Social Accounting Matrices and Sectoral Analysis for Guadeloupe : First prototype models and First Results

Sébastien Mathouraparsad, Alain Maurin, Jean Gabriel Montauban

Summary: This article was written in the context of the search for new ways in which to model the economic variables of the French overseas departments. It explores the possibility of applying the input-output approach, in order to prepare economic policy for these regions. Based on the economic data that has only recently become available, since mid-2003, it is now possible to envisage the modelling of interrelations between resource and employment aggregates and the sectional accounts of economic agents. With this in mind, the input-output approach, which has provoked a renewed interest during recent years, seems to be particularly adapted to the analysis of the major macroeconomic questions that today preoccupy both the government and regional representatives. This article has a double aim: to propose the first MCS prototype for Guadeloupe and to illustrate the uses of input-output models on one hand, and on the other, to provide teachings and recommendations for the establishment of a methodological process of elaborating macroeconomic estimates and simulations.

Given the budgetary severity which today characterizes almost all governments and economies, there is practically no reason to demonstrate to what point the preparation and assessment of public policies are immensely important.
In simply trying to reflect upon economic realities, we quickly become conscious of just how independent economic variables are, and also of the extreme complexity of the relationships between various economic factors.
As new problems appear, the economist finds himself having to sometimes create new concepts and tools, or sometimes improve those that already exist, when their application only partially resolves the difficulties being faced.

It is in this line of thought that the development of methodological approaches and models gradually became a focal point to many economists, dating back to the late 1940s when Keynes' theories were published, and the very first calculators were being perfected. Today, in most industrialized countries, resorting to econometric software programmes and to quantitative macro-economic works is now standard practice throughout the different stages of governments' decision-making process.

In France's overseas departments (DFA's), where local populations are being forced to accept more responsibilities, the need to understand and simulate the mechanisms governing the economy's workings and imbalances is now being invoked in the speeches made by local elected officials and authorities.

The events of recent months have illustrated over and over again to what extent the discussions concerning certain problems specific to the DFA's have been centred on the search for argued and assessed solutions. Thus, for example, the question of the over-payment of civil servants is no longer broached simply with passionate exchanges, where criticism and defensive reactions are confronted. On the contrary, it is dealt with through the multi-dimensional domain of macro-economic questioning, whether in terms of the wealth/growth creating model which was chosen for the DFA's, the content and credibility of a strategy to increase their reserves, or even the arbitration between budgetary measures and structural policies which have economic impact.
A second example is provides by the tourism sector which is the focus of attention for most of the key figures of economic development in the DFA's. For many decades now, support measures have been put in place to boost investment and employment in the hotel sector. However, when the time comes to draw up the balance sheets, does the immense difficulty of their impact on the economy and the fragility of the estimations made become apparent?

To succeed in this gamble of new responsibilities, the heads of local and municipal councils must from now on lay the groundwork, in order to find the best route leading towards development. This is a delicate exercise which implies the capacity to outline a reliable vision of future economic evolution.

In the case of the DFA's, such steps or requirements can have solid foundations if they are based on the principle of constructing alternative models, which are to be used complementarily.

That is the goal of this article, which has a double purpose: to propose the first MCS prototype for Guadeloupe and illustrate the uses of the input-output models on one hand, and on the other, to provide instructions and recommendations for the setting up of methodological processes to produce macro-economic forecasts and simulations.

I. A Review of Works dealing with the Use of Input-Output Models

1. Leontief's simple model…

In the 18th century, Quesnay, the King's doctor, decided to study the relationship between the different sectors of the economy. He came up with the famous *Tableau économique (Economic Table)* in which agriculture plays a central role. That is how the leader of the physiocrates described an economic circuit representing the circulation of agricultural products. Almost a century later, another French man, Walras, studied the economy's global functioning. Nevertheless, his works remain purely theoretical and have no immediate concrete applications. In the wake of Walras and Quesnay, in the 1930s, Leontief set about constructing a framework to analyse the economy in its entirety and presented the relationships between the sectors comprising it. His work gave birth to a complete comprehensive methodology of economic mechanisms, which earned him the Nobel Prize for Economic Science in 1973.

Even in his earliest research, Leontief combined a powerful theoretical approach and intensive statistical work. On one hand he resumed Quesnay's *Economic Table* and Walras' theory on general equilibrium. On the other, he endeavoured to empirically study the interrelationships between the different economic sectors. This double approach gave birth in 1941 to the inter-industrial trade table, which Leontief used to describe the inter-dependence which existed between different sectors of production. Initially, there was no in-house consumption and products were all intermediary goods. Leontief then prepared an operational frame to analyse economies, integrating real and registered fluxes. He thus contributed, like Meade (Nobel Prize 1977) and Stone (Nobel Prize 1984) to the birth of modern national accounting.

The use of Leontief's table of inter-industrial -or intermediary- trade (TEI) led to the use of the input-output table. The statistical description of the relationships between sectors serves mainly in national accounting and in planning. The table also allows for the carrying out of simulations and forecasts. In fact, Leontief assumed that technical coefficients were stable in the short term and that their modifications were predictable. For this reason, these tables became a practical forecasting tool. They make it possible to study the impact of political decisions on the economy or even to detect sources of inflation. Furthermore, they reveal the most dynamic sectors of the economy. Finally, the opening up of the economy in Leontief's model allows economists to determine which sectors are heavily dependent on external trade. Leontief writings have been put to many uses and are still considered to be precious macro-economic tools. They have already permitted us to deal with many issues, such as the impact of war on the economy or the effects of production on the environment and also to ask questions, as was proven by the debate provoked by the so-called paradox evoked by Leontief in the 1950's. Indeed, according to his thesis, the United States exported goods that were less capital-intensive than those which they imported, a shocking fact coming from the country considered by many to be the most economically developed and which should by all rights export goods of a strong capitalistic intensity.

The input-output models are currently used in two manners: to obtain short term forecasts on one hand, and medium or long term planning on the other. The short term models are useful in the creation of economic budgets. Their main objective is to assure coherence in the choice of economic policies through the follow-up of macro-economic and financial balances: the balancing of payments, State accounts, public debt, etc. As for medium term models, they aim to verify the macro-economic coherence of development plans. There are also some models whose function is to analyse the macro-economic evolution in a more long term fashion. These are Keynesian-structure models, created with the aim of exploring the paths of economic growth while seeking to attain the levels of private and public demands which are compatible with the great macro-economic and financial balances.

1.1. Use in France

In France, several applications have already taken place, as much on the national level as on that of various organizations such as universities and the INSEE. One example of the input-output model is the DEFI model (Prospects, Jobs, Sectors, Inter-industrials) created by Péronnet and Rocherieux in 1983. This model permits economists to calculate the number of jobs created in France, in each sector of activity, and in relation to expenditure. For each sector, the model calculates the ratio of workforce/added value, then takes the jobs generated by intermediary consumption into account by reversing the input-output table provided by national accounting.

Another example is the DIVA (Dynamic, Twenty-year old Inter-sectionals) model, a simulation model developed by Passeron for Bipe, a company providing advice in specialized strategy for economic forecasting and applied economic forecasting, in the late 80's, to describe sectional scenarios which would be coherent in the medium and long term. Since then, this model has been used on numerous occasions, on the request of different companies or government services, either as a guide for sectional forecasts or to study the consequences of steps taken as part of economic or industrial policies. In effect, this model represents a generalized version of Léontief's model. In other words, it harmonizes a product's supply and demand levels through an input-output matrix, or, it can be used in more medium/long term situations to assimilate the demands of the different material sectors with intermediate demands. In 1999, the Ministry of the Economy and Finance used this method to study the impact new information technology has on growth

The final example is the AVATAR model (VAriantelle Analysis of the Resource Appropriation Table). Used at the INSEE, this analytical model concerns the only productive sphere France. It is used to assess the effects of a product's price-change on all other products and also to estimate how much of final demand is satisfied by importation as well as the percentage of imported intermediate material needed for the local production of certain elements of the final demand.

1.2. Use in Overseas Departments

In the overseas departments, findings tend to vary.

In French Guiana, many interesting studies have been carried out with regard to the modeling process, the first being done by Moriame (1995) at the INSEE, with the aim of finding quantified responses to the question of the impact of space activities on the Guianese economy. From the calculations made by Leontief and Keynes, the model has made it possible to assess and analyse the effects of different economic measures and in particular, to quantify the economic weight of space activities.
The fist version of the input-output model was then updated in the light of the data provided by national accounting records form the year 1997, within the context of the drafting of the TABLO model.

More fundamentally, these works have demonstrated the importance of collecting detailed data within the department: data describing the transactions in different sectors of activity, between them and with the rest of the world, data indicating the final uses of products, the origin of resources and jobs related to each product. However, these studies have basically had a catalysing effect in provoking an official recognition from certain Guianese decision makers, with regard to the use of a input-output model as a tool to assess economic policies.

In Martinique, first Hagnier and then Chauvet worked on creating a TEI model in 1996. It was perfected, on one hand, due to the data concerning the economic accounts of certain sectors and on the other, through the extrapolation of the TEI used in metropolitan France for the other sectors.

Why build a Martinican TEI based on the metropolitan TEI? The main reason is quite simply a lack of information. With only limited data available, the distribution of intermediate consumption into a sector of the metropolitan TEI, weighted by previously calculated technical coefficients, was adopted. This TEI was then balanced by Martinican production in order to obtain a Martinican TEI.
Nevertheless, the global results have shown certain notable differences with respect to those coming out of Martinican economic accounts. Moreover, according to the authors, the creation of this TEI has revealed other problems such as the insufficiency of the collection of local data in terms of quantity and quality, conveying a relatively unreliable contribution of information about the economy. For this reason, this model appeared to be unusable and was subsequently abandoned by the State.

In Reunion Island, the different cartouches of the input-output table have been published by the local INSEE in *DOM 25* since 1993. Unfortunately, the core of the input-output model remains nonexistent. The margins of the TEI's rows and columns, which are available, can be more or less broken down according to the level of classification retained. This however does not hold true for the intersection of lines and columns representing the breakdown of intermediate consumption. A TEI is currently being worked on.

In Guadeloupe, as opposed to the other overseas departments, the first input-output model was available very early on; it was developed by the INSEE in 1969. After that, there was practically no further development for thirty years. Now, throughout this period, various socio-economic stakeholders repeatedly asked for a TEI for the Guadeloupean economy.
The main stumbling-block used to explain this situation was the elevated level of investment, in terms of both time and money, needed for the collection of the vital data.
Only in 2003 did Simon, benefiting from the aid allotted to economists in overseas departments, develop a input-output model more representative of Guadeloupe's present-day economy.

Faced with this state of affairs in the overseas departments, one can only wonder about the lack of awareness in relation to the input-output table's utility in Guadeloupe.

It would be unnecessary to draw up a booklet of practical references in order to outline solutions for this problem. The following two illustrations should suffice.
Recent events in the overseas departments have provided many ideas and raised many questions concerning the strategic question of the search for a system of sustainable economic development in Guadeloupe, French Guiana, Martinique and Reunion Island. Many persons are of the opinion that a real awareness and firm commitment are absolutely essential for a better future in these departments. Many agree that substitutes must be found to replace the principle of annuities based on public transfers. From their point of view, tourism represents one of the sectors which must contribute to the setting up of endogeneous production, in each overseas department, capable of generating income and distributing revenue to the population. Keeping in mind the various elements of the controversial debate on the factors and conditions needed to successfully develop a harmonious form of tourism in each overseas department, there can be no doubt that this sector will be beneficiary to the future.
This vision of tourism is very sensible. For it to be shared by all, it would definitely be necessary to provide the population with clear information, concerning the various issues at stake. Who reaps the benefits? How many direct and indirect forms of employment are created? How does it contribute to the total added value? How can its yield be accurately evaluated? How much has it already yielded? What channel of the financial flux affects tourist activities? How does one measure its interactions with the other aspects of this particular activity? In terms of space, what are the levels of revenue and expenditure generated in each town?

Let us consider the example of the fiscal system reform in the overseas departments, a recurring theme in political speeches for many years. When one considers the fact that excise duties such as

VAT bring in the most considerable tax revenues for local authorities and the State, it is easy to understand why it is necessary to increase and encourage profound reflection which would permit the outlining of an optimal fiscal structure in the overseas departments.

For all these concerns and for many others which could easily be listed, models like the SAM (Social Accounting Matrix) and the CGE (Calculable General Equilibrium) represent appropriate tools for drawing up solutions.
Today, the design of an input-output model, which is the stage preceding the creation of these models, is in the testing phase. In addition, the feasibility of these models is for the most part justified, more so since they are part of a context in which accounts are increasingly well managed as the drive for successive accounts grows more intense and enriched.

1.3. Use in the rest of the world

Various examples fully illustrate the multiple uses made of input-output models throughout the world, thanks to their simplicity. They are used for both short term forecasts as well as for medium/long term planning, and are tools which make it possible to obtain projections of macro-economic evolution. Short term models are in general pure accounting models, with an elementary Keynesian structure, while the structure of medium and long term models can be compared to Léontief's dynamic model, where investment is endogenous.
Without being exhaustive, it would be possible to list many other well-known examples.

In African countries, since the mid-1980s, many studies have been carried out within the framework of the input-output approach. Among them, several were realized by the French Development Fund (*Caisse Française de Développement*) which, in 1987, started the construction of a standard model covering several African countries and focused on their forecasting requirements. The choice of an input-output type accounting model was made in respect to the need for simplicity and effectiveness. This model, known as the TABLO[1] model, is operational in several African countries: the Ivory Coast, Cameroon, Gabon, Congo, Burkina-Faso and it will soon be adopted in France's overseas departments.

The Japanese government also resorted to the input-output approach. With the help of a first model, the government conducted research into the possible impact of petroleum desulphurization at a pre-established cost. The study was based on the idea that the expenses borne by polluters, (Polluters Pay Principle) could be absorbed by those who have the possibility to increase their selling prices. There was a second model used in the Hokkaido region, to the north of Japan. Developed in the early 90s by Nakamura and Seto, (see Brauers (1995) for more details), this was an econometric model whose particular feature lied in the fact that it integrated an input-output model in order to obtain long term projections. Thus, it was used to study economic scenarios up to the 2000.

In Germany, Beutel set up an input-output model to measure the economic impact of the Structural Funds on certain European countries. This system of analysis was developed for the General Management of Regional Policies and Cohesion. A dynamic input-output type model was used. Designed to run parallel to the multiplying-accelerating analysis of macro-economic theory, its objective was to evaluate the long term effects of the European Community's structural policies on supply and demand. In other words, it sought to determine how much of the economic growth noted in the concerned States was due to the Structural Funds and to the Community's interventions.

In Belgium, on November 7, 2001, the company *Sabena S* went bankrupt. This company employed 7800 persons at the time, and was part of the Sabena Group of companies, along with *Sabena Technics*, DAT, Sobelair and other subsidiaries. In total, the Group employed more than 12000

[1] This name was chosen in reference to the model's inspirers or authors, Daniel Tommasi, Jean-Noël Aerts, Blaise Leenhardt and Gaston Olive.

persons. After the company's failure, a consortium of private and public investors was formed, charged with gathering funds to finance the re-launching of airline activities through DAT. Assessing the impact of a failure of this size on the Belgian economy implied various hypotheses, as much for the supply aspect as for demand. The Federal Planning Office used an input-output model to measure this impact. It made it possible to evaluate the effects a drop in production in the airline transport sector had on activity levels in all other economic sectors

In Canada, the organisation *Econometrik National Plus Incorporation*, developed the Future Canada model in 2002. It described the Canadian economy in terms of an input-output model. At present, this model has already been officially applied, notably in the maritime domain.

2. Computable General Equilibrium (CGE) Models

Léontief's methodology as continued in Computable General Equilibrium models (CGE models or CGEM).
From a theoretical point of view, the CGEM are founded upon the Walrasian theory of general equilibrium and they propose a micro-economic approach to the study of interaction mechanisms among various economic agents. In Walras' viewpoint, these agents determine the system of relative prices which is responsible for the equilibrium of all markets. In doing so, they contribute to the figuring how to allocate resources and distribute revenue stemming from this equilibrium.

From a technical point of view, the input-output models facilitate the construction of the SAM which describes all economic transactions between an economy's agents, and which represents the starting point in the creation of a CGE model. When the accounting relationships between agents are taken into account, the SAM almost seems to be a generalization of the input-output model.
With the addition of functional forms specifying the characteristics of the agents' useful functions, production functions and the choice of disintegration level, economists obtain a CGE model which has to be finalized through the use of different numerical techniques. The finalization of a model entails two main phases: calibration, to get the values of the parameters intervening in the various functions, followed by the development of an iterative algorithm, in order to achieve economic equilibrium. It should however be pointed out that opinions tend to vary with regard to the proposed methods for carrying out these technical phases. The problem lies in the fact that the methods used to assess the parameters of a CGE model make it difficult to implement validation tests, as is proposed in econometric assessments[2].
After calibration and finalization, the model can be used to assess and study the effects of economic measures. Today, the CGEM are viewed in a very positive light by many organizations, such as the World Bank, which are interested by the evaluation of economic policies in industrialized countries, as well as in developing countries.
From a historic point of view, it can be considered that Calculable General Equilibrium Models share certain similarities with macro-econometric models, in terms of the number of years in which they have been used, and their subsequent evolutions.

It should briefly be recalled that with the apparition of the very first calculators, macro-econometric models became operational in the evaluation of economic policies in the early 1950s (notably with the publication of works by Tinbergen (1956), Klein (1950), Klein and Golberger (1955)). They then went through a period of enormous success in the 60s, 70s and 80s, with the development of many models in the majority of industrialized countries. Finally, they came in for much criticism, for theoretical and technical reasons, in the 1990s. They are currently undergoing a renewal of sorts.

The early 1950s also saw the beginning of practical utilization of models based on the general equilibrium approach. In a follow-up to Leontief's methodology (1951, 1966), detailed specification

[2] See Dixon, Parmenter and Powell's publication (1992) for a detailed presentation of the technical concepts related to CGE models.

of the interdependence of economic activities were progressively proposed and widely used until the end of the 1960s. However, while falling under Walras' heritage, this first generation of CGE models fell short of the general equilibrium theory, since they lacked a price regulation mechanism.
The second generation of CGE models appeared in the 1970s. Their main contribution was the introduction of a price system which assures market equilibrium. The conditions for the existence of such equilibrium were based on the works of Arrow and Debreu (1954). CGE modelling went through a « golden age » in te late 1970s and throughout the 1980s following Scarf's important discovery in 1967, of an algorithm allowing for computer-based solutions. A wave of new works then followed, giving way to five distinct approaches to CGE modelling: the Johensen approach; that of Harberger, Scarf, Shoven and Whalley; the World Bank approach, specific to developing countries; Jorgenson's econometric approach; the approach of Ginsburgh and Waelbroeck; and that of Manne. Schubert (1993) presents a very useful review of these different approaches.
Maturity was reached during the 1990s. The research carried out in this tradition of analysis of economic policies, which was founded upon the search for equilibrium capable of taking all markets and economic spheres into account, has led to dynamic models on one hand, and, on the other, models which incorporate expectations.

CGE models range from the very simple to the very sophisticated and have been used as methodological aids in a considerable number of quantitative studies concerning several types of economic policy problems: economic planning problems; sector-based problems (notably in the agriculture and energy sectors); international trade problems; environmental issues; fiscal matters. Since these problems have an effect on the overall economy, it is only natural that they be dealt with through CGE models, which lend themselves naturally to modelling interdependencies and feedback among economic variables.
There is one outstanding aspect which characterizes the interest sparked by CGE models: they have been more widely used than any other existing type of model, irrespective of country or economic system.

This naturally leads us to wonder about the case of the French overseas regions.
On examination of all publications of applied works concerning the CGE approach, the rarity of the application of input-output and CGE models in the Caribbean region stands out. After all, these models have often been used in countries where there is a dire shortage of statistical data.
Could it be that the general equilibrium approach is not relevant to the functioning of the markets in overseas departments?
Could it be that the practical obstacles are too numerous in this region to allow for the development an application of these models?

2.1. Theoretical considerations

In the Walrasian tradition, general equilibrium theory analyzes the economy within a context of pure and perfect competition. Economic agents maximize their utility and profits under revenue and cost restraints. The "business" agent maximizes its total profit under production constraints. Similarly, the "household" agent's optimal calculations consist of maximizing marginal utility under budgetary constraints. Scale yields are constant and externalities non-existent. In such a system, prices play a definitive role: they are in a state of continuous adjustment in order to assure equilibrium between supply and demand in all markets, including the labour market. The equilibrium prices and quantities resulting from the model's resolution allow, in turn, for the study of resource allocation and income distribution.

Little interest has been shown in the application of such neoclassical models to the analysis of the Caribbean's small island economies. However, the pre-eminence of Keynesian models has been criticized, and arguments made in favour of « supply side » models, since these countris are mainly limited by supply and production constraints. Acording to such arguments, any policy measure

seeking to achieve economic recovery through demand stimulation will result inevitably in a significant rise in imports and chronic trade deficit. Accordingly, production increases are limited by shortfalls in production factors, such as capital, jobs and imported intermediate goods.

For sure, the theoretical framework of general equilibrium may appear too constraiing and even unrealistic for applied work. However, one of the main advantages of the CGE approach is that it offers a certain flexibility which allows it to go beyond the Walrasian framework, through the incorporation of more realistic assumptions. Indeed, the vast majority of recent applications are not subject to the Lucas critique. They allow for the analysis of the reaction of economic agents to a change in economic policy, since choices are modelled explicitly according to the objectives that they fix for themselves and the constraints that they must respect. More generally, the behaviour of economic agents is modelled in a framework of optimization over time.
Some authors have adapted CGE models to the peculiarities of developing countries principally by disregarding some of the Walrasian assumptions and incorporating blocs which model the socio-institutional characteristics of these countries.

With this in mind, it would be worthwhile to consider the contribution made by Tokarick (1993), which represents one of the rare attempts at applying CGE modelling to a Caribbean country, in this case, Trinidad and Tobago.
He set up a model deigned to study the effects of two types of external shocks.
This model was constructed in the tradition of CGE models applied to small open economies which was introduces by Dervis, Melo and Robinson (1982) and by Shoven and Walley (1984). It is static and based on three sectors: *"exportable sector which is made up of mainly petroleum products, importable sector which consists of labour-intensive manufacturing activities and, non-traded sector which is comprised of services and construction activities. Among the main hypothesis, the terms of trade are exogenous and, in contrast, the price of the non-traded good is determined locally by domestic demand and supply"*. The model contains about thirty equations including the accounting identities of the SAM and supply and demand functions for the different sectors.

Concerning the theoretical pertinence of the use of the CGE approach for a satisfactory representation of Trinidad and Tobago's economy, Tokarick argues that the model he proposes *"is sufficiently general to be applied to other small, open economies", "the general equilibrium model is especially appropriate for analysing the effects of changes in commercial policy and terms-of-trade shocks because of its ability to capture directly the important relative-price effects of various shocks*".

Another way of drawing attention to the possible interest of the CGE approach for Caribbean countries and for French overseas departments would be to compare it to the econometric approach which has been widely adopted by Caribbean economists. The first thing to note is that *"While other types of modelling techniques, such as macroeconomic modelling, could conceivably be used, these types of models do not usually capture resource constraints, material balance constraints such as market clearing, and other elements grounded in general equilibrium microeconomic theory*" (Tokarick (1995)). Secondly, it should be highlighted that while the construction of a satisfactory econometric model is only possible in a small number of Caribbean countries, the development of a CGE model is possible in all.

All arguments prove therefore that theoretically speaking, there is nothing standing in the way of the construction of a CGE model for the overseas departments and its multiple applications to several problems, as has been done in many countries. The theoretical foundations of such models would have a common basic structure which may integrate non Walrasian specificities to take the characteristics of small open developing economies into account (segmented labour markets, price rigidities, etc.).

In fact, it is no exaggeration to state, while being careful to formulate pertinent hypotheses to represent transactions on different markets and describe the behaviour of economic agents, that it will always be possible, with some compromise in regard to the degree of disaggregration retained, to specify a CGE model for any overseas department.

2.2. Technical considerations

The transition from a theoretical to an applied CGE model, quantified and set up to evaluate the results aimed for by political decision-makers, involves a certain number of technical operations linked to two fundamental steps. Firstly, data must be collected to set up the Social Accounting Matrix (SAM). Secondly, the coefficients of the model must be estimated via calibration.

From the Input-Output Model to the Social Accounting Matrix

While the input-output table provides us with a description of the exchanges between the productive economic sectors, the SAM traces out the flow of exchanges between the different agents in the economic circuit.

The SAM is in fact designed as a generalization of the input-output table to provide a representation of global accounting for the entire economy. It takes the form of a square matrix which matches row and column entries to each category of goods, production factors and economic agents. Each row traces out the origin of a resource associated with an economic agent. Inversely, each column accounts for the utilization of these resources. Each associated row and column thus corresponds to the account of one economic agent covering its earnings and expenditure, which must be balanced. This principle of accounting equality between resources and jobs is therefore globally verified as well as at the level of each agent. So firms can be grouped into different economic sectors, households into social categories, and so on. This set of accounts explains in detail the relationships between production structures and revenue distribution, as well as financial transactions within the domestic economy and between the latter and the rest of the world. To illustrate this, we will use an extract of a standard SAM matrix, taken from Dervis, Melo and Robinson (1982).

A SAM is made up of three main accounts :

- The Production account is further divided into the "Activities" account, which traces back the production process (Input-Output Table), the "Commodities" account, which highlights the equality between supply (brute production, indirect taxes, imports) and demand (consumption, investments, exports) and the "Factors" account, which distributes factor income among economic actors.
- The Institutions account is made up of a Current account for each agent (firms, households, the State) and showing their resources (revenue) and their expenditure (private and public consumption, investment, exports) and a Capital account, which highlights the saving/investment equality.
- The Rest of the World account highlights the standard balance of payments accounts.

A SAM can be articulated using data drawn from one year or based o the average of two or more years. Several problems may be encountered during this construction, the most notable of which are:
- The consistency of the data, seeing that the data sources are extremely diverse because they come from national accounts, company balance sheets, household surveys, monetary and financial batches, data from the rest of the world, etc. When there are inconsistencies in the data, they must be adjusted to ensure accounting balance in the SAM[3] ;
- The choice of the base year : a year for which macro-economic equilibrium is verified must be found. One solution would be to use an average of data spanning several years, allowing cyclical fluctuations to be smoothed out;
- The disaggregation level: as is the case for macro-economic models, there has to be a compromise between constructing a model as detailed as possible, to best reflect reality and the limitations imposed by cost, data availability and other such considerations. One satisfactory method consists of starting off at an appropriate disaggregation level and then gradually disintegrating, in function of the questions being considered.

Despite these difficulties, the SAM has enjoyed tremendous success in countries where time-series data bases are inadequate. It is interesting to note that SAM modelling has been applied more in developing countries than in industrialized ones.

Simulation of the SAM model

The SAM may be used to estimate the effects of external changes or capital injections such as increased public expenditure or exports. Any shock demand can be followed by an increase in production, thanks to the system of interdependence existing among economic sectors. The direct, indirect and side effects of an injection of capital into endogenous accounts are evaluated with the help of multipliers. For example, a public works programme for the construction of a road would need a certain number of workers, coming from various categories of rural and urban households. In return, the revenue earned by both categories of workers will be spent in the consumption of goods. The increase in production to satisfy the surplus demand will lead to more job creation and hence more revenue in both household groups. This mechanism will continue up to a point where the multiplying process can go no further.

The SAM is made up of endogenous and exogenous accounts. Endogenous accounts vary according to revenue. They include: (i) production activities (the sub-matrix of intermediate inputs), (ii) production factors and (iii) institutions such as households and companies. The expenditure in exogenous accounts is independent of all revenue variations. They include: (i) the government, (ii) capital accounts (iii) tourists and (iv) the rest of the world.

The following table represents a SAM in which endogenous and exogenous accounts are highlighted. T_{33} represents needs in terms of intermediate inputs; T_{32} indicates the total amount of money spent by institutions for different consumer products; T_{13} accounts for the added value generated by the different sectors among production factors, while T_{21} describes how revenues are distributed among the different institutions; T_{22} represents transfers between institutions. The total earnings of endogenous accounts, is represented by $\mathbf{y_n}$, which is equal to the total expenditure of the endogenous accounts (T_{nn}), which in turn, is worth **n**, plus the total expenditure of exogenous accounts (T_{nx}), which is worth **x**, and which represents capital injections. In the end, $\mathbf{y_n = n + x}$ and similarly, $\mathbf{y_x = l + t}$ in the case of exogenous accounts. Moreover, since the rows and columns must balance, we have $\mathbf{y_n = y_n'}$ and $yx = \mathbf{y_x'}$ where $\mathbf{y_n'}$ and $\mathbf{y_x'}$ are the transposed values of the columns $\mathbf{y_n}$ and $\mathbf{y_x}$. All of T_{xn} represents capital flight and all of T_{xx} the residual equilibrium.

[3] One of the most widely used is the RAS procedure, whose aim is to balance statistical tables whose margins are identified. It establishes an iterative process adjusting rows and columns within the matrix, until a solution converging towards identified margins is obtained.

Figure 2: *Simplified Representation of a SAM*

		Expenditure				TOTAL
		endogenous accounts	sub total	**exogenous accounts**	sub total	
Earnings	**endogenous accounts**	T_{nn}	n	T_{nx}	x	y_n
	exogenous accounts	T_{xn}	l	T_{xx}	t	y_x
TOTAL		y_n'		y_x'		

Defourny and Thorbecke (1984)

In the following table, the intersection of the endogenous blocks is isolated:

		Endogenous accounts		
		1. Factors	2. Institutions	3. Production activities
Endogenous accounts	1. Factors			T_{13}
	2. Institutions	T_{21}	T_{22}	
	3. Production activities		T_{32}	T_{33}

With $T_{nn} = \begin{pmatrix} 0 & 0 & T_{13} \\ T_{21} & T_{22} & 0 \\ 0 & T_{32} & A_{33} \end{pmatrix}$

Revenue is distributed among production activities, factors and institutions. Figure 4 traces revenue flows while highlighting the inter-relationships of endogenous accounts. For example, added value is paid by production activities to the factors of production. This then determines the revenue of households, companies and the State, and in turn, their level of consumption.

Existing inter-relationships allow us to measure any impact on the socio-economic system, after an injection of capital. The magnitude of the impact is measured by the multipliers, which depend on the intensity of the relationships between sectors.

It is possible to break down the multiplier in order to determine how the system has been affected. A analysis of this break down provides decision-makers with precious information concerning the different levels of impact on endogenous accounts.

The method which allows us to break down multipliers was developed by Pyatt and Round (1979) and later modified by Stone (1985). This method is widely discussed in various publications. Her is a brief description :
Pyatt and Round (1979) start off on the basis that $\mathbf{y_n} = \mathbf{n} + \mathbf{x}$.

$$\mathbf{y}_n = \mathbf{A}_n \mathbf{y}_n + x = \left(\mathbf{I} - \mathbf{A}_n\right)^{-1} x = \mathbf{M}_a \mathbf{x} \qquad (1)$$

where $\mathbf{A}_n$ is the matrix of standardized endogenous coefficients also known as the average expenditure propensity matrix, and $\mathbf{M}_a$, the matrix of multipliers. The revenue form endogenous accounts can be determined by pre-multiplying capital injections x, by the multiplier, M_a. This matrix therefore allows us to calculate the totals obtained by column, in the SAM, but not the way in which they are generated.

Several examples can illustrate the information contained in the matrix A_n. For example, it is clear that the production of one unit of an agricultural product translates into 38% capital revenue and 20% labour revenue. In the same way, it is possible to determine the average spent by households on consumer goods, the amount paid in taxes to the State and the amount saved by reading the elements in the household column. Many concrete cases can also highlight the way in which the multiplier $\mathbf{M}_a$ can be interpreted. If for example, we wish to examine the general socio-economic impact of a decrease in exports of agricultural products, in batches of 100 units, we would observe that this would lead to a decrease worth 56 units in capital revenue and 46 units for labour.

As we highlighted earlier, we can also break down the multiplier into three multiplying components, in the following way:

$$\mathbf{y}_n = \mathbf{M}_a\mathbf{x} = \mathbf{M}_{a3}\mathbf{M}_{a2}\mathbf{M}_{a1}\mathbf{x} \tag{2}$$

Stone (1985) showed that this break down can also be expressed as:

$$\begin{aligned}\mathbf{M}_a &= \mathbf{I} + (\mathbf{M}_{a1} - \mathbf{I}) + (\mathbf{M}_{a2} - \mathbf{I})\mathbf{M}_{a1} + (\mathbf{M}_{a3} - \mathbf{I})\mathbf{M}_{a2}\mathbf{M}_{a1} \\ &= \mathbf{I} + \quad \mathbf{T} \quad + \quad \mathbf{O} \quad + \quad \mathbf{C}\end{aligned} \tag{3}$$

These three types of multipliers are used mainly for global analyses of the effects of shocks on the different sectors of the economy. Each one has a specific interpretation (besides the matrix identity **I** which analyses the initial capital injection):

- The direct effect multiplier (transfer effects) **T** analyses the direct effects between groups of endogenous accounts (intra-group transfers). This matrix assesses the internal impact on the primarily affected account. For example, the direct effect of a tourist paying for a hotel room will concern the hotel-restaurant sector and will depend on the price paid for the room.

- The open-loop multiplier **O** analyses the interactions between endogenous accounts (extra-group effects). This matrix assesses the impacts of capital injection on the other accounts, without any feedback effects on the original account. For example, the extra-group effect of a tourist paying for a hotel room would be the variation in household revenue (production factors account) and consumption (institutional account). These multipliers show the way in which other categories of accounts are affected.

- The closed-loop multipliers **C** show the complete circular effect of the shock. They have inter-group effects and explain the way in which a shock in one sector affects other sectors, and how it subsequently returns to its starting point. For example, a tourist paying for a hotel room, in the form of a production of services, would have an impact on household revenue, leading to a rise in household expenditure on goods and services, which would equally include the hotel sector, where this service would be “consumed”.

In a matrix, the breakdown of multipliers takes place in the following manner:

$$\begin{aligned}\mathbf{y}_n &= A_n y_n + x_n = (A_n - \hat{A}_n) y_n + \hat{A}_n y_n + x_n \\ &= \left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} \left(A_n - \hat{\mathbf{A}}_n\right) y_n + \left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} \mathbf{x} \\ &= A^* y_n + \left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} x_n\end{aligned}$$

with $\hat{A}_n = \begin{pmatrix} 0 & 0 & 0 \\ 0 & A_{22} & 0 \\ 0 & 0 & A_{33} \end{pmatrix}$

By multiplying on both sides by $\mathbf{A}^*$ and by substituting $\mathbf{A}^* y_n$ according to the left –side component of the preceding equation, it becomes:

$$\begin{aligned}\mathbf{y}_n &= A^{*2} y_n + \left(\mathbf{I} + \mathbf{A}^*\right)\left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} x_n \\ &= \left(\mathbf{I} - \mathbf{A}^{*2}\right)^{-1} \left(\mathbf{I} + \mathbf{A}^*\right)\left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} x_n\end{aligned}$$

Similarly, by multiplying both sides of the initial equation by $\mathbf{A}^{*2}$ we get:

$$\begin{aligned}\mathbf{y}_n &= A^{*3} y_n + \left(\mathbf{I} + \mathbf{A}^{*2}\right)\left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} x_n \\ &= \left(\mathbf{I} - \mathbf{A}^{*3}\right)^{-1} \left(\mathbf{I} + \mathbf{A}^* + A^{*2}\right)\left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} x_n \\ &= \mathbf{M}_{a3}\mathbf{M}_{a2}\mathbf{M}_{a1}\mathbf{x}_n\end{aligned}$$

and more generally:

$$\mathbf{y}_n = (I - A^{*k})^{-1} \left(\sum_{i=0}^{k-1} A^{*i}\right)\left(\mathbf{I} - \hat{\mathbf{A}}_n\right)^{-1} x_n$$

In summary, the three level of breakdown reflect the different sequences of a complete cycle. The elements of the matrix M_{a1} analyse the intra-group effects of exogenous injections. They show the multiplying inter-industrial effects and the inter-institutional transfers. The matrix M_{a2} shows the open-loop effects which are propagated throughout the exogenous accounts, thus forming a loop. Finally, M_{a3} introduces the closed-loop effects. The flux is propagated throughout the entire system, going around several times until the effects are completely absorbed, thus ending the process.

From this brief presentation of the SAM approach and of the status of CGE modelling in the Caribbean, at last two elements must be retained. Firstly, the accumulated knowledge concerning the functioning of the economy in the French overseas departments and in Caribbean countries is sufficiently wide to allow for the specification of relevant theoretical models. Secondly, the data that could be collected for the finalization and empirical application of these models already partly exists, and requires relatively little time to become totally available.
Furthermore, in the long run, there are no major obstacles barring the development and use of this type of model within the framework of the preparation and implementation of economic policies. To illustrate this with a precise example, let us take the model developed by Dalrymple, Holder, Holder and King. One cannot help but notice that while this model is still in its first version and there are many improvements to be made, it is already stirring up great interest on several accounts. In particular, it opens the way up for the launch of modelling activities, which can lead to the

development of even more sophisticated CGE models, incorporating recent advances from publications dedicated to this method of modelling.

II. Methodological Approaches in Guadeloupe

1. The Input-Output Table

In practical terms, there are two general methods of developing an input-output table. Both methods obtain their statistics from diverse, non-sectional companies (tax declarations, annual company reports). The first, the macro-economic method, requires the calculation of the technical co-efficient of different 'branches'[4], according to the co-efficient of the sectors ; it consists of allocating the inputs of the sectors to their lines of activity, which are then merged to form a branch, in return for hypotheses concerning their technology. The second, the micro-economic method, realizes this calculation by resorting to individual company data and econometric techniques (see Divay and Meunier (1980) for more details).

Olivier Simon's creation of an input-output table for Guadeloupe consisted of filling out a TEI, knowing that its margins were fixed. This entails the convergence of the two intermediate consumption approaches, after having ascertained certain equalities in intermediate consumptions, in both the supply and demand approaches. This convergence is the result of the application of the RAS method.

The RAS procedure (Racking-Ratio or Iterative Proportional Fitting), developed by Bacharach (1970), is a simple method which is widely used to support all types of statistical tables within their margins. It is an iterative method that proportionately adjusts the rows and columns of a basic matrix, until the margins are equal.

In the beginning, the only thing known about Guadeloupe's table of intermediate trading was the totals of its rows and columns. The individual components were unknown and were estimated by extrapolating France's general matrix of intermediate trading. The work then consisted of proportionately adjusting the rows and columns of the base matrix, until convergence was achieved. The RAS method used was slightly modified since for certain branches, information concerning certain intermediate consumption practices was available.

The TEI is particular because it takes the shape of a matrix with a (52.26) format. Its twenty-six columns correspond to the twenty-six branches of the economy, according to DOM25, and its fifty-two rows correspond to twenty-six locally produced goods and twenty-six imported goods.

The demand approach essentially relies on the accounts of the different economic agents *through* the creation of branch accounts describing the production process (production achieved, intermediate goods required for this production, etc.). This approach is favoured in the synthesis of intermediate consumption. This means that it is the total intermediate consumption of all the branches which is used in the second approach.

The supply approach falls into the framework of the creation of resource/job equilibriums (ERE). It relies on the statistical sources which describe the economy's available resources. It entails, according to the regulations concerning (NAF 700) products, the implementation in the internal market (production + importation – exportation) of certain 'universal' principles of sharing between intermediate goods final goods and investment.

[4] The notion of a 'branch' is defined in the French SECN as a grouping of homogenous production units.

Practically speaking, the author used two tools: the vector of intermediate goods per branch and the national TEI structure, since it was on the basis of the latter that 'margin immobilisation' was initiated, thus permitting the realization of a Guadeloupean TEI.

Naturally, to construct an input-output table for a regional economy, it is important to properly consider the local specificities and find a relevant way to relate them to the structure and variables of the national economy.

Thus, by starting off with an empty matrix, with 114 columns, 228 rows and fixed margins (TEI0), the author integrated data from investigations concerning the levels of intermediate consumption in certain branches of certain products. In other words, the boxes were either fixed or adjusted, with respect to distribution in all of France, according to information coming from local agencies responsible for statistical investigations and studies. This was the case for branches such as agriculture and electricity. These fixed boxes represented a starting point for the following process, which entailed the application of the national TEI structure for a given branch, to this same branch (if existent), in the TEI0 (the structure here is given in percentage: that of the CI within the global CI of the branch).

Through a series of iterations based on proportional adjustments, in the rows and columns respectively, this first version of the TEI was then immobilised to obtain an adjusted and balanced TEI, while taking all constraints into account. The process used here is close to that used on a national level to create input-output tables for the year n.

More precisely, local specificities mainly concerned the division between imported intermediate goods and locally produced intermediate goods.
Thus, the first thing we observe is that in many branches, there is a lower level of in-house consumption (financial activities, construction, agriculture, other IAA, other business-related services), in relation to what can be observed throughout France. This indicates shorter economic circuits and hence, an increased level of production directly destined to the consumer.
For the "commerce" branch, we observe a stronger presence of « wholesale trade » products in intermediate consumption, which signifies a greater use of commercial, negotiating or purchasing intermediaries. The high levels of importation can perhaps explain this phenomenon.
Similarly, in other branches, the particularities specific to the overseas departments are also at the root of the differences in distribution. In the "water/electricity" branch, the slight presence of "commercial research" can be explained by the fact that EDF Guadeloupe is not an autonomous electricity-distributing company, but an establishment benefiting from research conducted by EDF. In "construction", the meagre usage of interim services may stem not only from the deficient supply in this domain, but also from the employment of casual labour. In "other food-processing industries", the heavy consumption of agricultural products stems from the use of sugar cane in the processes of the sugar-rum sector.

Finally, we should note that two important operations have been carried out in both upstream and downstream industries: local-imported distribution and price-volume distribution (see Mathouraparsad, Maurin and Montauban (2004)).

2. The SAM

The table provides the SAM for Guadeloupe's economy, in millions of euros, for the year 2000. The economy is divided into 16 branches of production, which are listed in the following table, and five economic agents (households, the State, companies, tourists and the rest of the world). There are only two production factors (workforce and capital)

The SAM thus has 57 accounts: 2 factor accounts, 5 agent accounts, 1 accumulation account, 16 production branch accounts, 16 local goods accounts, 16 imported goods accounts and 1 marginal account.

2.1. Production Factors

Traditionally, two types of production factors can be distinguished: work and capital. It is possible to divide the work factor into several categories of qualification.
Data on the number of qualified workers can be obtained form job studies as well as from annual data declarations collected by the INSEE.
An evaluation of the capital stock per sector appears would nevertheless be more difficult to accomplish.

A total of 3 128 in salaries was paid and 1 906 in capital remunerations distributed. Salaries were distributed between households (2 391 in net salaries) and the State (737 in Social Security contributions). 1 190 in capital revenues was paid to households in the form of dividends and interest, 545 to companies in the form of brute profits (after the distribution of dividends and the payment of interest) and 171 went to the government, as remuneration for the State's participation to the capital of production companies.

2.2 Economic Agents

The economic agents considered here were households, companies, the State, tourists and the rest of the world.
Individual entrepreneurs were included in the household category. For companies, there was no particular form of distinction
As far as the public service is concerned, a distinction was made between public State administrations and local authorities.

Households received a total of 4 491. The State received, in addition to its capital revenues and Social Security contributions, direct taxes paid by households and private companies, to the sum of 359 and 77 respectively, to which should be added 681 in indirect taxes.

The agent column shows how revenues were used. Households paid 359 in direct taxes, saved 458 and consumed local agricultural products to the tune of 213 and imported agricultural products worth 29. They bought local industrial products to the tune of 579, imported industrial products worth 1 365, local commercial services worth 1 294, imported commercial services worth 65 and local non-commercial services worth 108. The State accumulated a public deficit of 1 056, paid 910 to households in the form of transfers, 67 in export subsidies and 2 104 in public expenditure and product subsidies. It spent 85 in imported industrial products, 84 in local commercial services and a total of 1 880 in non-commercial services. Tourists spent 10 in local agricultural products, 23 in local industrial products, 10 in exported industrial products and 285 in local commercial services.

2.3 Branches and Products

All of this information was obtained form the document, DOM25. To be homogenous, we have included the original input-output table. Thus, from 25 branches, we have arrived at 16 branches, which were regrouped as follows:

1	**AGRICULTURE**
2	**SUGAR, RUM and OTHER ALCOHOL**
3	**OTHER IAA**
4	**CONSUMER GOODS INDUSTRY**
5	**CAPITAL GOODS INDUSTRY**
6	**INTERMEDIATE GOODS**
7	**ENERGY**
8	**CONSTRUCTION**
9	**COMMERCE**
10	**TRANSPORT AND TELECOMMUNICATIONS**
11	**FINANCIAL ACTIVITIES**
12	**REAL ESTATE ACTIVITIES**
13	**OTHER SERVICES RENDERED TO COMPANIES**
14	**HOTELS AND RESTAURANTS**
15	**OTHER SERVICES RENDERED TO INDIVIDUALS**
16	**NON6COMMERCIAL SERVICES**

Let us begin with the production branches. All sales dealt with here are carried out locally and externally. The products being sold are locally produced or imported. Thus, agriculture produces and sells 431 in agricultural products. The industrial branch produces and sells 3 520 in industrial products, commercial services 3 310 and non-commercial services 2 002. All of the above values are given before tax (subsidy free) or in other words, at factor cost. An examination of the columns of the various branches shows how production costs are allocated to production factors and intermediate costs. Let us take the agricultural branch for example. For a total production cost of, 86 is paid in salaries, 156 generated in brute exploitation revenue, 9 worth of agricultural products bought in the form of intermediate goods, 126 worth of industrial products bought, 17 worth of commercial services and 3 worth of non-commercial services. An analogous analysis is done of the other branches.

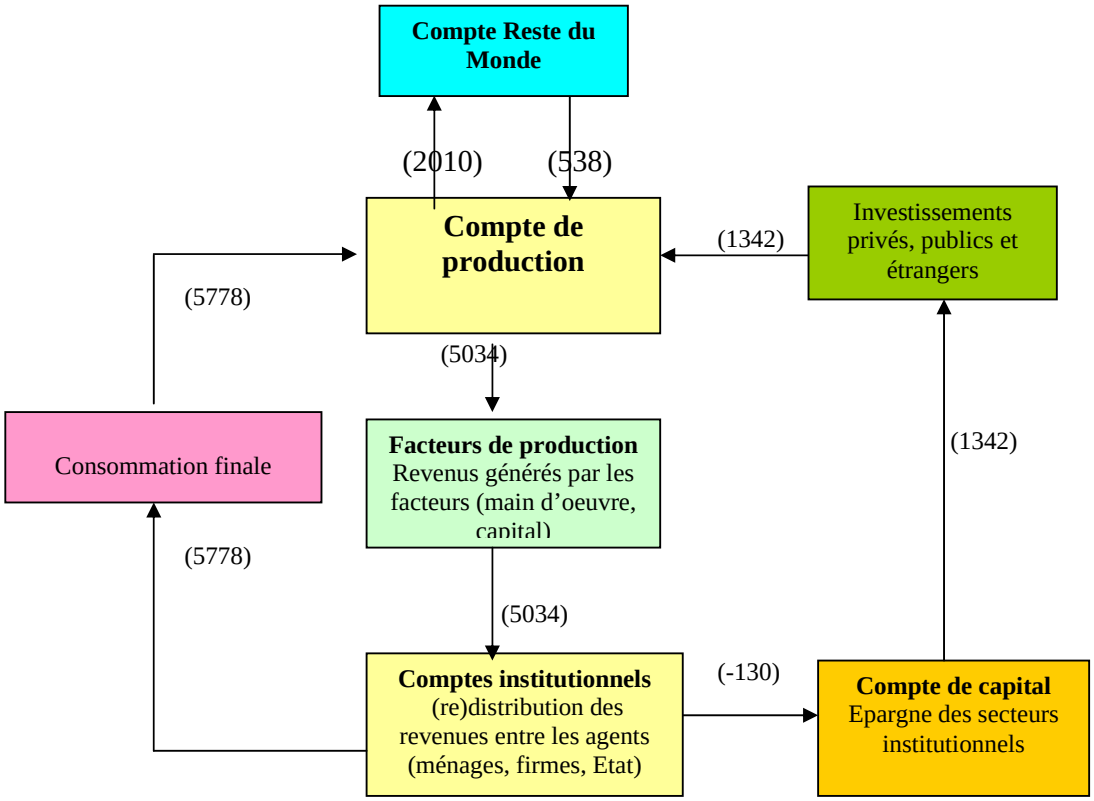
The total market price of the various resources can be calculated by adding the taxes and indirect taxes to production, at the cost of the different factors. For example, to the factor cost of industrial production, 3 486, we add 35 in indirect taxes, evaluated at market price, which adds up to 3 521. An analogous analysis is done of the other branches.

Goods and services are allotted to intermediate and final utilizations (private and public consumption, investment, exportation). Let us consider the example of industrial products: for a total of resources at the market price of 5 642, 1 695 was bought by households, 1 187 went to investment, including the variations of inventory stocks, 33 bought by tourists and 48 exported. The rest was used by agriculture (126), industry (1 424), commercial services (527) and non-commercial services (248), for transformation purposes.

The SAM can be described as a general balancing system of the revenue and expenditure accounts, linking production activities, production factors and institutions within an economy.

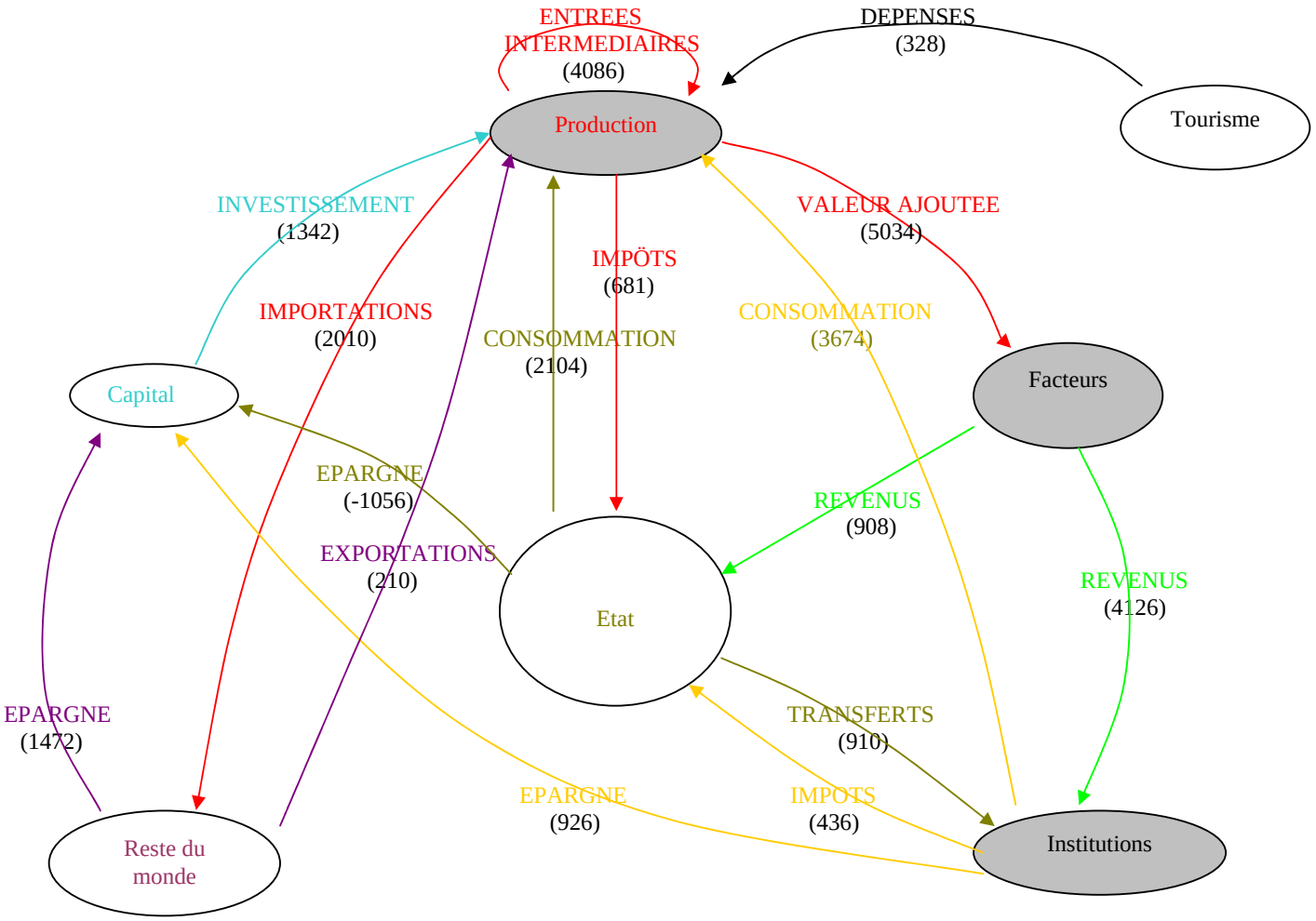
In figure 3, we can note that industrial production generates added value, which facilitates the remuneration of production factors. In return, this revenue is re-distributed to different institutions. Then, after a process of re-distribution, the revenue is either used to cover expenditure in final consumption or saved. The cycle ends when consumption and savings are on equal levels with industrial production (Pyatt and Round, 1985).
Figure 4 reproduces all the transactions appearing in a SAM[5]. For example, we can see that the added value represents revenue for the production factors account, paid by the production account. The diagramme therefore describes the economic mechanisms, while the SAM assesses these transactions.

Figure 3: *Simplified representation of the main flux between the accounts of the Guadeloupe SAM*



[5] the grey cells represent exogenous accounts

Figure 4 : *Diagramme of the transactions within the SAM*



III- Simulation exercises

SAM simulations were carried out, using the input-output table developed for Guadeloupe on the basis of the data available for 2000. This was the last year in which accounts were published.

For each account, the calculations of the multiplier provide a general image of revenue distribution. The break down of the multiplier explains what contributes, more or less, to revenue determination among the different agents. We are particularly interested by the redistribution generated by the multiplying effects, which are due to the inter-dependence within an economy.

In the multiplying matrix, the sum of the columns shows how the revenue of the productive system is increased, when the branch receives an exogenous injection. These total values reveal the distribution effects on the productive system, which are generated by each activity.
The sum of the rows show how the revenue of the corresponding account is increased when there is a unitary injection into each economic activity. These total values show the absorption effects of a sector when global revenue grows by one unit.

The multiplier shows that the most notable distribution effect is caused by the commercial sector, which creates 2.866 units of revenue for each exogenous unit received. The sugar-rum branch also has a considerable multiplying effect, which amounts to 2.604. The branches which accrue the least amounts of revenue are the capital goods and agricultural branches. The branch with the largest absorption effect is the commercial branch (5.265), followed by the services rendered to companies branch (3.763).

Moreover, it can be observed that there are very significant differences between sectors, where the level of distribution multipliers is concerned. Those that are likely to raise the added value revenue level even higher are the commercial sector (1.401), the non-commercial service sector (1.350) and the retail activity sector (1.344). It should be noted that the non-commercial service branch accrues the most in terms of workforce revenue (0.963) and that the highest capital multiplier belongs to the real estate activity branch (1.020). The sectors with the weakest multipliers are the capital goods industry (0.652) and energy (0.662).

As far as the industrial accounts are concerned, it may be noted that an increase in household revenues by 100 units would provoke a 39-unit rise in commercial production, an 18-unit rise in real estate activities (intersection of the household column and the commercial and real estate branch rows).

1. Tax Exemption

In the overseas departments and territories, the Girardin Law tax exemption has been in effect since July 01, 2003. It foresees a tax relief for persons acquiring real estate properties in the overseas regions, to the value of 8% the total cost of the properties acquired during the first year. Thus, investors buying properties in either one of the four overseas departments (Martinique, Guadeloupe, French Guiana, Reunion Island) or in one of the two overseas territories (French Polynesia, New Caledonia), or even in one of the two territorial ‘collectivities’ (Mayotte and Saint Pierre and Miquelon) benefit from a tax reduction once the house concerned is used as the main residence of the purchaser or renter, for at least five years.
Thus, real estate activity should experience boom in the coming years. What repercussions would a 10% rise in real estate investment have on the entire economy?

Distribution of Investment in Local and Imported Goods

	Local Products	Imported Products
AGRICULTURE	0.91%	0.05%
SUGAR, RUM and OTHER ALCOHOL	0.00%	0.00%
OTHER FOOD-PROCESSING INDUSTRIES	0.00%	0.00%
CONSUMER GOODS INDUSTRY	0.34%	1.78%
CAPITAL GOODS INDUSTRY	2.59%	17.29%
INTERMEDIATE GOODS	0.53%	0.84%
ENERGY	0.00%	0.00%
CONSTRUCTION	64.38%	0.00%
COMMERCE	0.66%	0.00%
TRANSPORT AND TELECOMMUNICATION	0.00%	0.00%
FINANCIAL ACTIVITIES	0.00%	0.00%
REAL ESTATE ACTIVITIES	3.85%	0.00%
SERVICES RENDERED TO COMPANIES	6.47%	0.12%
HOTELS AND RESTAURANTS	0.00%	0.00%
SERVICES RENDERED TO INDIVIDUALS	0.14%	0.04%
NON COMMERCIAL SERVICES	0.00%	0.00%

In 2000, investment was estimated at a little over 1.3 billion euros. More than half (68%) was spent in real estate. 20% was spent in the acquisition of capital goods. The rest was distributed among services rendered to companies, consumer goods, agricultural products, intermediate goods, commerce and services rendered to individuals. Investments represent 18% of the total final demand in Guadeloupe.
Real estate activities add up to more than 25% of commercial production. They also represent 20% of the wealth produced, 7% of paid salaries, 13% of direct taxes paid by Guadeloupean companies and close to 11% of VAT takings.

A rise in investment in construction and real estate activities would lead to a 1.7% increase in GDP, for a production increase of 2.1%. When the breakdown of intermediate consumption is taken into consideration, practically all commercial activities stand to benefit from this rise, even though non-commercial services would experience a slighter increase in earnings (+0.1%). The sector that would be most concerned is the construction sector (+9%), the intermediate goods industry would follow with an increase of 5.6%, followed by the capital good sector, 4.9%.

Effect of a 10% Rise in Investment in Construction and Public Works on the Added Value of Branches

AGRICULTURE	1.0%
SUGAR, RUM and OTHER ALCOHOL	0.9%
OTHER FOOD-PROCESSING INDUSTRIES	1.3%
CONSUMER GOODS INDUSTRY	1.2%
CAPITAL GOODS INDUSTRY	4.9%
INTERMEDIATE GOODS	5.6%
ENERGY	1.4%
CONSTRUCTION	9.0%
COMMERCE	1.4%
TRANSPORT AND TELECOMMUNICATION	1.2%
FINANCIAL ACTIVITIES	2.0%
REAL ESTATE ACTIVITIES	1.9%
SERVICES RENDERED TO COMPANIES	1.5%
HOTELS AND RESTAURANTS	0.9%
SERVICES RENDERED TO INDIVIDUALS	1.1%
NON COMMERCIAL SERVICES	0.1%

The revenue brought in by the different economic agents would also be affected by this rise. In fact, the remuneration of salaries would go up by 1.3%. At the same time, capital revenue would increase by 2.3%, which can be linked to the rise in real estate activities, since they require a lot of capital. Subsequently, household consumption would go up by 1.3%, accompanied by a rise in importation of 1.8%, especially where intermediate goods are concerned (3.7%). As far as taxes are concerned, taxes on revenue would go down by 0.8% since the economic agents who invest in real estate benefit from a tax relief worth 8% of the total price paid. Similarly, where the State's earnings are concerned, company taxes would go up by 2.3% and taxes on production would decrease by 1.8%.

By analysing the total effect of the multiplier, one would observe that the revenues of certain accounts vary more than others. Only the accounts whose variations are relatively significant are shown in the table. Thus, domestic demand for construction materials would increase by 8.8% and the demand for intermediate goods would rise by about 8.4%. Company revenue would go up by 2.34%. It should also be noted that there would be a decrease in demand for imported services (0.8%), to the benefit of local services, where the demand would go up by about 1.5%.

Revenue variations in certain accounts[6] following an injection of 10% into investment in construction materials and real estate activities

CAPITAL FACTOR	2.34%
CAPITAL GOODS INDUSTRY	4.69%
INTERMEDIATE GOODS	5.33%
CONSTRUCTION	8.80%
INTERMEDIATE GOODS	3.70%
COMMERCE	2.83%
OTHER SERVICES RENDERED TO COMPANIES	-0.80%
CAPITAL GOODS INDUSTRY	4.63%
INTERMEDIATE GOODS	5.25%
CONSTRUCTION	8.69%
COMPANIES	2.34%
HOUSEHOLDS	1.33%

The multiplier effect can be broken down to three levels. The most important direct multipliers are the branches where surplus capital has been injected into production. Certain branches are not concerned. Thus, a one unit increase in investment into construction and real estate activities is followed by a rise in production, worth 1.102% and 1.086% respectively. The indirect multiplier or open loop shows the impact of this exogenous shock on household and company revenues. The indirect effects on the other accounts are non-existent. This injection would provoke a rise in household revenues of 1.006% and in company revenues of 0.323%. Finally, the closed loop multipliers are relatively more important for the following accounts: agriculture, other food-processing industries, consumer goods industries, energy, commerce, transport and telecommunications, financial activities, real estate activities, other services rendered to companies, hotels and restaurants and other services rendered to individuals. The following table show the results of a injection of a further 10% into investment in construction and real estate activities.

In the following tables, I, T, O and C represent the effects of an initial injection, a transfer, an open loop and a closed loop. These are the broken down multipliers.

[6] The accounts in red represent local goods, those in orange imported goods and those in yellow, branches.

Breakdown of the muliplying effects following an injection of 10% into investment in construction materials and real estate activities (in millions of euros)

	I	T	O	C	TOTAL
CAPITAL FACTOR	0	0	1 151	800	**1 951**
WORK FACTOR	0	0	2 250	920	**3 169**
AGRICULTURE	94	53	52	210	**409**
SUGAR, RUM and OTHER ALCOHOLS	50	6	7	28	**90**
OTHER IAA	6	22	40	158	**227**
CONSUMER GOODS INDUSTRY	31	53	28	111	**222**
CAPITAL GOODS INDUSTRY	42	94	4	15	**154**
INTERMEDIATE GOODS	6	288	27	108	**429**
ENERGY	6	48	37	150	**241**
CONSTRUCTION	974	135	21	83	**1 213**
COMMERCE	9	40	51	205	**306**
TRANSPORT AND TELECOMMUNICATIONS	91	159	98	393	**741**
FINANCIAL ACTIVITIES	17	138	38	153	**346**
REAL ESTATE ACTIVITIES	118	26	113	452	**710**
OTHER SERVICES RENDERED TO COMPANIES	154	297	79	318	**848**
HOTELS AND RESTAURANTS	184	24	74	295	**576**
OTHER SERVICES RENDERED TO INDIVIDUALS	45	14	31	125	**216**
NON COMMERCIAL SERVICES	1 880	7	24	95	**2 006**
AGRICULTURE	1	13	8	33	**55**
SUGAR, RUM and OTHER ALCOHOLS	-1	1	2	7	**9**
OTHER IAA	-4	52	92	370	**511**
CONSUMER GOODS INDUSTRY	108	102	116	463	**789**
CAPITAL GOODS INDUSTRY	248	181	71	282	**782**
INTERMEDIATE GOODS	14	275	51	206	**546**
ENERGY	0	80	67	266	**413**
CONSTRUCTION	0	0	0	0	**0**
COMMERCE	0	0	0	0	**0**
TRANSPORT AND TELECOMMUNICATIONS	1	34	19	78	**133**
FINANCIAL ACTIVITIES	0	1	2	10	**13**
REAL ESTATE ACTIVITIES	0	0	0	0	**0**
OTHER SERVICES RENDERED TO COMPANIES	2	0	0	0	**1**
HOTELS AND RESTAURANTS	0	0	0	0	**0**
OTHER SERVICES RENDERED TO INDIVIDUALS	1	2	1	3	**7**
NON COMMERCIAL SERVICES	0	0	0	0	**0**
AGRICULTURE	1	128	46	182	**357**
SUGAR, RUM and OTHER ALCOHOLS	9	47	6	23	**84**
OTHER IAA	4	24	33	132	**192**
CONSUMER GOODS INDUSTRY	1	55	18	73	**148**
CAPITAL GOODS INDUSTRY	2	123	3	14	**142**
INTERMEDIATE GOODS	6	246	23	90	**364**
ENERGY	1	50	35	139	**224**
CONSTRUCTION	14	1 072	20	80	**1 186**
COMMERCE	6	226	235	940	**1 407**
TRANSPORT AND TELECOMMUNICATIONS	5	254	100	399	**757**
FINANCIAL ACTIVITIES	0	154	38	153	**345**
REAL ESTATE ACTIVITIES	3	143	112	449	**707**
OTHER SERVICES RENDERED TO COMPANIES	4	410	72	289	**776**
HOTELS AND RESTAURANTS	2	205	73	293	**573**
OTHER SERVICES RENDERED TO INDIVIDUALS	3	48	26	102	**179**
NON COMMERCIAL SERVICES	9	1 954	25	98	**2 086**
COMPANIES	0	0	272	286	**558**
HOUSEHOLDS	910	0	2 138	1 503	**4 551**

2. Tourism

Undeniably, tourism represents an important stake in the Guadeloupean economy. Besides being a generator of employment, its financial repercussions in several branches of activity make it a true axis of development. However, for several years, this sector has been undergoing a drop in the number of tourists. Several reasons have been put forward in an attempt to explain this phenomenon: terrorist attacks, bankruptcy of certain airline companies, hikes in ticket prices, etc. What consequences would a 10% decrease in tourist expenditure have on Guadeloupe's economy?

Distribution of tourist expenditure between local and imported goods

	Produits locaux	Produits importés
AGRICULTURE	0.00%	0.00%
SUGAR, RUM and OTHER ALCOHOLS	3.00%	0.00%
OTHER IAA	1.00%	1.00%
CONSUMER GOODS INDUSTRY	6.00%	2.00%
CAPITAL GOODS INDUSTRY	0.00%	0.00%
INTERMEDIATE GOODS	0.00%	0.00%
ENERGY	0.00%	0.00%
CONSTRUCTION	0.00%	0.00%
COMMERCE	0.00%	0.00%
TRANSPORT AND TELECOMMUNICATIONS	5.00%	0.00%
FINANCIAL ACTIVITIES	0.00%	0.00%
REAL ESTATE ACTIVITIES	0.00%	0.00%
OTHER SERVICES RENDERED TO COMPANIES	20.00%	0.00%
HOTELS AND RESTAURANTS	56.00%	0.00%
OTHER SERVICES RENDERED TO INDIVIDUALS	6.00%	0.00%
NON COMMERCIAL SERVICES	0.00%	0.00%

Tourists spent 328 million euros over the course of the year 2000. Most of this went towards hotel accommodation and restaurants, to which tourists consecrated 56% of their budget. Next came car rentals, consumer goods purchases …

This expenditure is estimated to represent 9 % of total household consumptions in Guadeloupe. Tourists consume 11% of the local production of alcoholic beverages and 9% of the service rendered to individuals. Thanks to these tourists, the hotel and restaurant branch earns close to one third of its annual revenue. This sector of activity represents more than 7% of commercial production, creates 5% of the accrued wealth and contributes 10% of VAT takings.

A drop in tourist expenditure would lead to a –0.6% variation of the GDP, with a 0.7% drop in production. As is shown in the following table, practically all commercial activities would be affected by this drop, except non commercial services which show very little variation. The most hard-hit branches would be the hotel-restaurant branch (–3.6%) and the food-processing industry, with a drop in activities equal to 3.2%.

Effects of a 10% drop in tourist expenditure on the added value of various branches

AGRICULTURE	-0.7%
SUGAR, RUM and OTHER ALCOHOLS	-3.2%
OTHER IAA	-1.1%
CONSUMER GOODS INDUSTRY	-1.5%
CAPITAL GOODS INDUSTRY	-0.1%
INTERMEDIATE GOODS	-0.5%
ENERGY	-0.7%
CONSTRUCTION	-0.1%
COMMERCE	-0.6%
TRANSPORT AND TELECOMMUNICATIONS	-0.8%
FINANCIAL ACTIVITIES	-0.8%
REAL ESTATE ACTIVITIES	-0.4%
OTHER SERVICES RENDERED TO COMPANIES	-1.6%
HOTELS AND RESTAURANTS	-3.6%
OTHER SERVICES RENDERED TO INDIVIDUALS	-1.5%
NON COMMERCIAL SERVICES	0.0%

The revenues of the various economic agents are also affected by this drop. Salary and capital remunerations would decrease by 0.6% and 0.7% respectively. This drop would logically be followed by a 0.5% reduction in household consumption and a 0.6% decrease in importations, as a result of the slowdown of economic activity

With household disposing of less income and spending less, tax earnings would also be reduced. Income and company taxes would experience a drop of 0.5% and 0.7% respectively. VAT earnings would also drop by 0.8%.

The overall multiplying effect highlights the branches that are most closely related to the tourism sector. In other words, we can distinguish the sectors which are “boosted” by tourism. Thus, the sugar-rum branch would undergo a 1.8% drop in its activities. This is surely linked to the souvenirs tourists take with them when they leave the island. Production in the consumer goods industries would be reduced by 1.5% and the activities related to services rendered to companies, 1.56%. Finally, the greatest variation would take place in the hotel-restaurant branch, whose activities would be decreased by 3.6%. This minor crisis in the tourism industry would provoke an income shortfall for companies and households, corresponding to 0.67% and 0.48% respectively.

Variations in the earnings of certain accounts, following an injection of -10% in tourist expenditure

SUGAR, RUM and OTHER ALCOHOLS	-1.79%
CONSUMER GOODS INDUSTRY	-1.53%
OTHER SERVICES RENDERED TO COMPANIES	-1.56%
HOTELS and RESTAURANTS	-3.61%
SUGAR, RUM and OTHER ALCOHOLS	-1.61%
CONSUMER GOODS INDUSTRY	-1.52%
OTHER SERVICES RENDERED TO COMPANIES	-1.55%
HOTELS and RESTAURANTS	-3.60%
COMPANIES	-0.67%
HOUSEHOLDS	-0.48%

By breaking down the total revenue, we can see that the direct multiplier generates 45 production units out of a total of 82 units, 6 units *via* the open loop effect and 22 with the closed loop multiplier. Out of the 144 units in the consumer goods industry, the direct effects generate 53, the open loop effects, 18 and the closed loop effects, 72. The hotel-restaurant branch produces 548 units, with 186 generated by direct effects, 73 by indirect effects and 286 by side effects. The earnings of the economic agents are also affected, as seen earlier. Households receive a total of 4469 euros, or 0.48% less than what they would receive if there was no crisis situation. The open loop (2 083) and closed loop multipliers (1 476) are the elements which permit this revenue to be generated.

Breakdown of multiplying effects following an injection of -10% in tourist expenditure (in millions of euros)

	I	T	O	C	TOTAL
CAPITAL FACTOR	0	0	1 112	782	**1 894**
WORK FACTOR	0	0	2 211	899	**3 110**
AGRICULTURE	94	51	52	205	**403**
SUGAR, RUM and OTHER ALCOHOLS	49	6	7	27	**88**
OTHER IAA	6	21	40	155	**222**
CONSUMER GOODS INDUSTRY	29	51	28	108	**216**
CAPITAL GOODS INDUSTRY	42	87	4	15	**147**
INTERMEDIATE GOODS	6	267	27	106	**406**
ENERGY	6	47	37	146	**236**
CONSTRUCTION	885	127	21	81	**1 114**
COMMERCE	9	39	51	201	**300**
TRANSPORT AND TELECOMMUNICATIONS	90	154	98	384	**726**
FINANCIAL ACTIVITIES	17	132	38	150	**337**
REAL ESTATE ACTIVITIES	113	25	113	442	**694**
OTHER SERVICES RENDERED TO COMPANIES	147	285	79	311	**822**
HOTELS AND RESTAURANTS	165	23	74	289	**551**
OTHER SERVICES RENDERED TO INDIVIDUALS	43	14	31	122	**210**
NON COMMERCIAL SERVICES	1 880	7	24	93	**2 003**
AGRICULTURE	1	12	8	33	**54**
SUGAR, RUM and OTHER ALCOHOLS	-1	1	2	7	**9**
OTHER IAA	-4	49	92	362	**499**
CONSUMER GOODS INDUSTRY	108	100	116	452	**775**
CAPITAL GOODS INDUSTRY	248	173	71	276	**768**
INTERMEDIATE GOODS	14	257	51	201	**524**
ENERGY	0	77	67	260	**404**
CONSTRUCTION	0	0	0	0	**0**
COMMERCE	0	0	0	0	**0**
TRANSPORT AND TELECOMMUNICATIONS	1	33	19	76	**130**
FINANCIAL ACTIVITIES	0	1	2	9	**12**
REAL ESTATE ACTIVITIES	0	0	0	0	**0**
OTHER SERVICES RENDERED TO COMPANIES	2	0	0	0	**1**
HOTELS AND RESTAURANTS	0	0	0	0	**0**
OTHER SERVICES RENDERED TO INDIVIDUALS	1	2	1	3	**6**
NON COMMERCIAL SERVICES	0	0	0	0	**0**
AGRICULTURE	1	126	46	178	**351**
SUGAR, RUM and OTHER ALCOHOLS	9	45	6	22	**82**
OTHER IAA	4	23	33	129	**188**
CONSUMER GOODS INDUSTRY	1	53	18	72	**144**
CAPITAL GOODS INDUSTRY	2	117	3	13	**136**
INTERMEDIATE GOODS	6	228	23	88	**344**
ENERGY	1	49	35	135	**219**
CONSTRUCTION	14	978	20	79	**1 091**
COMMERCE	6	220	235	919	**1 380**
TRANSPORT AND TELECOMMUNICATIONS	5	247	100	390	**742**
FINANCIAL ACTIVITIES	0	148	38	149	**336**
REAL ESTATE ACTIVITIES	3	137	112	439	**691**
OTHER SERVICES RENDERED TO COMPANIES	4	393	72	283	**753**
HOTELS AND RESTAURANTS	2	186	73	286	**548**
OTHER SERVICES RENDERED TO INDIVIDUALS	3	46	26	100	**175**
NON COMMERCIAL SERVICES	9	1 954	25	96	**2 083**
COMPANIES	0	0	261	281	**541**
HOUSEHOLDS	910	0	2 083	1 476	**4 469**

3. Cost of Living Allowance

Since the late 1940s, with the implementation of the departmental regime, the French West Indies have benefited from several different forms of public transfers: tax relief for companies and households, financial grants to towns, unemployment benefits, overpayment of public servants … his fact has led certain authors to say, on one hand, that the overseas departments are characterized by surplus economies, in the sense that their growth is largely due to transfers coming from continental France and, on the other hand, that without these transfers and the substantial buying power accorded to public servants, there would no growth, where internal demand is concerned.
What then would be the economical impact of a withdrawal of this cost of living allowance from which all government employees benefit?

Salary distribution among branches

	Salary remunerations
AGRICULTURE	2.22%
SUGAR, RUM and OTHER ALCOHOLS	0.53%
OTHER IAA	1.28%
CONSUMER GOODS INDUSTRY	1.10%
CAPITAL GOODS INDUSTRY	0.86%
INTERMEDIATE GOODS	2.06%
ENERGY	2.14%
CONSTRUCTION	6.05%
COMMERCE	15.13%
TRANSPORT AND TELECOMMUNICATIONS	6.89%
FINANCIAL ACTIVITIES	4.16%
REAL ESTATE ACTIVITIES	1.01%
OTHER SERVICES RENDERED TO COMPANIES	6.35%
HOTELS AND RESTAURANTS	4.65%
OTHER SERVICES RENDERED TO INDIVIDUALS	1.64%
NON COMMERCIAL SERVICES	43.92%

Public earnings are assessed at a little over 2 billion euros. They are made up of capital revenues representing 8.45% of the total amount, transfers representing 36.4%, taxes on products and production representing 33.6%, income taxes representing 17.7% and company taxes representing 3.8%. The non commercial service branch contributed 33% of the total revenue for a production evaluated at 22% of the total, making it by far the most productive sector. Public expenditure consists of 6% in subsidies (on products and exports) and 45% in transfers.

In 2000, household incomes were evaluated at a little less than 4.5 billion euros, a sum equivalent to 80% of the regional GDP. This income included net salaries paid to the working population (53%), capital revenues (27%) and transfers (20%). The sectors contributing the most to household revenues were the non commercial service sectors, with 44% of the total salaries, far ahead of the commercial sector, which paid 15% of all salaries. The salaries paid to government employees in non commercial services were responsible for 73% of the consumption of non commercial state services.

Under similar circumstances moreover, a 40% reduction in the salaries of the non commercial sector would have a disastrous effect on Guadeloupe’s economy. The growth rate of the regional GDP would drop by 21 points. All branches of the economy would feel the effects of this cutback. The most affected would be the non commercial service branch (-38.6%) followed by the energy sector

(-17.7%) and commerce (-16.5%). The least affected would be the construction sector (-2.7%) and the capital goods industry (-6.4%).

Effects of a 40% decrease in public sector salaries on the added value of banches

AGRICULTURE	-12.1%
SUGAR, RUM and OTHER ALCOHOLS	-12.0%
OTHER IAA	-16.5%
CONSUMER GOODS INDUSTRY	-15.7%
CAPITAL GOODS INDUSTRY	-6.4%
INTERMEDIATE GOODS	-8.2%
ENERGY	-17.7%
CONSTRUCTION	-2.7%
COMMERCE	-16.5%
TRANSPORT AND TELECOMMUNICATIONS	-14.6%
FINANCIAL ACTIVITIES	-13.5%
REAL ESTATE ACTIVITIES	-14.1%
OTHER SERVICES RENDERED TO COMPANIES	-12.5%
HOTELS AND RESTAURANTS	-11.6%
OTHER SERVICES RENDERED TO INDIVIDUALS	-13.5%
NON COMMERCIAL SERVICES	-38.6%

The total salary mass of economic agents would drop by 24% and capital revenue by 15.8%. Consumption, production and importations would drop by 17%, 17.9% and 13.7% respectively. Tax earnings would also falll. Income and company taxes would drop by 17% and 15.8% respectively. Vat earnings would fall by 14.1%.

The following table highlights the manner in which the earnings of the different accounts vary after a shock. The most affected branches are listed. We can see that activity in the non commercial service sector would decrease by more than 38%, energy by 17.45% and commerce by 16.34%. The least affected would be the construction sector (-2.64%), the sugar-rum sector (-6%) and the capital goods industry (-6%). At the same time, households and companies would have their revenues decreased by 16.96% and 15.81% respectively.

Revenue variations for certain accounts following an injection of -40% in salaries of the non commercial service sector

SUGAR, RUM and OTHER ALCOHOLS	-6.00%
CAPITAL GOODS INDUSTRY	-6.03%
ENERGY	-17.45%
CONSTRUCTION	-2.64%
COMMERCE	-16.34%
NON COMMERCIAL SERVICES	-38.42%
COMPANIES	-15.81%
HOUSEHOLDS	-16.96%

The direct effect on production of non commercial services would add up to 1 174, for a total supply of 1 283. 25 units would be generated by open loop effects and 76 by closed loop effects. In the energy branch, production would be at 182 units, of which 40 would be generated by direct effects, 35 by indirect effects and 107 by closed loop effects. Estimated household revenues would add up to 3 729 euros, where 1 588 would be the result of indirect effects, 1 232 the result of the

closed loop multiplier and an extra 910, thanks to the initial injection representing transfers. There would be no direct effects.

Breakdown of multiplyin effects following an injection of -40% in public service salaries (in millions of euros)

	I	T	O	C	TOTAL
CAPITAL FACTOR	0	0	986	619	**1 605**
WORK FACTOR	0	0	1 665	712	**2 377**
AGRICULTURE	94	48	52	162	**357**
SUGAR, RUM and OTHER ALCOHOLS	50	6	7	21	**84**
OTHER IAA	6	21	40	123	**189**
CONSUMER GOODS INDUSTRY	31	41	28	86	**186**
CAPITAL GOODS INDUSTRY	42	81	4	12	**139**
INTERMEDIATE GOODS	6	259	27	84	**376**
ENERGY	6	37	37	116	**196**
CONSTRUCTION	885	115	21	64	**1 085**
COMMERCE	9	33	51	159	**252**
TRANSPORT AND TELECOMMUNICATIONS	91	132	98	304	**626**
FINANCIAL ACTIVITIES	17	120	38	119	**293**
REAL ESTATE ACTIVITIES	113	22	113	350	**599**
OTHER SERVICES RENDERED TO COMPANIES	154	252	79	246	**731**
HOTELS AND RESTAURANTS	184	19	74	229	**506**
OTHER SERVICES RENDERED TO INDIVIDUALS	45	12	31	97	**185**
NON COMMERCIAL SERVICES	1 128	6	24	73	**1 231**
AGRICULTURE	1	11	8	26	**45**
SUGAR, RUM and OTHER ALCOHOLS	-1	1	2	6	**8**
OTHER IAA	-4	47	92	287	**423**
CONSUMER GOODS INDUSTRY	108	75	116	358	**658**
CAPITAL GOODS INDUSTRY	248	149	71	219	**686**
INTERMEDIATE GOODS	14	244	51	159	**470**
ENERGY	0	68	67	206	**342**
CONSTRUCTION	0	0	0	0	**0**
COMMERCE	0	0	0	0	**0**
TRANSPORT AND TELECOMMUNICATIONS	1	28	19	60	**109**
FINANCIAL ACTIVITIES	0	1	2	7	**10**
REAL ESTATE ACTIVITIES	0	0	0	0	**0**
OTHER SERVICES RENDERED TO COMPANIES	2	0	0	0	**1**
HOTELS AND RESTAURANTS	0	0	0	0	**0**
OTHER SERVICES RENDERED TO INDIVIDUALS	1	2	1	2	**6**
NON COMMERCIAL SERVICES	0	0	0	0	**0**
AGRICULTURE	1	123	46	141	**311**
SUGAR, RUM and OTHER ALCOHOLS	9	46	6	18	**78**
OTHER IAA	4	22	33	102	**161**
CONSUMER GOODS INDUSTRY	1	48	18	57	**124**
CAPITAL GOODS INDUSTRY	2	112	3	11	**128**
INTERMEDIATE GOODS	6	221	23	70	**319**
ENERGY	1	40	35	107	**182**
CONSTRUCTION	14	967	20	62	**1 063**
COMMERCE	6	193	235	728	**1 162**
TRANSPORT AND TELECOMMUNICATIONS	5	227	100	309	**640**
FINANCIAL ACTIVITIES	0	136	38	118	**293**
REAL ESTATE ACTIVITIES	3	134	112	348	**597**
OTHER SERVICES RENDERED TO COMPANIES	4	369	72	224	**670**
HOTELS AND RESTAURANTS	2	201	73	227	**503**
OTHER SERVICES RENDERED TO INDIVIDUALS	3	46	26	79	**154**
NON COMMERCIAL SERVICES	9	1 174	25	76	**1 283**
COMPANIES	0	0	225	234	**459**
HOUSEHOLDS	910	0	1 588	1 232	**3 729**

Conclusion

Recently, since the late 1990s, and notably in the light of numerous debates on the issue of institutional change, economists in the French overseas regions are increasingly asked to provide simple explanations and propose guidelines to deal with the great challenges affecting the balance and evolution of their societies: exclusion and precariousness, salary inequalities, unemployment, ecological problems, development of local production, tourism policy, etc.
Faced with such diverse questions and needs, which are among the top priorities of the decision-makers and local authorities, a number of studies have proposed various responses, ideas and methodological approaches which have proven to be very useful in terms of understanding economic machinery, appreciating socio-economic evolutions and facilitating decisions.

The macro-economic models and analytical exercises proposed and discussed in this article stem from a resolute desire to provide the French overseas regions with the tools necessary for preparing and evaluating economic policies.
Our essential contribution has been the setting up of the first Social Accountability Matrix for Guadeloupe, which was created by extending the input-output table developed by the Insee for the year 2000. From this point on, a *Pandora's Box* of CGE models awaits, in Guadeloupe's case, which will permit many fruitful studies to be carried out, as in numerous other countries, in the aim of examining many diverse subjects.

The various scenarios explored in this article have proven to be extremely useful for analyzing the effects of certain measures, which bring different facets of the Guadeloupean economy into play and which highlight different problems confronting the island. On the matter of reducing public sector salaries for example, the SAM model is very clear: the GDP would drop by more than 20 points, leading to a spiral of economic disequilibrium. One of the after-effects would be reductions of more than 10 points fro the main variables: production in most sectors, consumption in households, investment and exports. Similarly, the State's tax earnings would be reduced by more than 14 points.

Despite the fact that it opens up the way for a wide variety of potential models for Guadeloupe, the SAM tool proposed here allows economists to achieve substantial results, which, at this point, is a by no means insignificant contribution where the economic decision-makers are concerned.

BIBLIOGRAPHY

Adelman, I and S Robinson (1989) Income Distribution and Development, Chapter 19 in Chenery and Srinivasan (Eds) *Handbook of Development Economics*, Vol II, North-Holland.

Archambault E. (1991), *Comptabilité nationale*, Coll. Economie, 4ème édition Economica, Paris, 271 pages.

Azihary M. Ponty N. (1991), L'application de la modélisation d'équilibre général calculable a un pays en développement, SATECO, INSEE, no 67,

Bacharach (1970) " Biproportionnal Matrices and Input-Output Change." Cambridge University Press, pp.42-58 et pp.75-86.

Basanta K. Pradhan, M. R. Saluja and Amarendra Sahoo (2000), Social Accounting Matrix for India - 1997-98: Concepts, Constructions and Applications, NCAER

Bernard P. (2003), *Commerce international et ressources renouvelables: le cas des produits halieutiques*, thèse de doctorat, Université de Nantes

Bernier B., Ferrandier R., Simon Y., (1990) *Macroéconomie, Exercices et Corrigés*, Coll. Exercices et cas, Ed. Economica, Paris.

Bourguignon F., De Melo J., Suwa A. (1991), Distributional effects of adjustment policies : simulations for archetype economies in Africa and Latin America, The World Bank Economic Review, vol. 5, no 2, pp. 339-366

Cogneau D. Roubaud F. (1993), Une matrice de comptabilité sociale pour le Cameroun : méthodes et résultats, SATECO, INSEE, no 75-76,

Collange G. (1997), Les modèles d'équilibre général calculable, une note méthodologique, Notes et Etudes, no 58, Groupe Caisse Française de Développement

Courbis R. (1975), "*Modèles régionaux et modèles régionaux-nationaux*", Actes du IIe Colloque international d'économétrie appliquée, Ed. Cujas.

Decaluwé B., Patry A., Savard L. et Thorbecke E. (1999), Poverty Analysis Within a General Equilibrium Framework, Working paper no. 9909, CRÉFA

Defourny, J and E Thorbecke (1984) Structural Path Analysis and Multiplier Decomposition within a Social Accounting Matrix, *Economic Journal*, 94: 111-136.

Dervis K., De Melo J., Robinson S., (1979) Les modèles d'équilibre general et le commerce international. Economie Appliquée, ISSMEA tome XXXII, no 4.

Dervis K., De Melo J., Robinson S., (1989) General equilibrium models for development policy, a world bank research publication, University Press, Cambridge, 515 p.

Divay, J.-F. et Meunier, F. (1980) « Deux méthodes de confection du tableau entrées-sorties », *Annales de l'Insee*, n° 37, janvier-mars 1980, pp. 59-108.

Dorosh P. (1992), A computable general equilibrium model for Madagascar : Equations and parameters, miméo, Cornell University, Food and Nutrition policy program
Flouzat D. (1986), *Analyse économique, Comptabilité nationale*, 4ème édition Masson, 349 pages.

Jirman A.P. (1992), Whom or what does the representative individual represent?, Journal of economic perspectives, vol. 6, no 2, pp. 117-136

Keuning, S.J. (1995): Productivity Changes and Shifts in the Income Distribution *Economic System Research*, vol.7, no.3, pp.453-468.

King B. (1981), What is a SAM? A Layman's guide to Social Accounting Matrices, Word Bank, Staff Working Paper no. 463

Les comptes économiques des Départements Français d'Amérique, Années 1993-1994-1995, Base 95, Les cahiers de l'INSEE

Mathouraparsad S., Maurin A., Montauban J-G. (2004), La modélisation input-output : une approche pour mesurer l'impact des mesures économiques dans les DOM, papier présenté aux journées internationales du LEAD sous le thème "la macroéconomie appliquée au service de la politique économique", le 21 Mai 2004

Maurin A., Montauban J-G. (2004), L'enjeu du développement économique insulaire, éditions SEDES.

Maurin A. and Watson P.K. (2000), "*Quantitative Modelling of the Caribbean Macroeconomy for Forecasting and Policy Analysis. Problems and Solutions*", Paper presented to the XXX Annual Monetary Studies Conference, Paramaribo.

Pichot A. (1988), *Comptabilité nationale et modèles économiques*, Coll. Economie, PUF, Paris, 661 pages.

Pisani-Ferry J., Sterdyniak H. Villa P. (1990), *Problèmes de macroéconomie*, Coll. Economie et Statistiques Avancées, Ed. Economica, Paris, 452 pages.

Pradhan, B.K., A. Sahoo and M.R. Saluja, (1999)**,** A Social Accounting Matrix for India 1994-95, *Economic and Political Weekly* Vol. XXXIV No. 48

Pyatt, G. and J.I. Round, (1977), Social Accounting Matrices for development Planning, *Review of Income and Wealth*, series 23, No. 4, 339-364

Pyatt, G and J I Round (1979) Accounting and Fixed Price Multipliers in a SAM Framework, *Economic Journal*, 89: 850-873.

Pyatt G. et Round J.I. (1985), Social Accounting Matrix. A basis for planning. Word Bank,

Pyatt G. et Thorbecke E. (1976), Planning Techniques for a better future. Geneva: International labour office

Robinson S., Rolland-Holst D. (1988), Macroeconomic structure and computable general equilibrium models, Journal of Policy Modeling, no 10, pp. 353-375

Robinson, S., (1989), Multisectoral Models, *Handbook of Development Economics*, Vol.11, North-Holland.

Round, J I (2003) Constructing SAMs for Development Policy Analysis: Lessons Learned and Challenges Ahead, *Economic Systems Research.*

Ronald-Holst, D. W. and F. Sancho, (1992), Relative Income Determination in the United States: A Social Accounting Perspective, *Review of Income and Wealth*, Series 38, No. 3

Schubert K. (1993), les modèles d'équilibre general calulable: une revue de la literature, Revue d'Economie Politique, no 6, pp. 777-825.

Simon O. (2003), Méthode de conception d'un tableau des échanges intermédiaires (TEI) pour le département de la Guadeloupe sur l'année 1999, INSEE

Stone, J. R. N. (1985) The Disaggregation of the Household Sector in the National Accounts, G.

Suwa A. (1991), Les modèles d'équilibre general calculable, Economie et Prévision, no 97, pp. 69-76

Thorbecke E and Hong-Sang Jung (1996) A Multiplier Decomposition Method to Analyse Poverty Alleviation, *Journal of Development Economics*, 48 (2): 279-300.

Zantman A. (1995), Modèles d'équilibre général calculable et répartition des revenus dans les pays en voie de développement : quelques éléments d'évaluation, Revue du Tiers Monde, tome XXXVI, no 142