What Drives Profits ?
An inquiry into the profit paradox

by

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ABSTRACT

This paper investigates the relationship between the different types of income and their uses in the case of the United States, from 1954 to 2004. The methodology employed is that of an unrestricted error-correction model which is widely viewed as an advanced, non-partisan, econometric technique. The introduction of the paper stresses the importance of studying profits in a large-scale model, where a lot of variables underlie complex economic relationships. The first part of the paper presents the a-theoretical framework of error-correction models and describes the main properties of the estimated system. Our study focuses on the place and determinants of corporate profits and provides an illustration of Parguez[2002]'s "Profit Paradox". Doing so, we introduce different concepts of causality and provide a dynamic causal chain that drives profits, both in the short run and the long run. This causal chain is treated both qualitatively (which variable precedes profits) and quantitatively (weight of the impact of a change in the profits' predictors). Part two provides a more theoretical approach to our results. We, in particular, show the coherence of our individual results and provide a restatement of such findings through the behavior of profits since the eighties. Our main findings are :

(1) Profits cannot be said autonomous, i.e. profits are very much more 'caused' (or determined) variables than 'causing' (or determining) variables.
(2) *In the short run*, profits do always depend upon *demand variables*, especially upon consumption, indebtness and government spending ;
(3) *In the longer run*, profits are again found to be dependent variables, but the factors determining profits behavior are more *income-variables*, especially rents.
(4) 'Discipline' policies are doomed to fail until the desirable goal of balancing the budget is understood as a *means rather than a natural outcome* of a demand-driven growth.

INTRODUCTION

The motivation of the present paper is an attempt to inquire a possible explanation of the rather ubiquitous support of the business community in favor of ‘discipline’ macroeconomic policies. ‘Discipline policies’ are the fashionable economic doctrine of economic policy ever since the seventies and early eighties in the United States. Such policies postulate that the State, by a perfectly coherent use of fiscal and monetary policies, should impose an adjustment of the economy towards a ‘natural’ growth path fitting all requirements of neoclassical economics (perfect neutrality of demand and money, ergodicity, perfectly flexible labor markets, etc…). Such an adjustment is being operated

- through a balanced budget target (a surplus being the desirable in the long run), achieved by a restrictive fiscal policy leading to a squeeze of the State’s outlays, and
- through monetary policy, which targets zero inflation through the restriction of indebtness.

Such a disciplinary package should generate the required growth of profits that sustains the growth of investment, which in turn increases the competitiveness of the domestic economy in the world market. Such discipline also constrains consumption, by permanently favoring thriftiness-led saving reflected into increased profits (whatever the mechanism). Herein lies the official explanation of the endorsement of this agenda by some non-neoclassical economists, especially those of strong neo-marxist pedigree.

Is this rather widespread adherence to disciplinary equilibrium ‘for the sake of equilibrium’ rooted into objective characteristics of modern capitalism ? Or is it a purely ideological vision contradicting the very facts ? Those questions are at the core of what has been deemed the profit paradox. It requires to address two related questions :

(1) what are the objective determinants of profits, and which are most important ?
(2) assuming profits are demand-led, would a policy-implied growth of aggregate demand engineer a fall in the share of profits below some required level ? Equivalently, are expansionist policies evil because they restrain profits ?

The rest of the paper addresses those two major issues and is organized as follows. Part one presents the econometric framework which is, to the contrary of many papers, <u>not</u> based upon an *a priori* model embodying any specific theory. Our approach makes use of empirical data modeled in an error-correction framework which is widely viewed as a non-partisan econometric/statistical technique. We in turn discuss the choice of variables that ought to be included in the model and check the properties of the data (I.2), briefly present the econometric technique and properties before proceeding to the estimation (I.3), and finally discuss the various concepts of causality among variables and the weight of the causal chain (I.4). The second part of the paper sums up our findings and provides an illustration of their relevance to the recent (80s onwards) American experience.

- PART ONE -
Modeling the evolution of profits

1. THE EVOLUTION OF PROFITS AND CARACTERIZATION OF RELATED VARIABLES

A good starting point for stating the profit paradox is first to look at the data. National accounts distinguish eight different income categories in Table 1.12 of the NIPAs, which are given below with magnitudes as of 2004Q3 in billions of current Dollars. Appendix 1 presents the comprehensive (yet simply put) definitions of those aggregates used in the NIPAs.

employee compensation (W, $6,657),
proprietors' income (PI, $903),
rental income (R, $153),
corporate income (Π, $1,118),
net interest (NI, $546),
taxes on production and imports (less subsidies)(T_{YMS}, $805),
business current transfer payments (BTr, $76) and
surplus of government enterprises ($6).

Total : National income ($10,264)

A category of income deserving particular attention is that of the proprietor's income. It consists of all income originating from unincorporated sole proprietorships and partnerships businesses. It is the historical third biggest income category of the American economy, ranging between 6% and 13% of national income, only slightly lower than corporate profits. The main problem is that this proprietor's income, as commonly known, itself consists of the other categories of income and that there is no clear way to separate out the various components. As a rough practical rule, we follow Johnson[1958]'s idea and treat one third of proprietors' income as profits, and two thirds as compensation.

As a good starting point, we derive the functional distribution of income of the United States, from 1954 to 2004. We distinguish the three usual shares of income : the share of wages, the share of profits and the share of rents. Those shares are computed as share in the national income (thus leaving the consumption of fixed capital aside) which is here taken net of taxes on production and imports, net of business transfer payments and net of the balance of government enterprises. Every type of income should be understood as before tax. For practical purposes, we aggregate rental income and net interest in one generic category of 'rents'. We thus end up with three shares of income, adding up to 100% :

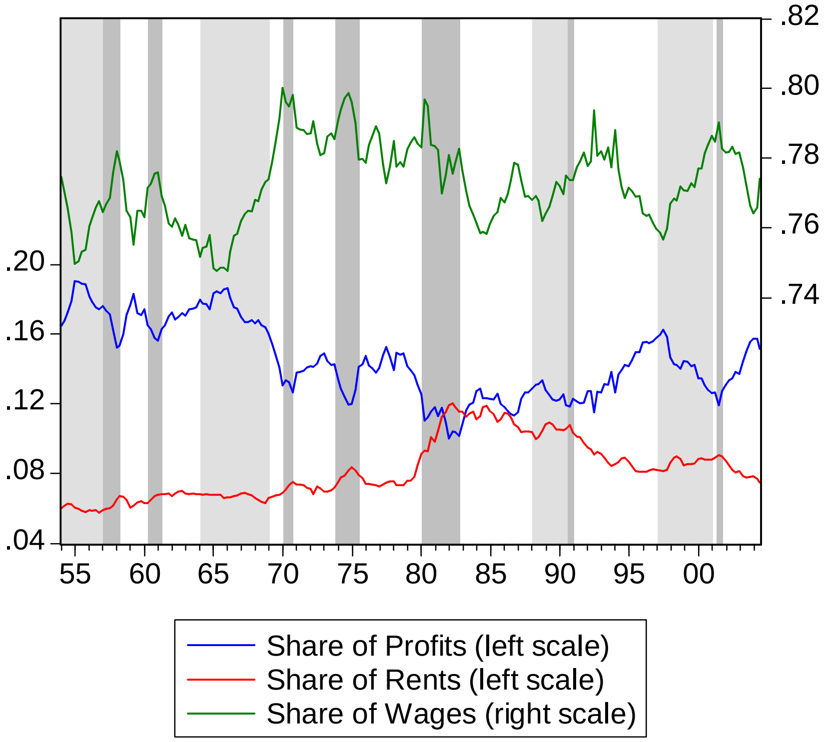
Share of Wages = (compensation of employees + 2/3 of proprietors' income) / (net national income)

Share of Profits = (corporate profits + 1/3 of proprietor's income) / (net national income)

Share of Rents = (rents + net interest) / (net national income)

Graph 1 plots those three shares of income from 1954 to 2004. Dark-grey areas indicate recessions, while light-grey areas indicate below-average unemployment rate (below 5.5% to 6%). One of the main conclusions drawn from graph 1 is that the functional share, such defined, are very volatile. The share of wages soared from 74.7% in 1966 to 80.0% in 1970 (a 7% increase), the profit share fell from 18.6% in 1966 to 10.0 in 1982 (a 45% drop), and the rental share jumped from 7.3% in late 1978 to 10.0% in late 1980 (a 37% jump). When unemployment is low and during recessions, the wage share increases and the profit share decreases, so both shares tend to exhibit opposite movements, at least in the short run. Yet the picture is not complete without rental income, which tends to be unrelated to the state of labor market, but which seemingly increases during recessions. Another interesting feature about the rent share is its stable, continuing slow growth from 1954 to 1979, its huge increase under the Volcker monetarist experiment, and its slow decrease from 1982 to 1996 (yet rents are still higher today than in 1978). Finally, there seems to be a break in the evolution of the functional shares in 2001, but it is too early to infer about whether it will persist or not.

Graph 1 – Shares of wages, profits and rents
(shares of before tax incomes in net national product)



Notes : light-grey areas indicate below-average unemployment rate, and dark-grey areas indicate recessions. Data from Table 1.12 of the 2004 revision of the National Income an Product Accounts (NIPAs).

Concentrating upon profits, the share of that type of income has broadly followed three distinct phases : stability until 1966, decrease from 1966 until 1983, and increase thereafter. Since those phases last for about 10, 15 and 20 years, there seems to be *persistence* in the profit share movements beyond the above-mentioned short-run volatility. This finding cast doubts about the global stability of the functional income distribution of the United States. More than this, it pushes the curious economic researcher to address the question of what drives profits.

1.1 THE CHOICE OF THE VARIABLES

In order to answer this question, the first step is to decide of a framework. Profits are indeed one variable among a lot of other macroeconomic aggregates, and it is vital step to choose a global framework in which profits evolve. We assume that an accurate picture of profits can be seen through the textbook double identity

$$\sum all \quad incomes \equiv Y \equiv C + I + G + X - M \qquad [1]$$

where Y stands for GDP or national income, and C, I, G, X and M referring to private consumption and investment, public expenditures, exports and imports. The left hand side of that double identity refers to the income-decomposition of the national income, whereas the right hand side refers to the demand-decomposition of the same aggregate. This double identity is therefore the one linking the different types of income to the various kinds of demands in the economy as a whole. What is at the core of the Profit Paradox is the study of the place and role of profits in such a framework, and the relationships between variables. The interesting feature of such a departing point is that profits appear as one component of a very large system relating income and spending.

Now equation [1] is not very deep unless measured, both quantitatively and qualitatively. In the real world of national accounting, the variables on the right hand side of [1] do not bring any measurement problems[1], and we already mentioned the eight left hand side variables. Yet the NIPAs provide two additional variables that enter the picture of those identities, which are here to link the right hand side to the left hand side : *consumption of fixed capital (private and public, CFC, $1.497),* and *net income receipts form the rest of the world (IncRoW, $+38).* We thus end up with equation [2], which consists –of the respectable number- of fourteen variables :

$$W + PI + R + \Pi + NI + T_{YMS} + BTr \equiv C + I + G + X - M - CFC - IncRoW \qquad [2]$$

where the *surplus of government enterprises* has been merged with the taxes on production and imports. Equation [2] features a lot of variables and is thus a picture of the economy's real complexity –and interrelatedness. In the rest of the paper we will take equation [2], an accounting identity, as representative of a real-world economic system which, among other variables, features profits upon which we will concentrate.

1.2 DATA SOURCES AND PROPERTIES

The data used here is that provided by the National and Income Product Accounts (NIPAs) as published by the Bureau of Economic Analysis, Department of Commerce. The dataset consists of 203 quarterly observations per variable and ranges from 1954:1 to 2004:4[2]. The data is in nominal terms since this is the only unit of measurement provided in the national accounts for measuring the various types of income.

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[1] National income or GDP are easily found in the NIPAs according to different measures, whether it be in real or nominal or index form, see especially Tables 1.5.5 and 1.12 of the NIPAs. A problem arises regarding the nature of *identity* of [1], since the data provided by the NIPAs on the different types of income do not sum up to the sum of the right hand side variables. This is probably to be explained by the fact that the income source of data are the tax declarations and are not known to be accurately reported. The magnitude of the discrepancy between the two decompositions of GDP varies quite a lot, *between -100 to +100 billions of current Dollars each quarter,* which is a surprising figure since the BEA already includes adjustments to counterbalance this problem. Yet while worth noting, this discrepancy is almost nothing in an eleven trillion Dollar economy and we will leave this question aside.

[2] All variables are available on a quarterly basis from the NIPAs since 1947:1. Yet the beginning of the sample is characterized by specific economic conditions, namely the Treasury-Fed Accord, the price control experience and the Korean war. Those events surely affected prices, interest rates and money in general. Since those variables are not explicitly present in the model (they are underlying forces behind the dynamics of the fourteen variables, nonetheless), it would be a bad choice to begin estimation during that early specific time. We thus start our analysis during more stable times, after 1954.

Before presenting the econometric tool utilized here, some important preliminary remarks need to be made regarding the properties of the data. First all fourteen variables are linearized by logarithmic transformation because linearity is very desirable property in an estimation procedure that will approximate economic relationships by linear relationships.

Second, the order of integration of each and every individual variable has important implications for the theoretical economist and the applied economist. For the purpose of the present study, only two orders of integrations are useful to recall :

- a series integrated of order zero or I(0) is termed a stationary variable. This property is equivalent of saying that the variable roughly follows a cyclical path through time around a (fixed) deterministic component, that is the series oscillates around a linear trend, a non-zero constant, or zero. Should a variable feature this property, one can *accurately* forecast its future value to always be around the deterministic component.
- A series integrated of order one or I(1) is non-stationary because it does not revert around any fixed deterministic component. In that case present and past behaviors of a series are dominated by stochastic fluctuations or random shocks, which make future values difficult or even impossible to forecast because the variance of the forecast error increases with the time of the forecast. Please note that I(1) variables become I(0) variables once differenced ; in other words the levels of a series are non-stationary but its growth rate is reasonably constant over time. Indeed Nelson & Plosser[1982] find that most macroeconomic aggregates fall into the I(1) category.

The classic way to infer the order of integration is testing for unit root(s). Results presented in Table 1 indicate that none of the series are stationary, except for corporate profits when a time trend is included. Please note that stationarity around a trend is only slightly rejected for all series. No series evolves around a mean or a (fixed, predermined) trend, except for corporate profits that significantly reverts around such a trend. This implies that, except for profits, shocks or deviations from a path may persist through time, thus creating a new path.

We are left with series that mimic a non-ergodic world, where forecasting can be made but will be more or less wrong because shocks accumulate in an non-orderly way. Profits on the other hand, are found to revert around a trend, thus future profits can be forecasted to be significantly in the range of the future value of the trend, more or less some cyclical adjustment. In this framework, time does not influence profits because we reasonably know what future profits will be. For all other variables, time creates uncertainty so that future values of the variables cannot reasonably be accurately forecast from past values.

On the other hand, once the series are differenced, unit root test results of Table 1 indicate that all series become stationary to a high level of significance. Thus all variables in logs are non-stationary in levels (except for profits around a trend), but their growth rates (Δlog) are reasonably stationary or I(0). We are left with series that are differenced-stationary or I(1), and the origin of this non-stationarity in levels comes from a more or less significant trend.

Table 1 – Unit root tests on series in logs and differenced logs, 1954:1-2004:3

Variable and determ. Comp.		ADF test (1)		DFGLS test (2)		KPSS test (3)	
		log	Δlog	log	Δlog	log	
W	T+C	0.99	0.00***	-0.70	-4.11***	0.305	0.357
	C	0.62	0.00***	0.71	-3.98***	1.794	0.456**
PI	T+C	0.24	0.00***	-1.23	-12.38***	0.275	0.076***
	C	0.99	0.00***	4.88	-9.63***	0.793	0.215***
R	T+C	0.74	0.00***	-1.44	-13.80***	0.359	0.075***
	C	0.96	0.00***	1.99	-14.54***	1.620	0.165***
Π	T+C	0.02**	0.00***	-3.42**	-3.33**	0.115**	0.021***
	C	0.88	0.00***	3.26	-4.01***	1.794	0.021***
NI	T+C	0.99	0.00***	0.09	-7.51***	0.389	0.190**
	C	0.07*	0.00***	1.13	-5.72***	1.728	0.906
T_{YMS}	T+C	0.97	0.00***	-1.00	-5.83***	0.288	0.252
	C	0.73	0.00***	0.82	-0.214 [a]	1.799	0.349**
BTr	T+C	0.55	0.00***	-2.28	-5.48***	0.210**	0.057***
	C	0.68	0.00***	1.86	-4.85***	1.786	0.146***
CFC	T+C	0.80	0.14	-1.61	-2.02**	0.250	0.270
	C	0.86	0.04**	0.89	-2.91***	1.790	0.291**
IncRoW	T+C	0.83	0.00***	-1.25	-7.98***	0.338	0.034***
	C	0.53	0.00***	1.14	-4.37***	1.610	0.135***
C	T+C	0.74	0.64 [a] ***	-1.96	-3.72***	0.250	0.416
	C	0.80	0.32 [a] ***	-0.50	-1.45	1.798	0.440**
I	T+C	0.41	0.00***	-2.39	-8.21***	0.262	0.042***
	C	0.80	0.00***	2.71	-0.54	1.785	0.072***
G	T+C	0.86	0.00***	-1.33	-4.09***	0.302	0.264
	C	0.87	0.00***	1.40	-3.23***	1.792	0.281***
X	T+C	0.80	0.00***	-1.79	-5.94***	0.251	0.092***
	C	0.71	0.00***	2.18	-5.55***	1.784	0.180***
M	T+C	0.91	0.00***	-1.13	-3.58***	0.265	0.178**
	C	0.91	0.00***	4.29	-3.53***	1.785	0.189***

(1) ADF test has been run with Hannan-Quinn information criterion to select the lag length. The value reported is the significance level of the AR(1) t-statistic (with MacKinnon[1996] critical values). Initial assumption is that the series contains a unit root and a low (<5%, etc…) value reported indicates the impossibility to reject stationarity ;
(2) DFGLS test is the detrended DF test as provided by Elliott Rothenberg and Stock[1996], used here in conjunction with the Hannan-Quinn information criterion. The values reported here are the detrended residuals' unit root t-statistics, to be compared with the critical values tabulated by the authors of -3.46, -2.93, -2.64 (in a model including a time trend) and -2.58, -1.94, -1.61 (in the case of a model including a constant only) at the 1%, 5% and 10% significance levels. Initial assumption is the same as in the ADF test
(3) KPSS test is performed with Newey-West bandwith selection and a Bartlett kernel. Critical values at the 1%, 5% and 10% levels are 0.216, 0.146 and 0.119 in a model including a trend and 0.739, 0.463 and 0.347 if no trend in included. Initial assumption is that the series contains no unit root and therefore that is level- or trend-stationary in the case of a lower-than-critical-value KPSS statistic.
[a] : test uses an improbably low or high lag lengh. Results with other information criteria indicate stationarity at the 1% level
***,** and *** indicate stationarity at the 10%, 5% and 1% levels, respectively.**

Table 2 – Descriptive statistics of select log-differenced series, 1954:1-2004:3

	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
W	1,70%	1,71%	0,009	-0,22	3,31	2,37	0,31
PI	1,52%	1,41%	0,026	0,28	7,03	140,29	0,00
R	1,22%	0,72%	0,062	1,28	9,25	385,75	0,00
Π	1,72%	1,56%	0,053	-0,13	3,75	5,25	0,07
NI	2,31%	2,16%	0,032	0,03	4,61	21,98	0,00
C	1,76%	1,68%	0,008	0,30	3,03	3,13	0,21
I	1,78%	2,03%	0,047	-0,48	4,44	25,33	0,00
G	1,57%	1,49%	0,013	-0,11	3,27	1,02	0,60
X	2,15%	2,17%	0,042	0,31	5,54	57,88	0,00
M	2,34%	2,44%	0,039	0,26	5,47	53,93	0,00

Though less fundamental, another interesting property of the data is its statistical properties, summed up in Table 2 above for the major types of income and outlays.

The first three columns presents the mean (or average growth rate per quarter, not at annual rate), the median and the standard deviation of all variables. Trade variables and net interest are the three series who present the highest average growth rate as well as the highest medians and belong to the highest standard deviations group. They are volatile and rapidly growing variables over the sample. Investment and profits are a little less fast-paced variables, but a little more unstable. Consumption and compensation are as fast paced as investment and profits, but are much more stable variables. Finally government spending is rather slow and steady, while rents are the slowest changing variable but the most volatile of all (especially after 1978).

Skewness measures the asymmetry of the distribution of the series around their respective means, with value zero representing perfect symmetry. None of the series can be said symmetric except for the income category of net interest. Wages, corporate profits and investment especially report negative skewness, indicating that the series has a long left tail, indicative of below-mean persistence. The opposite is true for rents, who exhibit a strong, positive skewness.

Kurtosis measures the peakedness or flatness of the distribution of a series, with value 3 as identical to the normal distribution (what one would expect 'in the long run' by the law of large numbers). Except for wages, profits and government spending, kurtosis exceed that value which is a common problem in econometrics known as 'excess kurtosis', indicating excessive peakedness in the data. Rents, again, show a distinctive result of an exceptionally high kurtosis.

Finally, the Jarque-Bera statistic combines the skewness and kurtosis statistics and is associated with a probability of a normal distribution. Except for government spending, wages, consumption and, to a lesser degree, corporate profits, none of the series appear to be distributed according to the normal distribution.

All in all, the statistical properties of the data point towards a lack of normality of the series (except for government spending), which is again a common problem in econometric analysis. But what also stems out of this purely statistical analysis is that rental income is exceptionally non-normal, due as much to very bad skewness as horribly bad kurtosis. Assuredly, a relatively high number of past values of the variables will be necessary in order to fulfill the prerequisite of normal errors for estimation.

2. INTRODUCING A DYNAMIC FRAMEWORK

Equation [2] is disappointing on several respects because it is just an accounting identity. It merely states that the fourteen variables are related to each other and it does not allow us to go much further. Even more annoying is its static nature : by how much would, say, profits increase following a rise in consumption ? Would profits increase of the same amount, or would that rise also mean higher wages ? By how much ? And, above all, what do profits depend upon ? Evidently in equation [2], all variables depend on each other to varying degrees, and that makes dynamic analysis a desirable way to investigate the present case[3].

One appropriate econometric tool to handle this kind of dynamic model is the vector autoregressive model or VAR. This class of models takes each variable and links it to all the (past values of the) variables, including its own. By stacking every such-defined variable in a coherent model, VAR models thus form simultaneous equation systems where 'every single thing is allowed to depend upon everything else'. VAR models thus do not embody *a priori* knowledge about whether a (dependent or endogenous) variable is caused or if it is a (independent or exogenous) variable that causes other variables. The fact that past values are included in the system also allows for lagged, dynamic effects to materialize and be taken into account. On the other hand, widely recognized problem pertaining to VAR models is yet their lack of theoretical underpinnings, the fact that the estimation results are somewhat sensitive to the parameters involved, and the high number of coefficients to be estimated. Our purpose for the time being is to estimate an unrestricted VAR model, where every variable may depend on everything else ; we thus use Sims'[1980] general, a-theoretical, framework. Such a typical VAR model would be, in the simple case of a of two variables *x* and *y* :

$$VAR(p):\begin{cases} x_t = a_{11}x_{t-1} + a_{12}x_{t-2} + ... + a_{1p}x_{t-p} + b_{11}y_{t-1} + b_{12}y_{t-2} + ... + b_{1p}y_{t-p} + \varepsilon_{1t} \\ y_t = a_{21}x_{t-1} + a_{22}x_{t-2} + ... + a_{2p}x_{t-p} + b_{21}y_{t-1} + b_{22}y_{t-2} + ... + b_{2p}y_{t-p} + \varepsilon_{2t} \end{cases} \quad [3]$$

where x_t, y_t are stationary variables. But since our variables are not stationary variables but variables integrated of order one, the VAR model could be a bad choice.

Following Granger[1983, 1987] representation theorem, equation [3] is only correct in the cointegrated case, that is where variables are not individually stationary but there exists a linear combination which is stationary. More intuitively, equation [3] is only valid if there exists one or several common trends among the fourteen variables. Cointegration can be tested for in the VEC through Johansen's Trace and Maximum Eigenvalue tests.

What we are going to estimate is not a VAR model itself, but a model based on it, called a vector error-correction model or VEC. VARs are too demanding regarding the stationarity of the data in the present case. Besides that, differencing the series in order to make them stationary would result in a huge cost of loosing all the relevant 'common trend' information about the links between variables. The derived error-correction model is a transformation of the previous VAR, following the works of Granger[1987] and Johansen[1988, 1991] :

[3] The importance of our approach becomes clearer after that being said. Since all variables are more or less interrelated, it would be a bad choice to analyse equation [2] after taking out a few variables here and there. It is indeed very tempting to reduce the number of variables to analyze, but that would immediately translate into a lower form of analysis because potentially important variables are missing. Suppressing the consumption of fixed capital would result in the hypothesis that it equally affects all other variables, and leaving aside proprietor's income because they are a too-difficult category of income to handle would result in a loss of information. All in all, we are left with all an irreducible identity which forms the basis of national accounting.

$$VEC(k): \quad \Delta X_t = \underbrace{\underbrace{\alpha.\beta'}_{\Pi}.X_{t-1}}_{long-run} + \underbrace{\sum_{i=1}^{k-1}\Gamma.\Delta X_{t-i}}_{short-run} + \underbrace{\mu_0 + \mu_1.t}_{\substack{deterministic\\component}} + \underbrace{\Phi D_t}_{\substack{exogenous\\regressors}} + \underbrace{\varepsilon_t}_{\substack{gaussian\\errors}} \qquad [4]$$

This representation [4] involves four different parts : a long-run, cointegration part $\alpha.\beta' X_{t-1}$, a short-run part $\sum_{i=1}^{k-1}\Gamma.\Delta X_{t-i}$, a deterministic component $\mu_0 = \alpha.\beta_0 + \gamma_0$ (as a constant) and $\mu_1 = \alpha.\beta_1 + \gamma_1$ (as a trend), and possibly a set of exogenous regressors D_t. We will postpone in-depth discussion to Appendix 2, where the interested reader will find a presentation of the different parameters involved as well as related issues. For the time being, we outline the main features of VEC models in the present case :

- VECs are based upon the cointegrated VAR model, that is a model that contains variables which are cointegrated ;
- are simultaneous equations models. They mimic *systems* and are particularly suitable to the present case because it is highly possible that variables interact on each other ; please note that this is an assumption that could be alleviated by forcing (i.e. restricting) some coefficients to be zero ;
- VECs include past values of every variable, thus allowing for lagged effects ;
- VECs do not assume any nature of the series (explained/dependant/endogenous or explanatory/independent/exogenous) ;
- VECs do not suppose all variables are stationary, and rely upon non stationary variables featuring cointegration. Thus we do not suppose that the system will return to a pre-programmed steady state : should a shock occur, this may have permanent effects ;
- VECs feature a timely dichotomy between short-run and long-run influences.
- Causality can be assessed through various measures and tests ;
- The evolution of the system can be seen through the simulation of an (unexpected) shock on a variable, and then tracing out the evolution of the impacted variable through time.

Those remarks being made, we then proceed to the estimation of this fourteen variable model.

3. ESTIMATION OF THE PARAMETERS

The statistical groundwork being discussed, three steps are being followed to estimate the system in full. Those are (1) the choice of the number of past values to include in the model (choice of *k*), (2) a discussion about the type of deterministic component relevant in this system, and (3) the estimation of the number of cointegrating relationships.

3.1. CHOICE OF THE LAG LENGH

How far back is the information contained in the data relevant ? Information criterion can help us set a value to *k* according to the precision of fit (FPE), the significance of an extra lag (LR sequential test), or maximal information content with a penalizing factor for extra lags (AIC, BIC, HQ…). The basic idea is to include as many past values of the series as possible ; yet including too many irrelevant past values would decrease the explanatory power of our system. Besides that, Johansen's multivariate cointegration technique relies upon a rather tough requirement : Gaussian errors (normally, independently and identically distributed). This specific requirement makes information criteria not very useful since they tend to underestimate the value of *k* that whitens the errors (Lütkepohl[1995]).

We have estimated the VAR in (log) levels of the form [3], adding one lag at each step and checked for the Gaussian errors requirements. Multivariate normality has been checked with a Breush-Godfrey[1978] test with the Doornik-Hansen[1994] method. This did not help us choose a lag length since all values of *k* provided normal errors (because of our big sample size of 203 observations). The independence of the errors has been tested for by an autocorrelation LM test up to 12 lags. It turned out that no serial autocorrelation was present when k=2 or 7 (or possibly 4) lags were used. The remaining assumption to fulfill is that of no heteroscedasticity. This has been checked with a White test with no cross terms for our three candidates k=2,4 and 7. It turned out that some homoscedasticity is still present when two lags are used, and that a four or seven lag specification is a better choice. Since the absence of autocorrelation is stronger in the case of seven lags, we chose a seven lag specification that matches all the Gaussian errors requirements of Johansen's method.

3.2. DETERMINISTIC COMPONENT AND THE TESTS OF THE NUMBER OF COINTEGRATING RELATIONSHIPS

The next step is that of the test of the presence of common trends among the variables. This is done through the Johansen's cointegration tests, but those in turn rely upon the specification of a deterministic component among five possible choices (see Appendix 2).

Applying the method presented in Appendix 2, we found that case five yielded thirteen cointegrating relationships, but that this specification gave rise to non significant quadratic trend coefficients. We thus rejected the quadratic trend in the data, and carried on with the estimation of case four. Cointegration tests yield eleven cointegrating relationships at the 10% significance level according to the maximum eigenvalue test (Johansen's preferred test). That specification features linear trends in the cointegrating relationships, which all simultaneously turned out to be significant.

We are thus left with a fully-estimated VEC model with seven lags, a deterministic specification of case 4, and eleven cointegrating relationships. As this model contains a lot of variables and lags, it will not be reproduced fully here. Only specific parts of it will be referred to when needed. For example, we can say at this stage that the model explains (R^2) between 60% and 80% of the variance of the growth rates of all variables. This is a very good fit, but those figures drop to the 20%-60% range when degrees of liberty are being accounted for (R^2 bar adjusts for the number of variables in the system, which is high in this case). The better-fitted variables are the consumption of fixed capital and the compensation of employees, while the least-fitted variables are imports, exports, rents and net interest. Those results are understandable since both CFC and W are heavily stable in time, whereas the least-fitted variables heavily depend upon the Dollar exchange rate and the interest rate, which are variables not included in the present analysis.

4. THE DYNAMICS OF THE MODEL

We now turn to the reason why we used this type of model, that is we address the issue of the dynamics between variables. Those can be assessed through two interrelated questions, that qualitative of causality and that quantitative of the weight of shocks. To illustrate the profit paradox, we will now concentrate upon the profit equation of the model, and leave aside all the other thirteen variables for a while. We thus concentrate on the following corporate profits equation of the model :

$$\Delta \log \Pi = \sum_{i=1}^{11} \alpha_i ECT_{t-1} + \sum_{j=1}^{7} \Gamma_{1j} . \Delta \log W_{t-j} + \sum_{l=1}^{7} \Gamma_{1l} . \Delta \log PI_{t-l} + ...$$

$$+ ... + \sum_{z=1}^{7} \Gamma_{1z} . \Delta \log M_{t-z} + Const. + \varepsilon_{1t} \qquad [5]$$

which states that the growth rate of corporate profits is explained by all the growth rates of the fourteen variables (including past values of the profits rate of growth), plus eleven 'error-correction terms or ECTs' deviations from the 'steady-state'/'common trends'/'cointegrating relationships'. Please remember all other thirteen variables are similarly –and simultaneously-determined elsewhere in the model. For the time being, equation [5] contains 14*7+11=109 estimated coefficients, representing the influence of 14+11=25 distinct variables.

4.1. 'SHORT RUN' GRANGER CAUSALITY

In a simultaneous equation model of the VEC type, a common concept of causality is that of Granger[1969]. Taking as example equation [5] above, it states that imports M are causing profits if all the Γ_{1z} 's are jointly significant. Equivalently, if those coefficients turn out estimated as non-significant or zero, then imports do no exert any influence over profits, and imports could therefore be taken out of the model without any loss of information. Please note the particular definition of causality that Granger causality implies : if a variable is significantly non-neutral in the explanation of another variable, then it is Granger causing. It means that Granger causality is a sort of precedence or predictability test : if a variable significantly helps predict the variance of another variable, then it is Granger-causing. Granger's causality test is a significance-level test, and does not provide any weight of the impact of the causal chain. Moreover, because of the particular definition of the Granger causality, two variables can be found causing each other ("feedback"). Also note the temporal causality nature of Granger's test, since it makes use of past values of a variable to explain the present value of another variable. Finally, since Granger causality tests significance levels of variables that are required to be stationary and thus differenced, Granger causality runs from multiple (lagged) differenced series to a single differenced series. Granger causality test results are therefore better understood as a 'short-run' precedence test.

Ultimately, Granger causality tests results in a statistic (distributed as chi-square) and a significance level. A low (<5% or 10%, etc…) significance level results in the rejection of the basic hypothesis that the independent variable does not Granger-cause the dependant variable, thus that is a significant causality between the variables.

At this stage, two Granger causality are of particular interest : (1) Granger causality on the profit equation [5] will allow us to discriminate between variables that help better predict the movements of profits and variables that do not, and (2) Granger causality on the whole 14-variable estimated system, which will allow us to detect which variable is system-wide the most highly caused, and which is the least significantly caused.

(1) which variables improve the forecast of the profits' rate of growth ?

In order to answer this question, we concentrate upon the influences of all the demand variables and leave aside the income variables (whose influence is presented in table 4 and detailed further in part 5). The results of the Granger causality are provided in Table 3 below, which features both the chi-square statistic and its associated probability.

Table 3 – Granger causality tests on the rate of growth of profits

Variable explaining $\Delta \log \Pi$	Chi-square statistic	probability
$\Delta \log C$	19.46	0.04
$\Delta \log I$	11.06	0.13
$\Delta \log G$	12.58	0.08
$\Delta \log X$	29.64	0.00
$\Delta \log M$	19.23	0.00

Results are the following : the rate of growth of profits is better predicted by (all variables in rates of growth) exports in the first position, then imports and consumption *ex-aequo*. The following variables do explain the rate of growth of profits, but quite loosely : government spending moves in line with (and before) profits, and investment is the variable that is the worst predictor of all demand variables (though not very bad in an absolute way)[4].

(2) which variable is the most/least highly caused ?

This question can be assessed by similar Granger causality tests performed on all the equations of the estimated system. We summarize the results in the following Table 4, where each cell represents the probability of a Granger causality running from a row-variable to the every remaining column-variable. Bolded figures indicate significant Granger causality up to the 15% level ; absence of bolding translate into the rejection of such a causality. The 'all' row summarizes the influence (probability) of all variables jointly, and presents the associated chi-square statistic. The last row also features a chi-square (increasing) ordering, with [1] indicating the lowest caused variable and [14] referring to the highly caused variable. Broadly speaking, three groups of variables appear according to their level of causality ; below is a brief outline of remarkable results :

Mostly exogenous/independent/autonomous variables (low ranking) :
[1, 2, 3] : Net interest NI, exports X, imports M and rents R appears the least explained variables. Not surprisingly, they turned out the least explained variables according to precision of fit as measured by the R^2. Again, this is explainable by the fact that those variables are highly sensitive to monetary conditions, which are absent of this model.
[3 *ex aequo*] Compensation of employees W and consumption C. This ranking is somewhat surprising, since one would think of compensation as being firstly determined by production and thus investment. To the contrary, we find that investment is a very poor predictor of compensation ; exports and net interest are the only two highly significant predictors of compensation. The same applies to consumption, who is not significantly caused by compensation, nor is it determined by any type of income. Assuredly, indebtness plays a major hidden role in here. Only trade variables and government spending appear to be good predictors of consumption in this model.

[4] Among the income variables, corporate profits do appear Granger-caused by taxes on production and imports (T_{YMS}) and rents (R) and proprietor's income (PI), but do not appear to be better predicted by net interest NI. Compensation is in between, being a somewhat 'elastic' predictor of profits. This could imply that other household revenues are at play, especially indebtness.

Partly endogenous, partly exogenous variables (middle ranking) :
[7] government spending G and government receipts in the form of taxes on production and imports T_{YMS} appear to be in the middle of the Granger-causality range covered by all variables. This is understandable with reference to the fact that government tax collection is sensitive to the state of the economy (thus to the other variables), and that government spending is more endogenous than previously thought (maybe because of self-imposed budget constraints).

Mostly endogenous/dependent/non-autonomous variables (high ranking)
[10, 11, 14] : Proprietor's income, investment and corporate profits. This ranking is interesting because it is an indication of the fact that those variables are the less autonomous of all fourteen (we already described profits in depth above). Yet the same applies to proprietor's income, which is found to heavily depend on demand variables (except on government spending), as well as compensation and profits (which are two subcategories of proprietor's income). Investment on the other hand, is not better predicted by any demand variable, only highly by compensation, proprietor's income, net interest and rents. Consumption in particular, is not a good predictor of investment at all. What seems to drive investment is on one hand labor income (compensation and proprietor's income), and more surprisingly rental income (rents and net interest) on the other hand. Investment thus appears more linked to income than spending patterns ; equivalently investment can be deemed exogenous *with respect to demand*, which indeed is a surprising result. Interestingly enough, investment seems to be non-related to profits and taxes on production and imports.

Another interesting result stemming out of Table 4 are the significance levels when all variables are included (last row). Except for exports and net interest, all *p-values* are below the 10% level which is an indication of good Granger predictability. Thus all variables are good predictor of all variables, except for the two exceptions mentioned. This reinforces the pertinence of our unrestricted approach, where 'everything may explain everything'.

Finally, Granger causality is not the only type of causality that takes place in the error-correction model. Indeed, our model features several 'common trend' equations associated with deviations from those 'steady-states'. This means that those deviations can also be thought of channels of causality. In other words, a VEC features a 'direct' causal chain assessable through usual Granger causality, and an 'indirect' causal chain through which variables adjust towards or away the 'steady-states'. This latter type of causality can be assessed through the inspection of the significance levels of the adjustment coefficients ($\hat{t}_{\hat{\alpha}}$), as shown in Appendix 2. It turned out that taking those significance levels into account did not alter the above rankings and conclusions.

Table 4 – System-wide Granger causality tests

	explained/dependent variable													
	C	*I*	*G*	*X*	*M*	*CFC*	*IncRoW*	*W*	PI	Π	*NI*	T_{YMS}	*R*	*BTr*
C	---	0,61	0,27	0,39	0,03	0,75	0,24	0,83	**0,05**	**0,04**	0,39	1,00	0,72	0,35
I	0,38	---	0,32	0,31	0,49	**0,02**	**0,16**	0,95	**0,00**	**0,13**	0,26	0,93	0,59	0,28
G	**0,11**	0,58	---	0,84	0,81	0,75	0,36	0,83	0,34	**0,08**	0,83	0,88	0,36	0,69
X	**0,03**	0,24	0,89	---	0,22	0,30	**0,09**	**0,07**	**0,02**	**0,00**	0,87	0,47	0,19	0,75
M	**0,03**	0,20	0,57	0,60	---	**0,15**	**0,13**	0,35	**0,01**	**0,00**	0,99	**0,08**	0,48	0,83
CFC	0,73	0,28	**0,01**	0,93	0,92	---	0,67	0,46	0,40	**0,03**	**0,12**	0,76	0,38	0,28
IncRoW	0,57	0,92	0,48	0,56	0,80	**0,00**	---	0,28	0,22	**0,02**	0,78	0,92	**0,03**	0,30
W	0,89	**0,10**	**0,14**	**0,05**	0,54	**0,05**	**0,03**	---	**0,01**	**0,16**	0,55	0,59	**0,04**	**0,01**
PI	0,48	**0,00**	0,71	0,75	0,47	0,26	0,49	**0,16**	---	**0,00**	0,47	**0,13**	**0,06**	0,48
Π	0,66	0,52	0,91	0,92	0,58	**0,12**	0,43	0,99	**0,00**	---	0,82	0,52	0,77	0,73
NI	0,21	**0,03**	**0,04**	0,69	0,75	**0,06**	0,58	**0,00**	0,67	0,45	---	**0,12**	0,94	**0,14**
T_{YMS}	0,47	0,48	0,28	0,34	0,94	0,25	**0,04**	0,27	0,20	**0,03**	0,28	---	**0,15**	0,63
R	0,67	**0,03**	0,70	0,60	0,61	0,19	0,62	0,18	0,61	**0,04**	0,93	0,73	---	**0,08**
BTr	0,25	0,92	0,63	**0,08**	0,99	**0,01**	**0,01**	0,24	**0,03**	0,84	**0,17**	**0,16**	**0,10**	---
ALL (chi-sq.) [ordering]	**0,05** (113,58) **[3]**	**0,00** (144,93) **[11]**	**0,01** (123,60) **[7]**	0,29 (97,84) [2]	**0,11** (107,65) **[3]**	**0,00** (169,37) **[13]**	**0,00** (141,17) **[11]**	**0,08** (110,53) **[3]**	**0,00** (132,63) **[10]**	**0,00** (175,81) **[14]**	0,85 (77,26) [1]	**0,01** (125,64) **[7]**	**0,08** (110,51) **[3]**	**0,01** (125,33) **[7]**

Note : figures represent Granger-causality probabilities. Low values, like the one put into bold letters, indicate significant causality from a row-varaible to a column variable. Last row presents the results when all variables are included in the explanation of variable Y, say, except for Y itself.

4.2. FEVD : PRESISTENCE, 'LONG RUN' CAUSALITY

As previously noted, Granger causality is a 'short-run' type of causality because it runs from lagged *differenced* variables to present *differenced* variables. Besides that, Granger causality is only based on (fixed) significance levels and does not embody any of the dynamics featured in the model. Another interesting way to assess causality in the present model would thus be tracking in time the persistence of the 'short-run' Granger causal chain. Forecast error variance decomposition, or FEVD can help us determine the evolution of causality through time. Yet just as Granger causality, FEVD requires the researcher to understand fully what particular definition of causality it describes.

The idea behind FEVD is to simulate a shock on the fully-estimated system, realize a forecast of every variable up to some chosen horizon, and then decompose the forecast error in components attributable to each and every variable of the system, at each time horizon. This means that a single variable will have its forecast error variance decomposed into all the variables of the system, including its own. In the end, FEVD results in 100% of a variable *X* being decomposed into fourteen variable influences. Results are therefore interpretable along 'at a *h* quarter horizon, variable *Y* is the variable whose change ('innovation') explains the most variable *X*'s forecast'. Trivially, a variable *X* that is optimally forecast by *its own* innovations does not depend on other variables, thus *X* is the most exogenous variable of the system, and thus is the variable that drives the system. In the end, what's of particular interest is, as for the Granger causality, the answer to two questions : (1) '*what are the profits fluctuations due to ?*' and (2) '*what's the most autonomous/driving variable of the whole system ?*'

Before proceeding to FEVD, a cautionary note is required. Since FEVD is obtained after a (one time) shock is simulated, results of FEVD are dependent upon the order the variables shock the system. In other words, the results would be different should a fluctuation of, say, profit occur first, than should an increase in consumption occur first. The idea to overcome this problem is to use the Granger-ordering found above, since variable ranked [1] is the most independent variable, and thus most likely to evolve than the more dependent variable ranked at number [14].

(1) <u>what are the profits fluctuations attributable to ?</u>

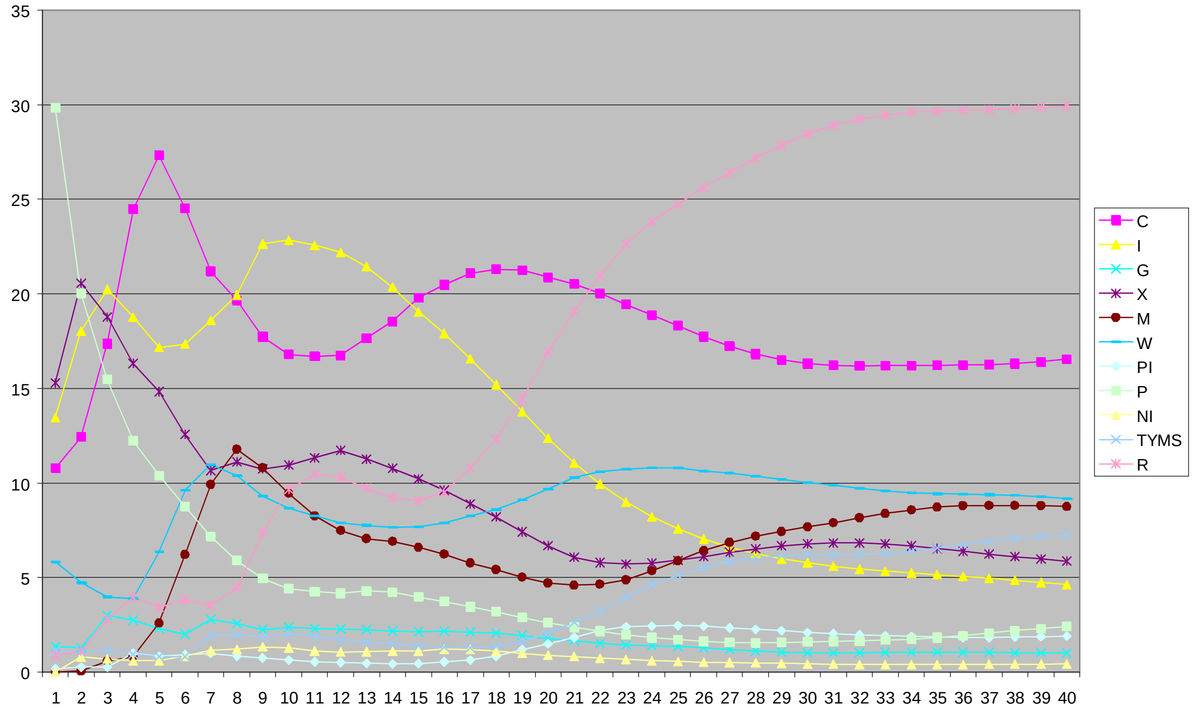
In order to obtain results that are robust to different orderings, we use two different orderings for the FEVD on the profit equation : ordering A is the one derived from Granger causality *system-wide* ([1] through [14] ordering above), and ordering B is derived from Granger causality tests *on the profit equation alone*. Please note that the two orderings make sense, and that the findings should be interpreted as a consensus between the two approaches. We then shock the system according to those two orderings and realize forecasts up to ten years, or 40 quarters. Results are provided on the following two graphs 2A & 2B.

Graph 2A represents the FEVD applied to the profit equation with ordering A. Broadly two results appear :

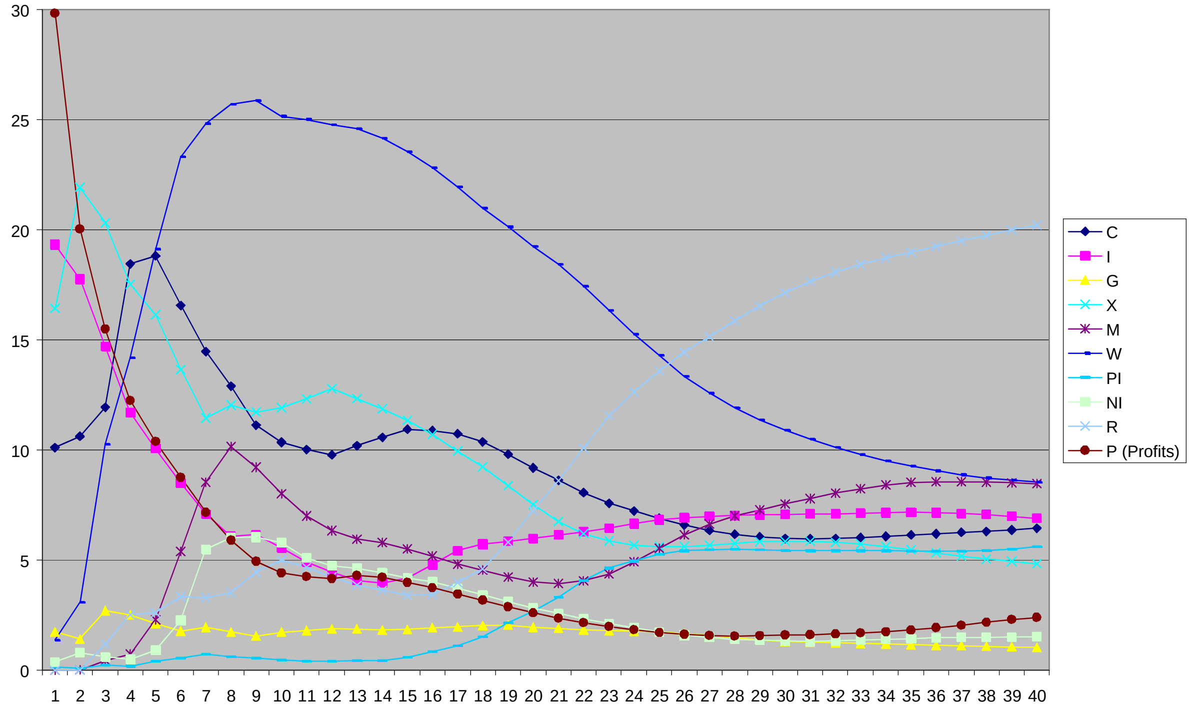
- in the short run (4-5 years after the initial simulated shock) :
  The variance of profits is essentially due to (changes in) consumption, investment, exports and compensation. Past profit values do not explain much of the variance of present profit values, except maybe for a year.
- in the longer run (more than five years) :
  The variance of profits is essentially due to rents and consumption. The other important variables are then compensation and trade. Of particular interest is that investment effect

on profits (yellow line) that decreases quite quickly, which is understandable in the following way : you need constant investment spending to get profits.

Graph 2A – profit FEVD based on *system-wide* Granger ordering



Graph 2B – profit FEVD based on the *profit equation's* Granger ordering



Graph 2B represents the FEVD applied to the profit equation with ordering B[5]. Broadly two results appear :

- in the short run (before six years after the shock), one variable stands out by far as a major determinant of the variance of profits : compensation. Other meaningful variables are the trade variables, investment and consumption
- in the longer run, the same variables are at work. Trade, investment and consumption are as powerful in explaining the variance of profits, but the influence of compensation has faded a lot and has been replaced by rents. Ten years (=40 quarters) after the initial shock took place, 20% of the (forecast error) variance of profits is explained by the evolution of rents.

When results from graphs 2A and 2B are taken together, it stands out that compensation, consumption, investment and trade are the main driving variables behind profits in the short run. Nonetheless over the longer run, it appears that an additional variable plays a considerable role in the determination of profits : rents. All in all, it seems that profits are mostly driven by demand spending in the short run, through compensation/consumption which is consistent with our previous Granger causality findings. But the results also show that in the longer run, functional income distribution comes into play. After a 5-6 years period, there seems to be a *trade-off* since changes in rents show up as the major force determining profits.

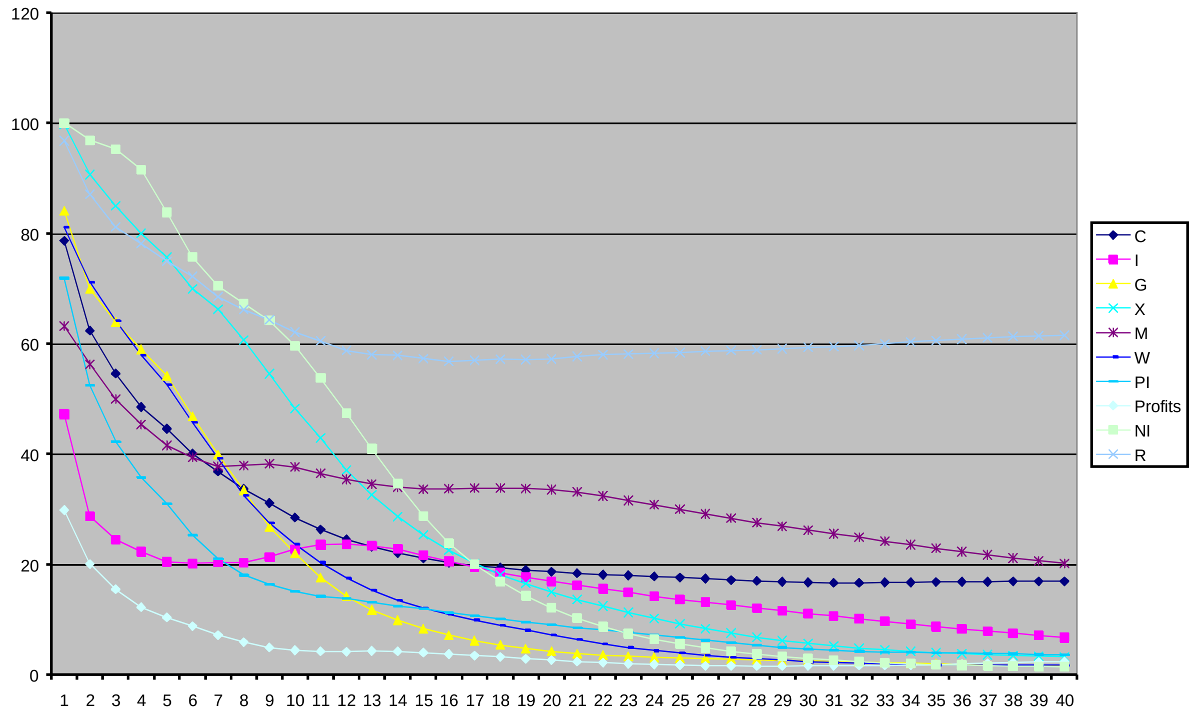
(2) <u>what's the most autonomous/driving variable of the system ?</u>

We so far used FEVD to assess the driving variables of profits alone. Yet this is not the only variable/equation in a highly interelated system. One can also use FEVD to determine which variable is the most exogenous of the system, and build another ranking from the most endogenous variable to the most autonomous. This can be seen through a FEVD of all variables one after another, then capture each variable auto-explanation level. Such a measure is a degree of exogeneity measure, since a variable that depends the most on itself does not depend on other variables and is thus the most autonomous of the system. Graph 3 traces such an auto-explanation 'exogeneity' measure when a one-time shock is simulated at time t=1. Values are computed up to the ten years horizon, and the shock underlying ordering is the one most likely to occur, that derived from Granger causality from [1] to [14].

If one simulates s shock at time t=1, all variables react to it and interact between them. What is striking about Graph 3 is that there does not seem to be a dichotomy between short run and long run results. Broadly speaking, variables that are the most exogenous in the short run are still the most independent at a longer horizon (the only exception being net interest, being among the most exogenous in the run and among the least exogenous in the long run). Besides that, all variables appear to be quite exogenous in the short run (with the exception of profits and investment), and this degree of exogeneity decreases through time, as all variables interact on one another. In the long run, all variables become somewhat endogenous, quite to the same degree. Yet one variable clearly stands out : rents, again. Even after a ten year horizon after the one-time shock, rents still explain about 60% of itself, thus only 40% is explained by the remaining 13 variables. Rental income is by far the most exogenous variable of the system, ever since a four-year horizon.

[5] We checked that the results do not depend upon the place of profits in the initial set of shocks (Graph 1B is when profits are ordered last).

Graph 3 – system-wide FEVD
(percentage of variable Z explained by its own innovations)



Rents have a particular place in this model : 'short-run' Granger causality results give rents a very endogenous role in the short run, and at the same time FEVD results indicate that rents are very exogenous in the longer run. This paradox can be better understood by saying that rental income is an 'adjustment variable' in the short run, but that it does not fluctuate too much in the long run. Thus rents receives the role of the adjusting variable in the short run, at the same time as rents are a major driving force of the system in the long run.

4.3. <u>IMPULSE/RESPONSE FUNCTIONS AND THE WEIGHT OF SHOCKS</u>

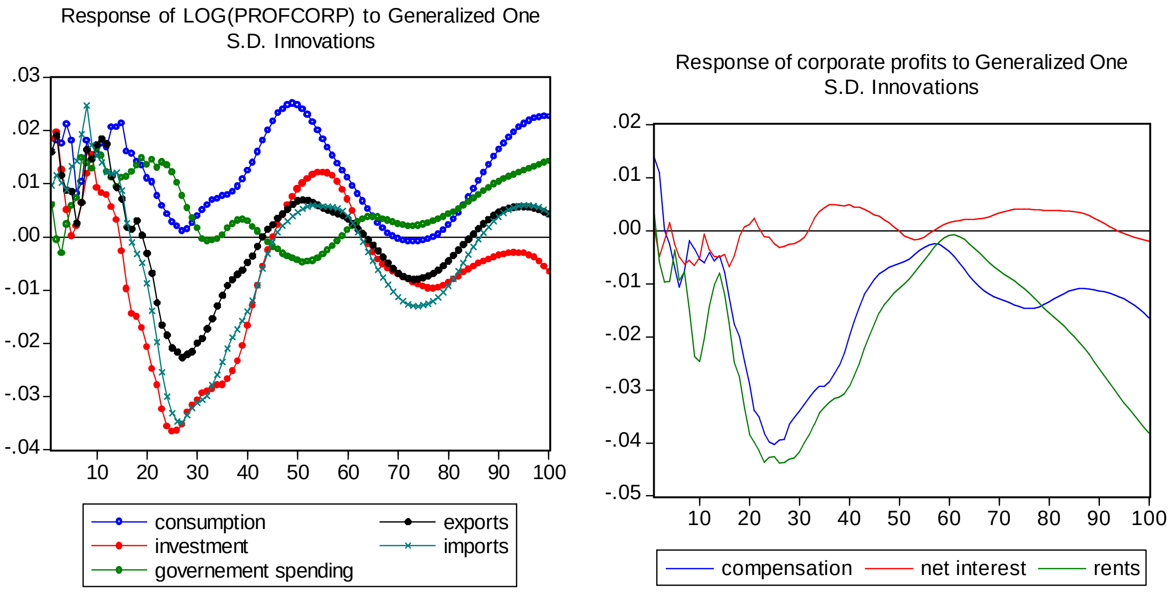
We so far discussed Granger causality which is a qualitative measure of causality, and FEVD which is a quantitative measure of the forecast error variance decomposition. Yet we did not infer about the signs and magnitude of the shocks on the profit equation ; this can be done through the computation of impulse/response functions or IRFs.

The idea behind IRFs is again to simulate a one-time shock on the system. Because of the amount of variables of the system, we will concentrate upon the profit equation again to illustrate the profit paradox. IRFs consists in keeping track of a 'response' variable, here corporate profits, when a shock is simulated on all the variables of the system, including the response variable itself. IRFs thus provide dynamic multipliers, i.e. the sign and magnitude of the evolution of profits conditional on an increase in each variable of the system.

Since a shock has to be simulated, one may think of the same shortcomings of FEVD for example, whose results depend upon the ordering of variables in the shock. A good news is that a recent econometric technique, called generalized impulses (Pesaran & Shin[1998]) provides results that are ordering-independent. Yet a bad news is that IRFs are based upon a *single* one-time shock, not a series of shocks. Thus IRF results are some kind of a ‘though of experiment’ whose results have to be understood as *ceteris paribus* or ‘in the absence of no other shock’.

We simulate a one-time shock on the system by increasing every variable by an arbitrary amount (a unit standard deviation of the variable), and then keep track of the evolution of corporate profits as time increases. Please note that any IRF value represents a ‘spot’ value, and that in order to assess the overall effect of a shock at horizon *h*, on has to accumulate all the dynamic multipliers before quarter *h*. Graph 4 presents such results, but due to the number of variables in the system, results are only provided for variables which have proved so far to be interesting :

Graph 4 – IRFs on the profit equation
(demand variables on the left panel, income variables on the right panel)



Note : The observed oscillations of the IRFs are purely due to complex roots in the system are therefore purely due to the parameters involved.

From the IRF stem out the following results :

- consumption and government spending are the only two variables that positively affect profits.
- Exports and imports exert a relatively neutral effect on profits. The effect of imports on profits is slightly lower than the effect of exports, and both effects are negative,
- Investment is neutral to slightly negative on profits.
- Interest is neutral on profits
- Compensation and especially rents are major drags to profits.

- PART TWO -
The profit paradox holds

Part one brought about the proof of the profit paradox without relying on a theory-biased framework. The absolute generality of the tested equation lies in their pure nature of identity. Denying equation [5] would deny equations [1] and [2] and therefore both the very existence of profits and national accounting itself. The estimated equation [5] cannot be deemed 'keynesian', 'post-keynesian' or whatever. Any other definition of profits, be it rooted into the neoclassical production function or into some neo-ricardian relationship, applying some exogenous share of profit to a given aggregate income, is an a priori ideological one.

5. 'DISCIPLINE' POLICIES DO NOT RAISE PROFITS : THEY SQUEEZE THEM !

5.1. THE CRUICAL ROLE OF CONSUMPTION

Contrary to the dominant conventional wisdom, consumption plays a crucial role in explaining the growth of profits. For the whole period, both in the short term and the long term, its positive impact is much more important than the impact of investment for two reasons :

- first consumption is strongly exogenous (autonomous) while investment is strongly endogenous, like profits. This contradicts the conventional view of an investment driven economy
- second it is true that investment has some positive impact but it fades out very quickly

Consumption being a driving factor of profits, advocating a squeeze of consumption to increase saving is fully contradicting the profit motive. What proves our analysis is that an advanced capitalist economy like the United States is never short of saving while it can be short of consumption, so saving out for thriftiness may be squeezed. Herein lies the objective proof of the inexistence of the so-called natural (potential) growth path which by postulate enshrines the supreme law of thriftiness. All our variables (and therefore the growth rate) are defined relative to their steady-state paths but none is following the neoclassical (or wicksellian) eternal path targeted by disciplinary policies.

On the other side, our results display the existence of a long run negative relationship between employee compensation and profits. How can we reconcile those apparently contradicting outcomes but by relying on the increased reliance of consumption financed through indebtness ? Desired growth of consumption is the leading animal spirit of the system, being so strong that effective growth consumption been more and more independent of the growth of compensation. Such an empirical result sheds light on fundamental characteristics of an advanced capitalist economy :

- Conventional consumption functions, whatever their nature, no more hold
- Wage-earners debt is in the long run substituted for corporate debt as one major source of profits
- Any policy hindering wage-earners growth of indebtness hinders the growth of profits. Inversely, encouraging the growth of wage-earners debt for consumption purposes translates into profit growth.

Herein is the straightforward proof that monetary policy targeting very low and stable interest rates is directly fitting the profits target, which explains the United State's monetary policy since the nineties. Inversely, pursuing a monetary policy of interest rates high enough to squeeze consumption for the sake of zero inflation is directly an anti-profit policy. The present study brings about a proof of interest rates as long as they are the outcome of monetary policy. Interest rates have an impact through consumption and housing, contradicting the conventional view of an investment-driven impact.

5.2. THE POSITIVE IMPACT OF PUBLIC EXPENDITURES

Our findings prove that the growth of public expenditures does not have a negative impact on aggregate profits neither in the short run nor the long run. It could be enough to dismiss the claim for fiscal policies targeting a squeeze of public outlays. Since it is straightforward that taxes cannot raise profits, it is true that targeting a zero deficit (or a surplus) cannot lead to a growth of profits. From our results, it is also fully impossible to deduce an inverse relationship between the growth of investment and the growth of public expenditures. Herein lies the last resort proof of the inexistence of any kind of crowding-out effect.

There is more because public expenditures do have a positive impact on the growth of profits. This effect is weaker than consumption's effect because public expenditures is merely a short run factor of the growth of profits. A possible explanation of that finding is that public expenditures are partly endogenous, and indeed may become more and more endogenous through time like tax collection. Changes in government spending are found to respond to changes in several other variables, which explains why it is not a fully exogenous, thus driving variable. Such an increased endogeneity could also reflect self-imposed constraints for the sake of attaining a mythical long run stable path, as discussed above. In any case, public expenditures do have a much more positive impact on profits than investment has. This alone should be enough to sustain the profit paradox hidden into policies of restraint: such policies themselves contribute to the drain of profits.

Our answer to the first question asked in the introduction : 'what are the factual determinants of profits, and what are the most important ?' can be summed up as follows :

- Pursuing both fiscal policy of squeeze and monetary policy of squeeze leads to a collapse of profits
- Pursuing a fiscal policy of restraint hinders the profits motive as long as it is not matched by a strong growth of indebtness-financed consumption allowed for by a fully expansionist monetary policy. This case appears to have been the one relevant to the explanation of the clintonomics of the second half of the nineties.
- The most efficient case for the profit motive is to pursue simultaneously an expansionist fiscal policy and un expansionist monetary policy. This being true of course, up until some satisfying low-unemployment equilibrium is found.

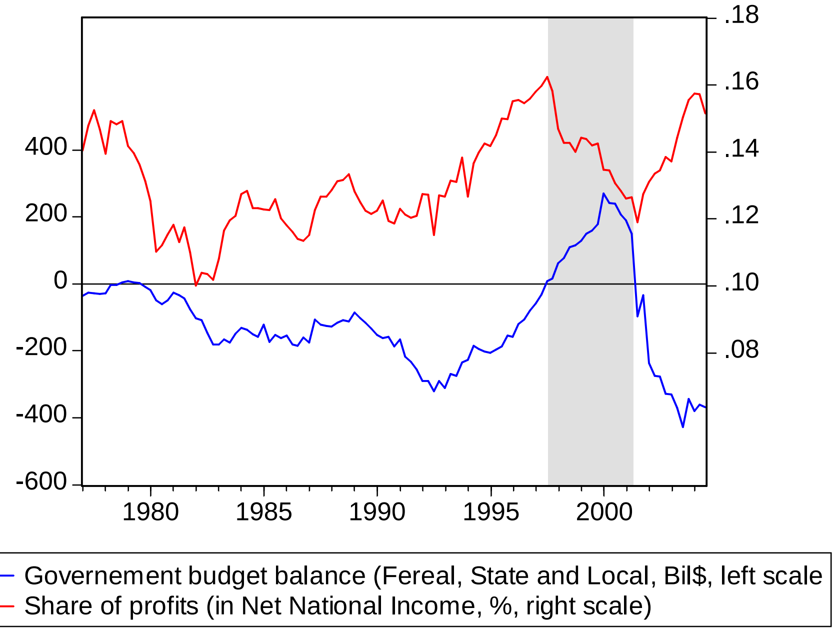
5.3. IS THERE A SHARE OF PROFIT MOTIVE SUPPORTING THE PARADOX ?

This section addresses the second question raised in the introduction, namely 'would a policy-implied growth of aggregate demand engineer a fall in the share of profits below some required level ?' To answer this question, we first provide the factual data of the government deficit and the share of profits (as defined in section I.1 above), drawn together on graph 5.

As mentioned earlier there seems to be some degree of persistence in the behavior of the distributed shares. As for the profit share, we mentioned earlier that it remained roughly unchanged until 1966 and decreased until 1982. In this section we are most interested in the behavior of the share of profits since that time, that is a rise from about 10% in 1982 to about

15% in 2004 (a 50% increase). An interesting pattern emerging from graph 5 is that government balance and aggregate profits exhibit a strong, positive correlation through time.

Graph 5 – Share of profits and government budget balance, 1977-2004



Note : Share of profits is gross of corporate income taxes as defined in section I.1 above. Government balance data encompasses the federal, state and local levels and is provided by the Federal Reserve Board Flow of Funds, Table F.106.C.

A decrease in government budget balance (1978-82, 1989-92) is associated with a decrease in the share of profits, and a reduction of government's deficit is associated with a rise in the share of profits (1992-97). Yet this is not always the case : the share of profits is falling as soon as the deficit transformed into huge surpluses and historically low unemployment (1997-2001). Thus full-employment and surpluses are a drag to the share of profits. From 2001 to 2004, the pattern observed in our previous econometric analysis emerges again.

Please remember from Table 4 our finding that government spending Granger-causes profits, but the contrary is not true, and that demand-variables influence profit the most. Thus apart from short-run movements, what we observe on the previous graph is fully in line with our previous econometric findings. For example the 1977-90 period clearly shows that recurrent and even greater deficits allow the restoration in the share of profits. This is even better seen from 1997 to 2001 when surpluses lead to a fall in the share of profits, and from 2001 to 2004 when the return to deficits turns into a restoration of the share of profits.

This could be enough to prove that expansionist policies did not impose a drop in the share of profits, but instead that government spending and deficit significantly influence positively the share of profits. Therefore expansionist policies do not contradict a share of profits motive (SOPM) if it exists at all.

How can we interpret the observed rise in the share of profits since the eighties ? Such a rise originates from either a profits' growth higher than other incomes', or from a lower growth of other incomes relative to profits' growth. What other type of income had to be adjusted to account for the rise of profits ? From graphs 1 and 4, we see that the wage share did not vary by much from the early 1980s, but that the rent share (possibly including interest) varied a lot. This finding is in line with our finding that net interest (in the short run) and rents (in the longer run) are two types of income which significantly drive profits (see graphs 2A and 2B of section 4.2). The formidable increase in the rental share observed on graph 1 in 1978-1982 significantly reduced (graph 4) the share of profits (graph 5). Thus rental income, being the most exogenous variable of our system at least in the long run, is inversely related to profits. When the share of rental income (rents plus interest) began to decrease since 1982, profits began to rise. Please note that the change in rental income affects primarily profits, since the wage share remains roughly constant. All our results thus lead to exhibit some sort of trade-off between more profits or more rents. The lowering of interest rates since the early 80s thus translated into more profits *because* rental income was on the decline.

In addition to rental income, we already mentioned the effect of aggregate compensation on profits. Our findings point out a negative relationship from compensation to profits. But since the 80s-onwards period is better characterized (1) by increased household indebtness and (2) moderate wage increases, both effects have jointly contributed to the rise of profits and the profit share. This finding, again, perfectly fits our previous emphasis on non-income-financed growth of consumption in the generation of profits.

Conclusion : The profit paradox holds because profits are demand-driven. 'Discipline should be a result rather than a means.

Profits are far from autonomous ; (short-run) Granger causality tests results in their endogeneity, and ('long run') FEVD conlsudes in their high degree of endogeneity as well. Even if they are a significant variable of the system, *profits are better understood as the result of the behavior of all other variables in the system*. There might be some degree of autonomy in the very short run, as illustrated by the system-wide FEVD, but *in the short run profits are also very well predicted by demand-variables, especially consumption, trade and government spending*. This short-run autonomy of profits can be explained by the willingness of executive boards to maintain some value for profits ; since it does not prevail in the long run, this may be called inertia, or 'short-run share of profit motive'.

Over the long run nonetheless, our results conclude in the direction of the fact that no inertia or 'share of profit motive' prevails. Of particular interest is that in the long run, profits seem mostly affected by another type of income : rents. Thus *the demand-driven profits observed in the short-run turn into a 'distribution conflict' over the longer run*.

Yet our study draws other conclusions too concerning profits. Three variables stem out in the present study of the behavior of profits. The first two are consumption and government spending, which have proved to be effective (Granger sense) predictor of profits in the short run and the long run, and they are positively related to profits (IRF sense). The third important variable are trade variables, since both exports and imports have proved effective predictors of profits, but the magnitude of the influence is not very large. All in all, demand variables are always very important in explaining the behavior of profits.

One final note should be made about the place of investment in this study. Just like profits, investment turned out very much influenced by the remaining variables, and is thus far to be autonomous. Investment has not proved to be an excellent predictor of profits, except maybe in the short run (conflicting results concerning the role of investment emerge from graphs 1A and 1B). Among short run investment determinants, one may mention only income-variables all predicting well investment *with the notable exception of profits*. Those findings about investment, alone, should be subject of future research.

In the meantime, a general conclusion emerges from all the tools used in this study. 'Discipline' policies are doomed to fail as long as the desirable goal of a balanced budget is understood with reference to supply factors only. Introducing demand factors in the analysis, we conclude, shows that *balancing the budget should be the result, not the means*, towards prosperity.

Appendix 1 – NIPA definitions

The 'guide to the NIPAs' available on the BEA's website presents NIPA definitions of the different aggregates used in this study. It reads as follows :

C : Personal Consumption Expenditures (PCE) are goods and services purchased by U.S. residents. PCE consists mainly of purchases of new goods and of services by individuals from private business. In addition, PCE includes purchases of new goods and of services by nonprofit institutions (including compensation of employees), net purchases of used goods by individuals and nonprofit institutions, and purchases abroad of goods and services by U.S. residents. PCE also includes purchases of certain goods and services provided by general government and government enterprises, such as tuition payments for higher education, charges for medical care, and charges for water and other sanitary services. Finally, PCE includes imputed purchases that keep PCE invariant to changes in the way that certain activities are carried out—for example, whether housing is rented or owned, whether financial services are explicitly charged, or whether employees are paid in cash or in kind.

I : Gross Private Domestic Investment (GPDI) consists of *fixed investment* and *change in private inventories*. Fixed investment consists of both *nonresidential* fixed investment and *residential* fixed investment. It is measured without a deduction for CFC and includes replacements and additions to the capital stock. It covers all investment in fixed assets by private businesses and by nonprofit institutions in the United States, regardless of whether the fixed asset is owned by U.S. residents. (Purchases of the same types of equipment, software, and structures by government agencies are included in government gross investment.) It excludes investment by U.S. residents in other countries. *Nonresidential fixed investment* consists of both *structures* and *equipment and software.*
Nonresidential structures consists of new construction (including own-account production), improvements to existing structures, expenditures on new nonresidential mobile structures, brokers' commissions on sales of structures, and net purchases of used structures by private business and by nonprofit institutions from government agencies New construction includes hotels and motels and mining exploration, shafts, and wells. Nonresidential structures also include equipment considered to be an integral part of a structure, such as plumbing, heating, and electrical systems. *Equipment and software* consists of purchases by private business and by nonprofit institutions on capital account of new machinery, equipment, furniture, vehicles, and computer software; dealers' margins on sales of used equipment to business and to nonprofit institutions; and net purchases of used equipment from government agencies, from persons, and from the rest of the world. Own-account production of computer software is also included. For equipment that is purchased for both business and personal use (for example, motor vehicles), the personal-use portion is included in PCE.
Residential fixed investment consists of all private residential structures and of residential equipment that is owned by landlords and rented to tenants. Residential structures consists of new construction of permanent-site single-family and multifamily units, improvements (additions, alterations, and major structural replacements) to housing units, expenditures on manufactured homes, brokers' commissions on the sale of residential property, and net purchases of used structures from government agencies. Residential structures include some types of equipment that are built into the structure, such as eating and air-conditioning equipment.
Change in private inventories is the change in the physical volume of inventories owned by private business, valued in average prices of the period. It differs from the change in the book value of inventories reported by most business; the difference is the *inventory valuation adjustment.*

X_{net} : Net Exports of Goods and Services. is *exports* less *imports* of goods and services. Income receipts and payments and transfer payments to the rest of the world (net) are excluded.

G : **Government consumption expenditures and gross investment**, the measure of government-sector final demand, consists of two major components: *Current consumption expenditures* by general government, and *gross investment* by both general government and government enterprises.

Consumption expenditures consists of compensation of general government employees (except own-account investment), consumption of general government fixed capital, and net current purchases from business and from the rest of the world. Consumption expenditures also include changes in inventories and net purchases of used goods. Current receipts for certain goods and services provided by general government agencies—primarily tuition payments for higher education and charges for medical care—are defined as government sales, which are treated as deductions from government consumption expenditures. Gross investment consists of purchases of new structures and of equipment and software by both general government and government enterprises, net purchases of used structures and equipment, and own-account production of structures and of software. Government consumption expenditures and gross investment does not include current transactions of government enterprises, transfer payments, interest paid or received by government, subsidies, or transactions in financial assets and nonproduced assets such as land.

W : Compensation of employees is the income accruing to employees as remuneration for their work. It is the sum of wage and salary accruals and of supplements to wages and salaries.
Wage and salary accruals consists of the monetary remuneration of employees, including the compensation of corporate officers; commissions, tips, and bonuses; voluntary employee contributions to certain deferred compensation plans, such as 401(k) plans; employee gains from exercising nonqualified stock options; and receipts in kind that represent income. Wage and salary accruals consist of *disbursements* and *wage accruals less disbursements*. Disbursements is wages and salaries as just defined except that retroactive wage payments are recorded when paid rather than when earned. Accruals less disbursements is the difference between wages earned, or accrued, and wages paid, or disbursed. In the NIPA's, wages accrued is the measure used for national income, and wages disbursed is the measure used for personal income.
Supplements to wages and salaries consist of employer contributions for social insurance and of other labor income. *Employer contributions for social insurance* consists of employer payments under the following Federal Government and State and local government programs: Old-age, survivors, and disability insurance (social security); hospital insurance; unemployment insurance; railroad retirement; pension benefit guaranty; veterans life insurance; publicly administered workers' compensation; military medical insurance; and temporary disability insurance. *Other labor income* consists of employer payments (including payments in kind) to private pension and profit-sharing plans, publicly administered government employee retirement plans, private group health and life insurance plans, privately administered workers' compensation plans, supplemental unemployment benefit plans, and several minor categories of employee compensation (including judicial fees to jurors and witnesses, compensation of prison inmates, and marriage fees to justices of the peace).

PI : Proprietors' income (with inventory valuation and capital consumption adjustments) is the current production income (including income in kind) of sole proprietorships and partnerships and of tax-exempt cooperatives. The imputed net rental income of owner-occupants of farm dwellings is included; the imputed net rental income of owner-occupants of nonfarm dwellings is included in rental income of persons. Proprietors' income excludes dividends and monetary interest received by nonfinancial business and rental income received by persons not primarily engaged in the real estate business; these incomes are included in dividends, net interest, and rental income of persons.

R : Rental income of persons (with capital consumption adjustment) is the net current-production income of persons (except those primarily engaged in the real estate business) from the rental of real property, the imputed net rental income of owner-occupants of nonfarm dwellings, and the royalties received by persons from patents, copyrights, and rights to natural resources.

Π : **Corporate profits (with inventory valuation and capital consumption adjustments)** is the net current production income of organizations treated as corporations in the NIPAs. These organizations consist of all entities required to file Federal corporate tax returns, including mutual financial institutions and cooperatives subject to Federal income tax, private non-insured pension funds, nonprofit institutions that primarily serve business, Federal Reserve banks, and federally sponsored credit agencies. With several differences, this income is measured as receipts less expenses as defined

in Federal tax law. Among these differences are the following: Receipts exclude capital gains and dividends received, expenses exclude depletion and capital losses and losses resulting from bad debts, inventory withdrawals are valued at replacement cost, and depreciation is on a consistent accounting basis and is valued at replacement cost using depreciation profiles based on empirical evidence on used-asset prices that generally suggest a geometric pattern of price declines. Because national income is defined as the income of U.S. residents, its profits component includes income earned abroad by U.S. corporations and excludes income earned in the United States by the rest of the world.
Profits before tax is the income of organizations treated as corporations in the NIPA's except that it reflects the inventory-accounting and depreciation accounting practices used for Federal income tax returns. It consists of profits tax liability, dividends, and undistributed corporate profits.
Profits tax liability is the sum of Federal, State, and local government income taxes on all income subject to taxes; this income includes capital gains and other income excluded from profits before tax. The taxes are measured on an accrual basis, net of applicable tax credits.
Profits after tax is profits before tax less profits tax liability. It consists of dividends and undistributed corporate profits.
Dividends is payments in cash or other assets, excluding the corporations' own stock, that are made by corporations located in the United States and abroad to stockholders who are U.S. residents. The payments are measured net of dividends received by U.S. corporations. Dividends paid to State and local governments are included. *Undistributed profits* is corporate profits after tax less dividends. *Inventory valuation adjustment* (IVA) is the difference between the cost of inventory withdrawals valued at acquisition cost and the cost of inventory withdrawals valued at replacement cost. The IVA is needed because inventories as reported by business are often charged to cost of sales (that is, withdrawn) at their acquisition (historical) cost rather than at their replacement cost (the concept underlying the NIPAs). As prices change, businesses that value inventory withdrawals at acquisition cost may realize profits or losses. Inventory profits, a capital-gains-like element in business income (corporate profits and nonfarm proprietors' income), result from an increase in inventory prices, and inventory losses, a capital-loss-like element, result from a decrease in inventory prices. In the NIPAs, inventory profits or losses are shown as adjustments to business income; that is, they are shown as the IVA with the sign reversed. No adjustment is needed to farm proprietors' income because farm inventories are measured on a current-market-cost basis.

NI : Net interest is the interest paid by private business less the interest received by private business, plus the interest received from the rest of the world less the interest paid to the rest of the world. Interest payments on mortgage and home improvement loans and on home equity loans are included in interest paid by business because home ownership is treated as a business in the NIPA's. Interest received by private non-insured pension plans is recorded as being directly received by persons in personal income (see below). In addition to monetary interest, net interest includes imputed interest, which is paid by corporate financial business. For regulated investment companies, imputed interest is measured as operating expenses. For depository institutions and life insurance carriers, imputed interest is measured as the difference between the property income received on depositors' or policyholders' funds and the amount of property income paid out explicitly. The imputed interest paid by life insurance carriers attributes their investment income to persons in the period it is earned. The imputed interest payments by financial intermediaries (other than life insurance carriers) to persons, governments, and to the rest of the world have imputed service charges as counterentries in GDP and in income payments to the rest of the world; these charges are included in PCE, in government consumption expenditures and gross investment, and in exports of goods and services, respectively.

BTr : ***Business transfer payments*** consists of payments *to persons* and *to the rest of the world* by private business for which no current services are performed. Business transfer payments to persons consist primarily of liability payments for personal injury and of corporate gifts to nonprofit institutions. Business transfer payments to the rest of the world consists of nonresident taxes—that is, taxes paid by domestic corporations to foreign governments.

T_{YMS} : Taxes on production and imports consists of (1) tax liabilities that are chargeable to business expense in the calculation of profit-type incomes and (2) certain other business liabilities to general government agencies that are treated like taxes. Indirect business taxes includes taxes on sales, property, and production. Employer contributions for social insurance are not included. Taxes on corporate incomes are also not included; these taxes cannot be calculated until profits are known, and in that sense, they are not a business expense. Nontaxes includes regulatory and inspection fees, special assessments, fines and forfeitures, rents and royalties, and donations. Nontaxes generally excludes business purchases from general government agencies of goods and services that are similar to those provided by the private sector. Government current receipts from the sales of such products are netted against government consumption expenditures.

GES : Subsidies less current surplus of government enterprises is the monetary grants paid by government agencies to private business and to government enterprises at another level of government. The *current surplus of government enterprises* is their current operating revenue and subsidies received from other levels of government less their current expenses. In the calculation of their current surplus, no deduction is made for net interest paid. The current surplus of government enterprises is not counted as a profit type income, and therefore, it is not counted as a factor charge. Subsidies and current surplus are shown as a combined entry because deficits incurred by some government enterprises may result from selling goods to business at below-market prices in lieu of giving them subsidies.

CFC : Consumption of fixed capital is the charge for the using up of private and government fixed capital located in the United States. It is defined as the decline in the value of the stock of assets due to wear and tear, obsolescence, accidental damage, and aging. For most types of assets, estimates of CFC are based on geometric depreciation patterns; empirical studies on the prices of used equipment and structures in resale markets have concluded that a geometric pattern of depreciation is appropriate for most types of assets. For general government and for nonprofit institutions that primarily serve individuals, CFC is recorded in government consumption expenditures and in PCE, respectively, as a partial measure of the value of the current services of the fixed assets owned and used by these entities. *Private capital consumption allowances* consists of tax-return-based depreciation charges for corporations and nonfarm proprietorships and of historical-cost depreciation (calculated by BEA, using a geometric pattern of price declines) for farm proprietorships, rental income of persons, and nonprofit institutions. *Private capital consumption adjustment* is the difference between private capital consumption allowances and private CFC.

IncRoW : Income receipts from the rest of the world consists of receipts by U.S. residents of foreign interest and dividends, of reinvested earnings of foreign affiliates of U.S. corporations, and of compensation paid to U.S. residents by foreigners. *Income payments to the rest of the world* consists of payments to foreign residents of U.S. interest and dividends, of reinvested earnings of U.S. affiliates of foreign corporations, and of compensation paid to foreigners by U.S. residents.

Appendix 2 – Further comments on VECs.

Let us first recall the general representation of a VEC model containing $X_t=(x_{1t},\ldots,x_{nt})$ I(1) variables indexed in time :

$$VEC(k): \quad \Delta X_t = \underbrace{\underbrace{\alpha.\beta'}_{\Pi}.X_{t-1}}_{long-run} + \underbrace{\sum_{i=1}^{k-1}\Gamma.\Delta X_{t-i}}_{short-run} + \underbrace{\mu_0 + \mu_1.t}_{\substack{deterministic \\ component}} + \underbrace{\Phi D_t}_{\substack{exogenous \\ regressors}} + \underbrace{\varepsilon_t}_{\substack{gaussian \\ errors}}$$

where k is the number of past values of each (differenced) variable used to explain the dependant variable, α is a $r*n$ matrix of coefficient loadings to the cointegrating relations (r being the rank of matrix Π), β' contains $r*n$ the 'long-run' or 'steady-state' coefficients, Γ is the 'short-run' or 'differences' coefficient matrix, D_t is a set of exogenous variables (not discussed here) and ε_t is a set of Gaussian errors.

The rest of this appendix provides an intuitive interpretation of the cointegrating relationships as well as the two tests measuring their number, presents and discusses the adjustment loadings, and introduces the five cases types of deterministic component.

First, $\beta' x_{t-1}$ are (is) the cointegrating relation(s), that is the relationship(s) that links all variables. Those cointegrating relationships are also called common trends, since they are interpretable as the common forces that bound *all* variables at the same time. This is (these are) cointegrating relationships in the sense that some linear combinations of the series, which are I(1), become I(0), thus fulfilling the stationarity requirements of efficient estimation. The coefficients of such stationary linear combinations are piled into the β' matrix.

Yet the number of such cointegrating relationships remains to be estimated, i.e. we do not know how many different forces drive all the variables. Johansen provides two tests, the trace test and the maximum eigenvalue test, to test for the number of cointegrating relationships. This number is therefore the number of relationships that bound variables. Please note that the asymptotic critical values of those tests crucially depend (1) on whether or not a set of exogenous regressors is present (D_t) and (2) on the deterministic specification of the cointegrating relationships the researcher chooses (μ_0, μ_1, see below). Note also that there may not be any significant cointegration between the variables.

Second, once those cointegrating relationships or 'long-run', 'steady-state' relationships are estimated, they enter the error-correction part of the model. Those relationships are stationary around the deterministic part of the model and there exists deviations from the trend/constant (see more below). Such deviations are interpreted as errors, which explain every variable of the system. For example, let us think of a system composed of only two variables, say GDP and consumption. Since there are only two variables, there can be at most one cointegrating relationship. Since the share of consumption in GDP is roughly stable, one can think of a common force, or cointegrating relationship, which drive *both* variables. In practice such a cointegrating relationship exists and *roughly* represents the share of consumption of GDP through time, scaled to revert around a trend or a constant. Johansen proves that there exists a representation in which those deviations from the 'steady-state' explain every variable in the system. Doing so, we explain both variables as a function of the share of consumption in GDP ; intuitively, if at some point in time we are below the 'steady-state' or 'long-run' value of the share of consumption in GDP, one of the two variables will have to move in such a way as to restore the 'long-run' value of that ratio. For example, in a time characterized by a below-average consumption-GDP ratio, consumption is likely to increase to restore the long-run value of that ratio. The magnitude of this adjustment of the variables is captured in the α coefficients, which are termed 'adjustment coefficients' after Johansen. Please note that those adjustment coefficients need not be all individually or jointly significant ; a system may come out estimated with non-error-correcting variables, or with variables that error-correct in the wrong direction (variables push the process further away equilibrium each time a maladjustment occurs).

Third, as mentioned above the deterministic component of the model is an important choice because it has clear implications for estimation. In the general model above, we specify the deterministc components as $\mu_0 := \alpha\beta_0 + \gamma_0$ and $\mu_1 := \alpha\beta_1 + \gamma_1$. Five cases arise from there on, ranging from a significant quadratic trend in the data to no trend and no constant in the data.

Case 5 : no restriction on μ_0, μ_1 implies that there is a quadratic trend in the data, or equivalently that the growth rates follow a timely trend.

Case 4 : $\gamma_1 = 0$ implies that **t**here is a linear trend in the data, and this trend does not cancels out in the cointegrating relationships. Thus the cointegrating relationships contain a significant trend, but the rest of the model (the error-correction part) does not contain any trend and features a constant only. This case appears to be a good one, albeit needs to be tested for, since (1) our variables appear to broadly follow a trend (see unit root tests), and (2) this case is particularly suitable for trend-stationary variables as corporate profits is (see unit root tests again).

Case 3 : $\mu_1 = 0$ implies that there is a linear trend in the data and it does cancel out in the cointegrating relationship. This case may be the one of choice if the trending series feature a trend that cancels out in the cointegrating relationship. In that case the constant is unrestricted and may belong either to the cointegration space or to the error-correction part of the model.

Case 2 : $\mu_1 = 0, \gamma_0 = 0$ but $\beta_0 \neq 0$ implies that there are no linear trends in the data, and the constant is restricted to lie in the cointegration space. This case may be good if the trends we observed earlier on were spurious trends.

Case 1 : $\mu_1 = 0, \mu_0 = 0$ implies that there is no deterministic component in the data. This would imply that the cointegrating relationship has zero mean, which is a bad choice since the data does not start from zero in 1954:1.

Please note that Johansen's classic five cases are all nested into one another, case four being a restricted version of case five, etc… The appropriate method is therefore to start with an assumption of case five, test for the presence of a quadratic trend in the data (*via* a LM test), and if rejected, carry on the analysis with case four. Such a method avoids the annoying pitfall of VECs which states that 'the deterministic component is an assumption of the researcher'.