Does investment call the tune? Empirical evidence and endogenous theories of the business cycle

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Abstract: Theories of the business cycle can be sorted into two main groups, exogenous and endogenous, according to the way they explain economic fluctuations—either as responses of the economy to factors that are external (exogenous shocks) or as upturns and downturns of the economic system internally generated (by endogenous factors). In theories like those proposed by the Keynesian school, investment is a key variable to explain the dynamic status of the economy. The role of investment in endogenous theories is examined by reviewing the insights of four major authors—Robert Matthews, Hyman Minsky, Karl Marx, and Wesley Mitchell—on how changes in investment and profitability push the economy toward expansion or contraction. Hyman Minsky claimed that investment “calls the tune” to indicate that investment is the only variable not determined by other variables, so that profits, investment, and the dynamic status of the economy are determined by current investment and investment in the near past. However, that hypothesis seems not supported by available empirical data for 251 quarters of the U.S. economy. Statistical evidence rather supports the hypothesis of causality in the direction of profits determining investment and, in this way, leading the economy toward boom or bust.

1. Introduction

Modern economists often discuss “the business cycle,” though some American economists avoid this term and prefer to refer to “economic fluctuations,” while British authors generally favor “trade cycle.” Indeed, a plethora of terms have been used in

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economic jargon to refer to this bipolar phenomenon: boom-and-bust cycle, expansion and contraction, upturn and downturn, mania and panic, and prosperity and depression have been among the terms used since the 18th century. Terms such as revulsion in trade, commercial distress, stagnation, slump, recession or crisis were also used in the past to describe the phase of declining business activity of the “cycle.”

The world-wide economic downturn that started in 2007 and was baptized the Great Recession has stimulated interest in business-cycle theory, in which a major issue is whether there exists a key variable or variables that exerts a major influence on the economy and serves as the major determinant of its dynamic condition of expansion or contraction. Many business-cycle theories claim to answer that question, though the answer is often buried in jargon or mathematical equations. This essay reviews some general aspects on how causes of business cycles have been conceptualized in economic thought, and the views of four major theorists of the business cycle are examined, focusing on the role of investment and profits. Empirical evidence is presented and statistical procedures—descriptive statistics, lag regressions, and Granger causality tests—are used to test how empirical data fit with the proposed theories.

2. Some general aspects of business-cycle theories

The earliest conjectures on the business cycle and depressions were probably the underconsumptionist theories proposed at the turn of the 18th century by Lord Lauderdale, Thomas R. Malthus and Simonde de Sismondi. These earliest theories attributed downturns in business and financial activity to economic circumstances, that is, to endogenous factors—in this view, purchasing power available in society was not sufficient to buy the output produced. These theories were however rejected by David Ricardo, Jean Baptiste Say and most economists of the 19th century, who also dismissed the views of Marx who on different grounds had rejected the idea that sufficient demand is always available to purchase the produced supply, thus precluding the possibility of
“general gluts.” Then in the last two decades of the 19th century and the earlier decades of the 20th a number of theories were proposed that attributed business cycles to natural causes. For instance, in the view of W. S. Jevons and H. L. Moore the key variable determining the dynamic condition of the economy was weather, under the influence of astronomical phenomena—sun spots in Jevons’s view, the planet Venus in Moore’s. The geographer Ellsworth Huntington proposed autonomous changes in the rate of death as the factor stimulating or depressing business. When mortality rises, it causes sadness and a drop in spending, which leads to a slowdown of the economy; conversely, a decrease in mortality would cause increasing spending and prosperity. These views, once proposed in academic circles and now scarcely considered or even known, are typical examples of exogenous business-cycle theories in which the movements between prosperity and depression are attributed to phenomena external to the economy itself.

Late 20th century authors who view business cycles as the consequence of a self-equilibrating economy responding to random shocks affecting aggregate supply often mention, in the tradition of Schumpeter and Hayek, technological innovations (or “shocks”) as causes of economic fluctuations; other exogenous factors such as demographic changes, political influences, or variations in relative prices have been also proposed. Authors supporting the real-business-cycle (RBC) theory often refer to this type of “supply shock” without specifying its nature, though James Hamilton has proposed changes in oil prices as a key determinant of recessions in the U.S. economy in recent decades (Hamilton 1988).

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2 An excellent survey on the business-cycle theories of the 19th century and earlier decades of the 20th century was provided by Wesley Mitchell in the first chapter of Business Cycles—The Problem and Its Setting (Mitchell 1927). Much more extensive and updated was the review by Gottfried Haberler in the successive editions of Prosperity and Depression—A Theoretical Analysis of Cyclical Movements (Haberler 1960). In The History of Econometric Ideas, Mary Morgan (Morgan 1990) has presented an excellent general survey of the econometric aspects of early business-cycle theories.
Nowadays, however, economists supporting a theory of business cycles determined by exogenous factors—Austrians, monetarists, RBC theorists— are probably a minority compared to economists who view the fluctuations of the market economy as mainly determined by endogenous factors—Samuelsonians, Keynesians, new-Keynesians, post-Keynesians, institutionalists and socialist economists. At any rate, as Thomas E. Hall put it twenty years ago, it is important to keep in mind the distinction between endogenous and exogenous theories, “because they imply a very different behavior for an economy.” Those supporting exogenous factors as causes of the business cycle tend “to view economies as being inherently stable but shocked by outside forces” while endogenous theorists “generally consider economies as being inherently unstable and subject to self-generating cycles. This distinction in macroeconomics is very old and exists today between the monetarists (primarily exogenous) and Keynesians (primarily endogenous)” (Hall 1990, p. 10).

Wages are a key variable explaining recessions for many economists. However, authors agreeing with this claim adhere to quite different schools of thought and have proposed diverse, indeed opposite mechanisms to explain why changes in wages would cause economic downturns. Both too high or too low wages have been viewed as causes of recession.

In the view of Arthur Pigou (1927) presented recently for example by Lee Ohanian, a qualified representative of the RBC school (Ohanian 2008), it is too high wages that cause too high costs for business, with the consequent decay in economic activity leading to a downturn. Consequently, in this view, probably shared by many economists, a decrease in wages would increase supply and would also have a stimulating effect on

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There are many sources providing modern perspectives on economic theories of the business cycle (for example Hall 1990; Gabisch and Lorenz 1987; Knoop 2004; Okishio 1992). The encyclopedia edited by Glasner and Cooley (1997) is a wealth of information.
economic activity. A different perspective is offered by those who from a variety of theoretical positions support the so-called profit-squeeze hypothesis (Boddy and Crotty 1975; Boldrin and Horvath 1995; Bhaduri and Marglin 1990) in which high wages lead to recession through the demand side. The pathway would here be (though some supporters of the profit-squeeze hypothesis may disagree in the details) from high to low profits, and from low profits to falling investment and the lack of effective demand with unsold goods that characterizes recessions. Some authors who support the profit-squeeze hypothesis also seem to hold underconsumptionist views, since they deemphasize the role of investment in business cycles by claiming that, with a “relatively weak response of investment to profitability (…), consumption necessarily assumes the dominant role in effective demand” (Bhaduri and Marglin 1990).

In a purely underconsumptionist view too low wages generating too low purchasing power for consumer goods reduce aggregate demand and cause recession, so that an increase in wages during a slump would tend to stimulate recovery. However, any cursory examination of economic statistics shows that the main element of aggregate demand fluctuating upward during expansions and downward during recessions is investment, while consumption varies little between expansion and recession, and wages increase during the entire expansion and fall during recessions (table 1). Indeed, as Richard Goodwin once explained, the early efforts in econometric research on the business cycle were the pair of monographs written by Tinbergen in 1939 for the League of Nations, and on the basis of general agreement among economists Tinbergen selected investment as the crucial cycle variable to be explained (Goodwin 1964). Perhaps for this reason underconsumptionist views that emphasize the role of consumption in recessions are common among left-wing politicians or well-intentioned defenders of the working class who don’t possess very clear ideas about how the economy works. As Haberler once
said, underconsumptionist theories have a scientific standard quite lower than other theories of the business cycle (Haberler 1960).

3. The Keynesian-Kaleckian perspective

The Trade Cycle by Robin C. O. Matthews was published in England in 1959 and republished in the United States as The Business Cycle (Matthews 1959). It can arguably be considered one of the first systematic examinations of business cycle theory from an explicitly Keynesian point of view.4

The Trade Cycle was part of the Cambridge Economic Handbooks series, whose General Editors were C. W. Guillebaud and Milton Friedman, and judging by the authors cited and the ideas discussed, it seemed that Matthews was open-minded toward recent ideas of Samuelson, Hicks, Friedman and others that were making powerful inroads in economics in the 1950s. The general perspective of the book, however, is clearly Keynesian. Matthews repeatedly also cited Michal Kalecki’s Theory of Economic Dynamics (1954), at that time the most recent and most sophisticated presentation of Kalecky’s ideas on the business cycle (Kalecki 1954).

Likely indicative of the complete rejection by the Keynesian school of ideas linking economic fluctuations with astronomical, meteorological or other exogenous phenomena, Mathews directly opened the book with a discussion of the economic variables that may produce an imbalance between aggregate demand and aggregate supply. When briefly mentioning Slutsky’s views on recessions being the consequence of the economy responding to random shocks of a diverse character, Matthews commented that statistical data indicate

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\text{that economic fluctuations are not due solely to random factors, and it is also clear both from an a priori reasoning and from our more detailed knowledge of history that certain forces do operate which are in principle capable of causing fluctuations of a systematic character (p. 202, italics in the original).}
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4 Business Cycles and National Income (Hansen 1964), first published in 1959, could also lay claim to that distinction.
According to Matthews:

The doctrine that consumption expenditure depends principally on the level of national income is one of the foundations of Keynesian economics. It is because of this doctrine that the other main component of national income, investment, is regarded as the prime mover in fluctuations in national income, the role of consumption being a passive one (p. 113).

To discuss the basic determinants of investment must therefore be a key aspect of the theory of the business cycle. In this respect, the major consideration affecting the inducement to do investment is profitability. Investment will be done if the expected profits represent an adequate return on the sum spent. The physical relation between output and capital is important only in so far as it influences the expected rate of return on investment (p. 34).

In other words, the basic postulate is that the amount of investment done is a function of the expected rate of return. If conditions are such as to promise a high rate of return, much investment will be done, and conversely. There will be a certain critical level of expected returns at which zero net investment is done (p. 36).

Matthews meticulously considered the relation of investment with competition, technical progress, animal spirits, finance, inventories and home construction. His conclusion was that the chief reason for the waves of high and low investment that are the essence of the cycle is the existence of a cumulative effect by which if investment in any period is high relative to its long-run trend value, it encourages investment in the next period to stay high or to rise further, up to a point, while if investment is low it likewise discourages investment in the next period (p. 82).

This means that with appropriate investment the economy would grow without interruption, and slumps would be avoided:

If entrepreneurs can only screw themselves up to do enough investment, it will eventually justify itself, since the income generated will absorb the excess capacity (p. 178).

A comparison of the theories of the business cycle in Matthews’s *Trade Cycle* and in Hyman Minsky’s *Stabilizing an Unstable Economy* (Minsky 2008), published thirty years later, reveals many common views but also some major differences in emphasis and even in conception. Both Matthews and Minsky were self-professed Keynesians, but as is now generally known Minsky’s view of economic fluctuations emphasized the financial factors creating economic disturbances and leading to financial crises and
recessions. By contrast, Matthews was quite convinced that business cycles are phenomena mostly related to the real economy, in which their causes need to be examined. Matthews had asserted in *The Trade Cycle* that at one time it had been thought

that the causes of fluctuations lay wholly or largely in the sphere of money and finance. The trend of opinion has now swung in the opposite direction. Most modern theoretical treatments of the cycle are based on an analysis of real forces, and it is implicitly assumed that secondary importance, at most, attaches to any effects that may be brought about by changes in the cost and availability of finance (p. 128).

Then, presenting a detailed discussion of factors leading to speculation and bubbles in different markets Matthews had concluded that financial crises generally occur after the downturn in the real economy has already started, so that the financial crisis may aggravate the downturn but does not cause it.

Matthews's argument contrasts with the main thrust of *Stabilizing an Unstable Economy*, where Minsky emphasized the role of financial factors and criticized the neoclassical synthesis for its inability to recognize that “the instability so evident in our economy is due to the behavior of financial markets, asset prices, and profit flows” (p. 156).

In Minsky's view, a basic aspect of modern capitalism is that past financing of investment leaves a legacy of payment commitments, and for these commitments to be fulfilled the income of indebted investors must be sufficient. The price system must therefore generate cash flows (…) which simultaneously free resources for investment, led to high enough prices for capital assets so that investment is induced, and validate business debts. For a capitalist system to function well, *prices must carry profits*  (p. 158, Minsky's italics).

The issue of what are the determinants of profits is therefore a key one, and Minsky concludes (p. 184, italics in the original) that

*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).*
Causality, then, “runs from investment and government spending to taxes and profits” and in recessions

Big Government, with all its inefficiencies, stabilizes income and profits. It decreases the downside risks inherent in a capital-intensive economy that has a multitude of heavily indebted firms” (p. 186).

Investment is therefore the basic determinant of the dynamic status of the economy. To look for economic factors causing investment to rise or fall is beside the point, since the present level of investment determines the present level of income and the future level of profits and investment. In the colorful words of Minsky, Government spending and investment “call the tune.” Only the psychological sphere of expectations remains as the source of investment fluctuations. Given adequate investment, profits will rise and the economy will grow.

Minsky viewed investment from the perspective of Keynes and Kalecki, as “a time-consuming process that rests upon profit expectations, so that the decisions to invest are always made under conditions of uncertainty” (Minsky 2008), (p. 133). But, as Michał Kalecki had put it, “roughly speaking, profits follow investment with a time lag” (Kalecki 1954) (p. 54), and since profits at a time \( t \) are a linear function of investment at time \( t \), and previous times \( t - \lambda \), profits are a function “both of current investment and of investment in the near past.” In other words, “investment at a given time is determined by the level and rate of change in the level of investment at some earlier time” (Kalecki 1954, p. 119). It is investment, then, which calls the tune.

4. Marx and Mitchell

Karl Marx and Wesley Mitchell are infrequently cited in modern discussions on macroeconomic issues, perhaps because compared with predominant Keynesian or neoclassical views they provide quite a different perspective on the ways our economy works. Both Marx and Mitchell share with the Keynesian school the view that
investment, or capital accumulation in Marx’s terminology, is a key variable in economic dynamics. However, neither Marx nor Mitchell attributes to investment the major causal role in business cycles, because they see investment as depending itself on profitability.

To a large extent Marx’s views on the business cycle are scattered through the works that were posthumously published by Engels and others and have been variously interpreted by his followers. However, quite definite insights on the business cycle are given in the only volume of Capital that Marx published himself in 1867 (Marx 1977). There, in the chapter on “the general law of capitalist accumulation” Marx stated that the characteristic evolution of modern economies is typically a ten-year cycle in which periods of average activity are followed by production at high pressure, crisis, and finally stagnation. Periods of capital accumulation (that is, economic expansions with high levels of investment) are characterized by an increased demand for labor power. In Marx’s view, during the cycle there is a constant formation, absorption, and re-formation of a mass of unemployed workers, which Marx calls “the industrial reserve army.” This mass of unemployed workers

during the periods of stagnation and average prosperity, weighs down the active army of workers; during the periods of over-production and feverish activity, it puts a curb on their pretensions (p. 792).

Periods of capital accumulation are the most favorable for workers in terms of income, because a larger part of the surplus-product of industry, which is

increasing and is continually transformed into additional capital, comes back to them in the shape of means of payment, so that they can extend the circle of their enjoyments, make additions to their consumption fund of clothes, furniture, etc., and lay by a small reserve fund of money (p. 796).

The tightness of the labor market during periods of capital accumulation (that is, upturns) will likely produce a rise in wages, and then two things can happen:

Either the price of labour keeps on rising, because its rise does not interfere with the progress of accumulation (...) Or, the other alternative, accumulation slackens as a result of the rise in the price of labour, because the stimulus of gain is blunted. The rate of accumulation lessens; but this means that the primary cause of that lessening itself vanishes (…). The mechanism of
the process of capitalist production removes the very obstacles that it temporarily creates (p. 770).

In this passage investment is clearly portrayed as a function of profitability when reference is made to accumulation slackening “because the stimulus of gain is blunted.” On the other hand, a profit-squeeze mechanism is also suggested, since Marx admits that rising wages might cut profits and in this way induce a fall in the rate of investment that triggers a downturn. Though this is offered as a possibility, Marx seems to reject that the implied causal pathway is an important one, because he immediately asserts later in the same paragraph that

To put it mathematically: the rate of accumulation is the independent, not the dependent, variable; the rate of wages, the dependent, not the independent, variable.

Profit is for Marx the monetary translation of unpaid labour supplied by the working class to the owners of capital. When profit

accumulated by the capitalist class increases so rapidly that its transformation into capital requires an extraordinary addition of paid labour, then wages rise, and, all other circumstances remaining equal

profit diminishes. But as soon as this diminution reaches the point at which profit that nourishes capital

is no longer supplied in normal quantity, a reaction sets in: a smaller part of revenue is capitalized, accumulation slows down, and the rising movement of wages comes up against an obstacle. The rise of wages therefore is confined within limits that not only leave intact the foundations of the capitalist system, but also secure its reproduction on an increasing scale (p. 771).

Marx emphasized the idea that accumulation, that is, investment, depends on profitability. He did so, for instance, by quoting the opinion of the English trade-unionist Thomas Dunning, who had written that capital

eschews no profit, or very small profit, just as Nature was formerly said to abhor a vacuum. With adequate profit, capital is very bold. A certain 10% will ensure its employment anywhere; 20% certain will produce eagerness; 50%, positive audacity; 100% will make it ready to trample on all human laws; 300%, and there is not a crime at which it will scruple, nor a risk it will not run, even to the chance of its owner being hanged. If turbulence and strife will bring a profit, it will freely encourage both (p. 926).
Wesley Mitchell is quite a different case. If Marx rejected what he called bourgeois political economy from his first intellectual contributions and was paid in kind with a plain rejection from academic economists, Mitchell was throughout his long intellectual life a highly-respected member of the economic profession. He taught economics in prestigious universities, served for decades as a leading member of the National Bureau of Economic Research, and was president of the American Economic Association. However, in the 1950s his views on the business cycle were considered atheoretical, and soon after his death his work disappeared into oblivion.5

Despite the view that Wesley Mitchell’s contributions lacked theory, the reality is that Mitchell had presented quite elaborate views on the causes of business cycles (that is, a theory of the business cycle) as early as the 1910s in his voluminous Business Cycles (Mitchell 1913). Part III of Business Cycles was republished in 1941 as Business Cycles and Their Causes. In his posthumous and unfinished What Happens during Business Cycles, Mitchell briefly restated his views on the causes of the business cycle, which had changed very little. He still viewed the cycle as a continuous endogenous development, with recession triggering processes leading to expansion, and expansions triggering processes leading into recession. Investment had a key role in the transitions from expansion to recession and vice versa. Though capital goods, Mitchell noted, “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

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5 It was Tjalling Koopman who first presented that criticism in his review (Koopmans 1947) of Measuring Business Cycles (Burns and Mitchell 1946). The accusation was echoed by Robert A. Gordon (Gordon 1961). From Keynesian quarters Alvin Hansen asserted that “the driving forces back of the cycle movement, Mitchell was never able to disclose” (Hansen 1949). The view of a Marxist economist was also that Mitchell described the “ups and downs [of the economy] using little theory” (Devine 1986).
cyclical fluctuation in output, and nearly half of the cyclical declines” (Mitchell 1951, p. 153).

In his 1913 *Business Cycles* Mitchell had noted that economic downturns often start with a financial crisis in which banks, insurance companies, and other financial firms go bankrupt. But for him these were surface phenomena in the financial sphere, and below them, in the so-called real economy, recessions were preceded by a set of processes that decrease profits, at least in a score of major enterprises or industrial sectors. This stagnation of profits in some parts of the economy created financial strain and reduced sales in other industries, all of which in turn would reduce the incentive to maintain or increase inventories. Investment in wages, raw materials, and new machines or production facilities would also fall, which would eventually reduce the level of business activity, since business failures and reduction of business activity cut both wages and investment, the two basic sources of demand. This vicious cycle would then operate for months or years, sending the economy into a downturn that can range from a mild recession to a great depression. Eventually the “very conditions of business depression beget a revival of activity,” profits grow, and favorable conditions for investment are newly created and the economy starts expanding again (Mitchell 1941). In summary, investment plays a prominent role “in the business cycle drama” (Mitchell 1951, p. 157), and depends itself on the level of profits.

That Mitchell put such emphasis on the role of profits in economics in general and in business cycles in particular was the result of his empirical studies of business and economic life, as well as his acquaintance with the work of Thorstein Veblen, one of the proponents, according to Mitchell himself, of the theory that profit is the key variable explaining economic fluctuations (Mitchell 1927). The Veblenian influence seems clear in Mitchell’s view of what he called “the money economy,” the type of economic organization of modern industrial society in which the bulk of economic activity takes
place through the activities of institutions—enterprises—that perform with the purpose of producing money profit. Where the money economy predominates (that is, where economic activity takes the form of making and spending money incomes)

natural resources are not developed, mechanical equipment is not provided, industrial skill is not exercised, unless conditions are such as to promise a money profit to those who direct production (Mitchell 1913) (pp. 21-22).

This was Mitchell’s view in the 1910s. Thirty years later, in one of his last contributions, Mitchell emphasized again the role of profits in understanding business cycles. But now he had lived through “the roaring twenties” and the Great Depression, and he illuminated the idea from a different angle:

Since the quest for money profits by business enterprises is the controlling factor among the economic activities of men who live in a money economy, the whole discussion [of expansions and recessions] must center about the prospects of profits. On occasion, indeed, this central interest is eclipsed by a yet more vital issue—the avoidance of bankruptcy. But to make profits and to avoid bankruptcy are merely two sides of a single issue—one side concerns the well-being of business enterprises under ordinary circumstances, the other side concerns the life or death of the same enterprises under circumstances of acute strain (Mitchell 1941) (Preface).

5. Empirical evidence

For Mathews, Minsky, Marx and Mitchell, investment and profits are the key variables explaining business cycles, which is another way to say that they are the key variables for understanding the dynamics of the capitalist economy. However, in terms of causation the perspectives of the four authors are very different. From the Keynesian-Kaleckian perspective of Matthews and Minsky, investment is the key variable that determines profits. From the perspective of Marx and Mitchell, the direction of causality is the opposite, with profits determining investment. Does the empirical evidence support either of these views more than the other?

5.1. Rates of growth of income flows

The mean flows of income components during phases of the business cycle, and in the vicinity of its turning points (table 1), give us insight on how major economic variables
change during macroeconomic fluctuations and illustrate the role of those variables in the generation of the cycle. NIPA data corresponding to 251 quarters of the U.S. economy show, for instance, that capital income, i.e., profits—either before or after taxes—, is much more volatile than labor income, as represented by wages and salaries—either with or without supplements. During expansions profits increased on average 1.9% per quarter, while wages and salaries rose 1.1% and 1.0%, respectively, with and without supplements; fixed investment grew 1.3% per quarter. In recessions all these flows reverse into negative growth, with profits falling 3.9% before taxes and 3.1% after taxes, private investment falling 1.3% per quarter, and wages and salaries without supplements falling 0.4% per quarter.  

More interesting, however, is to examine the evolution of income flows in the vicinity of turning points. Corporate profits stop growing, stagnate, and then start falling a few quarters before the recession. Profits before taxes on average grow 1.7% in the fifth quarter before the start of the recession, but then drop 0.4% in the next quarter and basically continue decreasing slowly until they plummet in the quarter immediately previous to the recession and during the recession itself (in which, on average, profits before taxes drop almost 4% per quarter). It seems as if the drop of profits about a year before the recession erupts sends a signal for managers and entrepreneurs to cut investment, because the drop in the rate of growth of profits before taxes (from 4.3% to 1.7% and then -0.4%) from the seventh to the fifth quarter before the recession is coupled with a substantial decrease in the rate of growth of investment (from 2.2% to

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6 Of course, as Kalecki pointed out, salaries in national income accounts include both salaries of government officials—which are paid from tax-revenues—and salaries of top-level executives—which are rather akin to profits (Kalecki 1954, pp. 38-40). We obviate all this, assuming here for the sake of simplicity that NIPA “wages and salaries” correspond to labor income. Indeed the referred salaries probably tend to increase in nominal terms during expansions more than wages, while in recessions they probably tend to decrease less than wages.
0.7% and then 0.2% in the same quarters). It may perhaps be that this decrease in investment avoids further losses to some extent, because in the second quarter before the recession profits stop falling and grow again at 0.2%. However, this is just a temporary step on the brake, because profits before taxes drop almost 2% the quarter immediately previous to open recession and almost 4% per quarter in each of the quarters of the recession.

On average, private fixed investment continues growing in this pre-recession period, however, and only one quarter before the peak investment starts falling. Wages and salaries continue growing even during the quarter immediately preceding the recession, and they only start declining during the recession itself.

Once the recession ends, the recovery of profits is quick, with a quarterly increase between 9% and 11%—considering profits before or after taxes—in the quarter immediately following the recession. In that same quarter, however, wages grow at a very small rate, quite below 1%, while investment grows quite intensely at a rate of 3.7%.

These figures do not seem to support the idea that causality runs from investment to profits, since profits reverse their growth and start falling several quarters before investment does. This is also applicable to the most recent recessions. For instance, preceding the recession that started in the fall of 2007 investment peaked in a kind of plateau that lasted from the second quarter of 2006 until the third quarter of 2007. However, profits peaked in the first quarter of 2006 and then steadily dropped in the rest of the year (figure 1). In the long expansion of the 1990s profits started declining (at the end of 2007) long before investment did (in mid-2000), and the same seems to have occurred in the expansions of the early 1970s and late 1970s (figure 2). In all these cases profits peak several quarters before the recession, while investment peaks almost immediately before the recession.
The quick jump of profits into strong growth as soon as the recession ends (table 1, figures 1 and 2) neither seems compatible with causation going from investment to profits. Some lag would need to exist for investment spending to be translated into increased profits for firms that sell investment goods or for producers who sell consumer goods to wage workers hired as the result of new investment. But there is no evidence of such a lag in the data. It is investment that follows, rather than precedes, profits.

5.2. Regression analysis

Another way to explore this issue is to test how changes in investment predict changes in profits, and vice versa. We can explore these relations by regressing the rates of growth of a variable on present and lagged values of the rate of growth of the other variable.

Regression models show that the change in profits, particularly profits before taxes (table 2, panel I), predicts to a significant extent the change in investment, while the change in investment does not predict the change in profits (table 2, panel III).

Considering the model that minimizes the Akaike information criterion (AIC), profits before taxes during the present quarter and the five former quarters have a very significant and positive effect on investment, with 44% of the variation in investment explained by the variation in profits (table 2, panel I, model F). Profits after taxes during the present quarter and previous quarters also have a noticeable effect on investment, but the effect is much weaker and, compared with profits before taxes, the proportion of change in investment explained is considerably reduced, from 44% to 32% (for model G, the one minimizing AIC in panel II, table 2).

On the other hand, lag regressions do not provide evidence of past investment predicting present profits (table 2, panel III). The effect at lag zero is very strong and

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7 The model is $\dot{I}_t = \alpha + \sum_{k=0}^{5} \beta_k \cdot \dot{P}_{t-k} + \epsilon_t$, where the superimposed dot indicates the rate of growth of the variable, $I$ is investment, $P$ is profits before taxes, $\epsilon$ is the error term, and the subindex $t$ refers to time in quarters.
positive, but lagged effects of investment on profits are not significant and even have "the wrong sign." If past investment were determining present profits, we would expect significant and positive lag effects of investment on profits. However, the observed lag effects are negative, and not statistically significant.

5.3 Granger-causality tests

Granger causality tests including many lags suggest bidirectional Granger-causality, with past profits helping to predict investment and past investment helping to predict profits. However, when the test is applied to profits before taxes (table 3, panel A) the hypothesis that profits do not help to predict investment is rejected at a much higher level of statistical significance than the hypothesis that investment does not help to predict profits. When profits after taxes are tested, the hypothesis that investment does not help to predict investment cannot be rejected at the usual level of confidence of 95% when 10, 7, or 5 lags are included in the test (e.g., including 10 or fewer lagged quarters in the tests, the $P$-value is 0.092 for the normal test and 0.054 for the asymptotic test, i.e. both $P$-values are greater than 5%). By contrast, for all lags tested, the hypothesis that profits after taxes do not help to predict investment is rejected at a very high level of confidence (beyond 99%, since for both the normal and the asymptotic test the $P$-value is under 0.001). Overall, Granger causality tests support causality from profits to investment much more than in the direction of investment to profits.

6. Final remarks

While Marx and Mitchell (MM) viewed profits as the key variable determining the dynamic condition of the economy, with the level of profits primarily determined internally by the workings of the system, authors following the Keynesian-Kaleckian
(KK) tradition view investment as depending on profits, but since profits depend themselves on previous investment, it is investment that ultimately sets the dynamic condition of the economy. As Matthews noted, with entrepreneurs screwing themselves up to do enough investment, profits would eventually rise. This is as if entrepreneurs and owners of money in general were able to pull themselves up by their bootstraps. Doesn’t this sound a bit like Say’s law, with supply creating its own demand? Furthermore, in the KK perspective a fluctuating economy occurs in which entrepreneurs’ changing rates of investment set the future path for the economy. Since investment and government spending are in this perspective the only two variables that set the future path of the economy, shouldn’t we consider the KK perspective as an exogenous theory of the cycle? Were it not for human psychology determining investment, and ruling political forces determining Government spending, there would be no recessions.  

On the other hand, if in the MM perspective profits determine investment, and investment determines expansions and recessions, then we have a system in which profits are the major variable that determines the dynamic status (of expansion or contraction) of the economy. To state that we have a profit-led economy (Barbosa-Filho and Taylor 2006; Rada and Taylor 2006; Mohun and Veneziani 2008) probably amounts to something similar. The existence of significant hoards of money during economic crisis has been recently highlighted (Wilson 2009) and it seems then that the conversion of these hoards of money into revenue-producing (and job-producing) investment is a key element for getting the economy out of a slump. But for this to occur, the rise in profitability is a key issue. The destruction of existing capital (by bankruptcies and liquidations) that reduces competition and allows for purchases of capital goods at

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8 According to the editor of Kalecki’s *Collected Works*, Jerzy Osiatynski, in Kalecki’s *Theory of Economic Dynamics* “the long-run development of the capitalist economy, and even its passage to the phase of the business upswing, was only possible under the influence of exogenous factors” (my emphasis, JATG). (Osiatynski 1991, p. 551). This sharply contrasts with assertions by Minsky, who following Kalecki’s views on economic dynamics claimed however that cycles and crises “are not the result of shocks to the system or of policy errors, they are endogenous” (Minsky 1991).
liquidation prices, coupled with the fall in wages, contribute to create renewed opportunities for the investment of liquid money required for recovery. But those owning banks or big enterprises don’t want to hear about destruction of financial capital as a key element to overcoming the crisis, and those earning their income from work prefer to believe those saying that rising wages will create more demand and lead the economy toward recovery.

These are however theoretical and political implications that can be put aside. What for scientific purposes must not be put aside is the statistical evidence that raises serious doubts about the hypothesis that past investment predicts profits, that investment, as Minsky put it, calls the tune. Statistical data and tests seem much more consistent with causality running in the opposite direction, from profits to investment.

This is not particularly surprising. The role of profitability as the major determinant of investment has also been found in other investigations (Bhaskar and Glyn 1995; Blanchard, Rhee and Summers 1993), and one of the key findings of Tinbergen’s early econometric studies on the business cycle was precisely that profits are the major determinant of investment (Tinbergen 1939). But Tinbergen’s pioneering investigations received heavy criticism from none other than Lord Keynes and the nascent figure of the anti-Keynesian field, Milton Friedman (Morgan 1990), and they were mostly dismissed by mainstream economics. Even a major econometrician and theorist of the business cycle, Richard Goodwin, attempted to downplay the importance of Tinbergen’s conclusion. Goodwin asserted that “if we reverse the direction of causality and say that investment determines profits through the multiplier and income, we rob one of Tinbergen’s chief results of much of its significance” (Goodwin 1964, p. 433). To support this criticism, Goodwin argued that “in the cycle most things go up and down together, and hence the danger of spurious correlation is very great.” While this indeed is true, it is possible to extend the analysis further. Though profits, investment, wages, output, and
other variables swing up and down “together” in expansions and recessions, observed
lags and statistical analysis show that the two potential directions of causation between
investment and profits are not equally likely. The hypothesis that profits determine
investment is much more consistent with the empirical evidence. If investment “calls the
tune,” then that tune is an echo of a previous melody.

Acknowledgements
This text has benefitted from comments and observations by Elena Gouskova, Paul Mattick,
Rolando Astarita, Anwar Shaikh, Duncan Foley, and Wallace Genser. The usual disclaimers apply.
I am grateful to the Queen Mary/University of London School of Business and Management
(particularly to Simon Mohun and Maxine Robertson), for providing me a place to work and
facilities for research.
**Figure 1.** Corporate profits and investment, quarterly data (seasonally adjusted at an annual rate) since 1999 to the Great Recession

Data source: Bureau of Economic Analysis (NIPA Table 5.1). Figures are seasonally adjusted at annual rates (data published July 30, 2010)
Figure 2. Corporate profits (before and after taxes) and fixed investment as a share of gross domestic income, quarterly data since 1947 to the Great Recession

Computed with NIPA data (U.S. Bureau of Economic Analysis, www.bea.gov) and the business cycle chronology of the National Bureau of Economic Research, assuming a recession lasts from the peak quarter to the trough quarter, and both quarters are included in it. The graph is plotted as if the recession that started in fall 2007 had lasted until the second quarter of 2009, though at the writing of this article the NBER has not yet dated the end of that recession.
Table 1. Quarterly rates of growth (%) of profits, investment, and wages and salaries during the recessions and expansions of 251 quarters of the U.S. economy (1947:I to 2009:III).

<table>
<thead>
<tr>
<th>Sample (quarters)</th>
<th>Profits before taxes</th>
<th>Profits after taxes</th>
<th>Private fixed investment</th>
<th>Wages &amp; salaries with supplements</th>
<th>Sample size (quarters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>0.7</td>
<td>0.9</td>
<td>0.7</td>
<td>0.7</td>
<td>251</td>
</tr>
<tr>
<td>Expansion</td>
<td>1.9</td>
<td>1.9</td>
<td>1.3</td>
<td>1.0</td>
<td>201</td>
</tr>
<tr>
<td>Recession -8</td>
<td>-3.9</td>
<td>-3.1</td>
<td>-1.3</td>
<td>-0.4</td>
<td>50</td>
</tr>
<tr>
<td>Recession -7</td>
<td>-0.4</td>
<td>-0.4</td>
<td>0.6</td>
<td>0.7</td>
<td>10</td>
</tr>
<tr>
<td>Recession -6</td>
<td>4.3</td>
<td>4.4</td>
<td>2.2</td>
<td>1.8</td>
<td>10</td>
</tr>
<tr>
<td>Recession -5</td>
<td>1.7</td>
<td>2.5</td>
<td>0.7</td>
<td>1.1</td>
<td>10</td>
</tr>
<tr>
<td>Recession -4</td>
<td>-0.4</td>
<td>-0.9</td>
<td>0.8</td>
<td>1.0</td>
<td>10</td>
</tr>
<tr>
<td>Recession -3</td>
<td>-0.4</td>
<td>-0.4</td>
<td>0.6</td>
<td>1.1</td>
<td>11</td>
</tr>
<tr>
<td>Recession -2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.9</td>
<td>1.0</td>
<td>11</td>
</tr>
<tr>
<td>Recession -1</td>
<td>-1.9</td>
<td>-0.8</td>
<td>-0.2</td>
<td>0.7</td>
<td>11</td>
</tr>
<tr>
<td>Trough</td>
<td>-2.5</td>
<td>-0.7</td>
<td>-0.8</td>
<td>-0.8</td>
<td>11</td>
</tr>
<tr>
<td>Trough +1</td>
<td>9.3</td>
<td>10.9</td>
<td>3.7</td>
<td>0.7</td>
<td>11</td>
</tr>
<tr>
<td>Trough +2</td>
<td>7.1</td>
<td>6.3</td>
<td>2.5</td>
<td>1.3</td>
<td>10</td>
</tr>
<tr>
<td>Trough +3</td>
<td>4.9</td>
<td>4.7</td>
<td>2.2</td>
<td>1.2</td>
<td>10</td>
</tr>
</tbody>
</table>

Note: Recessions defined as including both the peak quarter and the trough quarter in the NBER chronology, and all quarters between a peak and the next trough. “Recession -8” means the sample including the expansion quarters preceding recession by 8 quarters; “Trough +2” means the sample including the second quarters after the end of the recession, etc. All rates of growth computed with variables adjusted for inflation by transforming nominal figures from NIPA data into 2005 dollars.
**Table 2.** Results of regressions to estimate private fixed investment as a function of corporate profits or vice versa.

<table>
<thead>
<tr>
<th>Panel I.— Private fixed investment regressed on corporate profits</th>
<th>Lag</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0.77***</td>
<td>0.67***</td>
<td>0.67***</td>
<td>0.66***</td>
<td>0.68***</td>
<td><strong>0.70</strong>*</td>
<td>0.70***</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0.65***</td>
<td>0.66***</td>
<td>0.61***</td>
<td>0.59***</td>
<td><strong>0.61</strong>*</td>
<td>0.62***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.32***</td>
<td>0.29***</td>
<td>0.29***</td>
<td>0.29***</td>
<td><strong>0.26</strong></td>
<td>0.27**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>0.18*</td>
<td></td>
<td>0.15</td>
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<td><strong>0.16</strong></td>
<td>0.15</td>
</tr>
<tr>
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<td>4</td>
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<td></td>
<td></td>
<td>0.15</td>
<td></td>
<td><strong>0.10</strong></td>
<td>0.10</td>
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<tr>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.26</strong></td>
<td>0.25**</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>0.06</td>
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</tr>
<tr>
<td></td>
<td>R²</td>
<td>0.22</td>
<td>0.37</td>
<td>0.40</td>
<td>0.42</td>
<td>0.42</td>
<td>0.44</td>
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<table>
<thead>
<tr>
<th>Panel II.— Private fixed investment regressed on profits after taxes</th>
<th>Lag</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<td>0.35***</td>
<td>0.34***</td>
<td>0.36***</td>
<td><strong>0.37</strong>*</td>
<td>0.37***</td>
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<td>0.45***</td>
<td>0.46***</td>
<td>0.44***</td>
<td>0.47***</td>
<td><strong>0.48</strong>*</td>
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<tr>
<td></td>
<td>2</td>
<td>0.24**</td>
<td>0.22**</td>
<td>0.25**</td>
<td>0.21*</td>
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<td><strong>0.23</strong></td>
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<tr>
<td></td>
<td>3</td>
<td></td>
<td>0.14</td>
<td>0.12</td>
<td>0.13</td>
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<td><strong>0.11</strong></td>
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<td>0.18*</td>
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<td></td>
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<td></td>
<td><strong>0.20</strong></td>
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<tr>
<td></td>
<td>R²</td>
<td>0.10</td>
<td>0.23</td>
<td>0.26</td>
<td>0.27</td>
<td>0.28</td>
<td>0.29</td>
<td>0.32</td>
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<table>
<thead>
<tr>
<th>Panel III.— Corporate profits regressed on private fixed investment</th>
<th>Lag</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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</thead>
<tbody>
<tr>
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<td>0.28***</td>
<td>0.35**</td>
<td>0.36***</td>
<td><strong>0.35</strong>*</td>
<td>0.35***</td>
<td>0.35***</td>
<td>0.35***</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>–0.13**</td>
<td>–0.09*</td>
<td><strong>–0.08</strong></td>
<td>–0.08</td>
<td>–0.08</td>
<td>–0.08</td>
<td>–0.08</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>–0.10**</td>
<td>–0.04</td>
<td>–0.03</td>
<td>–0.03</td>
<td>–0.03</td>
<td>–0.03</td>
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</tr>
<tr>
<td></td>
<td>3</td>
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<td><strong>–0.13</strong></td>
<td>–0.11*</td>
<td>–0.11</td>
<td>–0.11</td>
<td>–0.11</td>
<td>–0.11</td>
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<td>–0.05</td>
<td>–0.04</td>
<td>–0.04</td>
<td>–0.04</td>
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<td></td>
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<tr>
<td></td>
<td>R²</td>
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<td>0.27</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
</tr>
</tbody>
</table>

**Notes:** The explanatory variable is included in the regression at lag 0 only in specification A, at lags 0 and 1 in specification B, and so on and so forth; until specification G in which the covariate is included in the regression at lags 0, 1, 2, ... until 6. Variables are quarterly rates of change computed from inflation-adjusted quarterly data for private fixed investment and corporate profits before and after taxes. Parameter estimates highlighted in boldface correspond to the specification that minimizes AIC in the panel. Specifications including up to 20 lags were tested.
Table 3. Granger causality tests for the relation between profits and investment. Figures are $P$-values obtained from testing the null hypothesis indicated at the top.

<table>
<thead>
<tr>
<th>Panel A</th>
<th>Profits before taxes do not help to predict investment</th>
<th>Investment does not help to predict profits before taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lags</td>
<td>Test 1</td>
<td>Test 2</td>
</tr>
<tr>
<td>15</td>
<td>0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>10</td>
<td>0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>7</td>
<td>0.009</td>
<td>0.004</td>
</tr>
<tr>
<td>5</td>
<td>0.003</td>
<td>0.002</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B</th>
<th>Profits after taxes do not help to predict investment</th>
<th>Investment does not help to predict profits after taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lags</td>
<td>Test 1</td>
<td>Test 2</td>
</tr>
<tr>
<td>15</td>
<td>0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>10</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>7</td>
<td>0.002</td>
<td>0.001</td>
</tr>
<tr>
<td>5</td>
<td>0.007</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Notes: Test 1 is the usual Granger test, test 2 is the asymptotically equivalent test. Quarterly data for private fixed investment, and corporate profits—before and after taxes—for the US economy from 1947:II to 2009:III. All series in rate of change.
References


