The Effectiveness of Fiscal Policy in the Stock/Flow Levy Model

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Abstract

This paper concentrates on the stock/flow model originally developed by Wynne Godley and his team at the University of Cambridge and subsequently developed further at the Levy Economics Institute. It utilizes the Levy Economics Institute version, to explore the impact of fiscal policy on the level of economic activity. The scale of the multipliers and effects of fiscal policy on the level of economic activity and other important variables in the economy are derived. The results obtained are compared with other estimates of the effects of fiscal policy and reasons for differences (and similarities) explored. It is generally concluded that fiscal policy is an important and effective instrument of economic policy. The significance of the results of this paper for fiscal policy is explored.

JEL Classification: E17, E62

Keywords: Stock/Flow Models, Fiscal Policy, Dynamic Multipliers

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1. Introduction

There has been a major shift within macroeconomic policy over the past three decades or so, in terms of the relative importance given to monetary policy and to fiscal policy. The former gaining considerably in importance, while the latter being so much downgraded that it is rarely discussed at least in academic circles these days. There are, of course, exceptions to this general statement. The onset of the 'great recession' prompted governments to initiate fiscal measures that avoided another 'great depression'. However, that was rather short-lived. It is now the case that a number of governments have resumed their hostility to fiscal policy as a stabilisation instrument. In Arestis and Sawyer (1998, 2004, 2003a), we critically examined the significance of this shift in terms of monetary policy, which led us to question the effectiveness of interest rates now used as the main instrument of monetary policy. In the same paper, but also in Arestis and Sawyer (2003b, 2006, 2010), we explored the role of fiscal policy, and argued that in the 'new consensus in macroeconomics' within which macroeconomics in general and monetary policy in particular is generally discussed, there is barely mention of fiscal policy.[1] We strongly suggested there that fiscal policy should be reinstated, and concluded that fiscal policy remains a potent tool for offsetting major changes in the level of aggregate demand. This paper aims to consider further those particular conclusions, by concentrating on the stock/flow Levy model.[2]

The Levy model has been designed to facilitate the construction of scenarios, and we use that model in this paper for the construction of scenarios arising from specified fiscal expansions. It differs in that sense from many other econometric models, which are generally designed for provide short-term forecasts. The Levy model has undergone changes over the years. For example, versions with complicated structural relationships for inflation, wage and labour market have been constructed. The version utilized for the purposes of this paper has an incomplete account of the channels of monetary policy (for example via the exchange rate), and an incomplete link amongst a number of variables (such as wages and inflation), and was designed to deal with periods of negligible rates of inflation. In what follows in this paper we utilize this version of the model, which is by no means fully completed.

We begin in section 2 by discussing the Levy model's stock/flow consistency aspects, before we provide a summary of its bare essentials in section 3. We then consider fiscal policy within this framework in section 4, providing quantitative estimates of fiscal

[1] With the implication, presumably, that fiscal policy does not matter, whereas the focus is on monetary policy and the use of interest rate policy to target inflation.

[2] The Levy model has been developed by a group of researchers at the Levy Economics Institute of Bard College (see, for example, Godley, 1996, 1999a, 1999b; Godley and Shaikh, 2002; Godley and Lavoie, 2007a, 2007b). It is closely related to the 'New Cambridge' model developed in the 1970s and 1980s at Cambridge University (see, for example, Cripps and Godley, 1983; Godley and Cripps, 1983). For an excellent summary and insightful analysis of these models, including a great deal of background material and an assessment of them, see De Santos (2003). We are extremely grateful to Claude De Santos and Gennaro Zezza, both from the Levy Economics Institute, for helpful discussions and enormous help especially on the more technical aspects of the Levy model. The usual disclaimer does, of course, apply.

policy multipliers in this model. In the final section 5, we summarize the argument and conclude.

2. The Stock/Flow Consistency of the Model

The model under investigation belongs to that category of models that take explicitly into consideration the stock implications that relate to debt and asset accumulation of the flow behaviour. Lavoie and Godley (2001-2002) argue that "The stock-flow monetary accounting framework provides ..... an alternative ... foundation ... that is based essentially on [a number of] principles ..... the accounting must be right. All stocks and flows must have counterparts somewhere in the rest of the economy. The watertight stock flow accounting imposes system constraints that have qualitative implications. This is not a matter of logical coherence; it also feeds into the intrinsic dynamics of the model" (p. 131; words in square brackets added). It is, thus, paramount that an adequate accounting framework is present to provide a 'system-wide' logical requirement, relevant to the issue under scrutiny. This would ensure that flows necessarily change stocks, which influence future flows, thereby establishing the dynamics of the system. Further requirements of such a framework to satisfy two sets of constraints are the following. The first is the 'sectoral budget' constraint, that in each accounting period economic agents are constrained by what is available at the beginning of the period; and the second is the 'adding-up' constraint, that the whole is equal to its parts and that combinations of stocks and flows obey certain identities.

The model is thereby more sensitive to changes in theoretical assumptions and accounting definitions, than in other models precisely because of these constraints. This makes the study of the model's dynamics particularly interesting in that the constraints that are required to satisfy the identities and accounting definitions of the model, may give results that are not necessarily expected from standard theoretical assumptions. And yet, explicit recognition of stock/flow relationships imply, by their very construction, a dynamic approach to modeling, contrary to the more conventional, Keynesian IS/LM models, which are predicated on static short-run equilibrium analysis. Indeed, and as Turnovsky (1977) puts it, the stock/flow models "necessarily impose a dynamic structure on the macroeconomic system, even if all the underlying relationships are static" (p. xi). Tobin (1982) is also explicit on this issue. He argues that "a model of short-run determination of macroeconomic activity must be regarded as referring to a slice of time, whether thick or paper thin, and as embedded in a dynamic process in which flows alter shocks, which in turn condition subsequent flows" (p. 189). Past stocks affect current flows and current flows affect current stocks, which affect future flows. Not only is this dynamic element of enormous importance, but also that the accounting framework in place, has no 'black holes' and in which every flow comes from somewhere and goes somewhere" (Godley, 1996, p. 7). In this regard, the model is unique in terms of its macroeconomic reasoning, and also in terms of its logical coherence (Tobin, 1980, 1982; Godley and Shaikh, 2002; Lavoie and Godley, 2001-2002; Godley and Lavoie, 2007a, 2007b).[3]

[3] A comprehensive summary of these views, and a great deal more details and analysis of the stock/flow models and their implications, can be found in De Santos (2003).

A further important facet of this type of models follows Solow's (1983) suggestion that the construction of stock/flow models is essentially an attempt to 'complete' Keynes' (1936) General Theory. This is so in view of "the largest theoretical gap in the model of the General Theory" which "was its relative neglect of stock concepts, stock equilibrium and stock-flow relations. It may have been a necessary simplification for Keynes to slice the time so thin that the stock of capital goods, for instance, can be treated as constant even while net investment is systematically positive or negative. But those slices soon add up to a slab, across which stock differences are perceptible. Besides, it is important to get the stock-flow relationships right; and since flow behaviour is often related to stocks, empirical models cannot be restricted to the shortest of the short runs" (p. 164).[4]

It would be instructive to compare this approach with that of more mainstream perspective.[5] Clearly the latter does not pay any attention to stock/flow issues, which may be rather surprising. This is so since it follows from what has been described so far, that authors of mainstream persuasion have acknowledged the importance of stock/flow issues (additional examples include, Christ, 1967, 1968; Turnovsky, 1977; Buiter, 1980, 1983). However, this paradox may be explained by referring to an important assumption of the mainstream approach. This relates to the 'perfect foresight' assumption, not unrelated to the rational expectations assumption, which had been used by mainstream analysis well before the emergence and acceptance of the rational expectations assumption. Foley (1975) demonstrates that under this assumption the distinction between stock and flow equilibria in asset markets is of no consequence. The main reason of this result becomes apparent once the distinction between 'stock' equilibrium, at the beginning of the period, and 'flow' equilibrium, at the end of the period, is made. The end-of-period equilibrium equates instantaneous flow demands for assets with instantaneous flow supply. Stock equilibrium "equates an instantaneous demand to hold the stock of an asset with an instantaneous supply" (Foley, op. cit., p. 315). Although these equilibria have very different qualitative properties, under 'perfect foresight' or 'rational expectations' they are indistinguishable.[6]

The Levy stock/flow model also differs substantially from the more recently developed Dynamic Stochastic General Equilibrium (DGSE) models. The Levy stock/flow model does not share the basic assumptions of this type of models, which rely on the 'representative' agent, who is assumed to optimize intertemporally a utility function based on consumption today and consumption in the future, in a perfectly rational manner. This agent is a fully trust-worthy 'representative' agent that would never default under the usual transversality conditions, an assumption that precludes the incorporation of money and a financial sector in these models. Under such assumptions fiscal policy is downgraded and monetary policy is upgraded; the latter is presumed to target inflation to be met through manipulation of the rate of interest under the further assumption of inflation being a monetary phenomenon and price stability the only objective of

[4] Tobin (1982) puts it in equally strong terms, "a model whose solution generates flows but completely ignores their consequences may be suspected of missing phenomena important even in a relatively short run, and therefore of giving incomplete or even misleading analyses" (p. 188).

[5] A more mainstream perspective is taken as one that does not concern itself with stock/flow issues.

[6] See, also, De Santos (2003) for an elaboration of the Foley (1975) proof that under 'perfect foresight' the distinction between flows and stocks does not really matter.

economic policy (see Arestis, 2009b, for a critique of these assumptions). These are all assumptions that are fully by-passed by the Levy stock/flow model.

Another important difference is the way econometric models are constructed. The conventional approach is to build up a macroeconomic model from its constituent components, such as consumption, investment, wages, inflation etc. This 'bottoms up' approach can lead to overlooking relevant macroeconomic relationships and to not ensuring that all stocks and flows are accounted for (in effect that one person's asset disposal is another asset acquisition). The Levy approach is a more 'top down' approach, which begins with a complete set of water-tight accounting framework where all stocks and flows are explicitly accounted for and modeled. With the accounting framework in place, the behaviour of the constituent components can then be addressed. The Levy approach is, thus, a microeconomic-macroeconomic one in which the behaviour of economic variables is modeled and the macroeconomic relationships between economic variables ensured.

These ideas are employed in the construction of the stock/flow consistent Levy model. In order to make sure that "this model has the merit of consistency, the accounting being watertight in the sense that everything comes from somewhere and goes somewhere, while all financial balances have precise counterparts in changes in stock variables" (Godley, 1999b, p. 23), Table 1 describes the accounting structure of the model (see, also, Godley and Lavoie, 2007a). It uses a double entry matrix so that every flow can be seen as a transaction involving at least two sectors. In this way, and as the quote above from Godley (1996, p. 7) makes clear, there are no 'black holes' in the sense that every flow comes from somewhere and goes somewhere. There are four sectors to consider: the private sector, comprising persons and companies, both industrial and commercial companies; the financial sector, which includes banks and other financial institutions; the government sector, including both state and federal governments; and the foreign sector that comprises non-residents, be they companies, persons or governments.

There are crucial and vital assumptions made, which are worth summarizing and commenting on. To begin with, the version of the model utilized for the purposes of this paper, is a 'pure' demand model, with supply constraints being absent. Additional important assumptions can be summarized as follows. The private sector comprises of households and firms, but does not include financial entities, other than certain aspects of the banking sector. In this sense, it would be best labeled as 'non-financial private sector'. Lumping households and firms is permissible; Matthew and Minford (1980) defend this aggregation by suggesting that "we do no violation to the theory in lumping firms with households, since we regard them both as obeying similar principles of asset disposition. Earlier work, along similar lines to ours ..... was highly disaggregated and perhaps for this reason may have proved hard to use for policy analysis" (p. 645). Furthermore, prices and wages are assumed exogenously determined. In terms of the financial sector, the assets of the banks consist of credit extended to firms (so that their income is the interest they receive on credit extended); their liabilities are the stock of liquid assets (SLA_b). The rate of interest on loans is a mark-up over the interest rate stipulated by the financial authorities, and banks are willing to supply whatever loans are demanded at that rate of interest. So that the rate of interest on credit extended is treated as exogenous, in that it is a constant mark-up over the given interest rate of the financial

authorities. Banks provide loans to firms passively on the security of inventories, and they do not have retained earnings. Consequently, disposable income is by definition personal disposal income (PYD). In terms of the government sector, it is assumed that government debt consists of perpetuities only, i.e. bonds that pay a fixed amount of money per period; they can be of either short-term or long-term duration. It is also assumed that government deficit and credit to banks are financed by high powered money and government debt.

The first four entries in Table 1 comprise GDP (Gross Domestic Product), with the rest of the symbols having their usual meanings, where PE is total private expenditure (consumption plus investment), G is government expenditure, X is exports and Q is imports. The next eight entries portray the components of Personal Disposal Income (PYD) where again the symbols are familiar. Thus, GDP_f is income from abroad, DT is direct taxes, IT indirect taxes, UB is unemployment benefits, SSC is social security contributions, OGTR is other government transfers, R.GD(-1) is interest payments (R is the bond rate, GD is government debt and the minus unity in brackets denotes one period lag), and TRF is transfers to non-USA residents which is the sum of TRFP (that part of TRF emanating from the private sector) and TRFG (that part of TRF emanating from the government sector).

The final three entries portray the uses and sources of funds. If any sector has a financial surplus, in that income exceeds expenditure, then it has to either acquire additional financial assets or pay off outstanding debts to the other sectors. Consequently, the Net Acquisition of Financial assets by the Private sector (NAFAP) is equal to its financial surplus, and, therefore, it can be defined as the difference between PYD and PE.[7] It is also equal to the sum of ΔGD and CA (current account of the balance of payments). In the event that NAFAP changes are small, the changes in government financial position would be reflected in changes in the financial position of the foreign sector of a similar magnitude, i.e. changes in CA.[8] In terms of the sources of funds, NAFAP is equal to the sum of positive ΔPC (the flow of personal credit) and the negative of ΔSLA (changes in the stock of liquid assets; these are non-interest bearing bank liabilities). Finally from the last entry, ΔSLA is the sum of two elements: ΔSLA_b (ΔSLA of the banking system) and ΔSLA_f (ΔSLA of the foreign sector). All the entries sum to zero both horizontally and vertically.

It is important under the conditions described in this section, to introduce a new concept instead of the traditional concept of equilibrium. The reason is simple enough, "the tendency of the system as a whole is governed by stock-flow norms rather than ..... equilibrium (or disequilibrium) conditions postulated by neoclassical theory" (Godley, 1999a, p. 396). So that when the system is shocked it goes through a number of changes

[7] Transfers of assets/liabilities within the personal sector do not change NAFAP. If the private sector as a whole is to change NAFAP, say increase it, then it must increase its holdings of assets or reduce its liabilities, to either the government or to the overseas sector. It also follows that a net acquisition of financial assets or a financial surplus of one sector, must be met by a financial deficit in at least one other sector.

[8] It is true, though, that the Levy model does not contain such an assumption. It was more prevalent in the older type of models, such as in Cripps and Godley (1983) and Godley and Cripps (1983). See below for a fuller discussion on the importance of the assumption discussed in the text.

required by the stock/flow interactions. When these dynamic changes are completed, the system comes to a 'steady-state' position, either in its growth or stationary sense (depending on the assumptions made about the exogenous variables). The concept of equilibrium employed for the purposes of studying this model is rather different from that of the more widely used concept of 'equilibrium'.

3. Model Description

The model comprises 56 equations, 7 of which are estimated equations (two of the estimated equations are non-linear), the rest being identities (37 of them) and calibrated behavioral equations (12 of them). An important distinguishing feature of the model is that it contains a very small number of behavioural relationships. The reason is simple enough and relies on human behaviour and its varied characteristics, so that the objective is to "establish principles which capitalize on adding-up constraints so as to confine behavioural processes to a relatively small number of variables, each of which can then be the object of empirical study. The smaller the number of behavioural variables which govern how the system *must* function in the view of the logical constraints, the more powerful will be our theory as a model of organizing and interpreting data" (Godley and Cripps, 1983, p. 18).

It follows from this theoretical position that the level of aggregation in the Levy model is an open issue. However, the approach to the model has a strong preference for aggregating 'the private sector as a whole'. An additional argument for this aggregation is that consumption is essentially determined by disposable income, and investment is also essentially determined by the disposable income of companies (i.e. retained earnings), so that aggregation retains the influence of disposable income on expenditure. This is strengthened by the observation that "given the well-known difficulty of modeling the corporate sector there is an advantage in aggregation provided the overall relationship is empirically robust" (Cripps and Godley, 1976, p. 336). This observation is based on the argument that the interaction between the personal sector and the company sector in determining their expenditure decisions is extremely complex. Any attempt to isolate them may not provide satisfactory predictions of consumption and investment. It is for these reasons that there is one relationship that describes the expenditure behaviour of the whole personal sector, labeled below as 'private expenditure', that is the sum of consumption and investment. Another important dimension of the Levy model is the treatment of the 'financial side' of the economy. Agents' financial decisions, including bank and household portfolio decisions as well as firm investment decisions, along with the consequences of these decisions are treated exogenous.

We may begin summarizing the model with the standard income identity (the symbols are as above; where new symbols are introduced they are immediately defined):[9]

(1) $GDP = PE + G + X - Q$

where G is treated as exogenous.

[9] The reader is reminded that this is only an objective summary of the Levy model. Full details of the latter can be obtained upon request from the Levy Economics Institute.

(2) $PE = PE(PYD, SLA, \Delta PC, SMP, HP)$

where SMP is the stock market prices, and HP is housing prices, both treated as exogenous variables. An important assumption made is that since all asset transactions (durable goods, equities and land, including housing) are confined to the private sector, they do not affect the budget constraints of the private sector as a whole or of the private sector or, indeed, of the rest of the world.

We proceed to discuss the determinants of the variables that appear in equations (1) and (2), beginning with PYD.

(3) $PYD = GDP + GDP_f - DT - IT + UB + R.GD(-1) - SSC + OGTR - TRF$

where OGTR and TRF (i.e. the sum of transfers from the private sector and the government sector to non-USA residents), are treated as exogenous. The rate of interest (R) is also treated exogenously determined, on the explicit assumption that the government acts to control the rate of interest on bonds.

(4) $SLA = SLA_b + SLA_f = SLA(-1) + NAFAP$

where NAFAP is as in Table (1), and in equation (5):

(5) $NAFAP = PYD - PE = \Delta GD + CA = PSBR + CA$

where PSBR is the public sector borrowing requirement, defined as:

(6) $PSBR = G - DT - IT + UB + R.GD(-1) - SSC + OGTR + TRFG$

and CA as in (7):

(7) $CA = (X - Q) + GDP_f + TRF$

We may also write:

(8) $GDP_f = R_f.SLA_f$

where R_f is foreign interest rate (treated as exogenous), and SLA_f is the stock of liquid assets of the foreign sector, so that:

(9) $SLA_f = SLA_f(-1) + CA$

A few simple relationships follow:

(10) $UB = UB(U)$

where U is the level of unemployment, determined in equation (11) by GDP:

(11) U = U(GDP)

Next, the government budget constraint is written in its familiar form:

(12) $\Delta GD = G - T + R.GD(-1) - \Delta H + OGTR$

where T = DT + IT, i.e. total taxes, ΔH stands for changes in higher power money (treated as exogenous), and GD is measured at the end of each quarter.

(13) T = T(GDP)

(14) SSC = SSC(GDP)

Finally, the two variables that comprise the trade balance are endogenized as shown immediately below:

(15) $X = X(GDP_w, ER, RPX)$

where GDP_w is world GDP, ER is (real) exchange rate, and RPX is the relative price of exports, with all three variables assumed to be exogenous.

(16) Q = Q(GDP, ER, RPQ)

where RPQ is the relative price of imports, assumed to be exogenous.

A final comment, which is of particular relevance to the following section, and to the policy implications of the model, is the interaction between NAFAP and PE. Recall that PE may be re-written as PE = dPYD + Z, where Z includes all the variables other than PYD in (2). It follows from (5) that NAFAP = (1-d)PYD – Z, where d is the long-run marginal propensity to spend out of disposable income, thought to be equal to unity. Consequently, to the extent that the impact of Z on NAFAP is small and predictable, changes in NAFAP would be small and predictable. It follows from (5) that changes in GD reflect changes in CA. Fiscal policy measures that are accompanied by changes in GD would then have serious implications in that CA would be substantially affected. Furthermore, re-writing PYD = GDP – T + OTH, where OTH is other variables in PYD, and substituting from (1) for GDP, we have: PYD = PE + G + X – Q – T, and substituting in (5) we derive: NAFAP = (G – T) + (X – Q), or NAFAP + (T - G) = (X – Q). This, of course, can be written in 'changes' to give us: $\Delta(NAFAP) + \Delta(T - G) = \Delta(X - Q)$. If $\Delta(NAFAP)$ is equal zero, the result follows that changes in the budget surplus are accompanied by equal ex post changes in the balance-of-payments surplus (which echoes the 'twin deficit' hypothesis).

This, however, is not a conclusion of the Levy model for three reasons. The first is while changes in NAFAP may have been small at particular times and places, it is not universally so as the experience of the USA and the UK during the 1990s indicates, and specifically in the context of the US economy at the present time changes in NAFAP cannot assumed to be small. The second is that the budget surplus is an endogenous component in view of the endogeneity of the T element, see equation (12) above; as such,

it cannot be under the direct control of the authorities. The third is that even if the budget surplus were exogenous, there would still be the problem of a two-way causation, in which case it cannot be inferred that $\Delta(T - G)$ causes $\Delta(X - Q)$. We may instead think of conducting policy experiments using the variables that are exogenous. The government expenditure element is such a variable. We turn our attention to this exercise in the session that follows.

4. Economic Policy Dynamic Multipliers

We examine in this section two types of economic policy dynamic multipliers, fiscal policy multipliers and monetary policy multipliers; in one case we report multipliers which might be viewed as both fiscal and monetary dynamic multipliers when a change in government expenditure is financed through printing high powered money. Table 2 provides a summary of the exercises undertaken for the purposes of this paper, and the figures plot the multipliers through time as indicated therein. The model is shocked by increasing government expenditure by 10 billion dollars and by changing the rate of interest by 1 per cent. We report the difference between the simulated and baseline GDP values divided by the increase in the value of the policy instrument (that is change in government expenditure). Figures labeled as A and B report similar exercises for CA and PSBR respectively.

Table 2 cites the results obtained in terms of the impact multipliers, i.e. the first period impact, and the long-run multipliers, that is the value of the multipliers when the system is at rest, as this term was defined earlier in the text. Three types of exercise have been undertaken: increase in government expenditure financed trough borrowing; increase in government expenditure financed through taxation; a mixed fiscal and monetary policy whereby the increase in government expenditure is financed through printing high powered money. A brief summary of the results provided is that fiscal policy can be effective in influencing economic activity. By contrast, monetary policy in the form of a change in high powered money is not very effective. When high powered money is allowed to increase the impact on the level of economic activity in the long run is rather small.

We begin discussion of these results with government expenditure multipliers. In a general way, changes in government expenditure have potentially a long-run effect on real output, which in turn has a direct effect on the level of unemployment. In this model, there is no equation for inflation, and hence there is no route through which the level of (or changes in) aggregate demand can impact on the rate of inflation. There are, though, within the model potential crowding-out effects of a change in government expenditure, and these depend heavily on the manner in which government expenditure change is financed. We discuss this possibility in what follows, but we can summarize the potential crowding-out effects as follows: whenever government expenditure increase implies increase in taxes this provides an avenue through which crowding out can occur. Another significant route whereby crowding out can occur is the so-called external crowding out through imports. An interesting case is also the possibility of crowding in, particularly in the case of monetary policy. An increase in the rate of interest affects 'interest income' which has a positive impact on the level of economic activity.

The case of financing an increase in government expenditure through borrowing is portrayed in Figure 1. It is clear that the impact multiplier is quite substantial in the first period, but subsequent crowding-out effects, emanating possibly from private sector expenditure, are not strong enough to restrict the positive impact. The increase in government expenditure and associated increase in GDP and PE increase GD and NAFAP. All these outcomes are very expansionary. Ultimately, some increase in imports restricts the increase in GDP and produces the long-run multiplier at the steady-state of 2.28. It is worth noting that this value of long-run dynamic multiplier is quite high compared to the findings of many other studies on fiscal multipliers.

Given the importance of the CA and PSBR in the model, and as indicated above, we show the results of similar exercises for CA and PSBR in Figures 1A and 1B. The plots in these figures are not surprising and confirm the model's properties: that a deficit in both CA and PSBR should be expected. The behaviour of CA is dominated by that of imports. With exports treated as exogenously determined, a deficit is inevitable. The behaviour of the PSBR is, of course, dominated by the increase in government expenditure, but also by government receipts, social security contributions, and unemployment benefits, themselves being endogenously determined by the level of economic activity; it is also affected by interest rate receipts, which change substantially given the nature of the exercise. The government expenditure variable, along with the rest of the variables that enter the PSBR equation, are treated as exogenously determined. The point made above about ex-post changes in the current account and changes in the PSBR is confirmed by these results.

Figure 2 depicts the case of an increase in government expenditure that is financed by increases in government receipts. The dynamic multipliers in this case, both impact and long-run multipliers are significantly lower than in the case of have just examined. This is not surprising given that the effects of the increase in government expenditure are to a large extent outweighed by the simultaneous increase in taxes with opposite effects. The initial positive impact on the level of economic activity is not strong enough to outweigh the initial positive effects. Figures 2A and 2B reflect the behaviour of the dynamic multipliers of Figure 2. The next two exercises introduce monetary policy elements.

Figure 3 is a mixture of fiscal and monetary policy elements, while Figure 4 is pure monetary policy. If we deal with Figure 3 first, the exercise depicted in this figure shows what happens in the Levy stock/flow model when government expenditure increase is financed through increases in high powered money. The impact multiplier is unsurprisingly the same as in the case of Figure 1. The long-run multiplier is, however, significantly lower at 0.44. The reason is that the combined impact of the increase in government expenditure and in high powered money and the subsequent increase in taxes reduces GD, see equation (11), which, through its negative impact on PYD, see equation (3), acts as a sort of crowding-out effect. This combined effect ultimately gives a low long-run multiplier, which surprisingly is the lowest of all long-run multipliers depicted in Table 2.

The results we have just reported are different from what one might expect from the analysis of the 'new consensus macroeconomics', where fiscal policy is substantially downgraded (see, for example, Bernanke et al., 1999; see, also, Arestis, 2009a). But as

one might recognize the 'new consensus' type of models may be thought of as unrealistic, simply because of all effects emanating from stock variables and 'interest income' are completely absent. However, a number of people have argued that these effects may be important. For example, Fair (2000) argues that that these effects are actually very important in view of the fact that "households hold a large amount of short term securities of firms and the government, and when short-term interest rates change, the interest revenue of households change" (pp. 28-29). The results of this paper are also substantially different from other work where estimates of fiscal multipliers are reported (see Hemmings et al, 2002, for a good representative sample). The fundamental difference is that fiscal multipliers from the Levy model are larger than those reported therein.

This last result along with the other results reported above, confirm our conclusions elsewhere (Arestis and Sawyer, 2003a, 2003b, 2004, 2006, 2010, are good example), that fiscal policy has a predictable and effective impact on the level of economic activity as this is proxied be the level of GDP. The inevitable overall conclusion is clear enough: fiscal policy ought to be reinstated.

5. Summary and Conclusions

The focus of this paper is on the effectiveness of fiscal policy within the stock/flow Levy model of the USA economy. We have attempted in the first instance to explain the importance of the stock/flow consistency aspects of the model and concluded that this is an important, if not the most important, aspect of the model. Other facets of the model have also been highlighted. This enabled us to summarize the essentials of the model before we conducted a number of economic policy exercises.

Three policy exercises have been conducted: two fiscal policy exercises, and one described as a mixture of fiscal and monetary policies. The overall conclusion from these exercises is that fiscal policy is a powerful instrument of economic policy. This is a result that is weakened when fiscal policy is combined with some form of monetary policy (see Figure 3). These empirical results lead us to the overall conclusion that the recent economic policy practice of downgrading fiscal policy and upgrading monetary policy is completely the wrong way round. It is the case that fiscal policy remains a powerful instrument of regulating the level of aggregate demand. We have demonstrated this result at the more theoretical level in a series of papers (Arestis and Sawyer, 2003a, 2003b, 2004, 2006, 2010), and this paper has reached the same conclusion, drawing on the empirics of the stock/flow Levy model. We may, therefore, conclude in the same manner Godley and McCarthy (1998) suggest, that "an expansionary fiscal policy is a necessary condition for growth in the long term, reasserting an old Keynesian principle that sustained expansion requires continuously growing exogenous injections to the flow of income" (p. 39).

References

Arestis, P. (2009a), "Fiscal Policy Within the 'New Consensus Macroeconomics' Framework", in J. Creel and M. Sawyer (eds.), *Current Thinking on Fiscal Policy*, Basingstoke, UK: Palgrave Macmillan.

Arestis, P. (2009b), "New Consensus Macroeconomics and Keynesian Critique", in E. Hein, T. Niechoj and E. Stockhammer (eds.), *Macroeconomic Policies on Shaky Foundations: Wither Mainstream Macroeconomics?*, Marburg, Germany: Metropolis-Verlag.

Arestis, P. and Sawyer, M. (1998), "Keynesian Policies for the New Millennium", *Economic Journal*, 108(1), 181-195.

Arestis, P. and Sawyer, M. (2003a), "On the Effectiveness of Monetary Policy and of Fiscal Policy", *Working Papers Series No. 369*, Levy Economics Institute of Bard College.

Arestis, P. and Sawyer, M. (2003b), "Reinstating Fiscal Policy", *Journal of Post Keynesian Economics*, 26(1), 4-25.

Arestis, P., and Sawyer, M. (2004), "On the Effectiveness of Monetary Policy and of Fiscal Policy." *Review of Social Economy, 62* (4), 441–463.

Arestis, P. and Sawyer, M. (2006), "Fiscal Policy Matters", *Public Finance*, 54(3-4).

Arestis, P. and Sawyer, M. (2010), "The Return of Fiscal Policy", *Journal of Post Keynesian Economics*, 32(3).

Bernanke, B.S., Gertler, M. and Gilchrist, S (1999), "The Financial Accelerator in a Quantitative Business Cycle Framework", in J. Taylor and M. Woodford (eds.), *The Handbook of Macroeconomics*, Volume 1, Amsterdam, Netherland: North Holland.

Buiter, W. (1980), "Walras' Law and All That: Budget Constraints and Balance Sheet Constraints in Period Models and Continuous Time Models", *International Economic Review*, February.

Buiter, W. (1983), "Measurement of the Public Sector Deficit and its Implications for Policy Evaluation and Design", *IMF Staff Papers*, June.

Christ, C. (1967), "A Short-Run Aggregate Demand Model of the Interdependence and Effects of Monetary and Fiscal Policies with Keynesian and Classical Interest Elasticities", *American Economic Review*, Papers and Proceedings, 57.

Christ, C. (1968), "A Simple Macroeconomic Model with a Government Budget Restraint", *Journal of Political Economy*, 76.

Cripps, F. and Godley, W. (1983), "A Formal Analysis of the Cambridge Economic Policy Group Model", *Economica*, November.

De Santos, C.H. (2003), *Three Essays in Stock-Flow Consistent Macroeconomic Modeling*, PhD Thesis, New School University, Graduate Faculty of Political and Social Science (Department of Economics).

Fair, R. (2000), "Structural Macroeconomic Modeling and the Modern View of Macroeconomics", *mimeo*.

Foley, D. (1975), "On Two Specifications of Asset Equilibrium in Macroeconomic Models", *Journal of Political Economy*, 83(2).

Godley, W. (1996), "Money, Income, and Distribution: an Integrated Approach", *Working Papers Series No. 167*, Levy Economics Institute of Bard College.

Godley, W. (1999a), "Money and Credit in a Keynesian Model of Income Determination", *Cambridge Journal of Economics*, 23(4).

Godley, W. (1999b), "Seven Unsustainable Processes: Medium-Term Prospects and Policies for the United States and the World", *Special Report*, Levy Economics Institute of Bard College.

Godley, W. and Cripps, F. (1983), *Macroeconomics*, Oxford, UK: Oxford University Press.

Godley, W. and Lavoie, M. (2007a), "Fiscal Policy in a Stock-flow Consistent (SFC) Model", *Journal of Post Keynesian Economics,* 30(1), 79-100.

Godley, W., and Lavoie, M. (2007b), *Monetary Economics: An Integrated Approach to Credit, Money, Income, Production and Wealth,* Basingstoke, UK: Palgrave Macmillan.

Godley, W. and McCarthy, G. (1998), "Fiscal Policy will Matter", *The Challenge Magazine*, 41(1), 38-54.

Godley, W. and Shaikh, A. (2002), "An Important Inconsistency at the Heart of the Standard Macroeconomic Model", *Journal of Post Keynesian Economics*, Spring.

Hemming, R., Kell, M. and Mahfouz, S. (2002), "The effectiveness of fiscal policy in stimulating economic activity: a review of the literature", *IMF Working Paper 02/208*, Washington D.C.: International Monetary Fund.

Keynes, J.M. (1936), *The General Theory of Employment, Interest, and Money*, London: Macmillan Publishing Company, UK.

Lavoie, M. and Godley, W. (2001-2002), "Kaleckian Growth Models and in a Stock and Flow Monetary Framework", *Journal of Post Keynesian Economics*, Winter.

Matthew, K. and Minford, P. (1980), "Private Sector Expenditure and Financial Asset Accumulation in the U.K.", *Journal of Money, Credit and Banking*, 12(4), 644-653.

Solow, R. (1983), "Comments on Godley", in G. Worswick and J. Trevithick (eds.), *Keynes and the Modern World*, Cambridge, UK: Cambridge University Press.

Tobin, J. (1980), *Asset Accumulation and Economic Activity*, Chicago, USA: University of Chicago Press.

Tobin, J. (1980), "Money and Macroeconomic Process", *Journal of Money, Credit, and Banking*, May.

Turnovsky, S. (1977), *Macroeconomic Analysis and Stabilization Policy*, Cambridge, UK: Cambridge University Press.

Figure 1: Impact of Increase in Government Expenditure on GDP Financed by Borrowing

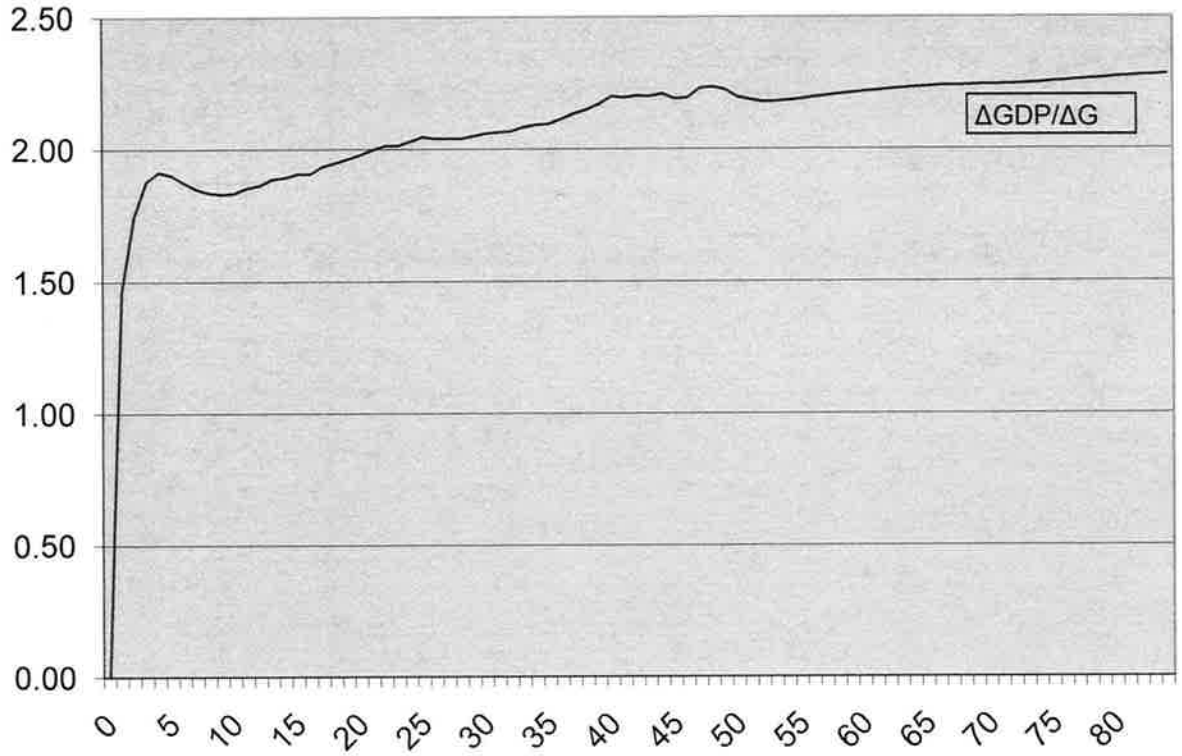

Figure 1A: Ratio of Simulated Balance of Payments and GDP (Bond - Financed case)

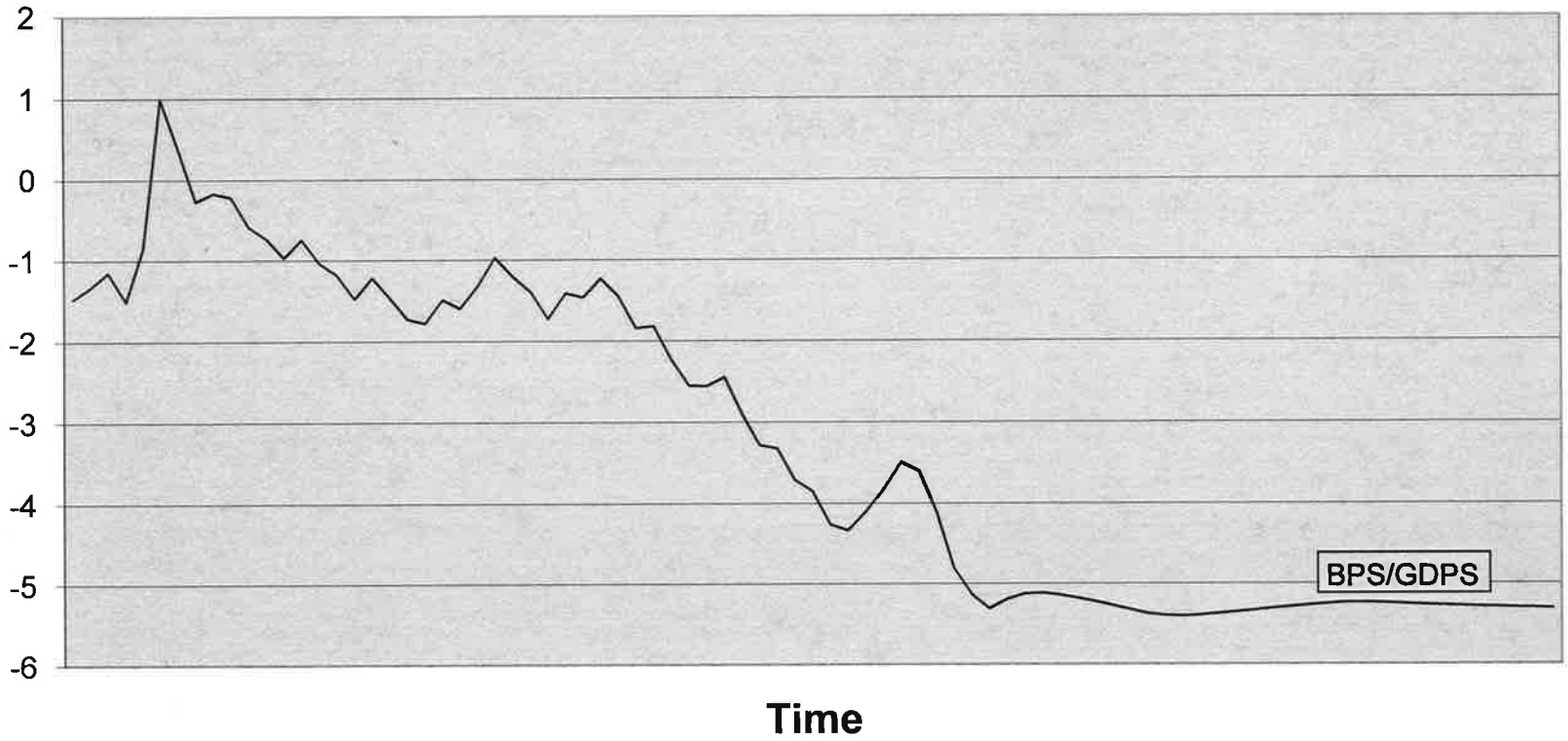

Figure 1B: Ratio of Simulated PSBR and GDP (Bond - Financed case)

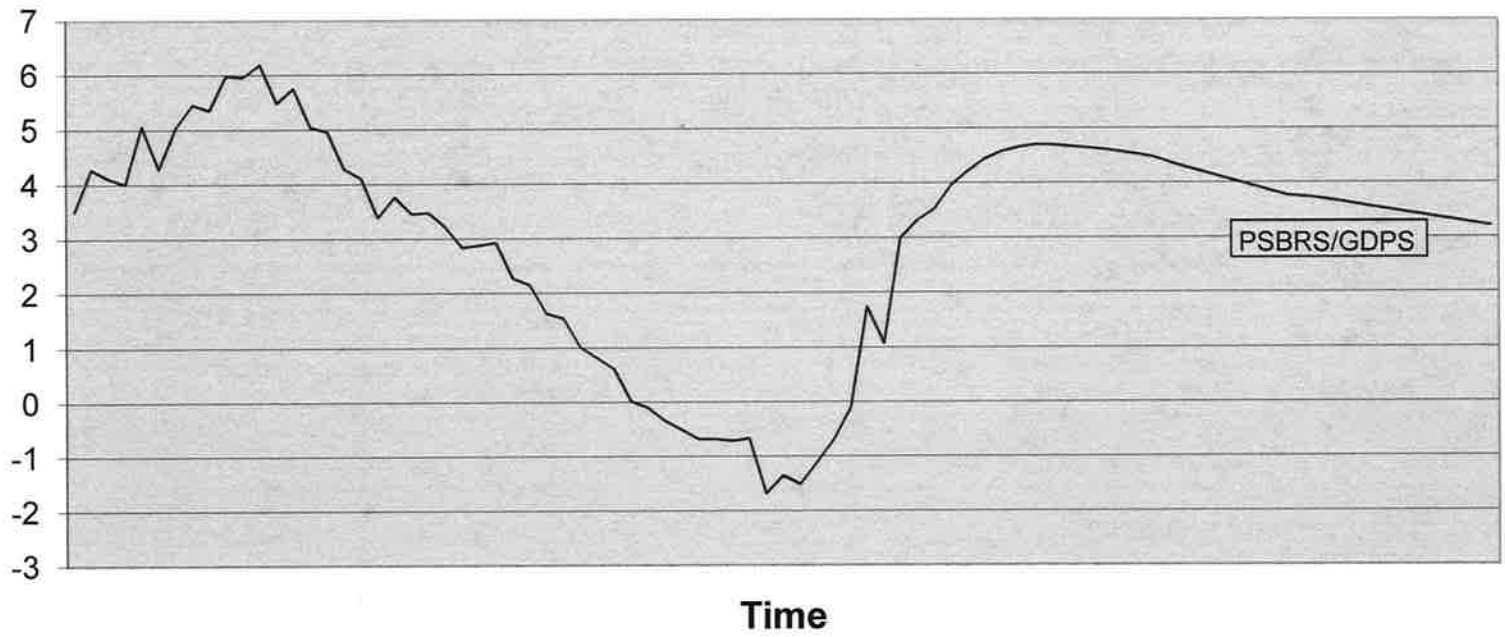

Figure 2: Impact of Increase in Government Expenditure on GDP Financed by Government Receipts

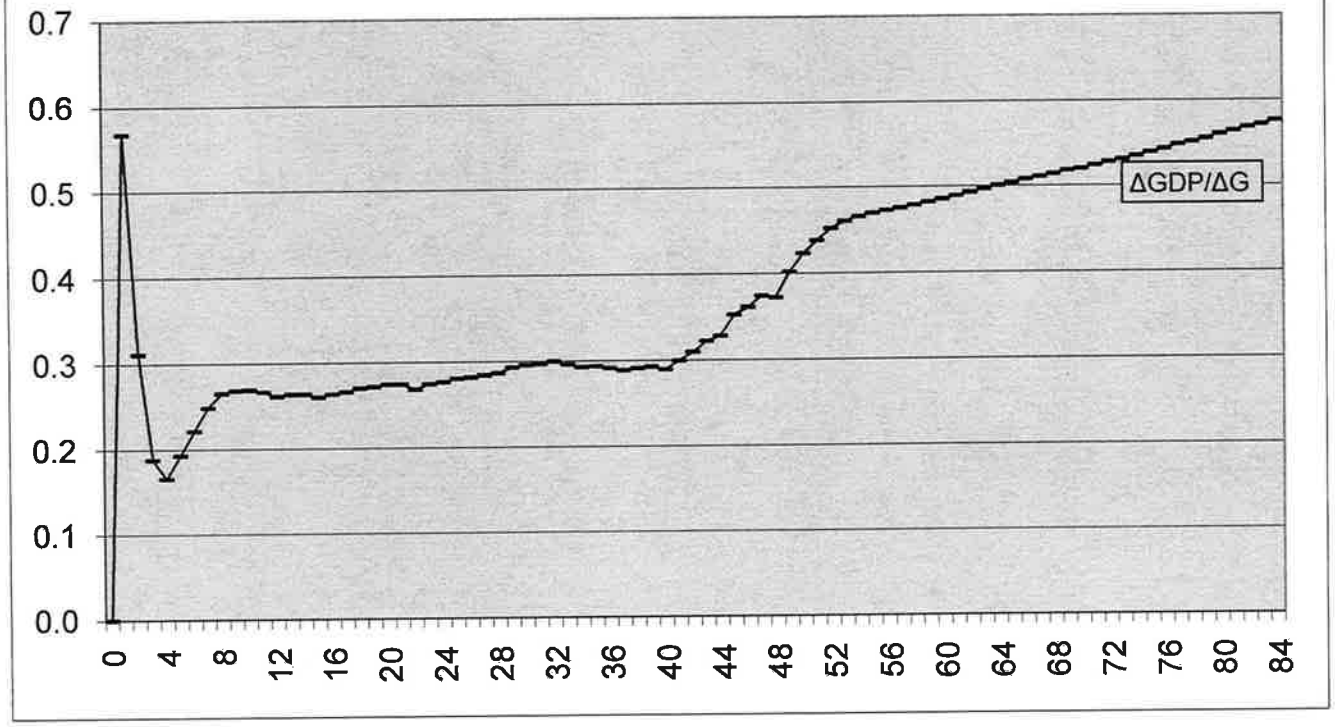

Figure 3: Impact of Increase in Government Expenditure on GDP Financed by Printing New High Power Money

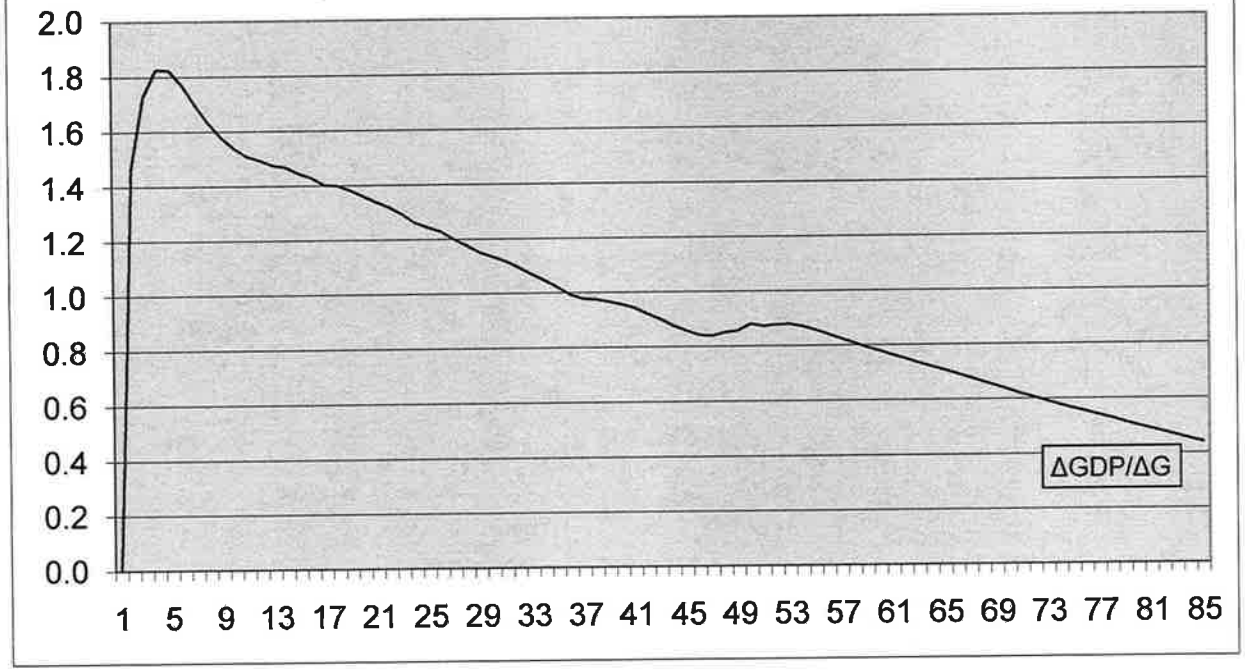

Figure 4: Impact of Increase in the Rate of Interest on GDP

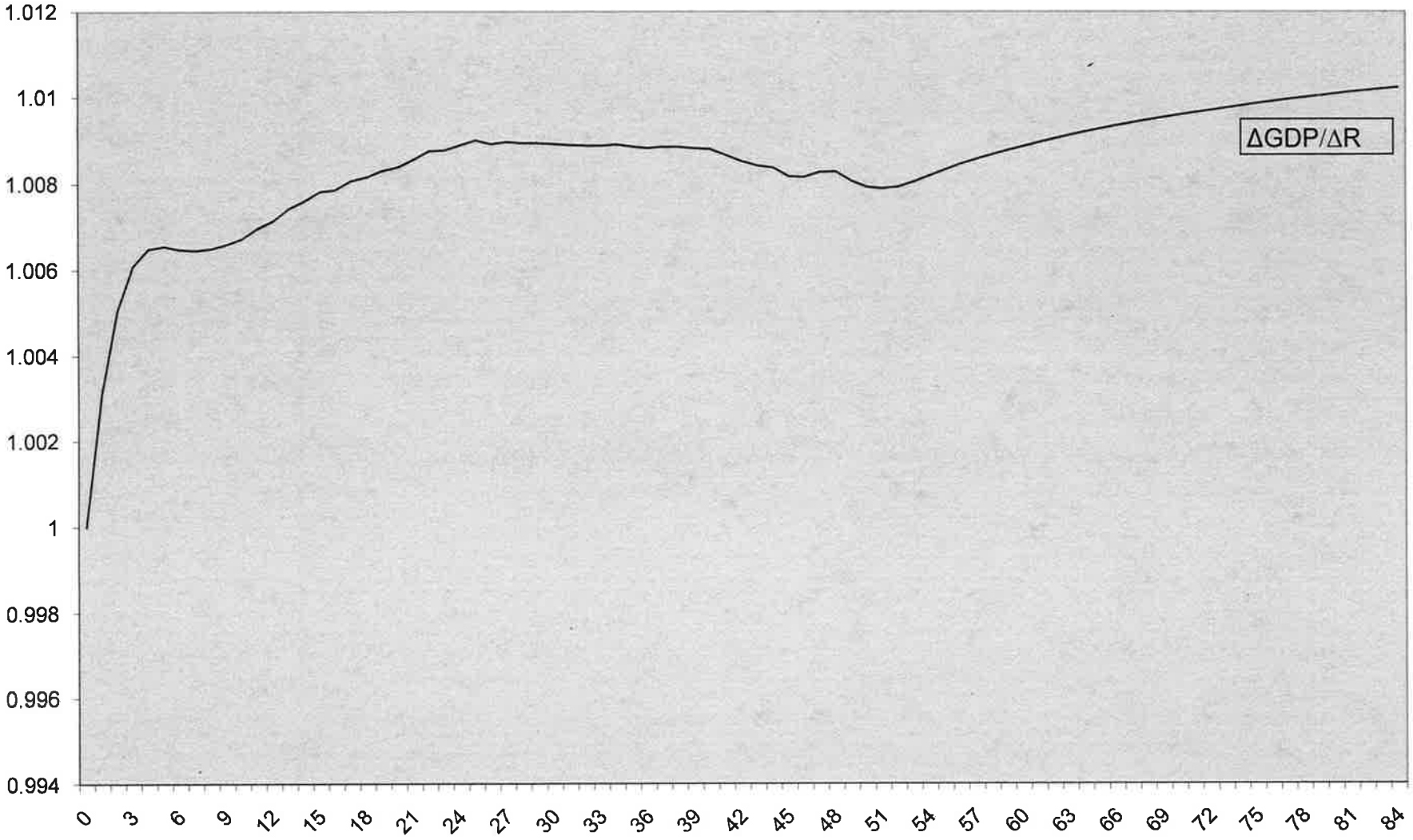

Table 1: Flow Matrix

Sector / Transactions	Private Sector: Income and expenditure	Private Sector: Production Expenditure	Financial Sector	Government Sector	Foreign Sector	Σ
Private Expenditure*	- PE	+ PE				0
Government Expenditure on Goods and Services		+ G		- G		0
Exports		+ X			- X	0
Imports		- Q			+ Q	0
Accounting Memo	GDP = PE + G + X – Q					
Income from Abroad	+ GDP_f				- GDP_f	0
Direct Taxes	- DT			+ DT		0
Indirect Taxes		- IT		+ IT		0
Unemployment Benefits	+ UB			- UB		0
Interest Payments	+ R.GD (- 1)			- R.GD (- 1)		0
Social Security Contributions	- SSC			+ SSC		0
Other Government Transfers	+ OGTR			- OGTR		0
Transfers to non - USA residents	- TRFP			- TRFG	+ TRF	0
Accounting Memo	PYD = GDP + GDP_f - DT - IT + UB + R.GD (-1) - SCC + OGTR - TRF					
Uses and Sources of Funds	+ NAFAP			- PSBR	- CA	0
Flow of Personal Credit	+ ΔPC		- ΔPC			0
Change in Stock of Liquid Assets	- ΔSLA		+ ΔSLA_b	+ ΔGD**	+ ΔSLA_f	0
Σ	0	0	0	0	0	0

*This includes expenditures by financial institutions, which is assumed to be negligible.

**ΔGD includes changes in high power money (ΔH).

Table 2 : Dynamic Multipliers

Type of Change	GDP	
Change in G and R	**Impact Multiplier**	**Long-run Multiplier**
10b dollar increase in G financed by borrowing (ΔGD)	1.46	2.28
10b dollar increase in G financed by government receipts (ΔT)	0.57	0.58
10b dollar increase in G finaced by printing new high power money (ΔHP)	1.46	0.44