

RECOLLECTING KALECKI'S STUDIES OF THE US ECONOMY

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Kalecki wrote a few empirical papers dealing with the economic evolution of advanced capitalist countries, and particularly of the USA economy. For that purpose, he devised a novel methodology of analysis that, unfortunately, did not have the impact it deserved on applied research, even among his followers.

The objective of the present paper is twofold. First of all, we want to revisit and discuss Kalecki's methodology, as well as some of his hypotheses. Our second objective will be to put these hypotheses to test for a study of the recent development of the USA economy. For the latter purpose, we use modern econometric procedures.

The two hypotheses we want to explore in our work are, (i) the positive impact on effective demand and output of a higher wage share; and (ii) the positive impact of increases in government expenditure, especially when financed through taxes on profits. It is beyond our objectives to carry out an overall study of the US economy; however, readers will probably recognize that these two points have been at the center of the economic debate for several decades, and that different schools of thought give different, and even contradictory, answers to the issues under consideration. An additional investigation of these two questions may not therefore be redundant.

Kalecki's hypotheses and methodology

Let us first of all discuss Kalecki's first hypothesis: the positive effect on demand and output of redistribution of income in favor of wage earners. To give due weight

to Kalecki's first hypothesis, it will be useful to make a short detour. A central notion of classical and neoclassical economics is that *laissez faire* capitalist economies are endowed with an endogenous full employment mechanism, triggered by the wage and price fall, caused by unemployment¹. The mechanism relies on several effects. In a closed economy the first effect is the reduction in interest rates, which would arise from the increased real amount of money, when prices fall and the amount of nominal money is given; namely, the so-called "Keynes effect"². The second effect, also pertaining to a closed economy, the "Pigou effect", is based on the notion that the wage reduction and the ensuing price decline would stimulate aggregate demand due to higher spending from creditors which, with lower prices, would feel richer and spend more. The third effect, which has to do with an open economy, adds to the two previous effects the depreciation of the domestic currency and the improved competitiveness following from the wage and price fall, and the consequent demand expansion associated with the improvement in the trade balance.

¹ Many contemporary heterodox authors share the idea that a wage fall may stimulate demand and employment (thus the notions of profit-led and wage-led regimes have been coined), whereas the first one denotes a situation whereby a higher profit-share stimulates output and employment, and conversely. More on this below.

² Kalecki independently proposed, in 1934, what came later to be known as the "Keynes effect" (see also López and Assous, 2010).

Kalecki criticized this mechanism on three grounds. In the first place, he discarded the view whereby the interest rate would be reduced when wages and prices fall, claiming that in fact banks would accommodate a lower demand for credit and rather maintain the interest rate (Kalecki, 1943). In the second place, Kalecki was also the first to reject the “Pigou effect” (Kalecki 1944). His third objection came from his argument that a wage reduction would likely imply a smaller proportional fall in prices than in wages, and that the consequent drop in the wage share would depress workers’ consumption and effective demand. Though his main emphasis was on a closed economy, he explicitly considered the case of an open economy, concluding that when wages fall the improvement in the trade balance might not occur, or might not be large enough to offset the negative impact on domestic demand ensuing from the fall in workers’ consumption, consequent upon the shift of factor shares from wages to profits (Kalecki 1939).

As to the second hypothesis, some years before Keynes had published **The General Theory**, Kalecki emphasized the expansionary role of government deficits on profits, and on demand and output. He argued that the demand effect of government expenditure depends not only on its amount, but also on how it is financed. Greater government expenditure financed either with deficit or with higher taxes on profits, stimulates effective demand. In the first case this happens because private income is not reduced, while in the second this is the consequence of taxes affecting income that would otherwise have been saved rather than spent. Moreover, he rejected Keynes’s objection that higher taxes on profits would negatively affect expectations and thus would discourage capitalists’ spending, replying that spending decisions are more influenced by results than by

expectations. He added that in any given period capitalists' spending follows from decisions taken in previous periods, and that these decisions would not normally be cancelled in the current period, because of the practical difficulties and high cost this would entail (López and Assous, 2010).

Let us now briefly formalize Kalecki's theory. Kalecki's enlarged formula for profits reads:

$$P^b = I + C_k + B + J + H - S^W \quad (1)$$

where P^b is (gross) profits **before taxes**, I is private investment, C_k is capitalist consumption, B is the budget deficit, J is the export surplus, H is total taxes on corporate profits and S^W is wage workers' savings. As said, Kalecki assumed that in any given (short) period capitalist expenditure ($I+C_k$) is predetermined.

On the other hand, Kalecki also showed that total effective demand depends on total profits before taxes and on the relative share of wages in national income, w . Namely:

$$Y = \frac{I + C_k + B + J + H - S^W}{1 - w} \quad (2)$$

where w is the relative share of wages in national income, which depends (inversely) on the degree of monopoly; i.e. on the ratio of the price to the unit variable cost. Now, if the productive capacity is not fully employed, when investment or capitalist consumption, or net exports or the budget deficit increase, then, in the short run, total profits before taxes will rise which, given total taxes on profits, induces also an increase in after tax profits. Similarly, if taxes on profits

rise, the remaining items on the right-hand side of equation (1) will not change so that, given the relative share of wages in national income, according to equation (2) total demand and output will rise by so much, that after tax profits will remain constant³. Note that, if the rise of taxes on profits brought about an increase in the degree of monopoly (and consequently a fall in the relative share of wages in national income), the denominator of (2), $1-w$, would go up, and the short-run impact on effective demand and output of higher government expenditure would be nil.

We shall now consider the methodology Kalecki devised for his analysis, for which it will be useful to clarify the purposes he had in mind. Firstly, he wanted to separate those components of income that determine changes in its volume, from those that play a purely passive role. In his theory consumption is a rather passive element because, with balanced external and government sector, and given the distribution of income, consumption simply follows the movement of investment.

Secondly, Kalecki aimed at analyzing the impact of government expenditure on effective demand, taking into account that the way of financing the expenditure affects its impact. He thus distinguished between (i) deficit financed expenditure, (ii) government expenditure financed by taxing profits, and (iii) net revenue of the government from persons; i.e. the net balance between taxes and transfers, which

³ This is only approximately correct. Since the additional government expenditure leads to an expansion of effective demand, imports tend to rise and net exports (J) are reduced. Also, if higher total wages induce a rise in workers' savings, this will also tend to reduce profits.

has a neutral effect on demand. Government spending on goods is equal to the sum of items (i) to (iii).

To conclude this section, let us recall that Kalecki elaborated the essentials of his theory during the 1930s and 1940s; and that he wrote the study of the US we will discuss in the next section in the mid-1950s. That was a period when his assumption whereby “workers spend what they earn” was probably close to reality. Besides that, until very recently the US economy was a relatively closed one and its financial development was not nearly as advanced as it is nowadays. Therefore, his statements that a wage rise, or an increase of taxes on profits, do not encroach upon profits, which then may have been approximately valid, has probably lost strength in the present circumstances. But before we deal with these issues, let us first discuss some salient facts of the USA economic evolution in the recent past, using what we may call a broad Kaleckian approach.

A Kaleckian description of the US economic evolution

As a preliminary step, we refer to one of Kalecki’s empirical papers (Kalecki 1956 [1997]), where the author carried out a long-run comparison of the economic situation of the US economy, between 1937 and the mid-1950s.

Kalecki first of all pointed out that in that period the national product had more than doubled, with an annual growth rate of 4.2% per annum. He then argued that from the supply-side this was not difficult to explain, because both total employment force and labor productivity also grew, 1.6% and 2.6% per annum respectively; even as capital equipment also expanded considerably.

The author then asked the following question: How was it possible that the productive facilities were in fact utilized? Indeed, he stated, “the discrepancy

between the development of productive forces and the market for their products constitutes one of the main contradictions inherent in the capitalist system.... [a contradiction that] in the period considered tended to grow more acute... [because]... big business's relative share of accumulation of the national product increased significantly" (Kalecki 1956 [1997]: 280). To answer this question the author produced a table where he organized the national income accounts according to his methodology.

In his study he found that the most important changes in the structure of final demand in the USA between 1937 and 1955 had been, firstly the change of sign of the trade balance, which went from a -0.5% of GDP to +1.3% of GDP, and which accordingly expanded demand. Secondly, government expenditure financed taxing corporate profits rose dramatically, thus creating additional demand. Thirdly, the relative share of private consumption fell, which hampered demand. Fourthly, he noticed the rise of what he called "Net government revenue from persons"; namely, the net balance between personal taxes and transfers. He thus concluded:

"The increase in the relative share of private accumulation in the national product... did not cause any underemployment of productive resources for the following reasons: the additional private accumulation was absorbed by armaments and by the export surplus, whose increase was associated with 'foreign economic assistance' or with the construction of bases abroad which provided the wherewithal for importing American goods. (Kalecki 1956 [1997]: 284).

In this study Kalecki thus came to the notion that expansionary fiscal policy in the US was not based on budget deficit, but on expenditure financed with taxes on profits, and he saw substantiation for his hypothesis that a balanced budget can

be expansionary when it is so financed. He also showed that the contractionary effect on demand of a falling wage share was more than offset by both the rise in expenditure financed with taxes on profits, and the export surplus achieved by the US in the period under consideration.

We shall now briefly consider the main factors behind US evolution after 1980 and up until 2007, with the help of Table 1 and Graph 1. The Table was built on the basis of Kalecki's methodology. To make the figures comparable, we select years corresponding to a business upswing⁴.

⁴ Between 1980 and 2007 US GDP grew 3.2% per annum; with total employment growing 1.45% (pa) and labor productivity 1.57% (pa).

**Table 1 US National Income, billions of chained (2000)
dollars (left), and % of GDP (right).**

Comps. of Nat. Income	1980		1981		1990		2001		2007	
1. Residential Investment	239.7	4.64	220.5	4.18	298.9	4.18	448.5	4.54	453.8	3.93
2. Non-residential Inv.	435.6	8.43	460.3	8.73	594.5	8.31	1,180.5	11.94	1,382.9	11.97
3. Change in inventories	-8.0	-0.15	34.9	0.66	15.4	0.22	-31.7	-0.32	-2.5	-0.02
4. Foreign trade balance	12.6	0.24	8.3	0.16	-54.6	-0.76	-399.1	-4.04	-546.5	-4.73
5. Taxes on corporate income	167.1	3.23	145.5	2.76	182.3	2.55	190.1	1.92	320.7	2.78
6. Budget Deficit	142.8	2.76	125.4	2.38	318.9	4.46	38.3	0.39	300.4	2.60
I. Priv. Accumulation *	989.8	19.15	994.9	18.87	1,355.4	18.94	1,426.6	14.43	1,908.8	16.52
II. Net taxes on Persons	805.5	15.58	854.7	16.21	1,028.8	14.38	1,551.9	15.69	1,390.9	12.04
III. Personal Cons. Exp.	3,374.1	65.27	3,422.2	64.92	4,770.3	66.68	6,910.4	69.88	8,252.8	71.44
National income inclusive of consumer	5,169.4	100	5,271.7	100	7,154.5	100	9,889.0	100	11,552.6	100
Total Government Exp. and Inv. (4 + 5 + II)	1,115.4	21.58	1,125.5	21.35	1,530.0	21.39	1,780.3	18.00	2,012.0	17.42
Private Saving [(1 + 2 + 3) + 6 + 4]	822.7	15.91	849.4	16.11	1,173.1	16.40	1,236.5	12.50	1,588.1	13.75

* Private accumulation is the sum of items 1 through 6 in Table.

** National Income might not add up to original GDP series due to approximations.

Sources: Own elaboration with data from the Bureau of Economic Analysis (NIPA Tables). See also Appendix

We follow Kalecki, and we divide the national product into three parts: (i) private accumulation, (ii) net taxes on persons, and (iii) personal consumption of goods and services. "Private Accumulation" includes investment in fixed capital,

increase in inventories, and the export surplus⁵; plus the budget deficit and the corporate profit tax (Ibid, 281-282). On the other hand, "Item (ii) represents the budget revenue exclusive of taxes on corporate profits but only to the extent to which they are spent on business products. Thus this is a surplus of personal income tax, contributions to social insurance plans, and indirect taxes over and above the expenditure on the remuneration of the armed forces...and of government employees, on social insurance benefits, and on the interest of the public debt" (Ibid, 281-282). In other words, this item represents net taxes on persons. As mentioned, national income is the sum of: (i) private accumulation, (ii) 'net revenue of the government from persons', and (iii) personal consumption of goods and services⁶.

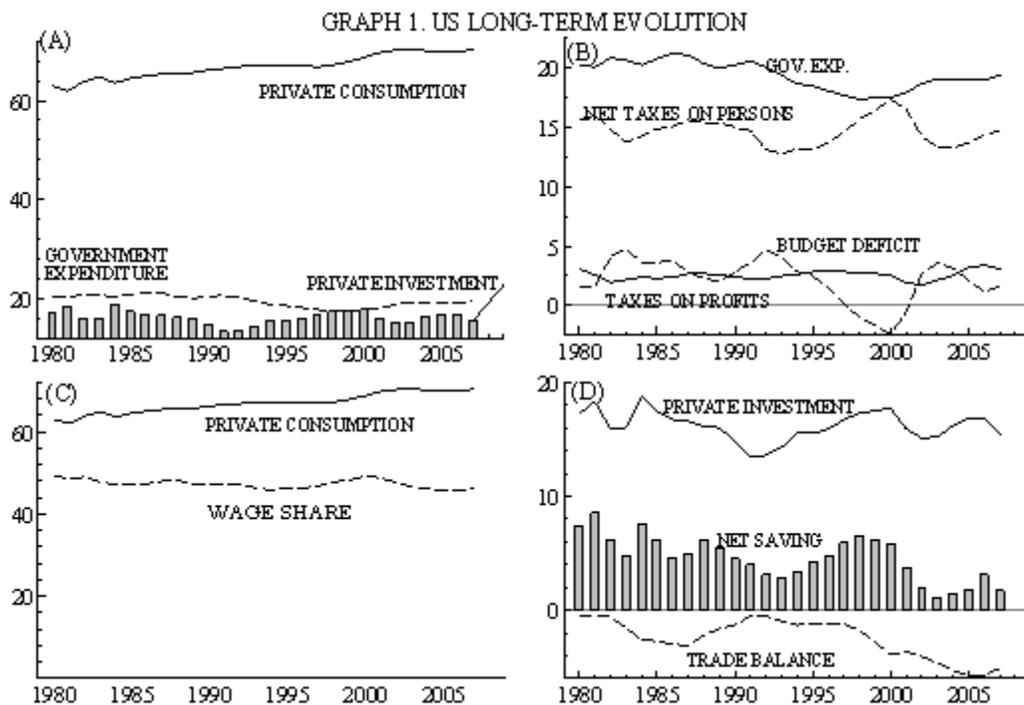
As said, Kalecki showed that, assuming workers do not save, a rise in any of the items included in Gross (or Social) accumulation, such as e.g. in government expenditure financed via budget deficit, raises by an equal amount profits and has

⁵ These three items make up what Kalecki called "Gross (or Social) Accumulation".

⁶ The budget deficit is directly obtained from the NIPA tables; and is also known (in the official nomenclature) as net government dissaving. Net taxes from persons were estimated as the difference between total government expenditure on goods and services, on the one hand; and on the other the sum of the budget deficit plus corporate income taxes. Another term for this concept, used by Kalecki, is "surplus of government revenue (exclusive of taxes on corporate profits) over government expenditure on compensation of employees and transfers". The remaining items in the Table and Graph should be clear to the reader.

a large multiplier effect on effective demand (see equations 1 and 2). On the other hand, when the government finances its expenditure taxing corporate profits, effective demand is boosted but after tax profits do not rise (see again equations 1 and 2). Finally, when government expenditure is financed with “net government revenue from persons”, it should crowd out private expenditure because it reduces the purchasing power of the population. Therefore, in the latter case the increase in government expenditure leaves effective demand and output unchanged.

In Graph 1 below we include the basic Kalecki’s variables; and we also add other variables significant for our discussion. All the variables are taken as a percent of GDP.



We shall now make some brief remarks on those changes of major relevance. In the first place, we point out the rise in the relative share of private

consumption in GDP, even as the share of private investment fluctuates, with a somewhat mild tendency to decline⁷.

We also notice that the rise in the relative share of private consumption occurred in spite of the shift of factor incomes from profits to wages. The latter share fell, though moderately, between 1980 and 1995, it regained its previous level between 1995 and 2000, and fell again between 2000 and 2006⁸. In this latter period private consumption and the wages share moved in opposite directions. The latter upswing in private consumption was surely aided by the rise in indebtedness of poor families (Barba and Pivetti, 2009), and the fall of net government taxes from persons. A supplementary factor probably was the spectacular rise in the price of assets and on wealth, which may have also stimulated a fall in personal savings.

The fall of the share of private savings is another important change that took place in the period, and it has been one of the most regular and unrelenting ones. Many analysts have observed this fall with apprehension, but we point out that falling personal savings create additional effective demand and profits (see equations 1 and 2) and, probably, stimulates capital accumulation. On the other

⁷ However, the share of non-residential investment did rise.

⁸ Note, the concentration of income in favor of the richest strata of the population did rise significantly in the period under study; see especially Piketty and Saez (2003). However, the fall in the relative share of wages in the US was milder than the one that took place in the European countries after 1980, where that share fell between six and ten percentage points.

hand, let it be remembered that private savings is a passive, not an active element of the macroeconomy (Steindl 1990, pp. 183-215; Laski and Römisch, 2001). From the National Accounts identity we know that private savings are necessarily equal to the sum of private investment, plus the budget deficit, plus the surplus in the current account balance. Such that, paraphrasing Keynes (14: 222), “the public can save ex ante, and ex post, and ex any-thing else until they are blue in the face”, but savings will not rise unless the right-hand side of that identity rises. Now, for the US in the period under consideration, the main factors behind the fall of the private savings share were the decline of the budget deficit and the growth of the current account deficit, as shares of GDP. Since the relative share of private investment in GDP did not change much, the rise in the propensity to consume would not have brought about a decline in the share of savings if the respective shares of the government deficit had remained stable, or the current account deficit had not worsened, or both.

This last observation brings to the fore the worsening trade deficit of the US economy, another regular and unrelenting phenomenon we observe in this period. Of course, the rising trade deficit siphoned off demand from the domestic to the foreign sector, thus adversely affecting output.

We already mentioned the fall of the budget deficit. From Graph1 we can see that the budget moved in ups and downs, so that the deficit peaked in 1992, reaching 6.1% of GDP, then fell until turning into a surplus of 1.6% of GDP in 2000, and in 2007 the deficit represented 2.6% of GDP. On the other hand, taxes on corporate profits remained stable during the whole period. Finally, net taxes on persons also moved with ups and downs, reaching its peak at 16.6% of GDP in

2000, to fall to 12% of GDP in 2007. We study below how these movements influenced effective demand and output.

Putting the hypothesis to test: A Kaleckian-VAR approach

Before proceeding with our analysis, we shall say a few words about the methodology we shall follow, and briefly discuss two works where the hypotheses we will explore have been previously studied.

There is an important controversy amongst econometricians about the most adequate procedure to carry out empirical modeling. Colander (2009), for example, contrasts two alternative perspectives in empirical macroeconomics. He distinguishes on the one hand what he calls the “European perspective”, based on “the general-to-specific Cointegrated Vector AutoRegressive (CVAR)” approach; and on the other the currently dominant “Dynamic Stochastic General Equilibrium (DSGE) models”. However, as Spanos (2009) has pointed out, the latter one can be “... better described as a Pre-Eminence of Theory standpoint, where the data are assigned a subordinate role broadly described as quantifying theories presumed adequate. In contrast, the European general-to-specific CVAR perspective attempts to give data a more substantial role in the theory-data confrontation and is more accurately described as endeavoring to accomplish the goals accorded by sound practices of frequentist statistical methods in learning from data”⁹.

In the applied part of this paper, we shall follow the “general-to-specific CVAR perspective” to econometrics. Accordingly, we emphasize the use of

⁹ See also Juselius, 2006.

statistically adequate models as the basis of drawing reliable inferences; where the term *statistically adequate* refers to the validity of the probability and the statistical assumptions underlying the estimated model. The foundation of this approach is a purely probabilistic construal of the notion of a statistical model, considered to be a set of internally consistent probabilistic assumptions aimed to capture the statistical information in the data (chance regularity patterns). In other words, economic theory suggests the potential theoretical relationships and the relevant data, but the statistical model is specified by viewing the observed data as a realization of a generic vector stochastic process with a probabilistic structure that would render the observed data a truly typical realization thereof. Thus, we distinguish between the structural model, which is based on substantive subject matter information, and the statistical model, which is chosen to reflect the systematic statistical information contained in the particular data. The way the two sources of information can be blended harmoniously is to embed the structural model into a statistically adequate model (Spanos 1999). The structural and the statistical models will coincide when we can give an adequate, and sufficient for the purpose at hand, economic rationalization to the latter one. When this is not the case, we will need to reformulate (reparameterize/restrict) an estimated well-defined statistical model in order to arrive at a structural model.

The success of econometric modeling depends on how appropriate the postulated assumptions are in capturing the statistical information in the data. Thus, in this approach, misspecification testing plays a fundamental role, to ensure the statistical adequacy of the model and the reliability of the inferences based on

such a model. This is because all statistical inferences will be misleading unless the probability and the statistical assumptions of the estimated model are valid.

We now refer to two previous studies, with a theoretical approach close to ours, where the authors have empirically considered the main hypotheses we want to test in the present paper. Thus, Barbosa-Filho and Taylor (2006) analyzed the relationship between effective demand and income distribution. To carry out their empirical study, the authors use a VAR (2) model, which includes capacity utilization and the wage share; as well as private consumption, private investment, government expenditure and net exports (the last four variables expressed as a share of potential output). The period under analysis is 1948-2002 on a quarterly basis. Their results show a negative association between the wage share and capacity utilization; and thus between the wage share and output. More specifically, a three-percentage point increase in the labor share would result in a fall of about one-percentage point in capacity utilization. They also set up different sub-periods, finding similar results in all of them. They thus concluded that when the labor share grows, this has a negative effect on effective demand, and hence on the degree of utilization of productive capacity.

The second paper we discuss is by Laramie, Mair, Miller and Stratopoulos (1997), who study the direct impact of taxes on profits and private investment in the US for the period 1980-1993 on a quarterly basis. The aim was to prove Kalecki's argument that taxes on corporate income do not necessarily depress private investment, by means of a reduced form Kaleckian investment function. Their investment equation is a time function (to take into account the innovation factor) of the average taxes on wages and profits, as well as of investment itself with a 12-

quarter lag, due to the time span between decision-making (mainly in spending) and current changes in investment. Moreover, they assumed government spending equaled taxes. They estimated distributed-lag models for different combinations of investment determinants. Their main conclusions were the following:

(i) Increases in taxes to corporate income, if paid through a reduction of personal savings, may not have an impact on profits. Moreover, if such increase is accompanied by purchases of government infrastructure or by transfers to the unemployed, it may increase after-tax profits, resulting in new investment.

(ii) It is possible to stimulate investment with a minimum impact on the budget deficit, satisfying at the same time equality goals.

Finally, it is important to mention that only the Laramie et al. study tests for misspecification to assess the validity of the underlying statistical assumptions of the estimated model. Lacking this, in our judgment indispensable, step, the results achieved by Barbosa-Filho and Taylor may be misleading.

Taking stock of the previous discussion, we can now proceed to the empirical part of our research.

To adequately test the hypotheses we want to investigate in this paper, we would need a detailed macroeconometric model. Since this is beyond our possibilities, we have estimated a Vector Auto Regression (VAR). We choose this methodology because most variables of interest are interrelated, and because there is no scientific basis for an **a priori** distinction between endogenous and exogenous variables (Spanos, 1990; Sims, 1980). Another aspect of empirical modeling that plays an important role in what follows is the use of system-based cointegration methods. These methods allow us to deal with the non-stationary

nature of economic time series. Finally, and to confirm the validity of our results, we also use the so-called Structural VAR or (SVAR) methodology.

Our main variable of interest is the US GDP. Even though we want to study only if, and how, the wage share and government expenditure financed via taxes on profits, affect GDP, we must take into account all the variables that are likely to affect GDP, as well as their interactions. Thus, we need a very general specification, within which to nest the fiscal policy and the factor share variables. Therefore, we start from the National Accounts identity slightly modified. Let Y stand for output, C private consumption, I private investment, J the trade balance (i.e. net exports). Further, H , B and Γ are government expenditure financed via taxes on corporate profits, via budget deficit, and via net taxes on persons, respectively. The last three items make up government spending on goods and services.

$$Y = C + I + J + H + B + \Gamma \quad (3)$$

We now have to establish which are the most basic factors determining the right-hand side variables. Unfortunately, however, the range of our choice is limited because we must save enough degrees of freedom to carry out the estimate and the misspecification tests. Besides, lack of adequate information will force us to use variables that are only imperfect proxies for our theoretical variables of interest. We now explain how we deal with this situation¹⁰.

¹⁰ Note, we tried many models, with different information sets. We selected finally the model we present below because it was the best one from the statistical point

We shall assume that the trade balance J depends on domestic output, on external output Y^* , and on the real exchange rate. To save some degrees of freedom, and given that the exchange rate depends on, and moves in opposite direction than, the share of wages in value added for a given **nominal** exchange rate (López and Perrotini, 2006), we take the wage share as an argument of the trade balance (as well as an argument of income distribution).

We assume private consumption and private investment depend on income and on the share of wages in the value added. Departing somewhat from Kalecki, we assume that both private consumption and investment depend also on Private Credit Outstanding (C) and on the interest rate (R). As we know, during the last years, and until the financial crisis imploded, a dramatic rise in private credit outstanding occurred, and we have to take into account this important new factor¹¹.

Finally we depart from Kalecki also in that we split government expenditure into two, and not three, items. On the one hand, we take taxes on corporate profits (H) as our first item; and on the other we lump together the budget deficit and net taxes from persons, which we denote by O (Other Government Revenues), as our second item¹².

of view. That is, it was subjected to, and was not rejected by, a large battery of misspecification tests.

¹¹ By the way, we tried also to have variables reflecting private wealth into our specification, but we did not find a statistically valid model including this variable.

¹² It would have been preferable to separate out the budget deficit from net taxes from persons. However, the actual budget deficit, for well-known reasons, is highly

Therefore, we can reduce (3) as follows:

$$Y = C(w, Y, C, R) + I(w, Y, C, R) + J(Y, Y^*, w) + H + O \quad (4)$$

where R is the real US Long-Run Interest rate (10 years)¹³. Simplifying again, our model will be specified as:

$$Y = Y(w, Y^*, C, R, H, O) \quad (5)$$

where the right-hand side variables are also endogenous.

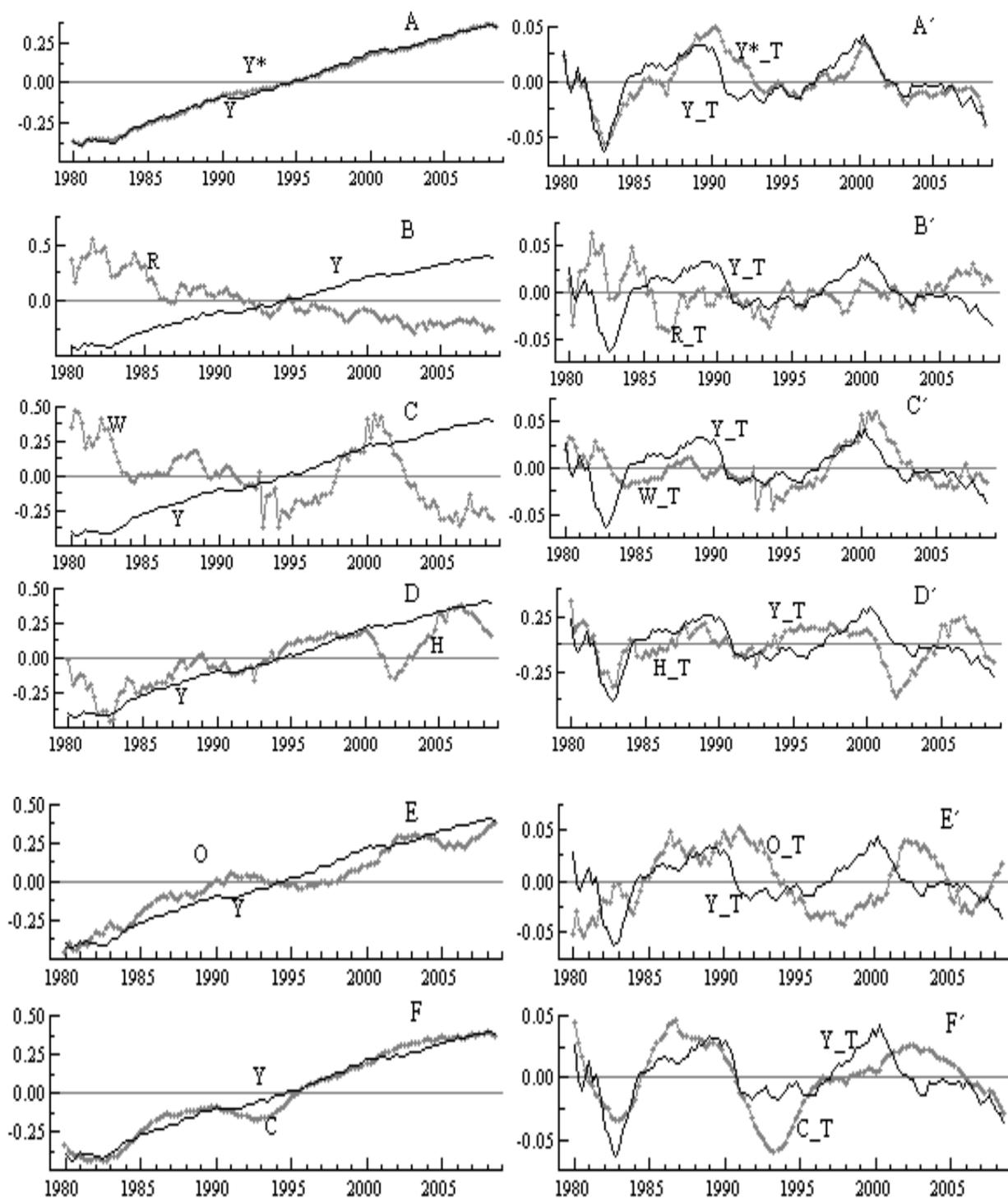
We begin the modeling exercise with a brief description of the data¹⁴. The sample is on a quarterly basis, and it runs from 1980(1) to 2008(3). All monetary variables have been brought to 2000 prices. In graph 2 below we plot each variable together with GDP. This will give us a first informal hint on how they may be associated. To facilitate visualization of their possible association we show in the left-hand panel the seasonally adjusted variables, and in the right-hand panel the variables in deviation from their trend.

pro-cyclical, and we did not find a satisfactory variable measuring the discretionary budget deficit. Note, we also estimated models where we split the budget deficit from net taxes from persons, but we confronted the problem of lack of degrees of freedom. Besides, the resulting estimates were not statistically valid.

¹³ We tried different interest rates until we could identify one that resulted in a solid statistical specification.

¹⁴ See the Appendix for the model data source.

GRAPH 2. GDP AND VARIABLES OF THE MODEL



Inspection of the graphs of the variables suggests that all of them are non-stationary, i.e. they have a trending mean, and that their underlying density

function is non-normal¹⁵. Unit root analysis of the series (not shown here) suggests that all series used in the model have the same order of integration (all are $I(1)$), and therefore we can test for cointegration via the Johansen procedure.

We can see at first sight a close positive association between Y and Y^* (panels A and A'); between Y and w (panel C'); between Y and H (D'); between Y and C (F'); between Y and (H) ; and probably also between Y and O (E'). The nature of the association between Y and R is less clear. Anyway, **prima facie** the information conveyed by the graphs seems to validate Kalecki's hypothesis regarding the expansionary role of the wage share and of government expenditure, on demand and output. But our econometric work will tell us whether or not this is actually the case.

We estimated a VAR with quarterly data for the period 1980-2008(3), which included the US GDP (Y), OECD GDP (Y^*), Private Credit Outstanding (C), Profit-Tax financed government expenditure (H), Other Government Revenues (O), the wage share (w), and the real interest rate (R); with all the variables, except the last two, in logarithms. We obtained a statistically well-specified equation, in a model including 3 centered-seasonals, 4 lags and one *dummy* variable, for the quarter 1987(1), to take account of an outlier in Credit in that quarter.

After checking for misspecification and confirming that no specification test is rejected, we checked for a long-run association between our set of variables with Johansen's cointegration test. The test suggests that up to three cointegration

¹⁵ Non-normality may be due to the presence of outliers.

vectors can exist¹⁶, and we assume that the first one can be taken to signify the long-run association between US GDP and its determinants. This long-run vector is as follows:

$$y = 0.25y^* + 0.55 W + 0.44 c + 0.22 o + 0.056h - 0.0017R \quad (6)$$

where lower-case letters refer to the variable in logarithms.

In words, we find that **higher** output is associated with **higher** OECD GDP, with a **higher** share of wages in value added, and with **higher** government expenditure financed either via **higher** taxes on profits or via **higher** other government revenues. Finally, a higher interest rate R depresses output.

Since correlation does not imply causation, it is still necessary to study whether output is indeed determined by the right-hand side of (6). Therefore, we carried out Granger causality tests and found out that this is in fact the case. This is confirmed by the estimated Error-Correction Model, which describes the short-run association between US GDP and its determinants. Table 2 below shows the error-correction model, where CV denotes the long-run cointegration vector. Note, in a multi-variate context, Granger causality of variable X on variable ϑ obtains when X is contained among the regressors in the equation for ϑ , or in the cointegration vector, or both.

¹⁶ The corresponding test for stability of the vectors indicates that only two of them are stable.

Error Correction Model for Dy				
Variables	Coefficient	Std.Error	t-value	t-prob
Dy*_5	0.954075	0.09199	10.4	0
Dy*_5	-0.287122	0.08211	-3.5	0.0007
Dh	0.0305833	0.007676	3.98	0.0001
Do	0.108564	0.03414	3.18	0.002
Do_4	-0.0830815	0.02274	-3.65	0.0004
DR_2	-0.00132199	0.0003484	-3.79	0.0003
DR_5	-0.00116874	0.0003196	-3.66	0.0004
DW_1	0.0101939	0.005347	1.91	0.0595
Dc_1	0.0635671	0.0272	2.34	0.0215
VC_1	-0.00113237	0.0005225	-2.17	0.0326

Source: see Text

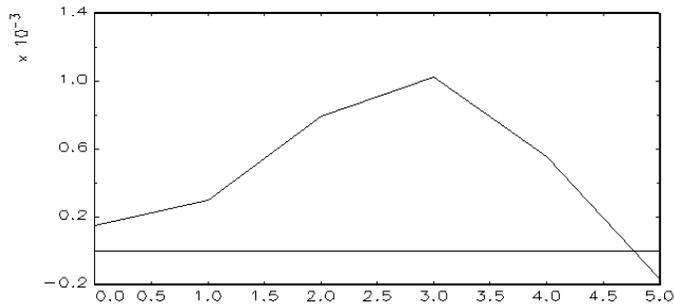
D before a variable denotes its first difference. X_q denotes that the X variable enters with q lags. VC is the cointegration vector

As we can see, both the wage share, and government expenditure financed either with taxes on profits, or other government revenues, Granger-cause output and demand, with a positive effect on the latter. Besides, world output (proxied by OECD GDP), and credit have also a positive impact while an increase in the interest rate tends to depress demand and GDP.

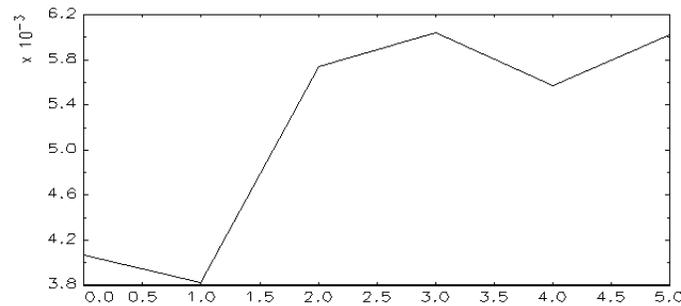
Finally, as the last step in our econometric exercise, taking as a basis the VAR, we estimated a SVAR. We confirmed the statistical validity of all our results, and we applied the so-called Impulse Response to our variables of interest.

GRAPH 3. SELECTED IMPULSE-RESPONSES

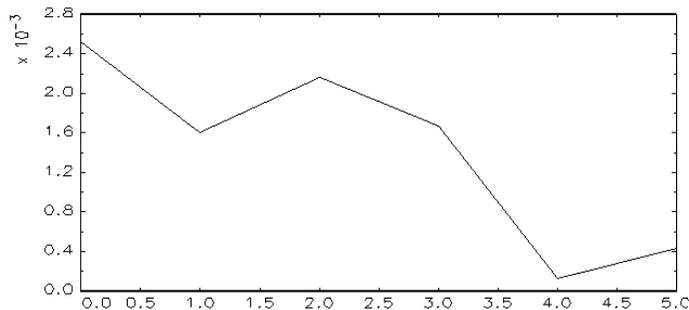
RESPONSE OF Y TO W



RESPONSE OF Y TO H



RESPONSE OF Y TO O



Source: See text

As we can see through the Impulse Response graphs, both a rise in the wage share, and in government expenditure financed with taxes on profits, have a positive impact on GDP. In fact, even when government expenditure is financed with other resources, it has a positive impact on output. The graphs show that the

effects of the shocks do not peter out, which accords with the results from the cointegration vector.

Let us now give an economic interpretation to our results. We will not make an exhaustive discussion of the estimated equations, concentrating instead on the two hypotheses that are the main object of our inquiry.

First of all we notice that a higher share of wages stimulates demand and output in the short-run; an effect that, according to the sign of the variables in the cointegration vector, also carries over to the long run. From our estimate it thus appears that in the USA a shift from wages to profits stimulates the economy¹⁷. In other words, the expansionary effect of a higher wage share on domestic demand seems to more than offset its (possible) recessive impact on investment, as well as its negative impact on the trade balance.

In the second place, we have found that higher government expenditure financed with higher taxes on profits, tends to stimulate demand and output. Thus for example, let us assume that in 2007 government expenditure had been US \$100 (billions) higher. If that rise had been entirely financed taxing corporate profits, then the latter item would have risen from US \$320.7 to US \$420.7 (see table 1); i.e. an increase of 31% with respect to its original value. Since the long-run elasticity of GDP with respect to taxes on corporate profits is 0.056 (see eq. 6), that rise in government expenditure would have brought about a long-run increase

¹⁷ Our result contradicts what Barbosa-Filho and Taylor (2006) found in their paper. As we previously mentioned, we have methodological reservations regarding their estimate.

in GDP amounting to 1.74% (31 times 0.056); namely, of US \$200 billion. On the other hand, if the US \$100 (billions) of additional government expenditure had been financed via other budget revenues, the latter would have risen 5.9%, and in the long run output would have been US \$150 billion higher. Thus, according to our estimate, the larger impact would take place if government expenditure were financed taxing corporate profits.

Final remarks

To conclude our study, we may summarize our findings noting that we have found full confirmation for the two Kalecki's hypotheses we have empirically studied in this paper, namely the one related to the positive effect of government expenditure financed via taxes on profits on demand and output, and the second one, which refers to the expansionary effect of a shift from profits to the wage share. Let us delve a bit deeper on these two issues.

After many years of being considered by both governments and the economics mainstream as a forbidden weapon, as a consequence of the depth of the current world financial crisis, public spending, and even deficit spending, has regained a place of honor in the arsenal of acceptable economic policy instruments. This new situation is hailed by publicists and pundits as a revival of Keynes and Keynesianism, especially because writers who identify themselves with the so-called Post-Keynesian school, have always insisted on the beneficial effect of government expenditure, and of government deficit, when idle resources are abundant (see especially Wray 1998, and Arestis and Sawyer 2003 and the bibliography cited therein).

There is much truth in the previous opinions. However, let us recall that Keynes was not the first economist to put forward the idea of utilizing government expenditure as a tool to fight unemployment; and that he saw the deficit only as an instrument of last resort. It was rather Michal Kalecki who, when he firstly put forward his version of the principle of effective demand, gave a prominent place to government spending as an additional source of demand. He also emphasized the expansionary effect of financing government expenditure with taxes on profits. In our study we have been able to verify this specific Kalecki's hypothesis. In more general terms, the idea that the government can stimulate a business upswing by raising its expenditure, and that this stimulus takes place particularly when it finances its expenditure with higher taxes on profits, appear to us to be empirically valid for the US economy.

Let us now discuss the second of Kalecki's hypotheses, which we may relate to the discussion that has taken place amongst Post-Keynesian economists on the so-called "wage-led" and "profit-led" regimes¹⁸. This discussion has made it clear that whether a wage-share fall will stimulate demand or not in the short run, depends on how strong its negative impact on workers' consumption is, vis-à-vis its supposed positive effect on profits, investment and the trade balance. On the other hand, the long-run effects of such a fall depend on the weight of the different determinants of the investment function, and on how strongly investment impinges on the competitiveness of domestic producers. Indeed, the wage fall may raise

¹⁸ See for example Bhaduri and Marglin (1990); Bowles and Boyer (1995); Blecker (1999); and the literature cited therein.

profits in an open economy in the short run, but may reduce demand, which are two arguments that we may assume should be included amongst the determinants of investment.

Our empirical results for the US economy suggest that in this country a shift from profits to wages does indeed cause a short-term rise in effective demand; and the long-run growth also appears to be stimulated. We may suggest that the evolution goes more or less along the following lines. Let us consider a situation where a rise of the wage share deteriorates the trade balance and profits, but causes a rise in aggregate demand. Let us moreover assume a simple investment function, where investment depends positively on profits and on capacity utilization. Let us finally assume that the trade balance depends on the competitiveness of domestic producers, which in turn depends on investment. Then, if the elasticity of investment with respect to profits is lower than its elasticity with respect to utilization, a wage-share rise will have a short-run positive effect on output and employment. Moreover, that effect will persist because investment will be growing at a faster rate due to the demand (and capacity utilization) rise and the trade balance will not worsen much because competitiveness will tend also to grow at a faster rate. This would be a typical example of what has been labeled in the previously cited literature as a “wage-led” regime; and we may infer from our empirical results that this type of regime may be the one prevailing in the US economy.

We do not claim of course that what we find for the US takes place in the same way in other advanced economies: the reaction of an economy to shocks depends on its structure and institutions. But we would suggest that the

methodology we have used in this work might be useful to study other national cases.

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Appendix

All variables expressed in dollars were modeled as natural logarithms (except the budget deficit). Output, investment and M2 were brought to 2000 prices using the CPI reported by the Bureau of Economic Analysis, through the NIPA tables. OECD output is presented in dollars as well, brought at 2000 prices by OECD considerations. Taxes on corporate income, net taxes on workers and the budget deficit were deflated using the price index for government consumption expenditures (G_CPI). R is the real long-run interest rate (10 years) and w^* is wage and salary disbursements divided by US GDP.

Model Data Sources

Variable	Variable name at source	Source	Description
Y	US Gross Domestic Product (at 2000 prices)	BEA	Table 1.1.6, item A191RX1
CPI	US Consumer Price Index (2000=100)	BEA	Table 1.1.4, item B191RG3
I	US Gross Domestic Private Investment (at 2000 prices)	BEA	Table 1.1.6, item A006RX1
Y*	OECD Gross Domestic Product (at 2000 prices)	OECD	OTF.VPVOBARSA.2000.S1____ GROSS DOMESTIC PRODUCT
W*	US Wage as share of GDP (=W/Y, both at nominal values)	BEA	Table 2.1, item A576RC1 (W) and Table 1.1.5, item A191RC1 (Y)
G_CPI	US Price Index for Government Consumption Expenditures and Gross Investment (2000=100)	BEA	Table 3.9.4, item B822RG3
G	US Government Consumption Expenditures and Gross Investment	BEA	Table 1.1.6, item A822RX1

B	US Budget Deficit (Total Receipts minus Total Expenditures)	BEA	Table 3.1, item AD01RC1
S	US Surplus of Government Revenue over Government Expenditure on Compensations to Employees and Transfers	Own calculation	Variable calculated as: $S = G - (B + H)$
H	US Taxes on Corporate Income	BEA	Table 3.1, item W025RC1
R	Long-run interest rate (10 years)	Secretary of the Treasury	-
J	Net Exports	BEA	Table 1.1.6, items A020RX1 (X) and A021RX1 (M)
NS	Net Savings	BEA	Table

Appendix

All variables expressed in dollars were modeled as natural logarithms (except the budget deficit). Output brought to 2000 prices using the CPI reported by the Bureau of Economic Analysis, through the NIPA tables. World output is presented in dollars as well, brought at 2000 prices by OECD considerations. Taxes on corporate income, net taxes on workers and the budget deficit were deflated using the price index for government consumption expenditures (G_CPI). R is the real long-run interest rate (10 years) and w^* is compensation of employees (received) divided by US GDP.

Model Data Sources

Variable	Variable name at source	Source	Description
Y	US Gross Domestic Product (at 2000 prices)	BEA	Table 1.1.6, item A191RX1
CPI	US Consumer Price Index (2000=100)	BEA	Table 1.1.4, item B191RG3
Y*	OECD Gross Domestic Product	OECD	OTF.VPVOBARSA.2000.S1___

	(at 2000 prices)		GROSS DOMESTIC PRODUCT
W*	US Wage as share of GDP Compensation of Employees, received (=W/Y, both at nominal values)	BEA	Table 2.1, item A576RC1 (W) and Table 1.1.5, item W209RC1 (Y)
G_CPI	US Price Index for Government Consumption Expenditures and Gross Investment (2000=100)	BEA	Table 3.9.4, item B822RG3
G	US Government Consumption Expenditures and Gross Investment	BEA	Table 1.1.6, item A822RX1
B	US Budget Deficit (Total Receipts minus Total Expenditures)	BEA	Table 3.1, item AD01RC1
S	US Surplus of Government Revenue over Government Expenditure on Compensations to Employees and Transfers	Own calculation	Variable calculated as: $S = G - (B + H)$
H	US Taxes on Corporate Income	BEA	Table 3.1, item W025RC1
R	Long-run interest rate (10 years)		
C	Consumer Credit Outstanding		Federal Reserve

Table A.1

VAR Vector Misspecification Tests (AR 1-5: F-test; Norm and Hetero: Chi²)

	Autocorrelation (1-5)	Normality	Heteroskedasticity
p-value	0.0222*	0.2776	1.0000

* Significant at 10%

Table A.2

MCE Misspecification Tests

	AR 1-5	ARCH 1-4	Normality	Heteroskedasticity	Linearity
p-value	0.4475	0.5773	0.6901	0.7386	0.2249

All F-tests, except Normality (Chi²).