Profits encourage investment, investment dampens profits, and government spending has little effect — Business-cycle dynamics in the US, 1929-2013

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Abstract — In the context of theories of the business cycle it is often said that investment is autonomous and leads the cycle, since it is not determined by other variables. An opposing view is that investment actually depends on past profitability. A third view is that government spending is key to pump-prime the economy by stimulating private investment. This paper uses these three ideas as hypotheses to be tested against annual data of the US economy between 1929 and 2013. Data show that (a) investment is not autonomous, profits raise future investment; (b) investment tend to decrease future profits; and (c) little evidence is found that government spending may stimulate future investment and in this way may pump-prime the economy. The two basic regularities shown by the data, that a change in profits tends to be followed next year by a change in investment in the same direction, and that a change in investment is usually followed in the next few years by changes in profits in the opposite direction, are sufficient to generate the cycle. Considering the results, the "regularity" of the business cycle, and the fact that profits stagnated in 2013 and declined in 2014 after growing between 2008 and 2012, it can be concluded with some confidence that a recession of the US economy, which will be also part of a world economic crisis like the Great Recession, will occur in the next few years.

1. Introduction

It is a common view in economics that the market economy has a built-in ability to balance itself toward equilibrium. If that is so, business cycles, oscillations of the economy

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between prosperous business conditions and crisis, between expansion and recession, would be just manifestations of the reaction of the system to exogenous events, such as injudicious actions of governments or central bankers [1], spikes in oil prices due to a variety of factors [2,3], idiosyncratic events impacting big firms [4], or other undefined "shocks." Versus this vision in which economic disturbances have *exogenous* causes, there is the opposite view that the business cycle is an *endogenous* phenomenon determined by the inner workings of the market economy. In this view the system would be kind of unstable and prone to periods in which factors of production are unemployed.

In economic theories that conceptualize the boom-and-bust cycle as an endogenous phenomenon of capitalism, three monetary aggregates, investment, profits and government spending, are basic macroeconomic variables to explain the dynamics of the economy, its movements toward expansion or contraction. A major component in some of these theories is the idea that investment is autonomous and responds basically to relative confidence in the prospects of businesses, to "animal spirits", so that present profits are determined by current investment and investment in the near past [5-9]. An alternative, older view, is that investment depends on profitability, so that movements in investment respond to previous movements in profits [10-13]. Finally, an idea which since long ago has been ground for unending political infighting is that by prime-pumping the private economy, government spending is able to stabilize the economy and keep it growing. This paper is an attempt to test empirically these ideas by examining how good each of them is to explain annual data of the US economy in the period 1929-2013. Each of the three aforementioned ideas is used as a hypothesis to explain the data. The first two hypotheses represent opposite views of causation. In the first one investment is as an autonomous variable leading the cycle and thus determining profits, while in the opposing hypothesis, the second one, causation goes the other way around, with profits determining investment. The third hypothesis, that government spending has a key role in pump-priming the economy, is not directly related with the other two, though usually appears coupled with the idea that investment is autonomous, so that, as Hyman Minsky

put it, "investment and government spending call the tune for our economy because they are not determined by how the economy is now working. They are determined either from outside by policy (government spending) or by today's views about the future (private investment)" [9] (p. 184)

In summary, the results of the statistical analysis in this paper provide strong evidence against the first hypothesis, very strong evidence in favor of the second hypothesis, and almost no evidence in favor of the third. Data show that investment is not autonomous, but strongly dependent on past profits, and except in a sample in which government spending seems to stimulate gross investment but not business investment, higher government spending in the past is not associated with increased private investment in the present.

The rest of the paper presents the data and descriptive statistics in sections 2 and 3, the statistical methods and the results of the analysis in sections 4 and 5, and a general discussion of the results in section 6. Concluding remarks are presented in section 7

2. Data

Data used for the analyses are annual statistics of the US economy, available from the National Income and Product Accounts (NIPA) for the years 1929-2013 [14]. Though annual data allow for less statistical power than quarterly data, they can be normalized easily as percentages of national product without cumbersome seasonal adjustments.[2] Furthermore, while quarterly data for major components of NIPA are only available from 1947, quarterly data are available from 1929.

I examine data on investment, profits and government spending because these three monetary aggregates have been considered since long as basic macroeconomic variables to describe and to understand the business cycle. It is an old opinion that theories that

[2] I use gross national product (GNP), gross domestic product (GDP) and national product as equivalent terms. Computationally I arbitrarily choose GNP as denominator to normalize business cycle variables. For the 75 year sample 1929-2013, annual GNP is always greater that GNP, on average 0.6% greater, with the maximum difference, 1.6%, in 2011. Thus all results would be basically identical using GDP to normalize the data.

attribute business cycles to underconsumption have a scientific standard quite lower than other theories of the business cycle [15]. Indeed, a basic criticism of underconsumption explanations is that they neglect the elementary fact that inadequacy of wages "to buy the whole product at cost-covering prices would not prevent hitchless production in response to the demand of non-wage earners either for 'luxury' goods or for investment" [16] (p. 740). Considering NIPA data for 1929-2013, the mean shares in national product are 63.8% for consumption expenditure, 15.4% for gross private domestic investment, and 10.7% for private fixed nonresidential domestic investment, but the coefficients of variation for these three variables are respectively 9.3%, 25.9% and 23.7%. Thus the variability of investment is much greater than the variability of consumption. The consumption share in national product grew during the Great Recession since it was 66.8% in 2007 and rose to 67.3% in 2010. Contrarily private fixed nonresidential domestic investment dropped from 13.2% in 2007 to 10.9% in 2010. In general, data from recent decades are consistent with what Wesley Mitchell wrote six decades ago, that in spite that investment spending, that is spending in capital goods "form less than 18% of the gross national product, their output is subject to such violent alternations (...) that this minor segment of the economy contributes 44% of the total cyclical fluctuation in output, and nearly half of the cyclical declines" [17] (p. 153). For all these reasons I focus on investment and do not examine data on consumption in this paper.

Unemployment rates and wages have a major role in business cycles as interconnected factors that may influence consumption and profits. Indeed too high wages have been recurrently mentioned as cause of recessions [18,19] and conditions of almost full or full employment were also considered as leading to labor shortages that push wages up and generate a profit squeeze which would trigger the recession [20,21]. The effect of unemployment and lower wages on the economy at large would be through two pathways, one depressing consumption and thus pushing toward recession and another one rising profits and favoring expansion. Since the first effect would be mediated by consumption and

the second effect would be mediated by profits, I do not examine here independent effects of unemployment and wages.

As measures of investment I examine both gross private domestic investment and a subset of it, private fixed non-residential domestic investment. Gross private domestic investment includes expenditures by firms on capital goods such as machinery and buildings, residential expenditures on residential structures and equipment, and changes in inventories. Private fixed investment measures spending by private businesses, non-profit institutions, and households on fixed assets, that is, structures, equipment, and intellectual property products that are used in the production of goods and services. Since in the NIPA framework residential structures used for housing by individuals or families are viewed as businesses, so that a house occupied by her owner is considered as rendering a flow of income to her, excluding residential expenditure produces a measure of investment more indicative of the creation or improvement of productive assets, or the replacement of worn out or obsolete means of production. In other terms, while private fixed non-residential investment is used here as an index of the formation of capital and thus the willingness of business and money owners to expand the production capacity, gross private domestic investment is also used in the analysis to test the sensitivity of the results to using a more inclusive measurement of investment that includes expenditure that many authors would conceptualize as consumption spending. To avoid using long terms, I will abbreviate gross private domestic investment to "gross investment" and private fixed non-residential domestic investment to "business investment."

Corporate profits are reported in NIPA before and after taxes, and since these two categories may be differently related to other variables, both are used in the analyses. Though profits of all industries are used in the main analysis NIPA data also include corporate profits, before and after taxes, for domestic industries. On average, for the 86 year period 1929-2014, corporate profits before taxes of domestic industries are 90.2% of all corporate profits before taxes, and for the 85 year period 1929-2013, corporate profits after taxes are on average 85.4% of all corporate profits after taxes. The greatest differ-

ences are observed in the past decade, when profits of domestic industries before taxes oscillated year to year around 70% - 80% of all corporate profits before taxes (the minimum, 48.4%, corresponds to 2008). For profits after taxes the share of domestic industries also reaches minimum levels during the past decade, with the minimum in 2008 when domestic profits after taxes are only 58.3% of all profits after taxes. Corporate profits of domestic industries were used for robustness check of the main results obtained with corporate profits of all industries

Total government expenditure is reported in NIPA as the aggregate of (a) current expenditure, plus (b) gross government investment, plus (c) net purchase of nonproductive assets, plus (d) capital transfer payments, minus (d) consumption of fixed capital. However, estimates for the net purchase of nonproductive assets are available in NIPA from 1960 only, and thus total government expenditure is not reported for the years 1929-1959. I have used as an estimate of overall government expenditure the sum of current expenditure and gross government investment, which for the comparable years never exceeds the figure of total government expenditure reported in NIPA by more than 12%, with the difference mostly attributable to the consumption of fixed capital. To use current expenditure plus gross government investment as an indicator of the government contribution to aggregate demand seems defensible, as for the creation of demand for goods and services what is important is the total spending of funds by the government, and not that this spending is or is not substituting obsolete or lost fixed capital.

3. Descriptive statistics

Plots of annual series (Figure 1) illustrate the fluctuations of investment and profits which are intrinsic components of the business cycle. In the long run government expenditure mirroring investment, particularly gross investment, illustrates how remarkably spending by the government fluctuates countercyclically, compensating during recessions the lack of demand from the private economy. Considering averages for the years 1929-2013, gross investment is 15.4% ± 4.0% of national product (mean ± standard de-

viation), while business investment is 10.8% ± 2.6%, corporate profits before taxes are 9.1% ± 2.4%, profits after taxes 5.9% ± 1.7%, taxes on corporate profits 3.2% ± 1.4%, and government expenditure 32.0% ± 7.4% of national income.

Both investment and profits (Figure 1) strongly declined in the early 1930s, during the Great Depression. They sharply rose in the recovery of the mid-1930s, and dropped again in 1938 in the so-called Roosevelt recession, following a sharp reduction in government spending in 1937. During World War II private investment strongly declined at the same time that government expenditure skyrocketed (Figure 1), and a big gap opened between profits before taxes—which rose from being 5.7% of national product in 1938 to 12.5% in 1943—and profits after taxes—which just increased from 4.6% to 5.6% of national product in the same period. The three decades following the end of World War II show the minor fluctuations of investment, profits and government spending corresponding to the mild business cycles and small recessions of the time. Since the 1970s there is however a clear change, as the oscillations grow in amplitude and apparent declines in investment and profits mark the recessions of the US economy at the end of the 1960s, mid-1970s, early 1980s, early 1990s, and at the turn of the century. According to the NBER chronology, peaks of the US business cycle took place in December 1969, November 1973, January 1980, July 1981, July 1990, March 2001, and December 2007. Considering the NBER recessions of 1980 and 1981 as a unique one, the dates correspond quite well with the declines in profits and investment observable in the late 1960s, mid 1970s, early 1980s, early 1990s, and around the turn of the century. The Great Recession is evident in the plots as a precipitous decline affecting private domestic investment between 2006 and 2009 and business investment between 2008 and 2010. Corporate profits escalated since 2001, reached a peak in 2006, and then dropped in 2007 and 2008.

An issue highlighted by recent debates on income and wealth inequality is whether there have been long-term changes that make the distribution of income more unequal. In terms of profits after taxes the best time for owners of capital has been the most re-

cent years, as in 2010–2013 profits after taxes reached levels over 9% of national product. Indeed in the period 1929-2013 there were only five years in which profits after taxes reached 9% of national product, to know 1929, when profits were 9.0% of GNP, and the four years 2010–2013, where a all-time high of 9.61% was reached in 2013. Between 1929 and 2013 there were only two years in which profits after taxes were negative, 1932 and 1933, when profits were respectively –1.0% and –1.2% of national product.

The percentage of corporate profits in national product is a measure of the share of capital returns in the national product. Of course, it can be argued that this is an underestimate, as it assumes that all incomes included as wages and salaries in NIPA estimates are part of labor income. Recent reports indicate that earnings of CEOs may reach a ratio of 2,238 to 1 compared with the median earnings of the employees of a company (this was the case with Walt Disney CEO, Robert Iger, in 2014 [22]). In the NIPA tables monumental salaries of this order are conceptualized as returns of labor. Michael Kalecki had the view that these salaries of top-level managers, which often also have shares in the ownership of the firm, shall be considered as profits [23] (p. 237, fn. 17) but NIPA estimates are not accounted following Kalecki's advice and this issue will be ignored here.

Linear trends computed for the whole sample 1929-2013, or for the subsample 1946-2013 which excludes the turbulences of the 1930s and World War II, shows that the long-term trend of profits before taxes is sample-dependent, as it has a growing trend in 1929-2013 and a falling trend in 1946-2013 (Table 1). But the share of profits after taxes in national product has a clear rising trend in both samples, growing between 0.02 and 0.03 percentage points of national product per year and reaching an all-time high close to 10% in 2013. Gross investment has an increasing trend in the long run when the trend is computed for the years 1929-2013 (Table 1), but the rising trend clearly depends on the very low values during the Great Depression (Figure 1), as the trend computed for 1946-2013 has a slope of 0.013 with a standard error of 0.010, i.e., it is indistinguishable from zero. However, business investment reveals a significant long-term rising trend whatever sample we choose.

In the period 1929-2013 the annual spending of the government had a minimum of 10.7% of national product in 1929 and a maximum of 51.5% in 1944. In the postwar period most of government spending is current expenditure, which grew to be about 90% of total government spending in recent years, from levels of around 80% in the 1950s. Government spending has a clear rising trend as a linear trend computed for the years 1929-2013 has a significantly rising slope of 0.184 $\pm$ 0.026, while for the sample 1946-2013 the slope is only slightly flatter. Thus, on average, government spending has grown annually almost two tenths of a percentage point in national product units. For illustration of recent controversies on whether the Obama administration is "spending too much" it may be proper to point out that government profligacy in recent years reached its highest in 2009 and 2010, when government expenditures were equivalent to 40.20% and 40.22% of national product, respectively. This level of a spending can be considered proper of a war economy, as in 1942 the expenditure of the government was equivalent to 42.4% of national product (Figure 1), but can be hardly considered as an accomplishment of President Obama. Much before the Great Recession, since the mid-1970—and both under Republican and Democratic administrations—annual government spending was at levels oscillating around 35% of national product, which corresponds to World War II levels. Interestingly, and perhaps contrarily to common views, government expenditure rose during the Reagan-Bush years, declined during the Clinton era, rose sharply during the Bush II presidency, and declined again during the Obama administration (Figure 1).

Overall these results demonstrate that in the past eight decades profits after taxes and business investment are increasing fractions of national product, corporate taxes are declining, and government spending is increasingly large as compared with the size of the national economy.

4. Statistical methods

Avoiding spurious inferences from statistical analyses based on time series requires eliminating the trends. Common methods of detrending are filtering or differencing.

Since most economic series grow in the long run at a more or less constant rate, differencing produce series that may be trend-stationary but not variance-stationary, unless logarithms are taken before differencing, which is the same as to transform the original series in a growth rate series.

For the analysis in the present paper, all series were converted in a percentage of national product, and then differenced. This two-step procedure produces series which are both trend-stationary and variance-stationary. I use distributed-lag regressions to examine how changes in a variable predict changes in other variable. For instance, I regress the change in profits on the change in investment to estimate how present investment determines future profits. The regression equation is

$$\Delta P_t = \alpha + \sum_{k=1}^{r} \beta_k \cdot \Delta I_{t-k} + \varepsilon_t ,$$

where

P_t is the percent share of a given category of profits in national product,

I_t is a given measure of investment as a percentage of national product,

Δ is the difference operator so that ΔX_t is the change of the variable X between year $t-1$ and year t, and

ε_t is the error term.

Equations were estimated for specifications in which r, the number of lag terms of the explanatory variable, varied from 1 to 5, though I also computed some specifications with 6 lags. The limit of 5 or 6 was chosen a priori, arbitrarily, assuming that events that occurred more than 5 years ago are not likely to have an impact on the present condition of the economy.[3] Indeed, the results of the analysis showed that in almost all cases lagged effects beyond 3 years are statistically irrelevant.

To examine the robustness of the results to sample selection, I computed regression models for the whole sample 1929-2013 and for three subsamples: 1929-1960, 1961-1990, and 1991-2013. Since the purpose of the analysis is to look for plausible causal ex-

[3] An unconvincing attempt to prove that even lags of a decade or more have noticeable macroeconomic effects can be found in Neftci [45].

planations, in all cases I computed a second batch of regressions by switching explanatory and dependent variables.

All models exclude a simultaneous effect, with the explanatory variable at year zero having an effect on the dependent variable at year zero. This is because the purpose of the models is to look for causal explanations. A statistically significant parameter estimate of the variable x regressed on the variable y at lag zero can be explained by x causing y, by y causing x, by both causing each other, or by a third variable causing both. However, a change of an economic variable x at time -1 followed by a change in y at time 0 can be an effect of x on y or an effect of a third variable on both, but never an effect of y on x, unless we disregard all rational notions of causality or assume human beings with supernatural abilities to forecast the future, and adjust their actions to make the forecast true. Indeed, since the business cycle implies more or less simultaneous oscillations of the different components of the national economy, the oscillations of many series at lag zero are highly correlated. Series of profits and investment in first differences have very high and statistically significant positive correlations (Table 2). Because they are both strongly procyclical, profits before taxes and gross investment have a correlation of 0.51 ($P < 0.001$), but government expenditure have strongly negative correlations with investment, revealing its countercyclical fluctuations.

Omitting contemporaneous effects and focusing on models in which what happens at the present is modeled on what happened in past years facilitates establishing what covariates have an explanatory power of the changes in the variable used as dependent.

When using distributed lag regressions an issue is to choose how many lags shall be included in the model. An accepted way is to select the specification with the best fit, that which minimizes the Akaike information criterion (AIC). However, to make specifications with different lags comparable in terms of AIC the sample has to include exactly the same number of observations. Thus in the specification for the whole sample the observations used were actually those corresponding to the years 1934 to 2013, so that for all the sample there data are available for any variable lagged up to 5 years.

5. Results

5.1. Hypothesis 1: Future higher profits follow present higher investment

Models in which the change in investment is used to predict the change in profits (Table 3) do not provide evidence that investment in the past has a positive effect on profits in the present. Effects of investment on profits are statistically indistinguishable from zero for most lags, but predominantly negative. Considering the whole sample, the specification with the best fit (because it minimizes AIC) is equation 5 (Table 3, panel A), which includes effects for lags 1 to 5. The estimated equation (standard errors below the parameter estimates) is

$$P_t = 0.11 - 0.17\, I_{t-1} - 0.03\, I_{t-2} + 0.05\, I_{t-3} - 0.08\, I_{t-4} - 0.25\, I_{t-5} + \varepsilon_t$$

(0.08) (0.11) (0.11) (0.12) (0.11) (0.10)

The change in investment only predicts significantly the change in profits at lag 5. Focusing on this effect at lag 5 and assuming $I_{t-1} = I_{t-2} = I_{t-3} = I_{t-4} = 0$, the model predicts that an increase of one percentage point in the share of investment in national product is followed 5 years later by a significant decrease of 0.11 – 0.25 = –0.14 percentage points in the share of profits after taxes in national product. Except the effect at lag 3, 0.05, which is statistically indistinguishable from zero, the effect estimates are all negative and thus the estimated equation must be interpreted indicating that a rise in investment is associated with a lagged decline in profits during the following years. However, the overall ability of the equation to predict profits is low, as the R^2 is only 0.15.

Considering the subsamples, the pattern is the same with higher present investment predicting decreasing future profits. In the sample 1934-1960 (Table 3, panel B) the best specification also includes lags from year 1 to year 5 and the effect estimate at lag 5, which is negative, is the only significant effect (though at marginal levels of significance). In the samples 1961-1990 and 1991-2013 the best model is that including investment at lag 1 only (Table 3, panels C and D) and the negative effect of investment on profits is much more intense. It is in the sample 1991-2013 where investment has a higher ability

for predicting profits, as an increase of one percentage point in investment predicts a significant reduction of 0.56 percentage points in profits, and the change in investment explains 29% of the change in profits (Table 3, panel D, Eq. 1).

The hypothesis that higher investment in the past is followed by higher profits in the present does not fit the data and shall be rejected. What the evidence indicates is that a change in higher investment is followed by a change in profits in the opposite direction.

5.2. Hypothesis 2: Higher profits in the past are followed by higher investment in the present

Considering the full sample, the change in profits before taxes with one-year lag significantly predicts the change in business investment, with a one percentage point increase in the profit share associated with a significant increase of 0.24 percentage points in the investment share one year later (Table 4, panel A, Eq. 1). The results in the subsamples 1934-1960, 1961-1990 and 1991-2013 confirm the general pattern of a movement in profits predicting a movement investment in the same direction with a lag of just a few years (Table 4, panels B, C and D). Considering the R^2 values, in the whole sample the change in profits explains only 6% of the change in investment, and in the 1934-1960 sample even less, 2%. However, in the samples of more recent decades present profits have a much higher ability to explain future investment. Thus in the sample 1991-2013 lagged profits in the four previous years predict 59% of the change in investment, with a particularly intense effect at lag 2.

The hypothesis that changes in profits past are followed by changes in investment in the same direction seems therefore fully consistent with the evidence.

5.3. Hypothesis 3: Government spending pump-prime the economy by stimulating private investment

Regressions in which business investment is the dependent variable and government expenditure is the explanatory variable provide little or no support for the hypothesis that government spending may pump-prime the economy by raising future investment. If greater levels of government spending would contribute to stimulate the private economy, we would expect positive and statistically significant estimates in equations in which business investment is modeled as a function of lagged government expenditure. However, in this type of models (Table 5, panel A) effects of government expenditure at lags 1 to 3 on business investment at lag zero are mostly null or negative. The higher explanatory power of government spending on investment is found in the 1991-2013 sample in

which changes in government spending at lags 1 and 2 explain 40% of the variation in gross investment, but the effect is negative and significant at lag 1 and positive but indistinguishable from zero at lag 2. This is inconsistent with the view that government spending stimulates the economy by enhancing investment in following years. Results for the other subsamples and for the general sample are similar.

When gross investment rather than business investment is used as dependent variable (Table 5, panel B) the results are different. For the sample 1961-1990, effect estimates of government spending at lags 1 to 4 are positive and two of them are highly significant, which means that in this period a year of rising government spending was generally followed by four years of higher gross investment. This result seems to be an anomaly specific of this subsample, as it does not match with the results for the samples 1934-1960 and 1991-2013, which are comparable to those just described for regressions using business investment (in which government spending has predominantly negative effects on investment in the following years). For instance, for the sample 1991-2013 the equation with the best fit is the one in which government spending only enters at lag 1, explaining 8% of the variation in gross investment. The effect estimate, -0.29, is negative, and statistically not significant.

Thus with the exception of the results showing significant positive effects of government spending on gross investment in 1961-1990, data do not provide evidence in favor of the view that government expenditure may pump-prime the private economy. The hypothesis that an increase of government spending is followed by an increase in private investment shall be considered as rather unsupported by the evidence. The conclusion that government spending is *not* followed by enhanced investment is particularly robust for the sample 1991-2013.[4]

[4] Since the basic difference between the categories of gross investment and business investment used here is the inclusion of residential spending in the former but not in the later, a hypothesis worth examining is that in the period 1961-1990 spending in housing may have been particularly stimulated by government expenditure.

5.5. Further robustness checks

Models using lagged business investment to explain profits *after taxes* (Table 3) or lagged profits after taxes to predict business investment (Table 4) show that movements in profits tend to be followed by movements in investment in the same direction, while movements in investment tend to be followed by movements in profits in the opposite direction. When profit *before taxes* are used as explanatory variable to predict business investment or gross investment (Table 6) or when business investment or gross investment are used to predict profits before taxes (Table 7), the same patterns are found with just some anomalies. The patterns of profits positively associated with future investment and investment negatively associated with future profits is very strong in the samples 1961-1990 and 1991-2013. Thus considering the years 1991-2013, the accumulated effect of changes in profits before taxes increasing one percentage point per year by two consecutive years are 0.28+0.37 = 0.52, and the change in profits explains 58% of the variation in investment (Table 6, panel A, right column). On the other hand three consecutive years with one percentage point increase in business investment will have an accumulated effect of 1.59 percentage point decrease (–1.04 + 0.27 – 0.82) in profits before taxes (Table 7, panel A, right column), and the change in investment explains 55% of the consecutive change in profits. However, considering the whole sample 1934-2013 or the sample 1934-1960 profits before taxes have a very weak explanatory power of investment and even the net effect is negative in some samples (Table 6), while the change in investment has basically no explanatory power of the change in profits before taxes (Table 7).

In general, profits before taxes have a lower predictive power of investment (Table 6) than profits after taxes (Table 4), which is not surprising. Thus considering the sample 1991-2013, profits before taxes on business explain 58% of the variation in business investment (Table 6, panel A), while profits after taxes explain 61% (Table 4, panel D, Eq. 4). In the opposite direction of causality, investment seems to predict profits before taxes slightly better than profits after taxes, which also seems plausible. Thus in the sample

1991-2013 the change in business investment predicts just 40% of the variation in profits after taxes (Table 3, panel D, Eq. 1), but 55% of the variation of profits before taxes (Table 7, panel A).

To check how sensitive the results are to a change in the category of investment that is used in the regressions, I computed equations using the category that appears in NIPA as private domestic investment of businesses, which is only available for 1960-2013. The results (not shown) do not differ much from the results for the category of "business investment" used here. I also computed regressions using as measure of investment a net investment variable computed as gross domestic investment minus consumption of fixed capital minus gross government investment. The results were also not very different to those presented here.

I also computed regressions in which lagged investment is used as explanatory variable of government spending (Table 8). Results differ in different samples and using gross investment or business investment as covariate, but in general, investment is followed next year by a change in government spending in the opposite direction, which is consistent with the countercyclical character of government spending. However, considering the sample 1934-2013 changes in gross investment or business investment are followed with a lag of 3 or 4 years by changes in government spending in the same direction (Table 8, panels A and B). Again the sample 1961-1990 is an anomaly as almost a third of the variation in government spending is explained by changes in business investment in the previous year, but in this sample the effect is positive. The subsample 1991-2013 is a different anomaly, as a percentage point increase in the share of gross investment is followed one year later by a highly significant decrease of 0.58 percentage points in government expenditure, with the change in investment explaining a substantial 36% of the change in government spending.

When corporate profits of domestic industries, before or after taxes, are used in the regression models instead of profits of all industries, the results (not shown) are remarkable similar to those presented here (in table 3 to 8). Almost constantly the best specifica-

tion in terms of number of lags that minimize of AIC is the same using total profits or profits of domestic industries. However, across models the power of profits of domestic industries to predict business investment is slightly greater, and sometimes considerably greater, than the power of total profits. Thus for the sample 1991-2013 total profits after taxes have an accumulated effect at lags 1 to 4 of 0.29 + 0.54 + 0.17 + 0.31 = 1.31 on investment at lag 0, with R^2 = 0.59 (Table 4, panel D) while total profits after taxes of domestic industries have an accumulated effect of 0.25 + 0.55 + 0.15 + 0.28 = 1.23 with R^2 = 0.70. Total profits before taxes predict 58% of the variation in business investment in the sample 1991-2013 (Table 6, panel A, right column), while profits before taxes of the domestic industries predict 70% of the variation in business investment in the sample 1991-2013.

As it was mentioned, the category of "business investment" that I have used throughout this paper is actually what in NIPA tables appears as gross private domestic nonresidential fixed investment. NIPA tables include also a category of gross private domestic investment of business which, however, is only available after 1960. When I used that variable to compute regression estimates for the samples 1961-1990 and 1991-2013, I found results very similar to the ones I obtained with my own category of "business investment"."

Finally, I also tested the sensitivity of the results to including lag-zero effects in the regressions. The lag-zero effect is positive and very significant both for investment "causing" profits and for profits "causing" investment, as it is to be expected given the lag-zero strong positive correlation between these variables (Table 2). The other lagged-effect estimates change moderately in magnitude when the lag-zero effect is included in the model, but they do not change in sign and are substantially similar to the effects reported in the tables of this paper.

6. Discussion

In a paper written in 2012 I reviewed how causes of business cycles have been conceptualized in economic thought and examined quarterly data of the US economy, finding that profits have a clear stimulating effect of future investment, while investment has no impact on future profits [24]. Comparing those results with the results found in this paper confirms the stimulating effect of past profits on present investment revealed both by annual and quarterly data. But the comparison also shows that the analysis with annual data is able to reveal a statistically significant negative effect of lagged investment on present profits which does not appear in the quarterly analysis, in which lagged investment mostly shows no effect on present profits. Disaggregation often is an appropriate tool to enhance statistical power, but also raises statistical noise and may blur effects, making them undetectable.

Overall the results of the statistical analysis are quite consistent across samples in terms of direction of the effect, with higher profits predicting higher investment and higher investment predicting lower profits, but the models have a much higher predictive capacity in recent decades. This is not surprising, as during the turbulent 1930s and the war years the US economy was by far in quite abnormal circumstances. However, it is remarkable how stable are the results when the samples 1961-1990 and 1991-2013 are considered (Tables 3 and 4, panels C and D). In these samples models are able to predict a considerable fraction of the change in the dependent variable. For instance, the variation in profits explains no less of 25% of the change in business investment (in 1961-1990, Table 4, panel C), and up to 59% of it (in 1991-2013, Table 4, panel D). Models reveal a substantial stability of the effect estimate. Thus a 1 percentage point increase in business investment reduces the profit share next year by 0.54 percentage points in 1961-1990, and by 0.56 percentage points in 1991-2013 (Table 3, panels C and D).

In models to explain present investment by past government spending (Table 5) or government investment by past investment the explanatory variable (Table 8) has different sign in different samples. For instance, government spending seems to have an stimulating effect on gross investment in 1961-1990 but a negative or null effect in 1991-2013

(Table 5), while investment seems to inhibit future government spending in 1991-2013 and stimulate it in 1961-1990 (Table 8). This instability of the sign of the effect estimate makes the results difficult to interpret, and suspicious. Thus on the basis of the results of the analysis it can be said with confidence that profits stimulate investment and that investment cuts future profits. However, on the basis of the analysis not much can be said on the relation between government spending and investment.

Results in this paper provide evidence that past investment has an effect on present profits, but contrary to the Keynesian view, the effect is mostly negative. Also, contrary to Keynesian views, investment is not autonomous as to a large extent is guided by profitability rather than by animal spirits. The Keynesian view that government expenditure may pump-prime the economy by stimulating private investment has very little support in the data, as the net effect of government expending on lagged private investment is either null or negative. Only in the sample 1961-1990 past government spending appears as enhancing gross investment in the present, though it does not stimulate business investment, and the effect does not appear in other samples so that it does not constitute strong evidence in favor of a pump-priming effect of government spending. The data also show, however, that government spending is increasingly needed to keep the economy from falling into recession. Against the simplistic views of Tea Party activists, the activity of private business is clearly insufficient to keep the US economy afloat as clearly revealed by government spending at levels similar to those of World War II during the past three decades.

7. Concluding remarks

Controversies and discussions on the fluctuations of the market economy go back to the the 19th century. Sismondi blamed crises on insufficient consumption and rejected Say's views that production creates sufficient purchasing power for the product to be purchased, Marx wrote abundantly on the cycle of industrial crises as caused by a persistent tendency of profitability to decline, and in *Des Crises commerciales et leur retour peri-*

odique, Juglar referred to commercial crises as generated by the interplay of commercial and financial phenomena [16,25,26]. Though not many authors were interested in the phenomenon of economic crises, "panics" or "gluts" as they were referred to in the time, among those who paid attention to these phenomena the consensus was that every ten years credit panics occurred more or less at the same time that markets overflowed with unsold goods [27]. Then when economists started to talk about "business cycles" in the late 19th century, a whole series of putative causes for the cycles were proposed. Since the profession had fully embraced Say's law and the tendency of markets to be efficient and to clear, the causes of sharp downturns could not be inside the economic system, they had to be exogenous. Thus W. S. Jevons attributed the business cycle to weather events determined by sun spots, Henry L. Moore proposed a similar scheme based on effects of the planet Venus, and Ellsworth Huntinton proposed that fluctuations in business activity are consequences of fluctuations in mortality [16,26,28]. But all these theories fitted very poorly with the data.[5] They were object of criticism among others by Wesley Mitchell, who in 1913 published his *Business Cycles,* an impressive study on the phenomenon in Great Britain, Germany, France, and the United States. After a meticulous consideration of observed data, Mitchell theorized the cycle as an endogenous phenomenon of what he called "the money economy." For Mitchell the modern industrial system is basically a network of free enterprises that produce merchandise with the purpose of obtaining money profits, and spending in capital goods is the leading force pushing the economy forward. But profitability of business is the basic engine determining investment. Thus for Mitchell the business cycle is an autonomous phenomenon determined by the endogenous variations of profits and investment [11,17].

Though Mitchel's views, for a while continued by A. F, Burns, were part of mainstream economics during a few decades, a remarkable event in the development of ideas on the business cycle took place at the end of the 1930s. After years of economic and political

[5] Except that of Huntinton, though everything suggests that he got the direction of causality wrong, as shown by modern investigations that have found traffic injuries, heart attacks and general mortality increasing in expansions [46-50], with atmospheric pollution playing an important role [51].

turmoil the Society of Nations asked Jan Tinbergen to dedicate his talents to study business cycles. After examining the empirical material—the scarce economic statistics available at the time—Tinbergen concluded, confirming most insights of Wesley Mitchell, that business cycles are basically a fluctuation in investment determined by a previous fluctuation in profits[29,30]. The study was however strongly criticized, as containing major flaws, both by John Maynard Keynes and by the rising start of the anti-Keynesian field, Milton Friedman [26]. Thus Tinbergen's views [12] were marginalized along with those of Mitchell, and for the next three decades the predominant view came from Keynes, Lerner, Kalecki, and other Keynesians, who in greater or smaller degree rejected the Smithian idea of the invisible hand and accepted the new concept of *animal spirits*. In the Keynesian paradigm that prevailed in the decades following World World II rich people decide to invest or to hoard their money as moved by emotional impulses, and this creates conditions of prosperity or depression. But with a proper mix of monetary and fiscal policy, an intelligent economic policy will stabilize the economy.

But the Keynesian hegemony in economics that had never complete declined in the 1960s and 1970s, and since the 1980s much of the research in macroeconomics looked for inspiration in the traditional ideas of Smith, Ricardo, and Say, that Keynes had at least partially rejected. Starting from these classical ideas, that is, from general equilibrium, authors pertaining to the real-business-cycle (RBC) school produced models of the economy that were then compared with the real movements of the economy, i.e., "calibrated" to make them somewhat realistic. Both Keynesians and RBC authors produced complex models of the economy that supposedly enabled appropriate forecasts, but the fruits of this high-level math were scarce, as the global crisis that started in 2008 was unexpected for the RBC school as well as for most macroeconomists. The period of Keynesian hegemony in economics were three decades of strong economic growth and very mild recessions—no surprise that the business cycle was declared domesticated or moribund by Paul Samuelson. Keynesians and anti-Keynesian agreed that with the proper policies economic growth could be maintained steady and thus in the decades follow-

ing the first claim that business cycles were mostly under control new terms and concepts were proposed to emphasize that the economy does not alternate between boom and bust, between prosperity and depression, between expansion and crisis, but much more happily between years of strong economic growth and years of mild economic growth, in a quite moderate way. The first of those concepts was that of the growth cycle [31]. Though in the 1970s and 1980s major recessions occurred and the idea that the business cycle had died seems premature to many, the profession reiterated its belief in the perfection of the market with two new concepts, the New Economy, and the Great Moderation. In 2003, almost a quarter century after the US economy had suffered the last major downturn in the early 1980s, the President of the American Economic Association, Robert Lucas, confirmed that the business cycle was under control as the central problem of economic policy, that of preventing depression, "had been solved for all practical purposes" [32] Two years later the Chair of the Fed, Alan Greenspan, declared his awe at the degree of harmony and efficiency revealed by international finance and international trade. It would be hardly imaginable, he said, "that today's awesome array of international transactions would produce the relative economic stability that we experience daily if they were not led by some international version of Smith's invisible hand." [33]

Considering what economists thought before 2008, it is not surprising that the Great Recession "caught most economists flat-footed" as Nikolas Mankiw put it [34]. Statements on the ability of economic policies to prevent recessions are no longer heard, and luminaries of the profession such as Larry Summers, Paul Krugman, or Martin Wolf have expressed in recent years their belief in extended conditions of stagnation for the near future, or even the likelihood of another major recession coming soon. But, can recessions be forecasted as Queen Elizabeth wanted? David Andolfatto, Senior Vice President of the Federal Reserve Bank of St. Louis, recently wrote in his blog comparing forecasts of volcano eruptions and economic crisis as similarly difficult. Andolfatto joked on those economists "who successfully predicted 10 out of the past 2 recessions," and

claimed that there seems to be an insatiable demand for soothsayers, "clearly a case of demand creating its own supply." But then, in passing, he delivered his own forecast: "there will be another major financial crisis on the scale experienced in 2008" [35]. Other distinguished representatives of the profession, like Eugene Fama and Gregory Mankiw, have given explicit or implicit negative answers to the question whether recessions can be predicted. Thus the winner of the Nobel Memorial Prize in Economic Sciences, Eugene Fama, declared that economists do not know what are the causes of recessions [36], while Nicholas Mankiw stated that economic fluctuations do not follow a regular and predictable pattern, it is basically impossible to predict them [37], and indeed future crises will occur "at some unknown date for some unknown reason" [34]. Thus Mankiw, an enthusiastic Keynesian, confess he is ignorant of the causes of crises.

Judging by the results of this paper, it should be proper to say that to a large extent, fluctuations in profits and investment form a causal loop that fits very well with other business-cycle facts and seems to be a good explanation of the cycle. And what about the periodicity of the cycle?

As I already mentioned, for most of the 19th century a kind of consensus existed that the commercial crises were periodical with a cycle 10-year long [27]. Then in the late 19th century and early 20th century, crises clearly occurred at irregular intervals. Wesley Mitchell concluded that business cycles were phenomena that, in duration, "vary from more than one year to ten or twelve years" [25]. That the economic "cycle" is really irregular, that, as Mankiw says, it does not follow a regular and predictable pattern is true, but it is also true that during the past two centuries recessions have recurred with a periodicity which has certain limits. For instance, in the past 40 years business-cycle downturns appeared in the mid-1970s, early 1980s, early 1990s, at the turn of the century and in 2008-2009. I have argued elsewhere [38] that all these were actually crises of the world economic system but, of course, they were also visible as recessions of the US economy. These five crises, that can be individualized by calling them First Oil Crisis

(1975), Second Oil Crisis (1981), Eastern Europe Crisis (1991), Asian crisis (2001) and Great Recession (2008) were separated by irregular intervals which, though, fit well in the duration of the business cycle according to Mitchel, "from more than one year to ten or twelve years." More important, each of these recessions started at a time when profitability was falling as it had reached a peak at least one or two years earlier. Thus peaks in the share of profits before taxes are observable in 1973 before the First Oil Crisis, in 1978 before the Second Oil Crisis, in 1988 before the Eastern Europe Crisis, in 1997 before the Asian Crisis, and in 2006 before the Great Recession (Figure 1).

This paper provides strong evidence that at least since the 1960s the US economy has shown two major regularities, movements in profits followed by movements in investment in the same direction, and movements in investment followed by movements in profits in the opposite direction. These two mechanisms put together are perfectly sufficient to generate a cycle, a fluctuation of profits and investment which leads "the economy." Indeed, from econometric analyses a number of authors have concluded that the US economy is profit-led [39-41], though to my view the dynamics of profitability stoking future investment and investment dampening future profits has not been openly exposed.

As I write this on April 2015, it has been 7 years and a half since the start of the Great Recession dated December 2007 by the NBER. If recessions occur with the rough regularity that they had in the past two centuries, when rarely more than a decade passed without one, we are getting close to the time of a new one. On the other hand, and more important, profits have recently stagnated and started to decline after growing since 2008. According to recently reported NIPA data, profits had a peak in 2013 (Figure 2). Corporate profits before taxes which between 2012 and 2013 increased 4.2% from $2.02 trillion to $2.10 trillion dropped 0.8% to $2.09 trillion in 2014. Considering just domestic industries, corporate profits before taxes dropped 0.5% in 2014 after rising 5.4% in 2013, while profits after taxes dropped 10.3% in 2014 after gaining 5.4% in 2013.

If, as in past decades, falling profits are followed by decreasing investment, a recession will very likely occur soon. Considering the results of statistical models, the "regularity" of the business cycle, and the fact that profits are falling, and the present condition of the other parts of the world economy it can be concluded with some confidence that a recession of the US economy will occur in the next few years. ARIMA models or VAR models could be used to provide a more concrete timing of the forecast, but the resulting prediction would not be better than that provided here, as many factors related to the world economy are unmeasured and unknown. Thus I may quantify the degree of confidence in my prediction by using Bayesian terminology, so that my priors are 80% that a recession will start in 2015 or 2016, 90% that it will occur no later than 2018, and 99% that it will occur before the end of the decade. As in the mid 1970s, early 1980s, early 1990s, 2001 and 2008, it will be very likely a world economic crisis, and given the enormous volumes of debt now present in the world economy, the precarious situation of banks in many countries, the weak or negative economic growth in many European countries, the chronic problems of the Japanese economy, and the rapid deceleration during the past three years of most so-called emerging economies like China and other BRICS, it is very likely that this recession may be as great or even greater than the Great Recession. I agree with David Andolfatto on that.

Something that tends to make the prediction of recession in the next few years less likely is the fact that oil prices have been falling for many months. It is known that peaks in the price of oil occurred immediately before the recessions of the mid 1970s, early 1980s, early 1990s, 2001 and 2008 [3]. Indeed these "oil shocks" have been proposed by James Hamilton as the exogenous shocks that RBC authors never identified [42] (p. 80-81). But increases in oil prices previous to recessions of the world economy seem to a large extent part of a general increase in prices of raw materials endogenously generated in the global economy by the rising demand during expansions [43,44]. It is not inconsistent with the causal loop between profits and investment that increases in the price of energy and raw materials during expansions eventually dampen profits for the economy

at large, thus reducing investment and increasing the probability of a downturn. Consequently, falling prices of energy raise profits and stimulate the economy. That can be a major factor for the maintenance of present conditions in international markets, so that the world economy could continue for a while muddling through in the seemingly never ending aftermath of the Great Recession. That oil prices are falling because the demand for oil is low in a world economy which is presently anemic, almost nobody disagrees. What is less clear is how strongly falling prices of energy can stimulate the economy delaying the world recession that will eventually occur. My glass ball is not better than that.

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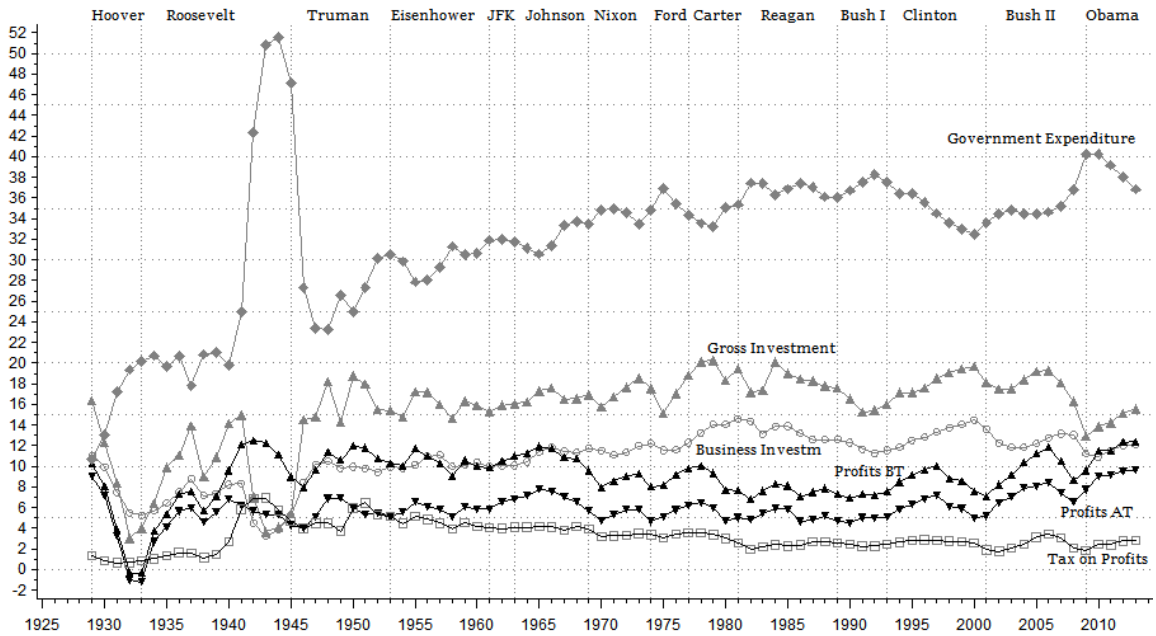
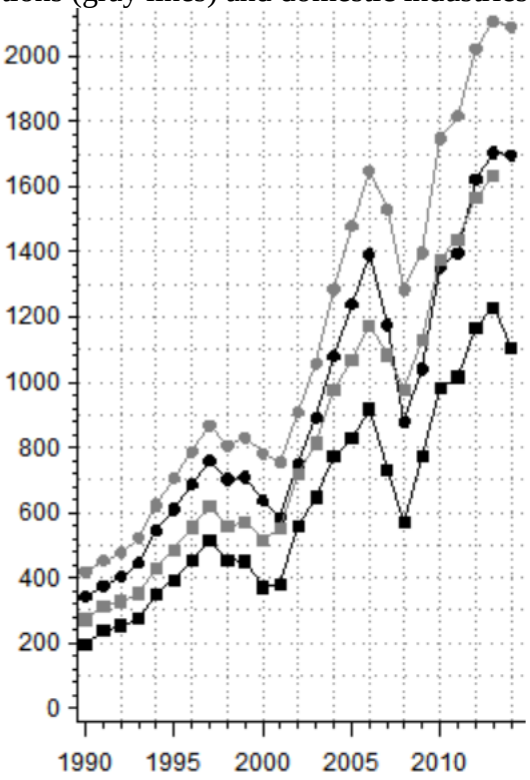
Figure 1. Government expenditure, domestic investment (gross and business), corporate profits (before and after taxes) and taxes on profits. All series are normalized as percentage of national product



Source: Author elaboration from NIPA data. For definitions of series see text.

Figure 2. Corporate profits before taxes (dots) and after taxes (squares) of all corporations (gray lines) and domestic industries (black lines), billion dollars



Source: NIPA tables 1.10 and 1.12, accessed April 2015.

Table 1. Long-term trends of five components of the US economy computed using a linear model in which the share of the variable in national product is regressed on time (year). Standard errors bracketed below the slope estimate

Variable	Sample 1929-2013 (n = 85)	Sample 1946-2013 (n = 67)
Corporate profits before taxes	0.020†	– 0.020*
	(0.010)	(0.010)
Corporate profits after taxes	0.031***	0.024***
	(0.007)	(0.007)
Taxes on corporate profits	– 0.011†	– 0.044***
	(0.006)	(0.004)
Gross private domestic investment	0.096***	0.013
	(0.014)	(0.010)
Gross private domestic fixed investment, non residential	0.079***	0.045***
	(0.007)	(0.007)
Government expenditure (current expenditure plus gross government investment)	0.184***	0.152***
	(0.026)	(0.014)

Author's computations from data taken from the NIPA website, accessed in February-March 2015

*** $P < 0.001$, * $P < 0.05$, † $P < 0.1$.

Table 2. Correlations at lag zero between variables in first differences after being converted into percentage of national product

	Gross Investment	Profit After Taxes	Profit Before Taxes	Taxes On Profits	Government Expenditure
Business Investment	0.80***	0.34**	0.27*	-0.01	–0.78***
Gross Investment		0.48***	0.51***	0.26*	–0.79***
Profit After Taxes			0.89***	0.16	–0.19†
Profit Before Taxes				0.60***	–0.09
Taxes on Profits					0.14

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, † $P < 0.1$.

Table 3. *R*esults of lag regressions in which the dependent variable is profits after taxes and the explanatory variable is fixed non-residential investment in the five previous years. Highlighted in **boldface** is the models with the best fit in each panel

	Lag	Eq.1	Eq.2	Eq.3	Eq.4	Eq.5
	1	-0.10	-0.12	-0.11	-0.12	**-0.17**
Panel A	2		0.06	0.04	-0.03	**-0.03**
Sample 1934-2013	3			0.03	0.14	**0.05**
	4				-0.21*	**-0.08**
	5					**-0.25***
	AIC	-49.0	-47.3	-45.4	-48.0	-52.4
	R^2	0.01	0.02	0.02	0.08	0.15
	1	0.10	0.06	0.09	0.06	**0.01**
Panel B	2		0.12	0.07	0.00	**-0.02**
Sample 1934-1960	3			0.08	0.21	**0.12**
	4				-0.23	**-0.08**
	5					**-0.28**†
	AIC	-4.3	-3.0	-1.3	-2.1	-4.6
	R^2	0.02	0.04	0.06	0.15	0.29
	1	**-0.54*** **	-0.51*	-0.46*	-0.42†	-0.43†
Panel C	2		-0.16	-0.19	-0.26	-0.24
Sample 1961-1990	3			0.13	0.18	0.15
	4				-0.15	-0.14
	5					-0.05
	AIC	-35.9	-34.6	-33.2	-31.8	-29.9
	R^2	0.22	0.24	0.26	0.27	0.27
	1	**-0.56*** **	-0.56*	-0.74***	-0.74***	-0.73***
Panel D	2		-0.01	0.25	0.27	0.27
Sample 1991-2013	3			-0.44†	-0.47	-0.45
	4				0.05	0.03
	5					0.04
	AIC	-21.7	-19.7	-21.5	-19.6	-17.6
	R^2	0.29	0.29	0.39	0.40	0.40

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, † $P < 0.1$.

Table 4. *R*esults of lag regressions in which business investment is modeled as a function of profits after taxes in the five previous years. Highlighted in **boldface** is the model with the best fit in each panel

Sample	Lag	Eq.1	Eq.2	Eq.3	Eq.4	Eq.5
	1	**0.24***	0.25*	0.25†	0.23†	0.21
Panel A	2		-0.01	-0.01	-0.04	-0.05
Sample 1934-2013	3			0.00	0.04	0.01
	4				-0.08	-0.06
	5					-0.05
	AIC	-24.9	-22.9	-20.9	-19.4	-17.6
	R^2	0.06	0.06	0.06	0.06	0.06
	1	**0.16**	0.21	0.11	0.04	-0.09
Panel B	2		-0.2	-0.14	-0.28	-0.3
Sample 1934-1960	3			-0.14	-0.02	-0.17
	4				-0.21	-0.1
	5					-0.22
	AIC	14.8	15.9	17.5	18.4	19.3
	R^2	0.02	0.05	0.07	0.11	0.14
	1	**0.44*****	0.44***	0.49***	0.49***	0.49***
Panel C	2		0.03	0.00	-0.01	-0.01
Sample 1961-1990	3			0.24	0.24	0.25
	4				-0.05	-0.06
	5					0.01
	AIC	-44.2	-42.2	-43.3	-41.5	-39.5
	R^2	0.25	0.25	0.32	0.33	0.33
	1	0.32	0.19	0.25	**0.29**†	0.35†
Panel D	2		0.54***	0.47***	**0.54*****	0.54***
Sample 1991-2013	3			0.25	**0.17**	0.21
	4				**0.31**†	0.29†
	5					0.13
	AIC	-19.6	-28.2	-29.2	-31.4	-30.2
	R^2	0.12	0.44	0.51	0.59	0.61

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, † $P < 0.1$.

Table 5. Results of lag regressions in which government expenditure is used to explain business investment, or gross investment. Only the models with the best fit are presented

	Lag	Sample 1934-2013	Sample 1934-1960	Sample 1961-1990	Sample 1991-2013
Panel A Government expenditure explaining business investment	1	-0.12***	-0.11*	-0.28***	-0.44***
	2	0.04	0.03		0.20
	3	0.06*	0.06		
	4				
	5				
	R^2	0.30	0.34	0.31	0.40
Panel B Government expenditure explaining gross investment	1	-0.11	-0.14	0.10	-0.29
	2	-0.06		0.61***	
	3	0.20***		0.07	
	4			0.45***	
	5				
	R^2	0.14	0.06	0.28	0.08

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, † $P < 0.1$.

Table 6. *R*esults of lag regressions in which profits before taxes are used to explain business investment or gross investment. Only the models with the best fit are presented

	Lag	Sample 1934-2013	Sample 1934-1960	Sample 1961-1990	Sample 1990-2013
Panel A Profits before taxes explaining business investment	1	0.02	-0.14	0.41***	0.28*
	2		-0.32†		0.37***
	3				
	4				
	5				
	R^2	0.00	0.21	0.35	0.58
Panel B Profits before taxes explaining gross investment	1	0.12	-0.26	0.61*	0.81***
	2	-0.55*	-0.84†	-0.42	
	3				
	4				
	5				
	R^2	0.08	0.19	0.19	0.45

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, † $P < 0.1$.

Table 7. Results of lag regressions in which business investment or gross investment is used to explain profits before taxes. Only the models with the best fit are presented

	Lag	Sample 1934-2013	Sample 1934-1960	Sample 1961-1990	Sample 1990-2013
Panel A Business investment explaining profits before taxes	1	-0.17	0.09	-0.81***	-1.04***
	2				0.27
	3				-0.82***
	4				
	5				
	R^2	0.02	0.01	0.32	0.55
Panel B Gross investment explaining profits before taxes	1	0.02	0.06	-0.34***	-0.34†
	2		0.11	-0.35***	-0.02
	3			-0.31*	-0.29
	4			-0.17	-0.26
	5			-0.24*	
	R^2	0.00	0.10	0.38	0.37

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, † $P < 0.1$.

Table 8. Results of lag regressions in which investment is used to explain government expenditure. Only the models with the best fit are presented

	Lag	Sample 1934-2013	Sample 1934-1960	Sample 1961-1990	Sample 1991-2013
Panel A Business investment explaining government expenditure	1	-1.16*	-1.71*	0.90***	-0.69†
	2	0.93†		0.70*	0.73†
	3	0.00			
	4	0.87†			
	5				
	R^2	0.16	0.13	0.39	0.20
Panel B. Gross investment explaining government expenditure	1	-0.13	-0.27	0.05	-0.58***
	2	0.24		0.25	
	3	0.47***			
	4	0.25			
	5				
	R^2	0.16	0.02	0.09	0.36

*** $P < 0.001$, ** $P < 0.01$, * $P < 0.05$, † $P < 0.1$.

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