Proceedings of the 8th WSEAS International Conference on APPLIED MATHEMATICS, Tenerife, Spain, December 16-18, 2005 (pp367-372)

The mutual interdependency as a result of the decisions made by savers. The basic role of the financial system in the relationship between economic agents.

JOSÉ MANUEL GONZÁLEZ PÉREZ
Department of Economic Analysis, University of La Laguna, Tenerife.
Director of CDI of the UIMP, Tenerife. SPAIN.

DAVID COVA ALONSO
Director of Financial Planing of CajaCanarias, Tenerife. SPAIN.

Abstract: The objective of this article is to present the interdependency between economic agents in the context of an open economy. Focusing on this interdependency, we obtain a well-defined approximation, both intuitively and analytically, of a macro view point of economic activity that is developed in the economy as well as the role or function of the financial system itself.

The general implications that were obtained by analysing the circular flow of income [1]between economic agents and their corresponding income balances have been: 1) The interdependency between the distinct economic agents through general income and expenditure behaviour, with respect to their savings' decisions; 2) And verifying the necessity to create mechanisms or instruments that permit the channelling of positive savings of some towards others who need financing in order to cover their deficits. This function is precisely the most important role of the financial system: the central bank, banks and savings banks. The study of all these mechanisms constitutes an important part of economic theory that centres on the description and analysis in financing the economy.

Key-words: Interdependency, save and financial system.
Jel Clasification: A14, A22, A66, and F41

1 Introduction

The objective of this article is to present the interdependency between economic agents in the context of an open economy. Focusing on this interdependency, we obtain a well-defined approximation, both intuitively and analytically, of a macro view point of economic activity that is developed in the economy as well as the role or function of the financial system itself. We use linear algebra. The model could be implemented with explicit behaviour equations in order to obtain computational efficiency.

2 Suppositions, the model and implications

The suppositions are:

Four economics agents: The domestic economy or households, enterprises, the public sector and the rest of the world.

Five markets: the goods and services market, the labour market, the money, the bond and the currency markets. On the one hand, the goods and services market and the labour market define the real or physical environment of the economy, and on the other hand, the money, bonds and currency markets define the financial environment of the economy.

We consider "a unique good" is produced. We call it (y), which represents the GDP in real terms of the economy.

We consider two inputs: The labour factor (N) and the capital factor (k). In the short term labour is a variable factor and the capital is fixed. Furthermore, we assume that the labour input is homogeneous.

2.1 The enterprise behaviour

The enterprises' forms the productive fabric of the country. They satisfy the production. This is its basic role in the economy.

Households, or the domestic economy, are owners of the enterprises. So in this manner, households and enterprises form the private sector of the economy. They produce this "unique good" (y)[1].

Enterprises demand labour (N) and capital (k) inputs. In respect to this, households as well make up this labour, as workers belong to the households. Additionally, we assume that there are N workers (number of workers or worked hours) contracted in the labour market (occupied population) and W as the nominal wage, which represents its labour price.

The capital stock (k) are units of (y) [2] which is made and used by enterprises (machines, buildings, cars, hardware, software,…) to produce.

The capital stock is formed by a part of the product that is identified as physical investment or Capital Gross Formation (FBK). Investment decisions are necessary and indispensable in order to expand the capital stock; and furthermore, to resolve the technical obsolescence (all tangible assets deteriorate) and/or economic obsolescence (by competitive requirements). Consequently, enterprises need to assign a part of its production to keep and to expand the capital stock.

We define real gross investment (ib) as the part of the production to maintain and to expand the capital stock of the economy and net investment (i) to represent expanding the capital stock. So therefore, let δ[3] be the rate of depreciation of the capital stock. Additionally, let k_t , represent the capital stock in t period. So:

$$ib_t = \delta k_t + (k_{t+1} - k_t)$$

= Depreciation + Net investment

$= \delta k_t + i_t$ [(Keep) and (expand)]

With regard to this, we assume that real net investment incorporates the stocks or existences of products of the enterprises. This includes the "desired" stocks, ones that cover demand as well as "not desired ones", unwanted accumulated stocks, which the consequence of this is an increase in inventory (Δinv).

If the economic agents of a particular country trade with the rest of the world then the economy is open. If this open economy is satisfied, then obviously, the *fundamental account identity in the macroeconomy is:*(from here on in denoted as i.c.f.)

$$y \equiv cn + i + \delta k + \Delta inv + g + x \quad (1)$$

Where as cn denotes household private consumption, $i + \delta k + \Delta inv$ denotes the made investment of the enterprises, g represents public expenditures, and x represents exports.[4]

The production generated (y) by the enterprises of the country in a period, a year for example, will be sent back through the four different agents described before.

Obviously, in the case that Δinv would be null, then the production made is equal to the desired demands[5]. In our model, we assume that the "made investment" and the "desired investment" are equal. Therefore, this equals the equilibrium obtained in the goods and services market. So therefore in this condition the equation is transformed into the following:

$$y = cn + i + \delta k + g + x \quad (2)$$

Now it is necessary to resolve two problems that occur when the agents have commercial trade with the rest of the world:

1st.- There is a difference between household consumption of national goods (cn) and importable goods(m)[6]. Effectively, it is not the same for national product (y) than is for the foreign product (y*)[7].

Now, we must consider that the total consumption of households (c) includes a part of national as well as importable goods.

2nd.- The second problem is to know how to account for importable goods. Because all of them have different unit measures. Consequently, importable goods in national unit terms would be:

$$((E\, p^*)/ p)\, m = \theta\, m \quad [8] \quad (3)$$

Where E is the exchange rates, p* are international prices and p national prices and m equals imports.

We said earlier that the total consumption of households is formed by national goods and importable goods. So, the consumption in national goods terms would be:

$$c = cn + \theta\, m \quad (4)$$

So, the equation (1) could be rewritten as:

$$y \equiv c + i + \delta k + \Delta inv + g + x - E\, p^*\, m / p \quad (5)$$

So, we obtain the i.c.f. of the open economy: It informs us that the real production generated by an economy will be the addition of the total consumption of households, gross investment, Δinv, and the balance of trade. Therefore, we can rewrite (5) as:

$$y \equiv c + i + \delta k + \Delta inv + g + bc \qquad (6)$$

Where, bc denotes the trade balance.

With this, we now can begin to understand the macro vision of economic activity and the strong interdependency between the economic agents. We will use an income circulation scheme, see graphic 1, to graphically denote the open economy context; and on the other hand, we will use the income flow balances for each of the economics agents.

The income circulation scheme:

In this scheme, see graphic 1 at the end of the text, we can appreciate squares with discontinuous lines. Furthermore, we see arrows identifying income flows related to at least to two agents. This generates economic activity. If we are able to measure the quantity of the flows then we would be able to measure the economic activity of the country.

What will be the balances of the income flows of the enterprises?

We identify the balance as the difference between the input or income flows and the output expense flows.

1st.- Result: we can quantify the enterprises' savings proceeding from its relationship with the other agents. Formally:

$$S_{emp} = p\,y - WN - (p\,i + p\,\delta k) -$$
$$(py - WN - p\,\delta k)^{9} = -p\,i < 0^{9} \quad (7)$$

So, what the enterprises save is the value, with an opposite sign, of the net investment. In other words, if enterprises to make a net investment, they expand its capital stock, then they would contract debts in the amount of their net investment.

2.2 The public sector behaviour

The public sector makes decisions on public expenditures (g). Under this concept will be include all the expense items related to the budgets of the entire public administration.

What will be the balance of the income flows of the public sector?

As income flows we will have to look at taxes(T). As out flows we will have the value of the goods and services bought for the public sector represented as (pg), and the payment transfers as (tr).

2nd.- Result: we can quantify the public sectors' savings (SP) proceeding from its relationship with the other agents. Formally, we identify the surplus budget as:

$$SP = T - p\,g - tr \qquad (8)$$

In case of being negative, it would assume a public deficit. And it would require that someone finance it.

2.3 Household behaviour

The hypothesis is: households are consumers of the goods and services produced (c). Its members are workers (N) and/or entrepreneurs, owners of the enterprises.

What will be their income balance in the domestic economy?

We quantify household savings (S_{ed}) as the following: This is generated by the economic relationship they have with the others agents. So:

$$S_{ed} = W\,N + b^{o}(y) + tr - p\,c - T =$$
$$W\,N + (py - WN - p\,\delta k) + tr - p\,c - T \qquad (9)$$

Where b^{o} represents the benefits.

We use equation (1), the equation (4) and we consider $\Delta inv = 0$. Then:

$$y = cn + i + \delta k + g + x \qquad (2)$$
$$c = cn + E\,p^{*}\,m / p \qquad (4)$$

Substituting in (9):

$$S_{ed} = W\,N + (p\,(cn + i + \delta k + g + x)$$
$$- WN - p\,\delta k) + tr - p\,(cn + E\,p^{*}\,m/p) - T =$$
$$p\,i + (p\,g + tr - T) + p\,x - p\,(Ep^{*}m/p)$$

We obtain:

$$S_{ed} = p\,i + (pg + tr - T) + p(x - Ep^{*}m/p) \qquad (10)$$

Also, it could be expressed:

$$S_{ed} = p\,i + DP + p\,bc =$$
$$-S_{emp} + DP + p\,bc \qquad (10')$$

3rd.- Result: The domestic economy savings will be determined by the value, with opposite sign, of the enterprises' savings, the public deficit and the balance of trade.

We see how the private savings (households and enterprises) are conditioned by the public sector and the rest of the world behaviours. Furthermore, this interdependence is valid in both directions.

2.4 The external sector behaviour

The balance of income from the perspective of the rest of the world will then be measured by the incomes flows, valued in euros from our imports, which are their exports, and from the flows from our exports, which we value in euros and represents our exports and their imports.

So, savings from the external sector would be:

$$S_{ext} = Ep^* m - p x =$$

$$p ((Ep^* m/p) - x) =$$

$$= - p ((x - (Ep^*/p) m)) =$$

$$-p (x - \theta m) ;$$

$$S_{ext} = - p bc \qquad (11)$$

4th.- Result: The savings from the external sector will be the value, with opposite sign, of the balance of trade.

How much savings from all the economic agents?

Adding the four results that we obtained before.

$$S_{emp} + S_{ed} + S_{gob} + S_{ext} =$$

$$(- p i) + p i + DP + p bc - DP + (- p bc) = 0 \quad (12)$$

5th.- Result: The sum of all the savings generated from all the economics agents, as a whole, is cero.

3. Conclusions

We have obtained as general implications from the cited results:

1st.- Implication: We have proved the strong interdependence between the economic agents through their behaviour in generating income and expenses. Thus, this is their saving decisions.

2nd.- Implication: It is necessary to generate a mechanism or instruments for channelling the positive savings from agents to others who need to be financed. This is the most important function developed by the financial system: the savings banks, banks and Central Banks. The studies of all these mechanism are very important for economic theory. It describes and analyzes the financial environment and its conditions in order to make monetary policy.

We must indicate that this paper doesn't explain anything about how the financial system functions, but only what is the role of the financial system [2]. They do this by channelling positive savings towards other agents with financing needs. The financial system does not intermediate in the payment flows nor intermediates in the counterpoint of savings/investment flows. It manages the financial health of the sectors. The financial system is in the core of the financial accounts of the economy and it is not in the macroeconomic square of the economy.

References:

[1] Cándido Muñoz Cidad, *Introducción a la Economía Aplicada. Cuentas Nacionales, Tablas Input-Output y Balanza de Pagos. Ed. Espasa Calpe, Biblioteca de Economía. Serie Manuales. (1989)*

John Maynard Keynes, *Teoría General de la ocupación , el interés y el dinero. Ed. Fondo de Cultura Económica. (1936)*

G.Mankiw, *Principios de Economía. Mc Graw-Hill. (1998)*

Lluis Barbé Durán *Curs d'introducciò a l'economia II. L'Escola Neoclàsica, Keynes i Schumpeter. Manuals de la Universitat Autònoma de Barcelona. (1992*Olivier

----------, *El curso de la economía. Ed. Ariel. (1996)*

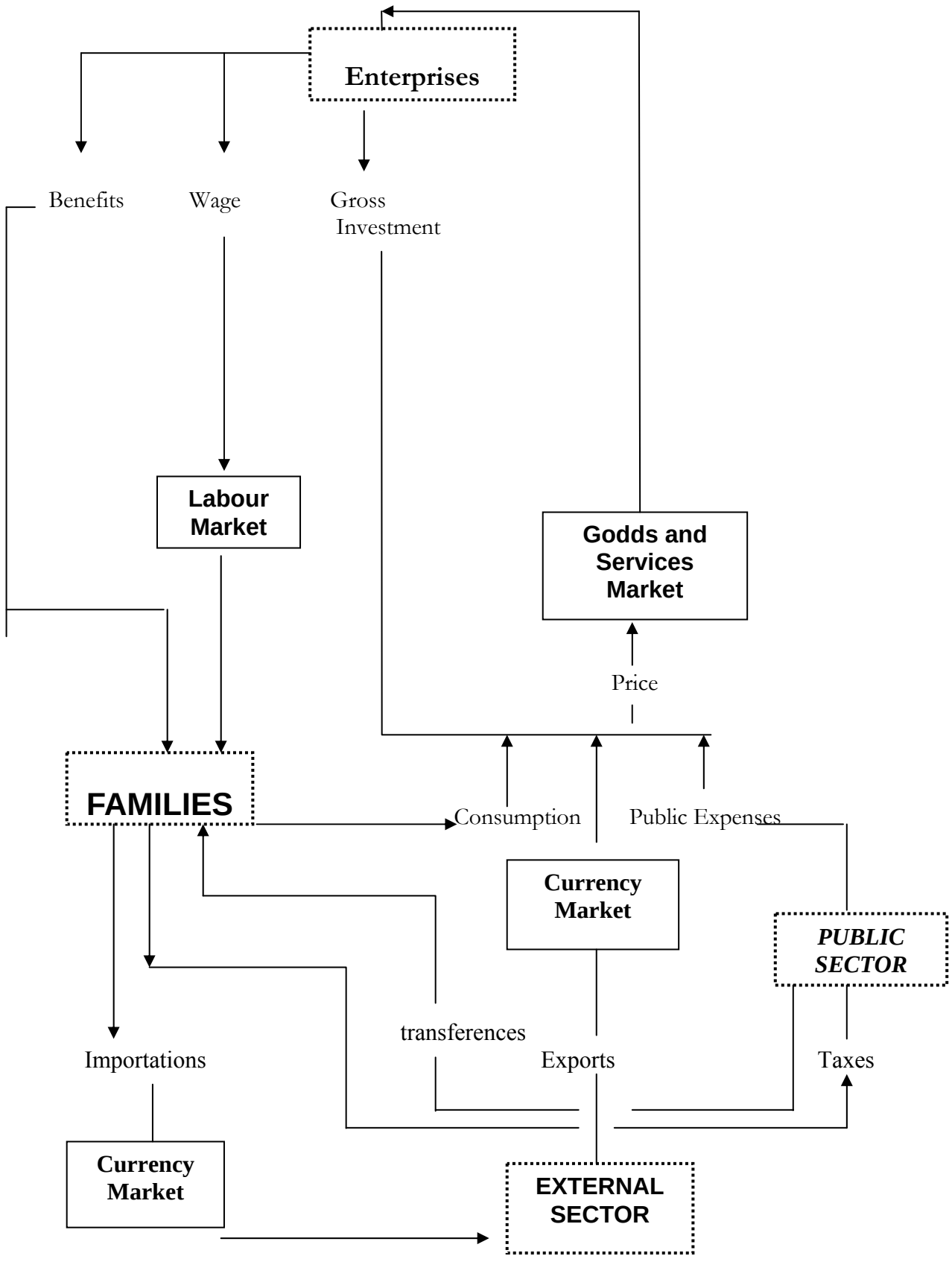
O. Blanchard, *Macroeconomía. Prentice Hall. 2ª Ed. (2000)*

José Antonio García Durán de Lara, *Iniciativa y bienestar. Introducción a la economía. Ed. Ariel. (2003)*

[2] José Manuel González Pérez, *Economía política, participación e interdependencia. La cuestión social. Ed. GEU (2005)*

[3] William H. Branson, *Teoría y Política Macroeconómica. Ed. Fondo de Cultura Económica. (1980)Informes Anuales del Banco de España y, en particular, las Cuentas Financieras.*

Escheme rents circulation in the open economy: Graphic 1



[1] This variable (y) is measured in national units of production, (n.u.).
[2] This variable (k) is measured in n.u.
[3] Coefficient between 0 and 1. Consequently, it is an obsolescence percentage.
[4] (cn) , (i+ δ k + Δinv) , (g) , (x) are measured in n.u.
[5] We assume that the taken and desired demands coincide with that of the households, the government, and the rest of the world.
[6] (m) are measured in foreign units (f.u.).
[7] (y*) are measured in foreign units (f.u.).
[8] (Ep*/p)=θ is identified as Real Relation of Interchange, it measure the competitive degree of the national production.
[9] The benefits are (py-WN-pδk) because we can not compute all gross investment. The net investment value is not here because it isn't consumed, still.