**34. Foreign capital formation [foreign income, capital formation]**: 10,645. Residually after having distributed final imports to all the other demand components.

**35. Domestic capital formation [domestic sales, capital formation]**: 14,061. Residually after having distributed domestic sales to all the other demand components of domestic commodities.

**36. Import tax on foreign capital formation [Mtax, capital formation]**: 432. Residually after having distributed import duties to all the other components of intermediate and final imports.

**37. VAT collected at borders on foreign capital formation [VATBorder, capital formation]**: 10,70. Residually after having distributed VAT collected at borders to all the other components of intermediate and final imports.

**38. Margins applied on foreign capital formation [TMM, capital formation]**: 825. Residually after having distributed import margins to all the other components of intermediate and final imports.

**39. Rural household income [rural hhds income, production costs]**: 44,422. This entry is a summary of total income for rural households. It comprehends income out of labour, distributed profits, and social transfers.

**40. Urban household income [urban hhds income, production costs]**: 52,267. This entry is a summary of total income for urban households. It comprehends income out of labour, distributed profits, social transfers, and remittances from abroad.

**41. Government income [gov't income, production costs]**: 13,784. This entry sums up the total government fiscal revenue from both direct and indirect taxes.

**42. Firm's income [firm's income, production costs]**: 32,427. This cell shows total firm's income which is solely out of capital.

## V. The SPK model specifications

In this section we describe the fundamental relationships building the Structuralist/ Post-Keynesian model. As already done for the other models, we will present the MCP format. As usual, there are three groups of relations: zero profit conditions, market clearing conditions and income balances. The model differs in the functional forms of these relations. The SPK model has the same Keynesian multiplier, *km*, of the BK model, since both of them are demand- driven system where output is endogenized through an endogenous labour supply. Although this similarity, the SPK model greatly differs in two aspects: the production function and the treatment of foreign trade. We have already outlined the essential features of the Structuralist production function, here we briefly sum up the basic notions to present it formally. Firstly, this formulation of the production technique is contextualized in a time

period through the employment of the technical coefficient $b$, $a_0$, and $a_1$. It is assumed that these coefficients show a particular combination of inputs given the technique available at time $t$. If the analysis considers time $t$+1, they are likely to be changed. Secondly, the combination of a mark- up rule for price determination and the rejection of marginal productivity remuneration leads to a different income distribution theory. Now, income is allocated not according to marginal product but as the result of class conflicts and bargaining power of the different social classes. Both the mark- up rate (which the profit income comes from) and the wage rate are set after struggling between rentiers and wage earners. Once more, income distribution has an historic perspective: it is determined by previous bargainings so that at time $t$ it is determined by class conflicts.

These specifications leads to the determination of the *numeraire* of the model. In the previous models we have assume no specific *numeraire*[10]. Here it is not likely. In the short-run we must assume that wages are fixed. They are set by previous workers' struggles and they do not change instantaneously to adjust. Here, wages are indexed and rigid in the short-run.

Formally, the production function is a Leontief function with fixed coefficients (the technical coefficients), determining the shares of input respect to total production.

The second difference is the treatment of international trade. In Neoclassical (and BK) model we have assumed the Armington assumption holds. This means there is an imperfect substitutability between domestic and imported goods and between domestic production and exports. Typically Structuralists reject this hypothesis. They prefer consider explicit functions for exports and imports. Moreover, they are interested in analysing the role of foreign intermediates into production costs, and consequently their effect on final price level. Therefore, there are three functions that illustrate foreign relations: an export function, an intermediate import function and a final import function.

This representation clearly avoids any degree of substitutability between domestic and foreign commodities.

In this functional description of the SPK model we refer to the previous macro- SAM so that in our model there is only one sector, one good, and two households, indexed by $h$. The first class of relations is the zero profit conditions whose associated variable is the activity level.

[10] The reader may see Appendixes C and E where the codes for the Neoclassical and the "Bastard Keynesian" model are shown. There is any reference to a *numeraire* of the model because GAMS/MPSGE automatically computes the results assuming normalization respect the higher agent's income. This means that, in those cases, it considers urban household income as the term of reference.

As already discussed, the zero profit condition for the productive sector satisfies the conditions on the production function listed above.

Production in sector *Y*:

$$PY0\cdot(1+atax0)=(1+\tau 0)\left[b0w0+\left(a_0P+a_1P^{*}pim\right)\cdot(1+vtreb0)\right]\cdot Y0 \qquad (1)$$

Where *PY* is the nominal GDP, $\tau$ is the profit mark- up rate over variable costs, *b0*, $a_0$, and $a_1$ are the technical coefficients of the Leontief function respect labour, domestic, and imported intermediates. Usually, variable costs comprehend only labour costs and imported intermediates, here there are also domestic intermediates. We suppose that the productive sector can't use directly its own intermediates without selling them to the formal market. This hypothesis is *ad hoc* in order not to have different tax rates and unitary margin on transactions. In equation (1) *w0* is the wage rate in the benchmark, *P* the domestic general price level (gross of tariffs and margins), $P^{*}$ is the foreign price. Then, *atax0* and *vtreb0* are the tax rate for activity subsidy and VAT rebate respectively[11]. $P^{*}\cdot pim$ represents the costs of imported intermediate in domestic currency gross of taxes and margins, since *pim* is defined as: $pim=pfx\cdot(1+tm0)\cdot(1+vtb0)+pt\cdot mgm$.

The second zero profit condition is related to the domestic market, where we aggregate domestic uses, margins, and indirect taxes.

Domestic supply, *A*:

$$(1+stx0)P\cdot a0=Py\cdot dm0\cdot(1+vtd0)+pt\cdot Trd+pt\cdot Tre \qquad (2)$$

Where *PA* is the nominal total domestic supply, *dm0* is the marketed production, *pt* is the price of margins, and *Trd* and *Tre* the two margins' quantities. *Stx0* and *vtd0* are the tax rates for sales tax (on total supply) and VAT collected on domestic uses.

Consumption for households is an aggregation of imported and domestic goods, *C*(*h*):

$$Py\cdot ha(h)+P\cdot ch0(h)+P^{*}\cdot pim\cdot fch0(h)=c0(h)\cdot pc(h) \qquad (3)$$

[11] If this relation should describe the production function for an informal sector it would not have either activity subsidies or VAT rebate.

For government expenditures the reasoning is close, although in this case they are referred only to domestic commodities.

Government consumption, *GOVT*:

$$P \cdot gd0 = GOVT \cdot pg \tag{4}$$

Investment production sector, *INV*:

$$P \cdot \beta_0 I + pim \cdot P^* \beta_1 I = pinv \cdot i0 \tag{5}$$

In this case investments are composed of domestic capital goods (a share $\beta_0$ of total investments) and imported commodities, so that $\beta_0 + \beta_1 = 1$.

Transactions margins, *MRG*:

$$P \cdot (Trd + Trm + Tre) = pt \cdot Trm + \cdot pt \cdot Trd + pt \cdot Tre \tag{6}$$

Exports, *EX*:

$$py \cdot x0 + pt \cdot Tre = pfx \cdot x0 \cdot \overline{P} \tag{7}$$

Overall imports, *IMP*:

$$a_1 Y \cdot pmi + pmi \cdot \left[ sum(h, fch(h)) + \beta_1 I \right] = P^* \cdot a_1 Y + P^* sum(h, fch(h)) + P_i^* \beta_1 I \tag{8}$$

Market clearing conditions represent the supply- demand law. It states that the supplied quantity of each good is demanded either as final or intermediate uses. Because this relation must hold for each good and factor of production, in our model there are twelve MCCs: for productive sector's output, domestic sales, private consumption goods, investment goods, margins, export, import, foreign exchange, capital, labour, distributed profits, and lump- sum transfers . Here the associated variable is the price level for each good or factor of production.

Productive sector's output:

$$Py \cdot Y0 \cdot Y = Py \cdot dm0 + sum(h, Py \cdot ah(h)) \tag{9}$$

Domestic sales:

$$a0 \cdot A = \frac{a_0}{P} Y + \frac{(Trd + Tre + Trm)}{P} MRG + \left( sum(h, \frac{cd(h)}{P} C(h) \right) + \frac{gd0}{P} GOVT + \frac{\beta_0}{P} INV \tag{10}$$

Foreign exchange:

$$P \cdot x0 \cdot \overline{P} \cdot EX + pfx \cdot R + pfx \cdot S_f = a_1 \cdot pfx \cdot P^* \cdot y0 \cdot Y + pfx \cdot F + (sum(h, pfx \cdot P^* \cdot fch0(h)) + pfx \cdot P_i^* \beta_1 I \quad (11)$$

Exports:

$$x0 \cdot EX = x0 \cdot \left( \frac{pfx \cdot \overline{P}}{P} \right)^{\delta} \quad (12)$$

Imports:

$$m0 \cdot IMP = m0 \cdot \left( \frac{pfx \cdot P^*}{P} \right)^{\alpha} \cdot \left( y0 \cdot Y \right)^{\beta} + a_1 \cdot P^* \cdot pim \cdot y0 \cdot Y \quad (13)$$

Labour:

$$km \cdot LS = b \cdot w \cdot y0 \cdot Y \quad (14)$$

Capital:

$$KS = \tau \left[ b \cdot w + \left( a_0 \cdot P + a_1 \cdot P^* \cdot pim \right) \cdot (1 - vatreb0) \right] \cdot y0 \cdot Y \quad (15)$$

Distributed profits:

$$ENT \cdot (sum(h, he(h)) + ge) = sum\left( h, \frac{he(h)}{pe} \right) + \frac{ge}{pe} \quad (16)$$

Margins:

$$(Trd + Tre + Trm) \cdot MRG = \frac{Trd + Tre + Trm}{pt} \quad (17)$$

Private goods:

$$C(h) \cdot c0(h) = \frac{RA(h)}{pc(h)} \quad (18)$$

Investment goods:

$$INV \cdot i0 = \frac{i0}{pinv} \quad (19)$$

Lump- sum transfers:

$$TRAN = \frac{sum(h,Tranh(h)) + Trane}{ptran} \; TRAN = \frac{sum(h,htran(h)) + etran}{ptran} \tag{20}$$

Finally, the income balance conditions state that the level of expenditure equals the value of income accruing from sale of factors' endowments, dividends' payment, or tax receipts, given the assumption of non- satiation. In our model there are four agents whose income balance condition has to be fulfilled: two household groups, enterprises, the government, and the foreigners.

Income balance conditions for household(*h*):

$$RA(h) = (1 - dtx(h)) \cdot \left[ Yw(h) + pe \cdot he(h) + ptran \cdot Tranh(h) + pfx \cdot R(h) \right] - pinv \cdot S_h(h) \tag{21}$$

Income balance condition for enterprises:

$$ENT = (1 - dtxe) \cdot (rP_k KS + ptran \cdot Trane) - pfx \cdot F - pinv \cdot S_e \tag{22}$$

Government income balance condition:

$$GOVT = Dir + (Atax + VATreb + VATb + VATd + Tar + Stax) - ptran \cdot (Trane + sum(h,tranh(h))) - pinv \cdot S_g \tag{23}$$

Foreigners income balance condition:

$$FOREIGN = pfx \cdot (a_1 P^* \cdot y0 \cdot Y) + pfx \cdot \left[ sum(h, fch(h)) + \beta_1 I \right] + pfx \cdot F - pfx \cdot R - pinv \cdot S_f \tag{24}$$

**VI. The elasticity issue**

As in the Neoclassical and "Bastard Keynesian" models, also the SPK model heavily relies on the modeller's choice on elasticity estimation. All the considerations explained in chapter 5 are still valid. However, here the issue is a bit more complicated. As the Neoclassical (and BK) model assumes the Armington assumption holds, we have the opportunity to adopt elasticity from the *GTAP database* whose statistics are derived according to this economic theory. But as clarified in the above section, SPK models reject the existence of a substitutability between

imports and domestically produced goods[12] and they adopt explicit import functions. Equation (13) shows the total imports demand highlighting the two components of intermediate and final imports. The former is a Leontief function respect to total production, according to the input-output coefficient[13], $a_1$. The latter, instead, presents two elasticity parameters we have to estimate: a price elasticity, $\alpha$, and an income elasticity, $\beta$.

The final import demand function is as follows:

$$finIMP = m0 \cdot \left( \frac{pfx \cdot P^*}{P} \right)^{-\alpha} \cdot \left( y0 \cdot Y \right)^{\beta}$$

The elasticities are calculated using a Ordinary Least Squares (OLS) method[14] as in von Arnim (2010). Taking the logarithmic expression of the function above, our regression becomes:

$$\ln finIMP = \ln M0 - \alpha \ln \left( \frac{pfx \cdot P^*}{P} \right) + \beta \ln GDP$$

denoting the real exchange rate as $\rho = pfx \cdot P^* / P$, the regression simply becomes:

$$\ln finIMP = \ln M0 - \alpha \ln \rho + \beta \ln GDP$$

so that we regress the logarithm of the value of imports on the logarithm of both domestic GDP and the relative price of imports respect domestic prices.

We need the import and GDP values, the price of imports and the domestic price. To provide continuity and for ease of comparison each variable should be indexed to a year value.

Firstly, we have to set which period we consider, and which kind of statistical variables are adopted.

As already stated, according to the law of the large numbers, a regression to estimate parameters is robust if there are at least 30 observations[15]. Respect to *UNCTADStat database*

[12] Another issue they rebut is the property of the CES function itself, and especially the income elasticity equals one. They assert that it is unlikely that a change in income stimulate an equal percentage change in demand for both domestic and imported commodities.

[13] The input- output elasticity values both for domestic and imported intermediates are calibrated on the benchmark data.

[14] The regression is performed using E-Views software version 5.

we have 30 annual observation from 1980 to 2010. However, we decide to restrict the time series to the period 1992- 2010. There are at least three reasons for this choice. Firstly, we assume there is an impossibility to compare data of the periods 1980-1991 and 1992-2010 because of the different economic systems in Mozambique. In the former time period there was a socialist economic system where Government had a strong role in price determinacy, in the latter there is a market economy with a lower level of State participation. Secondly, before 1992 the Country was involved in a Civil War which takes it to the economic collapse. We assume, according to Arndt *et al.* (2001), that in the Civil War period data collection and estimates were of poor quality. Moreover, in 1991 a new National Statistics Institute, INE, was created and it started its work.

Because of all these considerations, we justify a shorter period obtaining short- run elasticities.

After having defined the time period we have to find the useful data. For all our calculations, data are taken from the International Monetary Fund's International Financial Statistics (IFS), other IMF publications (IMF, 2009a, b, c, 2008a, b, 2007, 2005, 2004, 2002, 2001), and the *UNCTAD's volume series*. For each calculation *import volume* was used as the measure of imports, *Gross Domestic Product* (GDP) *volume* is used as the measure for GDP. Both of these variables are indexed to 2005 (according to the IMF data). For the price elasticity, the relative price may be calculated in cases where both import price and GDP deflator are available. Since we haven't information on the former we use the Real Effective Exchange Rate (REER). Both GDP deflator and REER are re- indexed to 2005 to provide continuity by the author.

In table 67 we sum up the values employed for the regression.

[15] In chapter 5 when we have faced the same problem for the first time, we have chosen to adopt the GTAP values, commonly adopted in literature. Here we haven't either a 30- observation series or literature values.

**Table 67: GDP and import volumes, GDP deflator and REER (1992- 2007)**

| Year | GDP volume | Import volume* | GDP deflator | Real Effective Exchange Rate** |
|---|---|---|---|---|
| | | *values are indexed to 2005 (2005= 100)* | | |
| **1992** | 35.36 | 45.41 | 9.42 | 99.30 |
| **1993** | 38.47 | 51.77 | 13.73 | 96.27 |
| **1994** | 40.83 | 65.34 | 21.50 | 93.09 |
| **1995** | 41.75 | 39.38 | 32.65 | 88.99 |
| **1996** | 47.92 | 40.31 | 50.36 | 102.18 |
| **1997** | 53.23 | 38.48 | 54.46 | 111.28 |
| **1998** | 59.53 | 43.27 | 56.86 | 114.77 |
| **1999** | 64.51 | 62.39 | 59.22 | 108.09 |
| **2000** | 65.50 | 60.89 | 66.05 | 103.70 |
| **2001** | 73.52 | 57.16 | 75.64 | 93.99 |
| **2002** | 80.31 | 82.58 | 81.65 | 87.93 |
| **2003** | 85.52 | 87.57 | 85.34 | 85.51 |
| **2004** | 92.26 | 94.04 | 91.93 | 106.73 |
| **2005** | 100 | 100 | 100 | 100 |
| **2006** | 108.68 | 112.13 | 109.32 | 101.80 |
| **2007** | 116.71 | 109.79 | 118.41 | 108.41 |

**Source:** ***IFS and author's own calculations***

Notes: * Values from the *UNCTAD's volume series* and re-indexed to 2005 by the author.

** Values taken from *IMF Country Staff Reports* (various years) and re- indexed to 2005 by the author.

Then, the results of the regression are shown in table 68.

**Table 68: Regression results**

Dependent Variable: LOG(M0)
Method: Least Squares
Sample: 1992 2007
Included observations: 16

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -2.584154 | 1.270734 | -2.033592 | 0.0629 |
| -LOG(ρ) | -0.418352 | 0.149403 | -2.800160 | 0.0150 |
| LOG(GDP) | 1.553539 | 0.283784 | 5.474375 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.820881 | Mean dependent var | 4.154454 |
| Adjusted R-squared | 0.793324 | S.D. dependent var | 0.379175 |
| S.E. of regression | 0.172379 | Akaike info criterion | -0.510880 |
| Sum squared resid | 0.386289 | Schwarz criterion | -0.366020 |
| Log likelihood | 7.087040 | F-statistic | 29.78868 |
| Durbin-Watson stat | 1.378548 | Prob(F-statistic) | 0.000014 |

**Source:** ***Author's own calculations***

## V. Simulations

The analysis of the SPK model is performed under the usual closure rules already applied in the previous models. This time we call *SPK benchmark* the closure where both public and foreign savings are allowed to move endogenously. Then, *closure 1* explores the effects of exogenously fixed public savings. We want to analyse if, modifying the model structure, the role of foreign savings remains unchanged. *Closure 2* and *3*, respectively, assume fixed foreign savings but different government behaviour: fixed government savings and fixed government expenditures. Table 69, as usual, shows the assumptions on the main economic variables and macro- aggregates in each closure. Formally, it does not greatly differ from the respective BK version (table 48). But, we have clearly demonstrated in section III that at least three issues are opposite: the production side, the consequent income distribution and the international trade. At a first sight the main difference is the introduction of a fixed wage rate that we have already justified as the *numeraire* choice.

There is a last aspect to detect: how to perform simulation. In the other models we have had a simulation involving different goods and different trading partners as well. Here, instead, the analysis is performed at the macro- level without distinguishing either commodities or foreign regions. If we set a reduction to zero in tariffs we are supposing a multilateral trade liberalization respect to the whole World. So, it is not likely. The better way is assuming a partial reduction in tariffs as if only the intra- SADC trade would be liberalized. Therefore, we simulate that tariff rate falls to 0.027.

**Table 69: The closure rules**

| | **SPK benchmark** | **SPK Closure 1** | **SPK Closure 2** | **SPK Closure 3** |
|---|---|---|---|---|
| **Potential macro closure variables** | | | | |
| **Exchange rate** | | | | |
| **Investment** | Fixed | Fixed | Fixed | Fixed |
| **Foreign savings** | | | Fixed | Fixed |
| **Labour supply** | | | | |
| **Capital supply** | Fixed | Fixed | Fixed | Fixed |
| **Government demand** | Fixed | | | Fixed |
| **Saving rate** | Fixed | Fixed | Fixed | Fixed |
| **Tax rate** | Fixed | Fixed | Fixed | Fixed |
| **Wage rate** | Numeraire | Numeraire | Numeraire | Numeraire |

## VI. Simulation's results

As already mentioned, this model is a demand- driven system, so we suppose that the effects on employment should be close to the BK ones. In fact, looking at data shown in table 70, whatever the closure rule is, there is a fall down in labour employment by 0.8 percent. This

result is in line with the other demand- driven systems and with the theoretical outcomes of the SPK adopted in chapter2. More precisely, this simulation demonstrates close outcomes respect the simulation of a supply- side shock in an SPK environment of chapter 2.

An interesting aspect to detect is the behaviour of the demand side which appears not to be affected by the closure rule. The same happens for the household consumption.

The causal chain may goes from the reduction of intermediates costs to a change in demand components. Let us present what happens in the production side. A drop down into tariff rates makes imported intermediates cheaper. This leads to a reduction in final production because intermediates (gross of taxes and margins) are proportional to total production through a Leontief production function. It is worthy noting (table 70) that in the formal sector the decline in production, employment and intermediate uses are all proportional (-0.91 percent). In the informal sector, instead, the outcomes are different. There is an increase in labour employment while intermediate uses are reduced by 0.30 percent (on average). This opposite trend may be explained by the role of this sectoral production. Since it is used for food-security purposes by poorer households, it probably has to outweigh the reduction in formal consumption. Indeed, as the formal production declines, domestic supply diminishes in the same proportion.

The drop in labour employment causes a reduction in wage income for households. This makes consumption to decline. At the same time also distributed profits reduce because now with a lower level of variable costs the mark- up rule assigns a lower amount of profits to enterprises. Private consumption declines differently across social groups. Rural households consume less than urban households. This depends on the change in consumption basket price. For rural consumers marketed (domestic and imported) and non- marketed commodities enter it. However, while marketed goods face a price reduction (imports because of the tariff cut and domestic goods because lower production prices), home consumption price is higher. It depends on the fact that the informal sector has no fiscal advantages in its production (no activity subsidies or VAT rebate, see Appendix F). Because of that the consumption price for rural household declines by 0.5 percentage points respect to the 1 percentage point decline in urban consumption price.

The behaviour of the other demand components (government expenditures, exports, and investments) and of the final import demand heavily relies on the closure rule choice.

**Table 70: Simulation results for the SPK model (real values)**

| | Base run | Percentage change respect the base run | | | |
|---|---|---|---|---|---|
| | | Benchmark SPK closure | SPK closure 1 | SPK closure 2 | SPK closure 3 |
| **Real Production** | | | | | |
| *Formal* | 148.354 | -0.91 | -0.91 | -0.91 | -0.91 |
| *Informal* | 26.224 | -0.28 | -0.28 | -0.28 | -0.28 |
| **Labour employment** | | | | | |
| *Formal* | 53.185 | -0.91 | -0.91 | -0.91 | -0.91 |
| *Informal* | 15.586 | +1.44 | +1.44 | +1.44 | +1.44 |
| **Real imported intermediates** | | | | | |
| *Formal* | 14.397 | -0.91 | -0.91 | -0.91 | -0.91 |
| *Informal* | 1.609 | -0.31 | -0.31 | -0.31 | -0.31 |
| **Real domestic intermediates** | | | | | |
| *Formal* | 51.377 | -0.91 | -0.91 | 0.91 | 0.91 |
| *Informal* | 5.743 | -0.28 | -0.28 | -0.28 | 0.28 |
| **Real consumption** | | | | | |
| **-Domestic** | | | | | |
| *Rural households* | 9.165 | -0.28 | -0.28 | -0.28 | -0.28 |
| *Urban households* | 25.154 | -0.04 | -0.04 | -0.04 | -0.04 |
| **-Imported*** | | | | | |
| *Rural households* | 8.455 | -0.28 | -0.28 | -0.28 | -0.28 |
| *Urban households* | 23.205 | -0.04 | -0.04 | -0.04 | -0.04 |
| **Real government expenditures** | 14.745 | - | -5.76 | -5.82 | - |
| **Real investments** | | | | | |
| *Imported investment goods** | 12.972 | -2.79 | +0.54 | - | -3.36 |
| *Domestic investment goods* | 14.061 | -2.79 | +0.54 | - | -3.36 |
| **Real expenditures** | 30.526 | -1.5 | -0.35 | -0.06 | -1.23 |
| **Real final imports** | 36.626 | -0.89 | +0.08 | -0.07 | -1.05 |
| | | | | | |
| ***km*** | 1 | -0.8 | -0.8 | -0.8 | -0.8 |
| ***fsav*** | 1 | +0.6 | +0.6 | - | - |
| ***gsav*** | 1 | +59.3 | - | - | +59.3 |

**Source: *Static CGE model results***

Note: * Denotes import demand components at final prices (gross of taxes and margins)

Features in the base run are 10^3 Billion MT

In the closure with fixed government savings, because of the contemporaneous reduction in tariffs, indirect taxes on imported goods, and direct taxes on mark- up income, government expenditures have to decline to balance its income constraint. However, the reduction depends on the foreign sector closure rule. Whenever foreign savings is set exogenous too (*SPK closure 2*), investment component is fixed. This has a positive effect on exports which slightly declines (only -0.06 percent). At the same time investments are at the base run level because no saving source is allowed to move (private savings by construction, public and foreign savings by closure rule). Because of the assumption on foreign savings final imports have to decline to maintain stable the capital inflows. The percentage change completely offsets the decline in final exports.

In this case because the total domestic production has declined, the demand components have to adjust to clear the market and therefore they diminish too. Firstly, private consumption has been satisfied, then government expenditures that should decline by closure assumption. At a second stage investments and net exports. Since investments have to be balanced by available savings, in this closure they cannot move. As already said this depends

on the impossibility to move of the saving sources. Finally, because of the foreign closure net exports are fixed too.

Whenever fixed government savings are combined with endogenous foreign savings (*SPK closure 1*), we have the only case when real investments and final imports increase. Here, government expenditures fall (only by 5.76 respect 5.82 of *SPK closure 2*), consumption is immediately allocated, then, the final elements to consider are investments and net exports (exports minus imports). Both of them may move. As usual, foreign savings are a positive stimulus to investments. In this case they get higher. To clear the domestic market, the last element, net exports, must diminish. Therefore, while final imports increase exports decline. The final aggregated effect on foreign trade has a negative sign. Exports decrease but it is outweighed by the shortfall in imports (where the decline in intermediate imports counterbalances the increase in final import demand).

As a consequence foreign capital inflows increase and this stimulate the capital accumulation.

Comparing these two closures where government savings are fixed, we highlight the prominent positive role of foreign savings in the Mozambican economy. These closures allow investment not to fall under the base run value.

Now we turn to the closures with endogenous government savings (namely the *SPK benchmark closure* and *SPK closure 3*). The *SPK benchmark closure* is compared in its effects with *SPK closure 1*. Since government expenditures are fixed now, the reduction in total production has to be cleared by other demand components, namely investments and net exports. The effects on net exports are evidently negative; they decline more than in *SPK closure 1*. The *SPK closure 1* 5.76% government expenditure reduction is allocated to investments too. It reverses the sign: while in *closure 1* investments grow, in the *SPK benchmark closure* they decline.

Although foreign savings may move, this closure has no the positive effects *of SPK closure 1*. The reason is the presence of endogenous government savings. This is the great limit of the Mozambican system. Because of a public dis- saving (or negative saving) in the base run, each closure involving a tax revenue reduction and moving expenditures leads to a worsening public saving. Because it is already negative in the base run it becomes more negative.

In *SPK closure 3* the only demand component allows to move is the investment demand. Here, in fact, endogenous government savings is combined with fixed foreign savings. The

outcomes may be compared with *SPK closure 2*. In both cases the production reduction is satisfied by the change of only one demand element. Since investments decline, as demand component, to clear the market, it is coherent with an increasing public negative saving level.

Prices' levels are not affected by the closure rule choice. Domestic production prices declines differently if they are formal on informal goods. The former declines by 0.4 percentage points while the latter only by 0.2 percent. This different behaviour depends on the presence of activity subsidies. The price of domestic supply declines in the same proportion of formal goods since only they enter the supply. Foreign exchange rate declines, while the final price of final imports declines more because of the accumulated effects of both the exchange rate reduction and the tariff cut.

## VII. Concluding remarks

In this chapter we have surveyed the Structuralist point of view on macroeconomics and causality inside a CGE model. This has been the basis to outline the differences between this theory and the others presented in previous chapters. After having presented them theoretically we move further and apply them to the Mozambican reality. This leads to the formulation of a new SAM which better reflects the fundamental relations building a SPK model and then to a CGE model to evaluate the Mozambican participation into the SADC-FTA.

Theoretically, this chapter has demonstrated the macro- causality inside the SPK model and how the closure rule choice affects it. Outcomes are summarized in box 29, where we show the behaviour of macro- aggregates for each closure.

**Box 29: Schematic representation of the causality in the SPK model according to closure rules**

| Closure rule | Macroeconomic balance |
|---|---|
| **SPK benchmark closure** | $\downarrow Y = C\downarrow + I\downarrow + \bar{G} + \left[\left(X\downarrow - M\downarrow\downarrow\right)\right]\downarrow$ |
| **SPK closure 1** | $\downarrow Y = C\downarrow + I\uparrow + G\downarrow + \left[\left(X\downarrow - M\downarrow\downarrow\right)\right]\downarrow$ |
| **SPK closure 2** | $\downarrow Y = C\downarrow + \bar{I} + G\downarrow\downarrow + \overline{(X-M)}$ |
| **SPK closure 3** | $\downarrow Y = C\downarrow + I\downarrow\downarrow + \bar{G} + \overline{(X-M)}$ |

**Source:** ***Results of the static CGE model***

Note: $\bar{}$ means fixed by closure rule; $\downarrow$ means "decline"; $\downarrow\downarrow$ means a "bigger decline"

Respect to the empirical analysis, this analysis has clarified two aspects that we recognize as fundamental in the analysis of the Mozambican trade reform. Firstly, this model shows an increase in unemployment as a result of the liberalization process, according to the BK model

outcomes. Here, however, workers loose more. Because of the production function the negative effects on employment are reinforced. Secondly, this model has demonstrated the fundamental role of foreign savings too. Assuming endogenous foreign savings mitigates partly the negative effects while the weakness of the Mozambican system is the high public deficit which leads to worsening performances when it is supposed endogenous.