A post-Keynesian Macroeconomic Theory for Equity Markets in Stock-Flow Consistent Frameworks

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Declaration for PhD thesis

I certify that the thesis I have presented for examination for the PhD degree of Kingston University is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it). The thesis does not contain any material that has been previously submitted for an award at an institute of Higher Education either in the UK or overseas. The copyright of this thesis rests with the author. Quotation from it is permitted, provided that full acknowledgement is made. This thesis may not be reproduced without my prior written consent. I warrant that this authorisation does not, to the best of my belief, infringe the rights of any third party.

Javier López Bernardo

27/10/2015

Statement of conjoint work

I confirm that Chapter 3 was jointly co-authored with Engelbert Stockhammer and Félix López Martínez and I contributed a minimum of one half of this work. I played a major role in almost all aspects of the project, especially in developing the argument of the paper and building the theoretical model used for the simulations. I also drafted the text.

Abstract

This thesis presents a theoretical framework for understanding the long-term behaviour of equity markets. The framework is informed by post-Keynesian theory. It highlights the importance of effective demand for equity valuation – alongside other post-Keynesian features such as a realistic institutional setup, the (in)efficiency of financial markets in pricing assets and the importance of income and wealth distribution for macroeconomic theory.

In contrast to mainstream approaches dominated and constrained only by the logic of rational agents, a Stock-Flow Consistent (SFC) methodology is followed here. The strict accounting rules of SFC models guarantee that all assets, flows and price revaluations that happen in an economic system are booked accordingly, with no accounting 'black holes' in the logical structure. The SFC approach also permits an outcome in which the market value of assets differs from their book value, a crucial distinction that should be at the core of any theory for equity returns.

This thesis makes a contribution to the post-Keynesian literature on the Cambridge corporate growth models. It is shown that this literature can be used as a starting point for developing a theory of equity markets with a more realistic institutional setup. The main features of the post-Keynesian theory for equity markets developed here can be summarised as follows. First, aggregate demand determines the return on shares and their valuation in the market. Second, Tobin's q is inversely related to the growth rate of the economy in the long-run and inversely related to the marginal propensities to consume. Third, Tobin's q can be different from 1 even in the long-run. And fourth, wealth holders' consumption decisions are a major driver of the equity yield in the long-run, a feature very similar in spirit to the Levy-Kalecki profit equation, but now applied to financial markets. I conclude that post-Keynesian theory can offer an alternative to mainstream finance and fill a gap in current financial macroeconomic theory.

Chapter 1. Introduction

The behaviour of financial markets and the fortunes and misfortunes of its participants have always been a subject of fascination for the public and academics alike. For the former, financial markets have been pictured as a path to a life of riches, and for the latter, a potential source of fluctuations and business cycles in capitalist economies.

One of these markets, the equity market, which (if we look at its history) has arguably been the most enticing financial market, is the topic of this thesis. The aim of the present thesis is to propose a post-Keynesian framework to understand several long-run features of equity markets from a macroeconomic perspective, with an emphasis on the long-run returns that can be achieved by participants investing in these markets. Despite all of its prominence in the media and in the everyday life of many people (through pension plans, for instance), the equity market is still a relative newcomer to economic theory in comparison to other many other fields of economic discussion. Whereas one can find theoretically-informed analyses of interest rates and international trade back to the 16th century, and income distribution and economic growth back to the 18th century (just to mention a few), equity markets as a theoretical topic had to wait at least until the first part of the 20th century. And there were very good reasons for this: at least three come to mind. First, proper equity markets did not fully blossom until the end of the 19th century, and only in the most advanced economies of the time. Although the first equity markets were developed in Holland and England in the 16th and 17th century, the South Sea Bubble in 1720 and the subsequent 'Bubble Act' delayed the development of equity markets until the mid-19th century (the Mississippi bubble engineered by John Law in 1719-1720 had similar discouraging effects in France). In this regard, it must not be forgotten that the history of equity markets is also inevitably bound to the history of the corporation (and the separation of ownership and control), which again did not fully develop until the late 19th century. Second, long time data series of equity market returns have not been systematically compiled for several countries until very recently , a fact that has made it quite difficult for researchers to think specifically about market returns – and we know how difficult and unattractive is to think about economic problems without an empirical background. And third, one could also offer theoretical reasons. Theories of the rate of profit and (especially) of the rate of interest were standard economic theory by the end of the 19th century, but for the writers of the time (i.e. mostly neoclassical economists) it did not occur that a separate theory for shareholders' return was needed. The interest rate for borrowing capital in an economy composed of free-standing companies was thought all that was needed to determine the return on different assets – adjusted for various degrees of risk. Having a theory for the rate of interest was equivalent to having a theory for the rate of profit and at the same time a theory for the equity yield. And furthermore, macroeconomics as a discipline was substantially only born with the publication of Keynes' *General Theory* in 1936, and thus the possibility of envisaging a theory for the behaviour of equity markets (or, for that matter, *any* financial market) with macroeconomic features was only conceptually possible after that.

As stated above, the framework used here to advance a new theory for the equity markets will be post-Keynesian. Post-Keynesian economics, which originated from the seminal works of John Maynard Keynes and Michal Kałecki and then expanded by the Cambridge Keynesians, is now a coherent set of ideas that deals with many issues and that goes well beyond Keynes and Kalecki's original ideas. There have been many attempts to synthesise the main tenets of post-Keynesian economics (Lavoie, 2006); because the number of issues addressed by post-Keynesians is now ample, in the models developed in this thesis I will emphasise the following features that I think to be the crucial ones (but by no means the only ones) for a post-Keynesian theory of equity markets:

- Economies are demand-led, which crucially means for our purposes that not only production (and income and employment) is determined by the level of aggregate demand, but that asset prices and shareholders' returns are also dictated by aggregate demand in the long-run. In traditional mainstream models, aggregate demand plays no such role, with equity returns given by an 'equilibrium Wicksellian interest rate' plus a premium for bearing risk.
- Unemployment is involuntary and given by aggregate demand considerations –and not by the will of rational agents who want to take extra leisure time.

- The institutional setup matters (Pasinetti, 1981) and thus many features of capitalist economies cannot be studied in a vacuum or, even worse, in a Robinson Crusoe-type economy. In the framework of this thesis, this principle means that households and firms in modern economies are separate entities, with different economic motivations, and they should be modelled as such. By contrast, in the mainstream framework there is only one representative agent, which during the day seems to play the role of a clever entrepreneur and during the night the role of a maximising-utility household.
- Investment is largely given by animal spirits, because firms' decisions cannot be made in a fully well-defined, rational manner in a world of uncertainty (Davidson, 1992), in which the path of future cash-flows is simply unknown.
- Income (and wealth) distribution matters, and as such they should be included in any formal macroeconomic model, even in simple frameworks.
- Money is endogenous and financial markets are not efficient in any meaningful sense of the word.

Although few post-Keynesians would disagree about the importance of the previous propositions and their place in post-Keynesian theory, the list is not exhaustive. Nevertheless, it will be enough to characterise the main features of the theory for equity markets developed here.

One of the contributions of the thesis is to present *a post-Keynesian theory for the equity markets in the long-run*. Presently, the post-Keynesian theory of equity markets is, at best, incomplete. The main post-Keynesian references for the behaviour of equity markets can be found in the seminal works of Hyman Minsky (2008a, 2008b). Unlike the mainstream framework, the Minskyan one displays a rich institutional structure, where the balance-sheets of households, firms and banks (and government) are interlocked with each other, creating a dense web of financial assets and liabilities. These assets and liabilities produce regular cash-flows between economic units, and these cash-flows are the means to 'validate' the commitments (in real and financial investment) made in the past. A subsidiary consequence of this institutional setup is that, depending on the pattern of cash-flows and the structure (i.e. leverage) of the sectoral balance-sheets, capitalist economies will suffer from recurring business cycles produced solely by financial considerations. Although one would hardly disagree with the Minskyan story in its general lines, its implications for the equity markets are incomplete. First, it relies heavily on the way people form expectations, and second, it only offers a theory of financial markets in the short-run – i.e. during the business cycle. I do not take exception to these two features, but they cannot offer by themselves a complete theory of the equity markets, given that macroeconomic forces and a longer period of analysis are absent from this analysis.

On the other hand, Nicholas Kaldor proposed some time ago (Kaldor, 1966) a post-Keynesian corporate economy framework for dealing with shareholders' returns in the long-run. The model was intended to be a contribution to the Pasinetti-Samuelson discussion on the significance of the Pasinetti's theorem and not a theory for equity markets, and that may be the reason why the model has never gained any acceptance as a theory for equity markets among post-Keynesian economists. But Kaldor's model, as well as its further developments (Marris, 1972; Moore, 1975; Moss, 1978; Panico, 1997; Lavoie, 1998), is the starting point for the theoretical models I present here. The literature of the Cambridge corporate models is the antipode of Minsky's: there is no mention to how people make expectations, investment follows a constant growth path, it embodies a long-run framework (and focusing on stable steady-state positions) and banks and other financial intermediaries are absent from the picture. However, whereas in the Minskyan approach the discussion of asset prices is always carried out in a business cycle context, the Kaldorian approach can offer new insights into the dynamics of equity prices in the long-run, a topic for which the Minskyan framework is badly suited. And a theory for equity prices in the long-run can improve our understanding for several real world issues and proved to be highly useful – as, for instance, in understanding how equity prices will behave in the future and the implications for the portfolio allocation of investors with very long-time horizons such as pension funds.

The present thesis will thus contribute to the expansion of the original Kaldorian results in economies with a richer institutional setup than in the Cambridge corporate models and explain how the new proposed features of these enlarged Kaldorian models can enhance our understanding of the working of equity markets. These novel features are summarised in the next few paragraphs.

Although the thesis is divided in three chapters that could be read quite independently, all of them deal with equity markets, so there is a common line of argumentation that can be highlighted in this introduction. Chapter 2 addresses the issue of corporate long-run profitability in a minimalist economy without a government or external sector. For classical, Marxist and some neoclassical economists, the rate of profit declines over time, approaching zero (or to a very low number) in the long-run. This issue is addressed in the first chapter for the very reason that, if equities have to be worth something, firms have to deliver a meaningful stream of future profits. With a zero (or very small) level of profits in the long-run, financial assets would not have any value, and then the whole exercise of proposing a theory for equity markets would be meaningless – the only prediction would be that in the long-run the value of the assets would be nil. In traditional discussions, a lower rate of profit only means lower investment in real assets by corporations in the future, but it is clear that the almost-never-discussed effects on the value of financial assets will also prove important. The main conclusion of Chapter 2 is that even in a no-growth economy (where the only investment carried out is replacement investment), the rate of profit can still be positive, determined by capitalists' marginal propensity to consume. As long as firms have a flexible pay-out policy (which means that firms will distribute all earnings as dividends in the stationary-state), dividends paid out by firms will be consumed by shareholders and then flow back as earnings to firms' profit and loss statement. Two things stand out from these results. First, shareholders' consumption decisions can affect the rate of profit even in the absence of net investment, in contrast to the 'Cambridge equation', in which a necessary condition for a positive profit rate is a positive growth rate of investment. And second, this stationary result of a positive rate of profit, together with a zero growth rate *is just a special case* of Piketty's fundamental inequality (Piketty, 2014): empirically what Piketty calls the rate of return (which actually is a 'wealth yield') has been greater than the growth rate of the economy in capitalist systems. My simple case is important because it reduces the complications to a minimum and shows that such an inequality is essentially given by capitalists' consumption decisions, regardless of the type of technology or the nature of the production function.

Chapter 3 extends this simple framework and abandons one strong assumption that was made in Chapter 2, namely, that Tobin's q, the ratio of the market value of the assets to their replacement cost, was exogenous. The aim of Chapter 3 is to explain what the macroeconomic forces are driving the evolution of q (taken here as a proxy for other equity valuation metrics) over long periods of time – say, decades. This question is hardly interesting for traditional (mainstream) economic theory, because the latter predicts that in the long-run q should be equal to one, offering the apparently compelling logical argument that this is the only sensible way to proceed in a world populated by rational agents: a q that were persistently different from one would trigger actions from entrepreneurs, who would automatically invest/divest in order to bring q to parity. As I will argue in Chapter 3, there is a lot of implicit theorising in this framework concerning the motivations imputed to managers and firms, the assumption of perfect capital markets and the irrelevance of both the financial structure and dividend policy for equity valuation. In the post-Keynesian theory presented here, Tobin's q not only reacts to entrepreneurs' decisions, but rather to the joint behaviour of the other sectors of the economy (note that, conversely, entrepreneurs' decisions are not influenced by q in the post-Keynesian framework, but by animal spirits). In particular, what I call 'a post-Keynesian theory for q' builds on the Kaldorian ideas mentioned above and can be summarised as follows: i) there is a negative relation between growth rates and valuation ratios ii) there is a negative relation between propensities to consume and valuation and iii) q values are different from 1 in the long-run. In the final part of Chapter 3 I stress the last feature and use it as part of a critique of mainstream finance, most particularly one of the implicit assumptions I mentioned above, the irrelevance of dividend policy, encapsulated in the Miller-Modigliani dividend irrelevance proposition. I show that *q values differing from 1 destroy the rationale for the dividend irrelevance theorem.* The reason can be intuitively explained as follows. For q values less than one, investors would find that assets are sold in the market for less than their book value. A policy of reinvesting earnings would not be advisable for shareholders, because for every dollar of earnings reinvested and booked in the balance sheet, they would obtain a less-than-a-dollar amount in the market as an unrealised capital gain. Dividends do not have this problem (because, obviously, they are always worth their face value) and thus they would be preferable on these grounds, allowing shareholders to take their cash and reinvest these dividends in other (hopefully) higher-yield companies. I conclude Chapter 3 by mentioning that the empirical evidence for a group of developed countries shows that q values for the corporate sector as a whole have historically been (and persistently) less than one, which clearly suggests that dividend policy has *not* been irrelevant in equity valuation and that the Miller-Modigliani propositions are misleading and cannot be very illuminating for real-world analysis.

Finally, Chapter 4 is, theoretically speaking, the most ambitious part of the thesis, because it integrates aspects of the previous chapters with new material, and synthesises them in a unified post-Keynesian framework to explain long-run returns in equity markets. The advantage of this model in comparison to the one presented in Chapter 3 is that it can be solved analytically, so it can provide additional economic intuition for the results. On the other hand, the goal of Chapter 3 is to understand the relationship between growth and equity valuations (measured by q), while the goal of Chapter 4 is to understand the relationship between growth and shareholders' returns. In this sense, Chapter 4 is more comprehensive because it deals with returns, so that valuation is seen to be only one of the many items that enters into the determination of shareholders' returns. The main conclusions are: first, I find again a negative relationship between Tobin's q (and valuation metrics in general) and economic growth. Second, the effect of economic growth on dividend yields and earnings growth is positive, but its effect on the growth in the number of shares can be negative (i.e. a 'dilution effect'), which makes the relationship between equity returns and economic growth to be indeterminate a priori, in line with the empirical evidence that finds little relation between growth and returns. Third, wealth holders' consumption emerges as a crucial driver for shareholder profitability in the long-run (a notion similar to Kalecki's theory of profits, but now applied to financial markets). Fourth, in post-Keynesian theory the equity yield is determined by aggregate demand, and no theory of risk is needed. Finally, the model suggests that a theory for shareholders' returns is something different from a theory for the rate of profit – in the model, the rate of profit in the long-run is given by a constant income distribution and a constant capital-income ratio, whereas the equity yield is given mainly by shareholders' consumption decisions. The central conclusion of the chapter (and, by the same token, of the thesis) is that *post-Keynesian theory can offer an alternative and superior framework to the mainstream approach* and enhance our understanding of the workings of equity markets in advanced capitalist economies.

A final word about the provenance of the idea of the thesis could be useful. The present thesis sprung from an original project that was aiming to summarise the evolution of the theory of profit in the history of economic thought. I was (and still I am) convinced that the poor accounting knowledge of economists until the 20th century (and in many cases up to the present) had precluded the development of a full understanding of the role of profits in capitalist economies. The proposed project was devised to explain this historical evolution and the source of the poor performance of the theory of profits in mainstream economics following Nicholas Kaldor's suggestion that the history of economic thought had gone wrong after Chapter 4 of Adam Smith's *Wealth of Nations*. In my story, however, the history turned in the wrong direction somewhat later, when Jean-Baptiste Say introduced the concept of the *entrepreneur* at the beginning of the 19th century, followed by John Stuart Mill, in his *Principles*, grafting it onto the Ricardian theory of distribution. Mill's (and therefore Say's) line was inherited by neoclassical and Austrian economists alike. This entrepreneur line of thinking has been largely responsible for the development in mainstream models of the concept of the representative agent.

What I found particularly disturbing in the theory of profits is that there was little mention of the role of capital gains in influencing profitability. As Steindl (1998, p.435) noted: 'It is one of the peculiarities of our very peculiar subject that it takes very little notice of capital gains. The national accounts do not know them at all and economic theory has very little if anything to say about them.' But at the same time I knew that capital gains can have a powerful impact on corporate profitability, because, for instance, during the 2000s the profits of Spanish corporations were largely driven by them (thanks mostly to the real estate and banking sectors). At the same time, however, corporate profits as measured by national accounts (profits that capture mainly profits from operations and not from revaluations) were declining throughout this period (López Martínez *et al.*, 2013).

While working on the Cambridge corporate models (and in particular with Moore (1973), for some reason a little-quoted but really astonishing paper) and considering how to include capital gains in the canonical Cambridge equation, I soon realised that while the impact of capital gains on corporate profits is important enough to deserve closer attention, an even more interesting topic was the relationship between corporate profitability and shareholders' return. Economic theory always assumes by default (and here traditional post-Keynesian growth models fare no better), without a glance at the evidence, *that both measures have to be equal*. This is where Say's lineage plays a major role, because the entrepreneur is assumed to be a household and firm at the same time, so in this mythical setup there is no reason why the rate of profit and the shareholders' return should not be equal. But *q*'s have historically been different from one, which means that the rate of profit and the equity yield have not been equal. Therefore, a thesis on shareholders' returns, rather than on the rate of profit earned by corporations, would be a worthwhile contribution, and moreover it would be a theory in which a truly integration of book values (where the accounting has to be waterproof) with market values (in which capital gains play a major role) could be easily explained.

This thesis could not have been done without the help of many colleagues and friends, and of my family. The Ramón Areces Foundation, a very well-run private Spanish foundation, provided the necessary funding to start the Ph.D. Engelbert Stockhammer and Paul Auerbach, my two supervisors and now friends, were very helpful in every aspect along all the process of writing the thesis and, moreover, extremely patient with me (more than could be expected according to 'regular' supervisory duties) and with my rather unorthodox way of thinking about economic problems. I have been lucky enough of having been exposed to post-Keynesian ideas very early, since I was an undergraduate, thanks to my father's 'theoretical tastes'. This long time has enabled me to develop progressively a consistent view on macroeconomic issues and to frame these issues in a critical and creative way. Moreover, my father was a constant source of intuitive ideas for the present thesis: some of them have crystallised in the theoretical models presented here. Gary Dimsky and Antoine Godin were patient enough to go through the thesis and they provided useful comments about the historical provenance of my models and about some aspects of the SFC modelling strategy, respectively. Marc Lavoie provided me with critical and penetrating insights about the implications of my models. Rafael Wildauer, my Ph.D. colleague at Kingston, was always open to discuss in length economic problems I faced when developing the models as well as its implications. Rafael has helped me a lot when sharpening the presentation and exposition of several passages. José de Arcos, a long time friend, was very kind to go through some of the maths and to clarify some of my mistakes. He was also doing his Ph.D. at the same time, so he was a source of mutual relief. Bárbara Balada had to put up with me and my mood (especially) for the last two years when I was not able to come up with a good solution for a particular part of the thesis or when the process in building the models was slow – alas, a recurrent issue. My mother, Victoria, and my grandmother, Victoria, encouraged me all the way to complete the thesis, even when the finish line appeared to me to be very far. And last, but not least, my deepest gratitude to my 'English family', Syd and Pam, who have been extremely kind to me beyond all measures and have contributed to this thesis more than they think.

Chapter 2. Profit rates in economies without growth in a Stock-Flow Consistent framework

'The first remark to be made applies not only to Marx, West, and Ricardo but to all the economists who busied themselves in finding an explanation for the secular fall in the rate of interest: it never occurred to any of them to ask whether there was such a secular fall. They simply took it for granted and, in doing so, displayed an almost unbelievable degree of scientific carelessness.'

(Schumpeter, 2006, p. 620)

1. Introduction

The discussions on the tendency of the rate of profit to fall during the growth process of capitalist economies rank among the oldest topics discussed in the profession. Even well before Adam Smith there was already a lively discussion on the relationship between economic growth and profitability. The observers of the economic life of the seventeenth and eighteenth century noted a prolonged decline in the interest rates on government debt, and they started to wonder whether there was a relationship between interest rates and the growth rate. This discussion benefited enormously from the availability of interest rate figures (mainly through the statutory rates given by usury laws), which were at that time the almost only economic empirical evidence available.

The Classical school, beginning with Smith, was more prepared to deal with these problems, given their focus in economic growth and income distribution. In the meantime, the economic landscape in the UK had changed dramatically, with the focus of the analysis shifting to those small businesses that were largely responsible for the Industrial Revolution and the role of the rate of profit (not the rate of interest) in economic growth. However, unlike interest rate figures, profit rates were not available (and remained unavailable until the beginning of the twentieth century), so that the investigation between the rate of profit and rate of growth proceeded in the Classical School *as if* interest rates were a good proxy for firms' profitability or, alternatively, by assuming that interest rates depended on the rate of profit.[1] Therefore, it was natural that the framework of the major Classical economists always contemplated a final stationary economy with no growth and hence no profits. Marx did not challenge this scheme, but rather incorporated it as the endpoint of his theoretical framework and the cause of the ultimate failure of capitalist economies. This debate is still controversial among modern Marxists economists and has been updated to take into account recent developments (Duménil & Lévy, 1993; Kliman, 2012).

The change in focus from production and distribution to exchange in economic modelling prevented neoclassical economists from substantively engaging in these debates. In their timeless framework, the focus of the analysis is on the determination of factor prices in a frictionless market economy – once technology, tastes and endowments are given. Despite the inability of this framework to deal with problems of economic growth, I think, however, that there is plenty of evidence disseminated in the writings of the main neoclassical authors to show that they believed that such a tendency of the rate of profit to fall was a natural outcome in capitalist economies. Most of the time this statement is implicit in the assumption of diminishing marginal returns to capital (together with a theory of distribution based on marginal productivities), but other times is simply part of the accepted and probably unconscious stylized-facts-heritage from Classical economists.

The birth of macroeconomics, the discovered new role for effective demand and the creation of the first sets of national accounts shed new light the relationship between economic growth and profit rate. Based in Kalecki's contributions (Kalecki, 1954, 1971) and in the first mathematical attempts at modeling growing economies (Champernowne, 1945; Von Neumann, 1945), the first Cambridge post-Keynesians were able to capture a simple mathematical relationship relating these two variables (Kaldor, 1955; Pasinetti, 1962; Robinson, 1956). The Cambridge model was quite classical in spirit, acknowledging the link between capital accumulation and firms' profitability and the fact that no capital accumulation at all yields a zero rate of profit.

[1] For a historical overview, with an especial emphasis on Classicals, Marx and Keynes, on the relationship between rate of profit and rate of interest, see Panico (1988).

It differed from the Classical school by incorporating the notion that effective demand matters taking into account wealth holders' consumption (the capitalist class in their terminology) as an important influence on firms' profitability. The Cambridge model furthermore asserted that technological relationships do not play any role in the determination of the rate of profit.

The previous historical remarks point out that, in general, there has been a tacit agreement between economists (although backed by different theoretical frameworks) in the sense that under no growth conditions one should expect a zero profit rate or, at the very least, a very small one converging to zero. The argument in this paper does not attempt to overturn the well-established causal link between growth rate and rate of profit, but instead offers an additional factor to explain the evolution of profit rates in the long-run: wealth holders' consumption decisions. Although post-Keynesians are well aware that in the Levy-Kalecki profit equation (Levy, 2001; Laski & Walther, 2013) for a closed economy and without government there is a term for wealth holders' consumption that has a positive effect on the level of profits, they have usually proceeded on the presumption (and the Cambridge model is a vivid example) that in the long-run what really matters is the growth rate of the economy and that in its absence other factors are almost irrelevant.[2] In fact, the present investigation arose from the realization that the Cambridge equation cannot accommodate a positive profit rate in the absence of capital accumulation.

In the simple Stock-Flow Consistent (SFC) model presented below, I introduce an alternative formulation to the Cambridge one that says that the rate of profit can be approached as the sum of economic growth plus capitalists' consumption – so there can be some profits even in the absence of economic growth. It will be shown that wealth holders' consumption alone can sustain a reasonable rate of profit in the long-run – in fact, with some back-of-the-envelope numbers it can be seen that in recent times it explains the greater part. The basic intuition behind the result is quite simple and it has to do with accounting: the task is to look for sources of purchasing power

[2] The exception to this norm in the post-Keynesian literature is the profit without investment debate, where capitalists' consumption is assumed to play an important role in determining profits. See Section II.4 below for additional remarks.

that flow as sales through the income statement of the corporate sector as a whole but that, at the same time, do not 'reflow' as costs. Once government and the external sector are assumed away, it is clear that the only sources which fulfil that requirement are sales of investment goods, dividends and realized equity capital gains consumed by wealth holders.[3]

The accounting structure of the SFC model will be closed using two sets of behavioural assumptions. In the first one, Tobin's *q* is considered to be exogenous and firms follow for their investment decisions a Harrodian investment function. In the second one, Tobin's *q* is an endogenous variable that reconciles firms' investment decisions with households' saving decisions and firms follow a 'Marxist' investment function, being profits the main variable in their investment decisions. The reason for the use of two different closures for the same underlying accounting structure is mainly illustrative: it allows understanding how the system as a whole will behave if some part of the system is assumed to be exogenous, comparing thus the results. The main conclusions from the study of both closures are: first, the rate of profit will be positive in a long-run equilibrium without positive net investment; second, wealth holders' consumption decisions determine the equity yield in both scenarios, no matter the assumption made for the *q*, but can only determine the profit rate when Tobin's *q* is not flexible enough to provide room for corporations; and third, government expenditures have a short-term impact (in both closures) on profits, but a persistent long-run effect on firms' profitability is lacking, because government deficits are ruled out by definition in a stationary state.

Beyond being a technical curiosity, the idea that in the long-run there can be profits without growth can offer a new perspective in some current debates. For instance, in a series of papers, Gordon (2010, 2012) has advanced the idea of sluggish growth in the US economy for the next twenty years, showing important concerns why productivity growth will remain abated.[4] Summers (2014) has also endorsed this idea

[3] Consumption out of credit would be the last example, although in our model we do not contemplate credit. Furthermore, as the global financial crisis has clearly shown, credit growth proves to be ultimately unsustainable if it is not backed by income growth.

[4] However, these studies are largely based on neoclassical growth accounting exercises. For a comprehensive critique of this methodology, see Felipe & McCombie (2013).

of 'secular stagnation' (Teulings & Baldwin, 2014). Furthermore, the ecological literature has raised the issue that in a finite world (with finite resources), infinite growth is contradictory; sooner or later ecological boundaries will constraint economic growth. But even if the previous arguments are not bought and one believes that capitalism can deliver positive growth rates and technological innovation will not falter, there is still no reason to neglect fairly long periods of economic stagnation after a severe economic crisis – as the Japanese experience since 1990s (Koo, 2011) or Europe in the aftermath of the global financial crisis. In all these cases, the contribution of the present chapter shows that as long as wealth holders' consumption remains high in the long-run, there is no reason to worry too much about the future profitability of capitalist enterprises due to a decline in the growth rates – and suggesting at the same time that policy makers when taking policy actions will have to focus their efforts on other weaker links of the economic activity.

In a related debate, Piketty (2014) has reawakened the discussion of economic growth and income distribution in a (very) long-run perspective, although presenting these topics through the lens of the neoclassical framework, where there is little role for demand considerations. Especially discussed has been the role of the so-called *fundamental inequality*, which says that because the rate of return of the economy has been consistently greater than the growth rate of the economy, that creates a source of income distribution divergence because the rate at which wealth grows is higher than the rate at which the rest of incomes (especially wages) grow. The discussion here will stress the importance of wealth holders' consumption for the $r > g$ debate, as it has already pointed out somewhere else (López Bernardo *et al.*, 2014). In particular, I conclude that such a gap is not given by technological factors, but rather by wealth holders' consumption decisions, and that the empirical series can be better understood using the growth-plus-consumption Cambridge formulation

The chapter will be structured as follows. In Section 2 a brief historical overview will be presented; a thorough survey would deserve a book on its own, but the authors selected will give a fair summary of the different views. Section 3 will analyze an extremely simple SFC model, which allows for the possibility of a positive profit rate in a no-growth framework, proceeding to some possible closures, depending on whether an endogenous or exogenous Tobin's q is assumed. Section 4 draws some conclusions from the model for the recent debate on Piketty's inequality $r > g$ and argues that such gap is not given by technology, as has been commonly presumed, but rather by wealth holders' consumption decisions. Section 5 will try to give more intuition to the previous results, putting emphasis on the accounting aspects. Section 6 will conclude.

2. Some previous (historical) explanations

1. Pre-Classical discussions in the seventeenth and eighteenth century

The debate about the relationship between economic growth and profit rates can be traced back, at least, up to the seventeenth century. The level of interest rates at the time coupled with the diverse growth experience of many countries in Europe[5] made English political writers wonder whether there could be a causal link in some direction between interest rates and economic growth. English usury laws, re-enacted in 1571 by English policymakers (Tucker, 1960, p.8), coupled with rates at which government borrowed, allowed people to have a clear benchmark against which compare the market rate of interest. Although it is not clear what the market rate of interest was for those writers, Tucker (1960, p.32) argues that '[w]hen writers of the late seventeenth and early eighteenth centuries referred to changes in the market or natural rate of interest (as opposed to the legal rate), they probably had in mind the rate at which commercial loans and mortgages could be effected on first class security.' In turn, these rates were heavily influence by government efforts to finance English wars: 'Government loans, which were usually in the form of perpetual annuities, set the going rate for all long-term loans [...] The widely variable market rate of interest on government bonds was an important stimulant or break on private economic activity' (Homer & Sylla, 2005, p. 151). In any case, the statutory rate had been declining in England over the seventeenth century: 'to 8 per cent in 1625; to 6 per cent in 1651; and to 5 per cent in 1714' (Tucker, 1960, p. 8). Therefore, it was assumed that this tendency was a natural outcome as economies grow.

[5] Especially Holland, Spain, France, Ireland and Scotland.

For the writers of the seventeenth century the discussion revolved around the direction of causality between growth and interest rates. While some writers like T. Culpeper the Elder and J. Child thought that stronger economic growth was the result of lower interest rates (and thus advocating for further reductions in the statutory rate in order to be in a par with the rates prevailing in Holland), by the end of the century the idea that low interest rates were the outcome (and not the cause) of economic progress had been consolidated in the public debate, thanks to the writings of D. North, W. Petty and J. Locke. The most common explanation put forward for this 'natural tendency' was increases in the supply of funds relatively to their demand (although Locke also argued that the rate of interest could be determined by the movements in the rate of profit); more developed theoretical explanations had to wait until the first half of the eighteenth century.

The major contributors to the debate at the beginning of the eighteenth century were Hume, Turgot and Massie, and all of them took for granted 'the conclusion that the rate of interest on loans tends to fall 'in all rising nations in the world'' (Tucker, 1960, p. 29). The contributions of these writers were fundamental for the subsequent debate through Smith's opinions in his *Wealth of Nations*.[6] Moreover, it is in these writers for the first time where strong theoretical reasons are advanced, reasons that will resonate over and over again in the future debate. Massie was one of the first who offered a comprehensive explanation where the rate of growth affected negatively the rate of profit (through the increase of the number of people in commerce), which in turn affected the rate of interest. Although the emphasis was still on the link between growth rate and rate of interest, it is indicative that profits were already included in the picture as part of the causal link; as it will be seen in the next section, this was the route taken by Classical economists, but giving changing the emphasis from the rate of interest to the rate of profit in the process of economic growth.

[6] For a summary of these views, see Tucker (1960, pp. 45–46).

2. *The Classical School: Smith, Ricardo and Marx*

Classical economists built on previous discussions and put them in the middle of a grandiose system where income distribution was one of the main pillars. This new framework, together with the social and economic changes of the end of the eighteenth century, helped to start the discussion on the role of business profits in capital accumulation; '[p]rofit theorizing can hardly be said to have begun before Adam Smith's *Wealth of Nations*. Indeed, profit was only beginning to be recognized as a distinct income category' (Obrinsky, 1983, p. 10).

Broadly speaking, Classical economists did not try to refute the idea of the falling profit rate from their antecessors, but rather they focused to improve the inherited explanations so as to justify the available empirical evidence. It is important to keep in mind that in the Classical framework the emphasis mainly falls on the rate of profit, and not on the rate of interest, but Classicals carried out the debate as if the empirical evidence on the interest rates could act as a proxy for the (unobserved) rate of profit. This approach had some merit, given that no profit figures were known at that time, a fact that remained true until the beginning of the twentieth century.[7] Smith, Ricardo and Marx's reasons for the falling profit rate will be briefly reviewed now.[8]

Smith was well aware about the 'stylized facts' of the declining rate of interest, as it can be seen in several scattered passages in the *Wealth of Nations.*[9] On the theoretical side, Smith provided a new explanation for the tendency of the rate of profit to fall, arguing that increases in competition (for Smith one of the most prominent features of capitalism) would eventually force the rate of profit to fall: '[t]he increase of stock, which raises wages, tends to lower profit. When the stocks of many rich merchants are turned into the same trade, their mutual competition naturally tends to lower its profit and when there is a like increase of stock in all the

[7] Fortunately, in the last decades there has been a lot of progress towards recovering historical company and stock market returns data, so we can figure out (better than the Classicals) how business conditions were at that time. See Atack & Bateman (2008) and Acheson *et al.* (2009).

[8] However, other major authors shared the same conclusions. For instance, Mill in his *Principles* devotes a whole chapter to the discussion (book IV, ch, IV). For a complete treatment of the discussion in the Classical period, see Tucker (1960).

[9] As in Chapter 9, where he discusses very broad facts of the interest rate and its evolution in England, Scotland, France, Holland and North American and West Indian Colonies.

different trades carried on in the same society, competition must produce the same effect in them all' (Smith, 1937, p. 87).[10] Later on, Smith (1937, p. 333) gives additional reasons for his theory: on the one hand, competition forces producers to sell their products cheaper, and on the other, they have to compete more fiercely for workers, which will push wages up.

Ricardo found this theory not convincing at all, as it is explained in his Chapter XXI of his *Principles* (Ricardo, 1951). He argued that tough profitability conditions in certain industries could not be generalized to the economic system as a whole – a reasoning that, later, Marx used to quote approvingly (Marx, 1969). Ricardo's own theory for the declining rate of profit is quite different from Smith's, it being based on the Malthusian theory of population and wages and on the theory of the rent developed independently by Malthus, Torrens and West.[11] For Ricardo, the process of economic growth can be depicted as the increasing use of less fertile lands which lead to a rise in the volume of rents – i.e. the farmers who cultivate more fertile lands have to pay a rent given the assumption of a uniform rate of profit across farmers. On the other hand, economic growth does not bring the same benefits for the working class, since their wages are tied in the long-run to the subsistence level. Under this scenario, the ever increasing rents eventually wipe out profits from the system, although Ricardo admitted that probably there would a lower limit beyond which capitalists would not accumulate. Ricardo also recognized that technological change (and other factors especially important at that time, as the suppression of the *Corn Laws*) could delay development of a final stationary economy with zero profits, although, in his view, technological change would eventually come to a halt.

Half a century later, Marx envisioned a very similar outcome for the rate of profit to the one proposed by Smith and Ricardo, although through different mechanisms. Marx's attempt to explain the decline in the rate of profit is a more comprehensive explanation than those of his predecessors, and it has had a long-lasting influence in

[10] For a different interpretation on Smith's theory, emphasising the role of the capital/output ratio instead of the competitive forces, see Verdera (1992) and Tsoulfidis & Paitaridis (2012). For additional remarks of Smith's theory, see Mirowski (1982).

[11] For mathematical formulations of the Ricardian economy, see, among others, Barkai (1959), Samuelson (1959) and Pasinetti (1960).

many subsequent debates. Even some non-Marxist authors admit that there is a grain of truth in Marx's intuition on the declining rate of profit. For instance, using his own framework, Piketty (2014, p. 228) highlights that '[w]here there is no structural growth, and the productivity and population growth rate g is zero, we run up against a logical contradiction very close to what Marx described [...] More generally, if g is close to zero, the long-term capital/income ratio $\beta = s/g$ tends toward infinity. And if β is extremely large, then the return on capital r must get smaller and smaller and closer and closer to zero [...].' And he concludes, acknowledging that '[t]he dynamic inconsistency that Marx pointed out thus corresponds to a real difficulty, from which the only logical exit is structural growth, which is the only way of balancing the process of capital accumulation' (2014, p. 228).

The Marxist literature, both theoretical and empirical, on the decline of the rate of profit is vast and goes beyond the aim of this brief survey (Steedman, 1971; Roemer, 1979; Shaikh, 1992; Duménil & Lévy, 1993, 2011; Kliman, 2012), but the main idea is that the rate of profit can be expressed as a positive function of the rate of surplus value and as a negative function of the organic composition of capital; assuming that the rate of surplus value is roughly constant, the process of economic growth is supposed to deliver an ever growing organic composition of capital. Six counteracting causes were proposed by Marx that could halt temporarily the predictions of the law (Sweezy, 1968, pp. 97–100), although it was expected that ultimately these were not enough to prevent the rate of profit to fall to very low levels.[12]

3. *Neoclassical economists*

It is quite difficult to give a fair overview of what neoclassical economists (both old and new) have to say about the debate of the decline on the profit rate, and mainly for two reasons: first, the neoclassical framework takes place in a timeless economy where exchange, but no production, gets all the attention and thus no capital accumulation is considered (so it is quite difficult by the very design of the theory to talk about the evolution of the profit rate *as* the process of economic growth

[12] For an early critique of the law, see Sweezy (1968, pp. 100–108).

operates) and, second, in the neoclassical school the concept of profit (as was understood by the Classical school) is shifted to the concept of interest, while the concept of profit is usually associated to the figure of the entrepreneur and has in general an evanescent existence – given the working of the perfect competitive market for entrepreneurs. Furthermore, earlier neoclassical economists had themselves different interest theories, which create an additional source for confusion, whereas the new ones barely mention the implications of their theories for the profit rate – as it can be checked in the leading neoclassical growth textbooks (Barro & Sala-i-Martin, 2004; Acemoglu, 2009).

Among the initial contributors to neoclassical theory, Jevons and Walras expressed in a quite clear way their views on the problem.[13] Jevons (1965, pp. 253–254) was one of the first to state explicitly, from a marginalist point of view, the fact of the declining rate of profit: '[t]he rate [of profit] will always ultimately sink so low, they think [the classical economists], that the inducements to further accumulation will cease. This doctrine is in striking agreement with the result of the somewhat abstract analytical investigation given above.' And he later adds: '[i]n England and other old countries the rate of interest is generally lower because there is an abundance of capital [...]' (ibid, 1965, p. 265). Walras shared the same conclusions in his more sophisticated general equilibrium framework: *'[i]n a progressive economy, the price of labour (wages) remaining substantially unchanged, the price of land-services (rent) will rise appreciably and the price of capital-services (the interest charge) will fall appreciably'* (Walras, 1954, pp. 390–391, emphasis in the original).

The second generation of neoclassical writers basically expanded this framework, sharing the same conclusions. Regarding the rate of interest, it was given by the marginal product of capital; '[t]he changes that have to be made in the forms of the capital, as the amount of it increases, reveal a reason for the decline in the rate of its

[13] Many of the economists of the Austrian school, which drew on Menger's contributions, would also agree on the fact of no profits (and interest) in a stationary economy; see, for instance, Mises (1949). Funny enough, Reisman (1996), who wrote his thesis with Mises, 'rediscovered' the Levy-Kalecki profit equation several decades later and integrated it with Austrian theory. For a comparison between Reisman' s profit (and interest) theory and the theory of his predecessors (such as Mises or Rothbard), see Kirkpatrick (2004).

earnings' (Clark, 1908, p. 105);[14] '[u]nder such conditions, we should therefore expect a continual accumulation of capital—though at a diminishing rate—and, at the same time, a continual fall in the rate of interest' (Wicksell, 1977, p. 209). Regarding the 'new' concept of profits (as a remuneration to the entrepreneur), neoclassical economists transposed Classicals' idea that they should be zero, but now through a market clearing process in the market for entrepreneurs; '[a]nd from the standpoint of aggregate profit in the society as a whole the question is whether there is any such share or not, whether entrepreneurs as a class make a profit or suffer a loss (speaking, of course, of net or 'pure' profit, after remunerations for all productive services are counted out) (Knight, 1964, p. 363). This fact of an entrepreneur ripping windfall profits also features in Schumpeter (1962), where technological change allows innovators to make extra profits on a temporary basis.[15]

It is interesting to note that Keynes, who was so at variance with the conclusions and policy recommendations of the neoclassical economists, was quite orthodox regarding the influence of the stock of capital on the evolution of the profit rate. As he clearly expressed in the *General Theory*, 'I feel sure that the demand for capital is strictly limited in the sense that it would not be difficult to increase the stock of capital up to a point where its marginal efficiency had fallen to a very low figure' (Keynes, 1936, Ch. 24).

Finally, Piketty (2014) has laid at the centre of his theoretical scheme the rate of profit, which according to him is one of the crucial drivers for functional income distribution in the very long-run. In his framework, the difference between the rate of return of the economy, *r*, and the growth of the economy, *g*, is what drives the relative growth rates of capital incomes and wages, and thus income distribution. Therefore, a theory that explains the rate of return is crucial for his framework. In Piketty (2014) he endorses two views: first, a pragmatic one with little theory behind it that is used in his long-run projections and second, a theoretical view that is very

[14] Similar sentences can be found in pages 215, 219 and 223.

[15] See Kurz (2008) for a mathematical analysis of technical change in a Schumpeterian economy. See Schumpeter (2006, p. 1014-1019) for further discussion.

close to the theory put forward by Marx and the neoclassical economists. He endorses Marx (Piketty, 2014, Ch. 6) when he says:

> 'Where there is no structural growth, and the productivity and population growth rate g is zero, we run up against a logical contradiction very close to what Marx described. If the savings rate s is positive, meaning the capitalists insist on accumulating more and more capital every year in order to increase their power and perpetuate their advantages or simply because their standard of living is already so high, then the capital/income ratio will increase indefinitely. More generally, if g is close to zero, the long-term capital/income ratio $\beta = s / g$ tends toward infinity. And if β is extremely large, then the return on capital r must get smaller and smaller and closer and closer to zero, or else capital's share of income, $\alpha = r \times \beta$, will ultimately devour all of national income.'

The position of Piketty towards neoclassical theory is very similar. Although he would reject neoclassical theory for explaining functional (and personal too) income distribution,[16] he uses it as a theory for the rate of return, endorsing thus technology and production functions as the main drivers for the returns of capital.[17]

4. *The Post-Keynesians*

Post-Keynesian economists have spent a big deal of time thinking about the role of business profits in a capitalist economy. This particular trait of the school is due to Kalecki's (1954, 1962) seminal contributions, which are unanimously considered to be part of the foundations of the post-Keynesian research programme (King, 2002; Lavoie, 2006). Furthermore, early post-Keynesians (and certainly Kalecki) had a

[16] Although throughout the book Piketty uses the neoclassical framework for explaining functional income distribution, in a private email he stated that: "Also, let me say very clearly that I do not believe that the one-sector neoclassical production function provides an adequate description of the economy. In my book, I try to write a multidimensional history of capital: different assets (land, real estate, business capital, financial assets, foreign investment, public debt, slaves, etc.) give rise to different property relationships, power struggles and bargaining processes. All I am saying is that even if the word was working as in the one-sector neoclassical model with perfect competition, then this would certainly not imply that we live in an harmonious or desirable place in any meaningful sense".

[17] See López Bernardo *et al.* (2014) for a detailed critique of Piketty's position regarding neoclassical economics and profit rates.

precise advantage over Classical economists and Marx when talking about business profits at the macroeconomic level: the framework of the national accounts.[18] This accounting framework allowed them to appreciate the place of profits in the circular flow of production and the importance of effective demand as an explanation of their macroeconomic behaviour.

For the issue at hand, we can divide post-Keynesian contributions into two camps: the first that deals primarily with Kalecki's contributions (in particular the profit equation) and the second that uses post-Keynesian Cambridge growth models and offers an explanation of the relationship between the growth rate of the economy and the profit rate (Kaldor, 1955; Robinson, 1956; Pasinetti, 1962). The distinction in terms of history and the original motivation of the authors is entirely artificial, given that the latter camp often took Kalecki as a starting point for the analysis, trying to 'generalize' Kalecki's insights into the long-run. However, for the relationship between profits and growth, Kalecki's framework can accommodate the fact (admittedly, after some crude institutional assumptions) that the level of profits can still be positive while at the same time net investment being nil,[19] while the Cambridge model cannot – a zero growth rate delivers a zero profit rate, no matter the value for capitalists' propensity to save; as will be seen, capitalists' consumption decisions are not *separable* from the growth rate of the economy when determining the profit rate.

Kalecki derived his profit equation in an extremely simple manner: starting from the GDP identity he obtained the following profit (accounting) identity:

$$\Pi = C_c + I - S_w$$

Where Π is total business profits *gross* of depreciation, I is gross investment and S_w is workers' savings. Assuming the last to be zero, Kalecki (1971, pp. 78–79) discovered an important causality, because '[i]t is clear that capitalists may decide to consume and to invest more in a given period than in the preceding one, but they cannot

[18] And certainly over Jerome Levy, who derived the profit equation in the 1910s without any reference to the National Accounts. See Levy (2001).

[19] Net investment is the relevant one for business profits as are commonly understood by accountants – *net of depreciation*. The use of gross investment would "add back" depreciation to the figure and would deliver a cash-flow measure. The former concept is the relevant one here.

decide to earn more. It is, therefore, their investment and consumption decisions which determine profits, and not vice versa.' Note that in the previous expression nothing theoretical can be said about the relative importance of investment and capitalists' consumption – they are independent from each other and their relative importance can only be measured through empirical analysis. Later commentators (but *not* Kalecki) have tended to stress the importance of investment in the previous equation over capitalists' consumption. For instance, Minsky asserted that '[t]he simple equation "*profits equals investment*" is the fundamental relation for a macroeconomics that aims to determine the behavior through time of a capitalist economy with a sophisticated, complex financial structure' (Minsky, 2008, p. 161, *emphasis in the original*) – which he called the *heroic assumption*; however, in frameworks different to Minsky's, no additional reason has been given to prioritise investment over wealth holders' consumption.[20] Likewise, Robinson (1970) asserted that this case was 'the simplest model of a pure capitalist economy'.

The Cambridge model developed in the 1950s was a decisive advance not only for the post-Keynesian growth and distribution theory, but for traditional growth models where the rate of profit (called the rate of interest in many of them) was given exclusively by the growth rate of the economy and it did not depend on demand considerations – as in the Von Neumann's slave economy model (Von Neumann, 1945; Champernowne, 1945). Once demand is taken into account in the long-run, capitalists' consumption matters and it creates an additional source for profits over investment spending (Kaldor, 1955; Robinson, 1956; Kahn, 1959).

There are two different approaches to the Cambridge model. The simplest versions of both of them are usually framed in a closed economy without government.[21] The first one is a dual-class model with capitalists and workers, where the main income

[20] However, for Minsky's analysis *there was* a good reason to stress the role of investment, because he was primarily interested in the relationship between corporate leverage and investment. Once the focus is moved to the study of the determinants of profits, such priority weakens.

[21] In the case of dual-class models the introduction of a government sector has been studied quite in detail (Steedman, 1972; Pasinetti, 1989; Dalziel, 1991) and less so the external sector (Panico & Salvadori, 1993). On the other hand, Cambridge models with corporate sector have tended to concentrate on stock market and stock valuation issues, paying less attention to the role of government and external sector. For an example of a corporate economy with government sector, see Panico (1997).

split is between wages and profits. The second version deals with a corporate economy (Kaldor, 1966), and it presents an institutional setup with firms and households[22] and where stock valuation plays a crucial role as an equilibrating mechanism between firms' investment decisions and households' savings decisions. In both versions, there is a savings function independent from the exogenous investment function (given by animal spirits) and, in both of them again, if the growth rate of the economy is zero the profit rate is zero as well – i.e. neither capitalists nor firms' decisions play any role in determining the profit rate if the growth rate is assumed to be zero.

The Cambridge equation for a two-class economy is given by:

$$r = \frac{g_n}{(1 - \alpha_1)}$$

Where r is the profit rate (current profits divided by the value of capital *at replacement cost*), g_n is the natural growth rate of the economy (in the Harrodian sense of keeping unemployment constant) and $(1 - \alpha_1)$ is capitalists' propensity to save. As it has been shown by Lavoie (2006, p. 108), the equation can be derived alternatively from a capitalists' consumption function that takes into account consumption out of profits:

$$\Pi = C_c + I = \alpha_1.\Pi + I \rightarrow \Pi = \frac{I}{(1 - \alpha_1)}$$

With this assumption we have moved from the Levy-Kalecki profit equation to the Cambridge equation; however, we have lost in the process what I have called the 'separability' of the variables: once investment is assumed to be zero, profits will be zero – regardless of capitalists' behaviour. This is a severe flaw of the Cambridge formulation, first because it does not allow for the obvious fact that capitalists can still consume even if in the current period no earnings have flowed to them and, second, because it does not fit well with the fact that in the real world zero and

[22] These corporate models can allow as well a breakdown of the household sector in capitalists and workers, dealing then not just with the distinction between firms and households but with capitalists and workers as well. See Moss (1978).

negative growth rates can be compatible at the same time with positive profit rates – at least for some period of time.[23]

For instance, to see how the results can change, we could assume that instead of consuming out of profits, capitalists decide to consume out of capital. This assumption is not purely arbitrary, given that capitalists can usually consume, if they want, more than their current level of income. This would yield:

$$\Pi = C_c + I = \alpha_1.K + I \rightarrow r = \alpha_1 + g$$

Or if we assume that instead of real capital, which is owned by corporations, capitalists consume some part of their wealth, we would obtain:

$$\Pi = C_c + I = \alpha_1.V + I \rightarrow r = \alpha_1.q + g$$

Where V is total wealth (measured *at market prices*) and q is Tobin's q, the ratio of market value to replacement value of total assets – known in the post-Keynesian literature as the Kaldor's valuation ratio. It can be seen that both cases are solutions attuned to the Cambridge model, because investment and capitalists' consumption influence the profit rate positively and the quantity of capital (the technology) does not have any effect on it. But the point is clear: as soon as we assume different capitalists' consumption behaviour with consumption out of wealth, then the growth rate does not play the prominent role embedded in the Cambridge model. The importance of the type of consumption function chosen in the traditional Cambridge model, based only in current flows, is even more surprising when one realises that what matters for the Cambridge model is the class analysis and the distinction between capitalists and workers. A capitalist is someone who can live out of their rents and (if needed) out of their wealth. Excluding wealth from the consumption function is then at variance with the very purpose of the analysis.[24] Beyond that, post-

[23] Someone could reply, following Joan Robinson's remark (Robinson, 1966a), that '[b]efore appealing to reality, and claiming support from statistics about the U.S.A., we need to allow for some further complications, including the fact that no period of actual history is a golden age.' In particular, governments have been crucial in sustaining the profit rate in the aftermath of the 2007 financial crisis through massive government deficits – for instance, in the US and Spanish economy. What we simply want to point out is that there is no reason in the set of logical relationships to invalidate the possibility of positive profit rates with zero growth rates.

[24] One could advance many hypothetical explanations for such an absence. For instance, the lack of balance-sheet data in the framework of the national accounts may have been an important drawback when doing models with stock-flow integration.

Keynesians have used elsewhere from time to time consumption functions with 'wealth effects' (Foley & Michl, 1999; Stockhammer, 2005; Palley, 2012; Godley & Lavoie, 2007; Dos Santos & Zezza, 2008). Moreover, there has been a growing literature that deals with the investment-profit puzzle or what is the called the 'profit without investment' regime (Hein & Van Treeck, 2010; Hein, 2014).[25] Hein (2014, pp. 376–377) defines it as 'a long-run tendency of rising levels of profits (not only profit shares) but relatively weak investment in capital stock'. He relates this phenomenon with the financialisation process and argues that a profit-without-investment regime can be caused not only by rising consumption demand, but also by rising government deficits or export surpluses. Although the evidence of this trend in the last decades in advanced capitalist economies is overwhelming, the literature fails to properly distinguish between this kind and the more general principle that profits are largely driven by capitalists' consumption, not only in the last few decades, but from a historical perspective. Not drawing this distinction allows readers to infer that the large weight of consumption in profitability is something specific to the finance-dominated capitalism, when the truth is it is not.

What about Cambridge models with a corporate sector? Kaldor (1966) found that, once the dividend policy, the decision of issuing new shares and the growth rate of investment were given by corporations, the profit rate could be expressed as:

$$r = \frac{g_n.(1-f)}{s_f}$$

Where f is the share of investment financed out of new shares and s_f is the firms' retention ratio. As in the dual-class model, once the growth rate is zero (or the parameter is set to 1), the profit rate is zero. Unlike the previous version, the crucial assumption here is a fixed retention ratio; as we will see in the next section, once we introduce an endogenous retention ratio, the profit rate will not be zero; retained profits will be exactly equal to zero while total profits will be given by total dividends.

[25] For a more sceptical view about the profit without investment discussion, see Cordonnier & Van de Velde (2015).

3. A Stock-Flow Consistent model with business profits and no growth

This section develops a simplified SFC model, in which the main aim is to show an economy with a positive profit rate and at the same time a zero net investment growth rate. The model thus tackles a very specific issue and in doing so abstracts from the many problems addressed in the literature. Although the model is highly simplistic and some assumptions have been made to give it some tractability, we believe that with additional assumptions the nature of the solutions would not change – in other words, wealth holders' consumption or firms' decisions would still be a powerful influence on profits in the long-run. Furthermore, the present model shares several features with Godley & Lavoie (2007, Ch. 7), but instead of focusing on the role of banks' loans as a buffer mechanism (as they did), the focus here is on the behaviour of profits in the long-run – actually no banking system is contemplated in our simple model. The SFC structure allows us to consider both short and long-run solutions, although due to how the problem has been presented in the literature long-run solutions will be emphasised. These stationary-state solutions will be presented in analytical form and some simulations will be conducted too in order to study the short-run behaviour of the model.

1. The matrices of the model

As is commonplace in the literature, a SFC model can only be deemed complete once three accounting matrices are fully laid out: the balance sheet, the transactions flow matrix and the revaluation matrix.

The balance sheet in our case shows three sectors and two assets. In the current model, the government sector plays a little role and it has been included mainly to give a well-defined stationary solution for the level of income – in further extensions of the model, there would not be any reason why the government sector should not have more 'realistic' features. In the case of firms, they only have one asset, real capital, which is fully financed through retained earnings. Households, in turn, have the ownership of corporations through shares. Unlike the rest of the SFC literature (Godley & Lavoie, 2007; Dos Santos & Zezza, 2008; Le Heron & Mouakil, 2008; Van

Treeck, 2008; Caverzasi & Godin, 2014) 'equities' are not included as a liability for firms; although in empirical applications the set of national accounts follow this treatment and thus it leaves little option for applied researchers, in theoretical exercises the inclusion of equities as a liability could lead to misleading results – like a leverage ratio which took into account market values instead of book values; for most of the decisions firms take it is book values rather than market values that are relevant. This change in accounting principles does not impinge, of course, on the ability of the matrix to track properly all the stocks of the economy.

Table 2.1. Balance sheet matrix

	Households	**Firms**	**Government**	Σ
Real capital		$+K$	–	$+K$
Equities (as financial asset)	$+p_e.e_h$		–	$+p_e.e_h$
Net worth	$-V_h$	$-V_f$	–	$-(V_h + V_f)$
Σ	0	0	0	0

The flows accrued to these assets are depicted in the corresponding transaction-flow matrix. There are no flow-of-funds entries in the matrix, given the assumption that firms finance completely their investment internally and that government finances all the spending through taxes.

Table 2.2. Transaction-flow matrix

	Households	Firms: Current	Firms: Capital	Government	Σ
Consumption	$-C_d$	$+C_s$			0
Investment		$+I_s$	$-I_d$		0
Government		$+G_s$		$-G_d$	0
GDP [memo]		$[Y]$			–
Wages	$+WB_s$	$-WB_d$			0
Depreciation		$-D$	$+D$		0
Firms' profits	$+\Pi_d$	$-\Pi$	$+\Pi_r$		0
Taxes		$-T_s$		$+T_d$	0
Σ	0	0	0	0	0

Finally, a simplified revaluation matrix to take into account change in share prices is needed. Given that shares are not considered to be a liability for firms, only an item for the household sector is recorded in the matrix.

Table 2.3. Revaluation matrix

	Households	Firms	Σ
Change in firms' equity prices	$+\Delta p_e . e$		$+\Delta p_e . e$
Σ	$+CG$	0	$+CG$

2. *The equations of the model*

The previous matrices give the logical structure for the following set of equations:

GDP	$Y = C_s + I_s + G_s$	(1)
Wage bill	$WB_d = \psi.Y$	(2)
Gov. expendidutres	$G_d = \bar{G}$	(3)
Tax decided by gov.	$T_d = G_d$	(4)
Capital depreciation	$D = \delta.K_{-1}$	(5)
Investment function	$I_d = i_0 + \varphi.(K^T - K_{-1}) + D$	(6)
Capital targeted	$K^T = \kappa.Y_{-1}$	(7)
Consumption function	$C_d = WB_s + \alpha_1.V_{h-1}$	(8)

Equation (1) is the GDP definition – investment is considered to be *gross*, not net of depreciation. Equation (2) says that income distribution is fixed,[26] while equation (3) shows that government expenditures are exogenous as well. Equation (4) allows us to avoid any change in government's assets or liabilities (i.e. we will not have to deal with flow-of-funds items) setting up taxes equal to government expenditures. This drastic assumption could be relaxed in a more sophisticated model.

Equation (5) says that fixed capital depreciation is some fixed proportion of the capital stock from the previous period. Equations (6) and (7) depict together investment decisions: while the former says that gross investment is a positive function of a constant that reflects firms' animal spirits, i_0, the gap between the desired capital by firms, K^T, and the actual amount of capital plus depreciation, the latter showing that firms choose the targeted level of capital as a fixed proportion of the income of the previous period. Clearly, in the stationary solutions, where stocks do not grow, the level of investment will be equal to the depreciation expense – and thus the targeted level and the current level of capital will be the same and animal spirits will be assumed to be zero. At first sight, the proposed investment function could hardly be considered Keynesian, given that animal spirits, which feature a

[26] See Godley & Lavoie (2007, ch. 9) for a SFC model where mark-up, income distribution, inflation and inventory accounting are integrated.

prominent role in most of Keynesian investment functions, do not have any effect here in the long-run; because an economic without growth is analyzed here, animal spirits must be zero. By no means is it implied that the influence of animal spirits in actual investment decisions is negligible, but rather than for the current enquiry this assumption is the correct way to proceed. On the other hand, investment functions in which capital-output ratio enters into the investment function and adjust to a 'desired rate of utilization' in the long run have been widely used by Skott (1988, 2010). More will be said about post-Keynesian investment functions in Chapter 3.

Finally, equation (8) is a consumption function that depends on wages and households' wealth. A more detailed model could pick up the Kaleckian distinction between consumption by workers and capitalists, splitting the household sector in two classes (Van Treeck, 2008; Zezza, 2008); in our model, the first term, WB_s, could be regarded as a proxy for workers' consumption and the second as a proxy for wealth holders' consumption. For simplicity, 'workers spend what they get' so that no parameter will be attached to the wage term; the contribution of this term to profits in the long-term will be nil.[27] There is no necessity to regard the previous consumption function exclusively as if it assumed a 'capitalist class with permanent membership' (Kaldor, 1966). Rather, a more realistic model could be envisaged with some version of institutionalized pension funds that have to sell some shares in every period in order to meet their beneficiaries' consumption requirements.

We need seven additional equations to close the model:

Business profits	$\Pi = Y - WB_d - D - T_s$	(9)
Retained profits	$\Pi_r = I_d - D$	(10)
Dividends	$\Pi_d = \Pi - \Pi_r$	(11)
Capital stock	$K = K_{-1} + I_d - D$	(12)
Households'wealth	$V_h = q.K$	(13)
Capital gains	$CG = V_h - V_{h-1}$	(14)

[27] With $\alpha_0 < 1$ we would obtain a profit drag. As we said before, wages never add to the level of the profits. At most, their influence will be nil. In the model, a sufficiently low level in the propensity to consume out of wages could outweigh capitalists' consumption and produce a negative profit rate in the long-run.

$$Tobins'q \qquad q = \bar{q} \qquad (15)$$

Equations (9), (10) and (11) show how corporate profits are determined in the economy. Equation (9) is the profit and loss (P&L) statement of the corporate sector, which after previous substitution of (1), (5) and (8) can be interpreted as the Levy-Kalecki profit equation – which here says that profits are equal to net investment plus wealth holders' consumption. Equations (12) and (13) show the evolution of firms and households' balance sheet, respectively. Although capital gains only plays an indirect role in the model (through the level of wealth in the consumption function), equation (14) is needed if we want to track capital gains short-run impact in some of the relevant variables of the model – as the equity yield. Because there is no accumulation in financial assets (there are no flow-of-funds accounts), capital gains are simply the difference between wealth in consecutive periods. Finally, in order to make the model fully-determined, equation (15) assumes that Tobin's q is exogenously given;[28] this assumption will be relaxed later.

The previous model is now completed, and we can move to study its properties.

3. *The analytical solutions in the stationary-state*

In the stationary state all stocks of the economy will remain constant. Furthermore, there will be no changes in equity prices – i.e. $\Delta q = 0$. In other words, we will have the following solutions (asterisks denote stationary-state solution):[29]

$$I_d^* = D^* \qquad (16)$$

$$\Pi_r^* = 0 \qquad (17)$$

$$CG^* = 0 \qquad (18)$$

$$\Pi_d^* = \Pi^* \qquad (19)$$

[28] In a model without growth, where capital gains in the stationary-state are zero (and thus they cannot provide any information about Tobin's q), the only equation that provides some information is Kahn's formula (Kahn, 1972), where q is given by the ratio of the rate of profit and the equity yield. In this model, the equity yield and the q have to be taken as given.

[29] Subscripts denoting time have been removed.

Investment in the stationary-state, equation (16), is devoted to replacing the existing capital stock, so it is equal to depreciation – i.e. net investment is zero. Looking at the transaction-flow matrix, this implies that retained profits are also zero – and hence total profits are equal to dividends. Another way to say this is that in this model the *pay-out ratio is endogenous*, and it is not one of the firms' decision variables, but rather it accommodates until in the stationary state all profits are paid out. Although this assumption departs from the SFC literature (and from the Cambridge corporate models), where the pay-out ratio is usually deemed to be exogenous, the motivation here is that profits have to be paid out if they have to be consumed by wealth holders – the circular flow dividends-consumption-profits-dividends is what keeps profits alive in a stationary state without growth.[30] Finally, capital gains are also zero – there are no profits to reinvest and changes in Tobin's q are assumed to be zero by definition in the stationary state.

The stationary-state level of income is:

$$Y^* = C_s^* + I_s^* + G_s^* = WB_d^* + \alpha_1.V_h^* + \delta.K^* + \bar{G}$$
$$= \psi.Y^* + \alpha_1.\bar{q}.\kappa.Y^* + \delta.\kappa.Y^* + \bar{G}$$

$$Y^* = \frac{\bar{G}}{[1 - \psi - \kappa.(\alpha_1.\bar{q} + \delta)]} \tag{20}$$

With all partial derivatives being positive: $\frac{dY}{dG} > 0, \frac{dY}{d\psi} > 0, \frac{dY}{d\kappa} > 0, \frac{dY}{d\alpha_1} > 0, \frac{dY}{dq} > 0,$ $\frac{dY}{d\delta} > 0$ and the values used in the simulations satisfying $(1 - \psi) > [\kappa.(\alpha_1.\bar{q} + \delta)]$ in order to keep economic sense. The effects of G and α_1 are the expected in the Keynesian literature, while the positive effect of ψ on long-run income depicts a wage-led economy, which confirms the empirical observations of the literature for closed economies (Onaran & Galanis, 2012; Onaran, Stockhammer, & Grafl, 2011; Stockhammer & Onaran, 2012). On the other hand, the multiplier is affected by Tobin's q; even in this simplified model without developed financial markets financial considerations play a role in determining equilibrium income, through the amount of

[30] See Section 5 for additional accounting details.

wealth holders' consumption at current market valuations – i.e. the real side of the economy is not independent from the financial side.

The stationary-state solution for the capital stock:

$$K^* = \kappa . Y^* = Y^* = \frac{\kappa . \bar{G}}{[1 - \psi - \kappa . (\alpha_1 . \bar{q} + \delta)]} \tag{21}$$

Moving to the financial side of the economy we can compute the equity yield. Starting from the GDP accounting identity:

$$C_s^* + I_s^* + G_s^* = WB_d^* + \Pi^* + D^* + T_s^*$$

$$\alpha_1 . V_h^* = \Pi_d^*$$

$$\alpha_1 = \frac{\Pi_d^*}{V_h^*} \tag{22}$$

In other words, the dividend yield in this economy is given by households' (i.e. wealth holders') consumption decisions. The previous result could have been alternatively achieved remembering that the equity yield, γ, is the sum of the dividend yield plus the capital gains yield.

$$\gamma = \frac{\Pi_d^* + CG^*}{V_h^*} = \frac{\Pi_d^*}{V_h^*} = \alpha_1$$

Because in the stationary state there are no capital gains, it turns out that the equity yield is equal to the dividend yield. Moreover, the equity yield is fully determined by households' consumption decisions. This solution is so elegant because in our model no alternative assets exist, but in models with more assets and portfolio decisions the influence of other factors will play a role in determining the equity yield.[31]

The previous solution deserves some additional remarks. When Kalecki famously derived the behavioural implications of his profit equation, he stated that capitalists were masters of their fate through their investment decisions, a powerful insight that

[31] On the other hand, in a equation like $C_d = \alpha_0 . YD + \alpha_1 . V_h$, α_1 would no longer be the equity yield. This sort of equation can be found in the "New Cambridge" models (Cripps & Godley, 1976; Zezza, 2009), which postulates a long-term stable relation between income and wealth. Our "stock-flow" norm provides instead a solution for the yield.

was counterintuitive at the microeconomic level. The equation above is similar to Kalecki's insight, in the sense that now shareholders at the macroeconomic level are who determine their own fates. A higher yield on equity will be associated with a higher propensity to consume, so equity returns will be determined by wealth holders' consumption decisions. The previous equation is thus a 'twin equation' for the original one proposed by Kalecki, but now applied to financial markets and taking into account changes in market prices – i.e. wealth is valued at market prices.

Finally, the equilibrium value for the rate of profit, r^*,is found as follows:

$$\Pi^* = \Pi_d^* = \alpha_1 . V_h^*$$

$$\frac{\Pi^*}{K^*} = r^* = \alpha_1 . \bar{q} \qquad (23)$$

We see that, even in a stationary state with no net investment, the profit rate is still positive – and, in fact, depending on the values of α_1 and q, can be quite substantial. Doing a back-of-the-envelope calculation, with values of $\alpha_1 = 0.05 - 0.075$ (Paiella, 2009) and $q = 0.7$ (historical average in the US), the profit rate would be around 4%, which is well above zero.[32]

On the theoretical side, we see that in order to say anything about the profit rate, we need first a theory of Tobin's q. In this way, we see that financial markets have an impact on the profit rate through asset market valuations. The idea that the financial side of the economy can have some effect on the profit rate is not entirely new, as it can be found in the works of Pivetti (1985) and Panico (1988, ch.6), where following the 'Sraffian suggestion' they proposed a profit rate dependent on the rate of interest. Here the mechanism is quite different, given that we do not have any interest rate at all, but the causality from the financial sector to the real economy holds.[33] On the other hand, the equation reflects the Kaleckian insight that capitalists are masters of their fate, because they can control the profit rate through changes in their consumption patterns. The simulations will show us that in this model

[32] Admittedly, savings out of wages and capital accumulation plays an important role in actual economies; the point here is to focus on the contribution of wealth holders' consumption in this simplified economy.

[33] In some SFC models (Lavoie & Godley, 2001), the effect of corporate leverage is clearly identified as an additional influence (we could say from financial markets) to corporate profitability.

investment has a short term effect on the profit rate (as post-Keynesians would predict), but that when this effect vanishes as depreciation catches up with net investment, wealth holders' consumption still plays a role sustaining a positive profit in the long-run even without the influence of investment.

4. *A different closure with an endogenous Tobin's q*

Tobin's q was considered to be given in our previous model. However, it is hard to believe that households' savings decisions or anything else do not play any role in determining Tobin's q. Although a full 'post-Keynesian theory' on Tobin's q is the goal of the third chapter, there are already substantial contributions on the role of Tobin's q in growing corporate economies (Kaldor, 1966; Marris, 1972; Moore, 1975; Moss, 1978). In these models Tobin's q is assumed to be endogenous and has to equilibrate the desire of growth by corporations with the desire of households to accumulate financial assets.[34] On the other hand, in these corporate models the profit rate is given by firms' decisions through the Cambridge equation, so that Tobin's q and the rate of profit determine the equity yield through Kahn's equation. Therefore, the main motivation of this closure is to make Tobin's q endogenous: Tobin's q will be determined once the profit rate and the equity yield are determined.[35]

Some changes in the behavioural assumptions (but *not* in the accounting structure) are needed in order to make Tobin's q endogenous. The following equations close the new model, and are different from the equations of the first closure:

Wage bill	$WB_d = \Pi + T_s + D$	(24)
Investment function	$I_d = i_0 + \varphi.(\Pi^e - \Pi) + D$	(25)
Expected profits	$\Pi^e = r^T.K_{-1}$	(26)
EBITDA	$\Pi = (1 - \psi).Y$	(27)
Capital gains	$CG = (p - p_{-1}).e_{-1}$	(28)

[34] These models have only one financial market, the stock exchange, and as Davidson (1968) quickly pointed out there is no banks – and no money. Therefore, the equilibrating mechanism is the share price. For a graphical representation of the model, see Araujo (1995).

[35] Obviously, in financial markets a change in Tobin's q will automatically entail a change in the equity yield; what I mean is the direction of causality in our behavioural equations.

Tobin's q	$q = \frac{V_h}{K}$	(29)
Equity prices	$p = p_{-1} + (\gamma^e - \alpha_1).\beta$	(30)
Expected equity yield	$\gamma^e = \gamma_{-1}$	(31)

Now, firms do care about their profit rate and will have some targeted profit rate for the long-run (given by convention) as equations (25) and (26) shows. The firms' ability to set the profit rate in the long-run is another well-known feature of the Cambridge corporate models, where animal spirits together with investment financing decisions (the pay-out ratio and the share of investment financed out of new shares) determine the profit rate.

Equation (25) establishes that investment decisions are influenced now by the targeted profit rate. On the other hand, equations (24) and (27) change the assumptions for the distribution of income: while in the previous model firms were concerned fixing the distribution of earnings before taxes and depreciation (EBITDA), now they set the profit rate in terms of net earnings – so now wages are the residual. Equation (28) is the accounting definition of capital gains (in terms of the increase in prices and the number of shares, e, at the end of the previous period) and it shows that capital gains no longer play a buffer role in the model, but rather follow agents' expectations on equity prices, p, given in equation (30) as the difference between the expected equity yield and the long-term equity yield – which was shown to be equal to the marginal propensity to consume out of wealth. Agents follow adaptive expectations (equation 31). Finally, equation (29) is q definition, and now there is nothing to prevent fluctuations on it.

Before proceeding with the stationary state solutions, equation (30) deserves some brief comments. Equation (30) implicitly assumes that agents know what the long-term equity yield should be in an economy like this. But of course, in real economies investors simply do not know what the structural equity yield should be. For the mathematical structure of the model, that would mean that agents would fix some arbitrary level for the equity yield, given perhaps by conventions or recent events, and that the structural level of the equity yield (given by the structural forces of the supply and demand of shares) would not coincide with the long-term goal of investors. This discrepancy between the two views would produce permanent fluctuations around some value, and a stable stationary state would not be reached. Although I will assume for simplicity that agents always target the marginal propensity to consume as the 'relevant' equity yield, so the stationary state solutions will be stable, this equation shows that even in simple frameworks fluctuations in the equity market are a natural outcome and can arise not because agents are irrational or markets are inefficient, but simply because households and firms can have different sets of expectations.

Bearing this in mind, the stationary state solutions are now as follows. Previous solutions (16) – (19) remain to be the same. GDP and capital will yield similar results:

$$Y^* = C_s^* + I_s^* + G_s^* = WB_d^* + \alpha_1.V_h^* + \delta.K^* + \bar{G}$$
$$= (1-\psi).Y^* + T_s^* + \delta.\kappa^*.Y^* + \alpha_1.q^*.\kappa^*.Y^* + \delta.\kappa^*.Y^* + \bar{G}$$

$$Y^* = \frac{2\bar{G}}{[\psi - \kappa^*.(\alpha_1.q^* + 2\delta)]} \tag{32}$$

Tobin's q is determined as follows:

$$q^* = \frac{r^*}{\gamma}$$

In turn, the equity yield will be given again by the marginal propensity to consume out of wealth, α_1, because the equity yield is again equal to the dividend yield, as in Equation (22). On the other hand, the rate of profit will be fully determined by firms' decisions:

$$r^* = r^T$$

Hence, as we can see, the profit rate will be still positive, but the difference is how it is determined and what role the q plays: a q that does not adjust will translate shareholders' decisions to the firms' P&L statement, but if it is flexible enough then it provides some protection to firms' accumulation decisions from shareholders' consumption behaviour.

Finally, the capital-output ratio is not anymore a firms' policy variable, but it is given indirectly by firms' targeted profit and income distribution decisions. In this sense, as Pasinetti (1974, p.144) says, '[i]n the long run, capital itself becomes a variable; and it is capital that has to be adapted to an exogenously determined rate of profit, not the other way round.'

$$k^* = \frac{K}{Y} = \frac{K}{\Pi}.\frac{\Pi}{Y} = \frac{(1-\psi)}{r^T}$$

5. *Simulations*

I will try to give some additional insights using simulations. Although a great deal of information is already conveyed in the previous analytical solutions, simulations will allow us to study short-term behavior and the stability of the steady-state positions. Furthermore, simulations will be performed for both closures and they will allow us to understand the fundamental differences between both closures.

Simulation 1 studies the impact of a permanent increase of government expenditures on the relevant variables. Figures 2.1 show the impact of such increase using closure 1. An increase in government expenditures has both short-term and long-term effects on output and gross investment and only short-term effects on the profit rate, the equity yield, the profit share and the capital-output ratio. The main reason why government expenditures do not contribute positively to the profit rate in the long-run is given by the fact that no government deficits take place in this model; actually, a growth model with positive growth rates would allow having persistent government deficits while at the same time having a constant government debt/GDP ratio in the long-run, so fiscal policy in this case could have *permanent* effects on the profit rate. On the other hand, Figures 2.2 show the same impact using closure 2. Here fiscal policy has positive effects too both in the short-term and in the long-term, although given the way expectations are formed, it has an initial negative effect in households' wealth. Moreover, because Tobin's *q* reacts now to households' expectations, the profit rate and the equity yield will diverge in the short-run: now, the capital-output ratio is not the only element of flexibility in the analysis, because Tobin's *q* shares as well the discrepancy between real and financial conditions.

Figure 2.1. Increase in government expenditures, closure 1

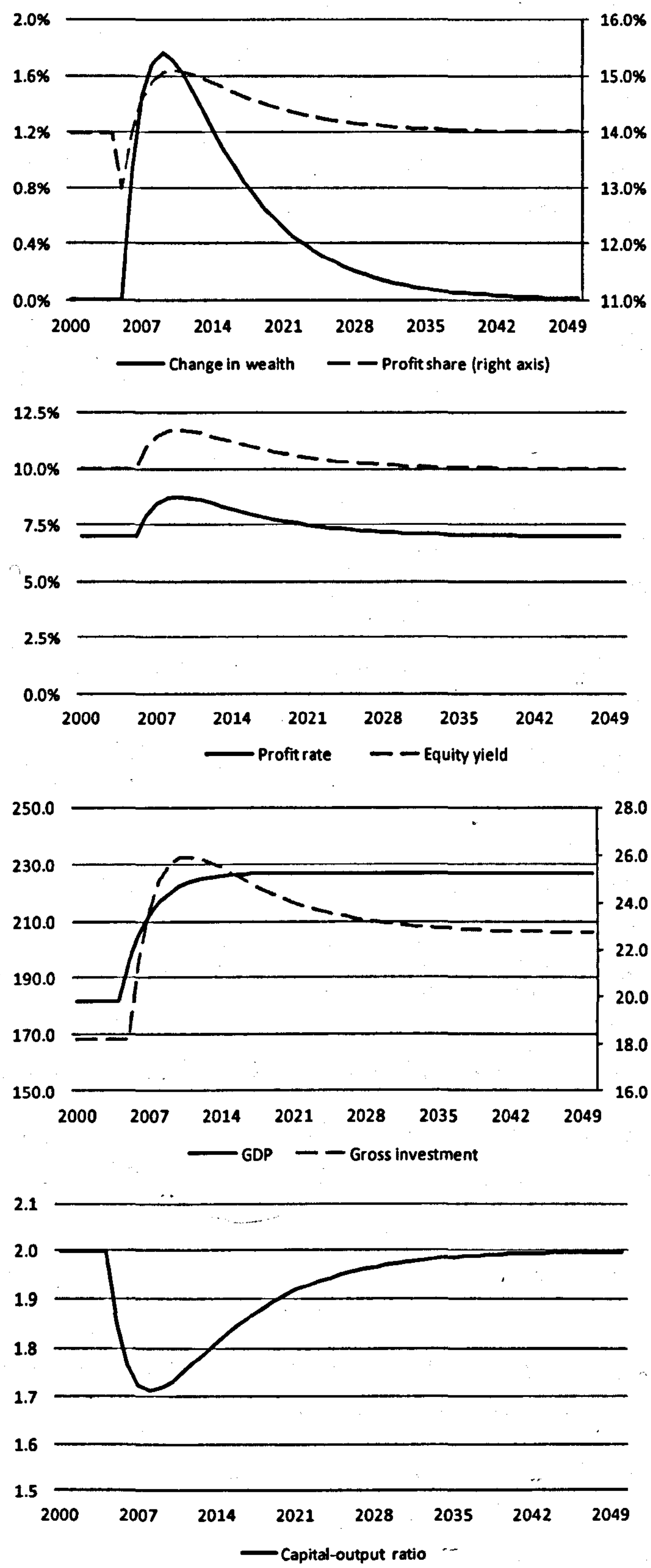
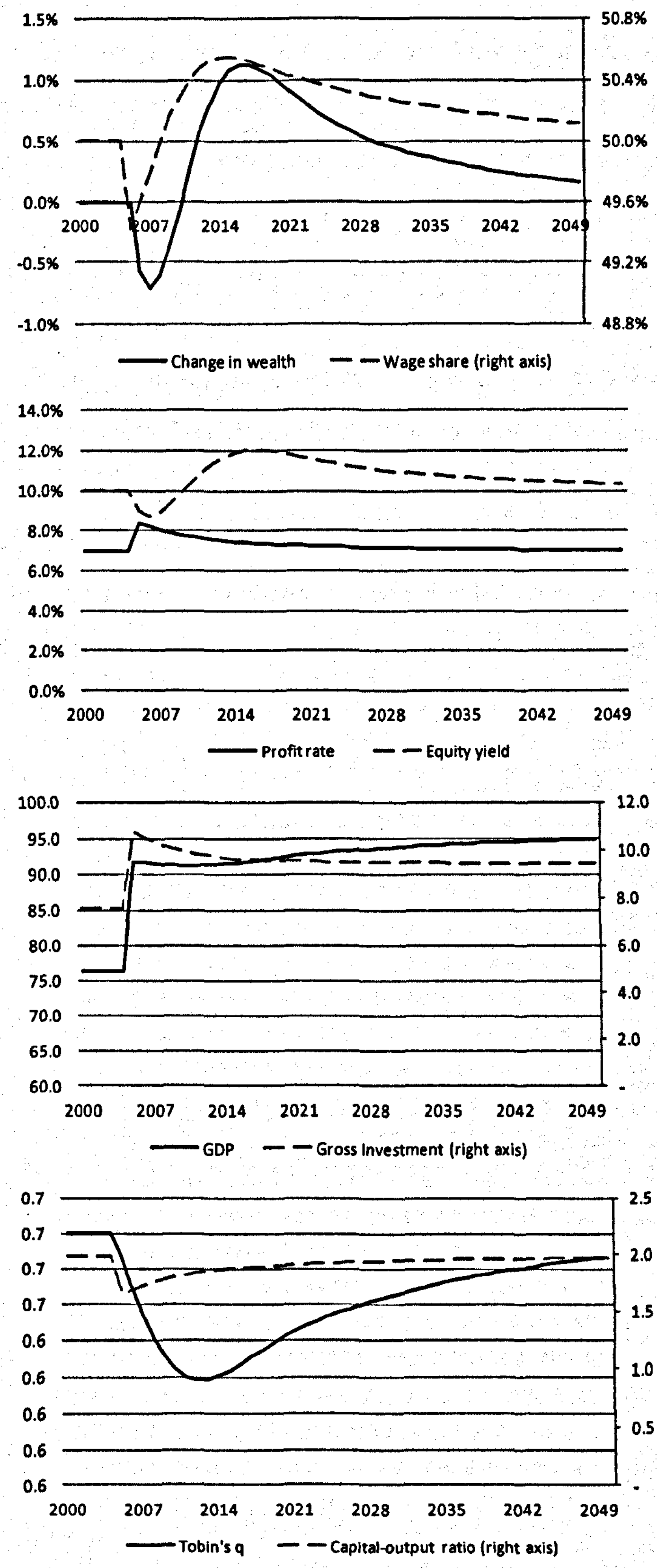


Figure 2.2. Increase in government expenditures, closure 2



In Simulation 2 a positive shock in propensity to consume out of wealth is imposed. Figures 2.3 and 2.4 show the effects for both closures. While the impact in closure 1 is fairly similar to the increase in government expenditures, the main difference is that such change in households' behaviour is a permanent increase (both in the short-run and long-run) in the rate of profit and in the equity yield. A permanent higher profit rate has a permanent impact as well on the level of profit share. On the other hand, Figure 2.4 shows different results for closure 2. The main difference is that although the increase in consumption has a temporary effect on GDP, such effect vanishes due to the fall on q: such fall produces a fall in wealth and dampers consumption in future periods through reduced wealth effects. Moreover, the change in the propensity to consume has little short-term positive impact on the profit rate and, although it has a negative short-term impact on the equity yield, the combine influence of temporarily growing economic activity (which implies higher dividends in absolute terms) and falling equity prices through the q produce a higher dividend yield and hence a higher equity yield.

Figure 2.3. Increase in propensity to consume, closure 1

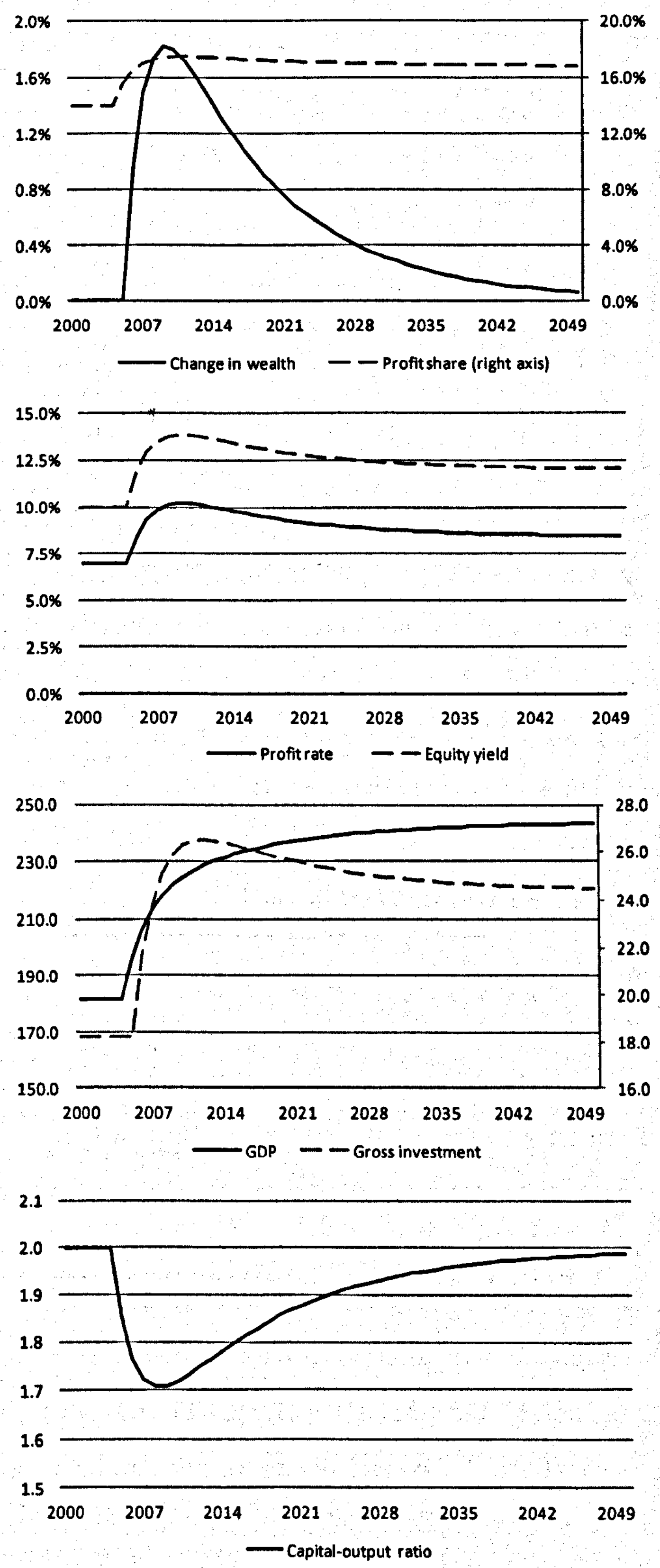
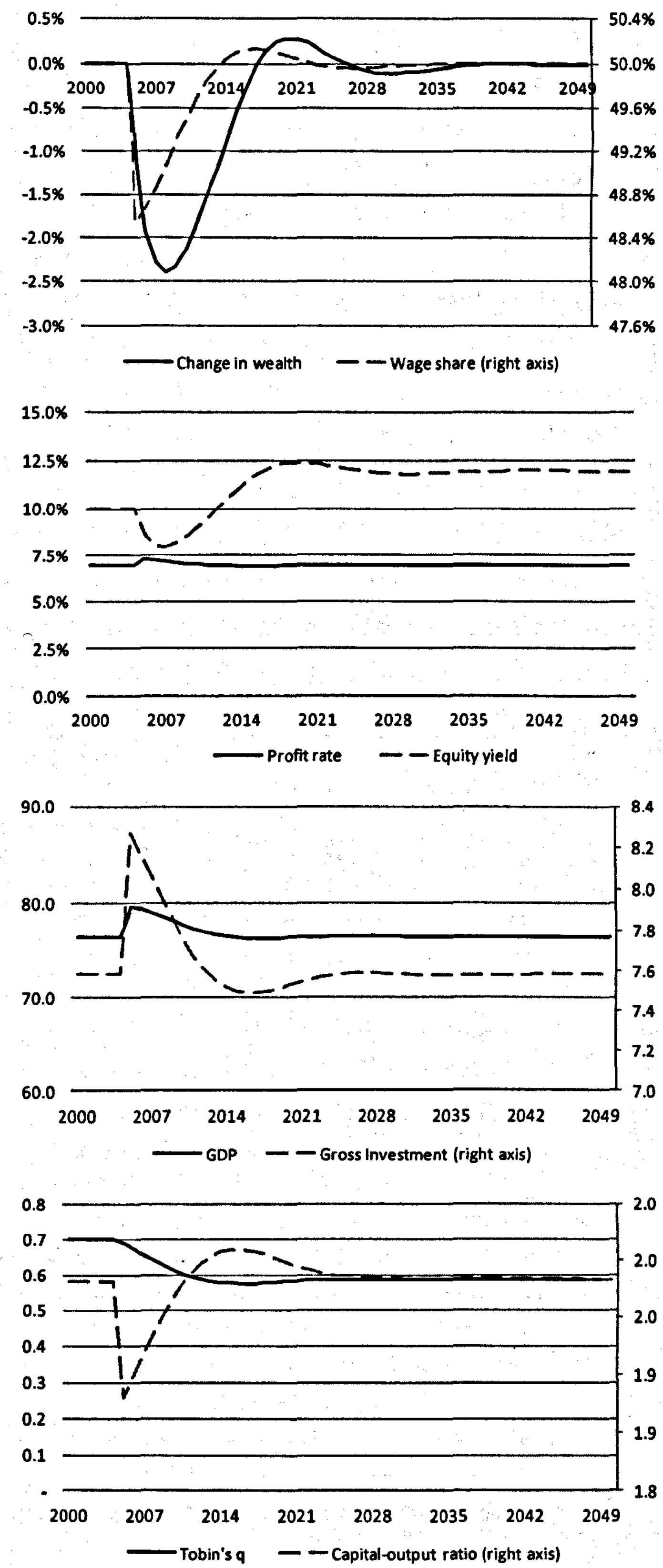


Figure 2.4. Increase in propensity to consume, closure 2



In summary, both closures clearly show that the rate of profit will be positive in a long-run equilibrium without positive net investment. In closure 1, such a result is achieved through wealth holders' consumption out of dividends, whereas in closure 2 a positive profit rate is achieved through a flexible Tobin's *q*, which allows reconciling corporations' decisions with households' consumption decisions. Second, wealth holders' consumption decisions determine the equity yield in both scenarios, no matter the assumption made for the *q*, but can only determine the profit rate when Tobin's *q* is not flexible enough to provide room for corporations' decisions – in other words, when *q* is flexible stock valuations adjust and firms can 'decide' their level of profits *à la* Kalecki. And third, government expenditures have a short-term impact (in both closures) on profits, which is a very well established post-Keynesian principle. Here, a persistent long-run effect on firms' profitability is lacking, because by definition in the long-run the government balance-sheet has to remain constant (and not asset/liability accumulation is allowed), so steady government deficits are ruled out by definition. In a model *with* growth, however, a permanent positive effect on corporate profitability given by persistent government deficits should be expected.

A final comment on equation (27), the solution for the equity yield in our steady-state position, is needed. Such a result has been achieved through the specification of the consumption function, which depends on disposable income and the level of wealth. Hence, the equity yield steady-state solution in our model is, according to the SFC literature (Godley & Lavoie, 2007, Ch. 3), a stock-flow norm. Stock-flow norms can provide insightful results in systems where the accounting is comprehensive. For instance, one of the main results of the 'New Cambridge models' (Cripps & Godley, 1976; Cuthbertson, 1979; Zezza, 2009) is that the ratio of private disposable income (households plus firms) to private wealth is a function of the different propensities to consume, and that such a ratio is stable in the long-run – as long as both propensities are stable as well. Such an insight has been successfully used for forecasting purposes for the US economy (Godley, Papadimitriou, Dos Santos, & Zezza, 2005; Godley, 1999). In the model presented here, the consumption function does not yield the wealth-income ratio, but rather the equity yield. This is an important difference achieved through a bit different specification – in the New Cambridge case a private expenditure is used, in the case presented here, a consumption function just for households is chosen. Although a deeper analysis will be needed in the future, the main advantage of the present formulation is that takes valuation issues to the forefront, whereas in the New Cambridge model these issues are not modelled explicitly. On the other hand, the New Cambridge formulation directly relates the level of wealth with the private income, a variable that is important for understanding several macroeconomic issues.

4. Some thoughts on Piketty's fundamental inequality (r > g)

The previous proposed formulation for the Cambridge equation, as the sum of growth rates plus wealth holders' consumption, can shed new light on some current debates. Piketty (2014) has recently brought to the forefront the issues of income and wealth distribution in a forceful manner. The book has combined rich datasets presented over the last two decades (Alvaredo & Saez, 2009; Atkinson, Piketty, & Saez, 2011; Atkinson & Piketty, 2006; Piketty, 2003) with some simple economic laws that try to explain these long-run trends. One of these laws, called by Piketty the 'fundamental inequality' (2014, p. 25), has attracted much more attention in the public debate than the other two (Krugman, 2014; Solow, 2014), because its simplicity and far-reaching conclusions. The fundamental inequality states that the rate of return of the economy, *r*, has been historically greater than the growth rate of the economy, *g*. The logical conclusion of this empirical regularity for income distribution is explained by Piketty as follows:[36]

> 'Consider a world of low growth, on the order of, say, 0.5–1 percent a year [...] The rate of return on capital, which is generally on the order of 4 or 5 percent a year, is therefore much higher than the growth rate. Concretely, *this means that wealth accumulated in the past is recapitalized much more quickly than the economy grows*, even when there is no income from labor' (p. 351, emphasis added).

[36] Other similar passages can be found in pages 26, 75-77, 351 and 359.

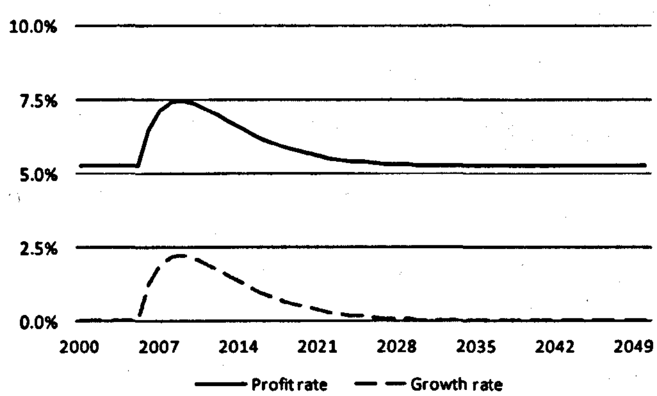
Therefore, the overall rate of return of the economy has a powerful effect in Piketty's framework through the fundamental inequality and the ability of wealth to recapitalise at a faster pace than the growth of the rest of the economy.

Recently, this simple logic has been called into question by López Bernardo *et al.* (2014) using the canonical Cambridge model of growth and distribution (Kaldor, 1955; Robinson, 1956; Pasinetti, 1962) and arguing that Piketty commits a fallacy-of-composition argument for not taking properly into account capitalists' consumption decisions in determining the rate of profit. As it has been explained before, the Cambridge model says that the gap between profit rate and growth rate is given exclusively by capitalists' consumption decisions, and only when capitalists save all their income the growth rate of the economy will be equal to the rate of profit. Therefore, Piketty's fears are unfounded, because precisely in the case $r > g$ capitalists are consuming part of their income – with the result that their wealth is growing at the rate g, not at the rate r.

Although the Cambridge model is enough to point out the dynamics of growth rate, profit rate and capital accumulation, the SFC model presented above is superior in at least two aspects: first, it clearly differentiates wealth and capital and second, firms are explicitly depicted as driving the process of capital accumulation. On the other hand, the Cambridge model has the advantage of being a growth model; however, for the issue at hand, our model has the advantage of delivering stationary-state solutions where the volume of profits is fully given by the amount of wealth holders' consumption – and not by technological considerations, as in the neoclassical framework. In that sense, it is worth stressing again that the framework presented here is different from Piketty's, because here the model is demand-led and no constraints are otherwise encountered; in Piketty's, not only output, but also returns and financial valuation ratios are given by technology, whereas here the supply-side does not play any role and the importance of demand in determining the future path of the variables is paramount.

Figure 2.5 depicts the $r > g$ evolution in our economy (using closure 1) after a permanent increase in government expenditures. The graph clearly shows several of the ideas advocated above; first, in absence of growth in the capital stock the profit rate will be above zero, fully given by demand considerations through wealth holders' consumption; second, economic growth adds to the profit rate (and in a model with continuous growth the increase in the profit rate would not be temporary, but permanent); third, empirical measures for the overall profit rate can be approximated with the following breakdown, growth rate in the capital stock plus wealth holders' consumption;[37] and fourth, technological considerations do not play any role in determining the rate of profit nor income distribution – as it was shown in the analytical solutions.

Figure 2.5. r > g after an increase in government expenditures, closure 1



5. A further digression from an accounting point of view

Before concluding, it may be worth having another look at the crucial role played by wealth holders' consumption expenditures in long-run models with negligible or zero growth rates. Having set up in the previous section a full model with its behavioural assumptions, the emphasis of this section will be placed on the role of accounting. It is going to be shown that accounting on its own can clarify several issues on the evolution of profit rates through time.[38]

[37] Naturally, savings out of wages should be taken into account in empirical exercises. In a long-run analysis, and according to the empirical evidence offered by Piketty (2014, pp. 122, 126), it seems that the external and government sector add very little to the long-run trend of the profit rate.

[38] Crucially, I assume social relationships to be given and beyond the scope of this section. In other words, all I want to say is that once the system of accounting is to be taken as given for whatever reason, then some very specific rules follow from there.

Taking the corporate sector as a whole, it is clear that the only macroeconomic items that can add to the profit figure of the sector are *items flowing as revenues through the P&L statement of the corporate sector but that at the same time do not reflow as costs*. The simplest case is wages: consumption out of wages is revenue for the corporate sector, but at the same time is a cost, so the impact of profits (assuming the marginal propensity to consume to be unity) would be at most zero. Going through every item in the P&L statement is clear that the following items are the only ones that can add to profits: expenditures of the government and external sector, investment, dividends and consumption out of capital gains.[39] If we rule out government and the foreign sector, it is clear that the other three items can have an effect on corporate profitability.

Investment is the traditional item recognised in the post-Keynesian literature since Kalecki's (1954) seminal contributions. The reason why investment adds to profits is just the way accounting works at the micro level: in the moment of the transaction, for the seller of the asset a revenue would be recorded in the P&L statement (specifically, the bookkeeping process would show an increase in cash and an increase in revenues), but for the buyer a change in assets, with no movement whatsoever in his/her profit and loss statement, would be booked – here, the bookkeeping process would show in the buyer's ledger a decrease in cash and an equal increase in fixed assets. This is, of course, a well-known example that profit accounting is always carried out in an accrual basis, rather than in a cash-flow basis – at least since the mid of the nineteenth century. In cash-flow accounting, the recording of profits occurs when actual cash changes hands, and nothing else (i.e. a cash-inflow is the same as a revenue, and a cash-outflow is the same as a loss). As shareholders of new railway companies painfully learned in the 19th century (the first companies in history where the deployment of fixed capital was massive), cash-flow accounting have some undesirable properties. In the railway case, a huge amount of losses were booked in the profit and loss statement when new fixed capital was bought and cash went out of the company (because an outflow of cash was

[39] As it was mentioned above, consumption out of credit would be another source, but it will not be discussed here. It is suffice to say that as long as there is economic growth, the volume of debt can still grow at a sustainable pace and thus being a permanent source of corporate profits.

considered to be *a loss*). This meant that new shareholders entering into the company had to suffer the whole replacement process, whereas old shareholders were enjoying a capital without gradual depreciation – and thus paying higher amounts of dividends than warranted if the depreciation process would have done properly, because profits were higher in the absence of depreciation. This is an example of why 'cash accounting might be OK for the tennis club, but not for businesses' (Penman, 2011, p. 47). On the other hand, accrual accounting records profits not when there is cash movement, but when there is a creation of assets and liabilities, and therefore 'brings the future forward' (Penman, 2011, p. 47). Then, in accrual accounting, the investment is then depreciated in subsequent periods, flowing as a cost through the P&L statement. When the process has been completed, investment has been fully amortised and its whole impact on profits has been nil: positive in the moment of the transaction but negative during the life of the machinery. Therefore, the reason why investment adds to profits in the Levy-Kalecki profit equation is due to the way accounting is done and how the cost (depreciation) is allocated over time – in other words, in a cash-basis method investment would not have any influence whatsoever, because investment expenditures would have been considered a cost since the very beginning, and then it would not be included in a hypothetical 'Levy-Kalecki cash-flow basis profit equation'. I think that the previous remarks will suffice to understand the paramount importance of accounting for our understanding of economic processes and the role played by the accounting methods even for something as incontestable as the Levy-Kalecki profit equation.[40]

In the case of capital gains, it is even clearer that they do not flow through the corporate sector P&L statement (unless corporations have equity cross-participations between them, and even in that case it will depend on the accounting method chosen by them), so if households decide to consume them this will increase corporate profits. As it has been seen in the simulations this will have a negative effect on

[40] In the previous explanation I have omitted the rather controversial issue of how accounting can modify economic behaviour. For instance, I have mentioned that cash-flow accounting influenced the management of railway companies through higher dividend pay-out ratios. Even if these instances are important (which I think they are) and should deserve additional explanation, they are beyond the scope of this section.

valuation ratios, but no immediate cost for the corporate sector is associated by such effects.

Finally, dividends are likely the less understood influence for profits. This may be due to the common misunderstanding among economists of regarding dividends as a 'cost' for the corporation, when actually they are a cash outflow and nothing else – in a cash-flow basis they would actually be a cost, but not under accrual accounting. Once this is recognised, it is clear that consumption out of dividends will increase corporate profits. In fact, it has been shown with our model that, in a stationary state, profits are equal to dividends, in virtue of the loop between profits and consumption out of dividends. It must be stressed again that once it is assumed that some part of the dividends can be consumed (a not-very-demanding assumption), this result is due purely to accounting; if we had been used a cash-basis accounting for profits, then profits would be zero (because dividends are a cash outflow). These accounting issues about dividends have been responsible, among other things, for the misunderstanding of the possibility of profits in the monetary circuit literature: 'The existence of monetary profits at the macroeconomic (aggregate) level has always been a conundrum for theoreticians of the monetary circuit' (Rochon, 2005). In my view, this conundrum has little to do with behavioural implications but rather on how accounting works.[41]

When economists talk about the influence of some factors (notoriously technical progress) on the profit rate they carry out their analysis without any mention on how the accounting would capture the flows through the P&L statement in such scenarios. Specifically, economists by and large have thought (and the brief history of economic thought presented above is clear evidence on that) that the profit rate will be driven in the long-run by some sort of technical progress, organic composition of capital or technology, focusing the problem from the point of view of the identity that says $\frac{\Pi}{K} =$

[41] Therefore, I completely disagree with Keen (2009, p.162) when he says that this conundrum is due to 'inappropriate modelling techniques' or to the 'misspecification of the nature of debt'. Accounting is independent of the modelling technique used (discrete time, continuous time, etc.), so the problem in the literature cannot be the former case Keen argues. Regarding the latter, we have seen that the emergence of profits in simple theoretical models has nothing to do with debt (there was no any debt in the previous model), so the latter reason cannot be either the explanation for the failure of the literature.

$\frac{Y}{K}.\frac{\Pi}{Y}$ and arguing that in the long run as $\frac{Y}{K}$ approaches to zero then the profit rate will do so too. From an accounting point of view, the problem with this explanation is that implicitly assumes that wealth holders' consumption will be wiped out somehow in the process of accumulation and therefore these revenues will not flow through the P&L statement of the corporate sector. However, such process is never explained. As it has been advocated here, a more fruitful way to approach the problem would be to start from the demand side and then to see the implications for capital-output ratios. These issues, however, are theoretical and go beyond the reign of accounting; the accounting can only say if additional explanations are needed in order to have a complete picture of the model.

6. Conclusions

The present chapter offers a new light on the debate on the declining rate of profit and on what drives profitability in the long-term in the absence, for whatever reason, of economic growth. In contrast to the Classical, Marxist and neoclassical theories, the rate of profit in a post-Keynesian model without growth is not given by some sort of technology (production function, organic composition of capital), but rather by wealth holders' consumption decisions. The SFC model presented above boils down this point through the growth-plus-consumption formulation of the Cambridge equation to its essentials, correcting at the same time one of the main deficiencies of the original formulation, where capitalists' consumption was irrelevant when the growth rate was nil. Despite of being a dual-class model, capitalists cannot consume their wealth, which is a major drawback (and unrealistic feature) of the Cambridge formulation. The main conclusions for a long-run theory of the rate of profit from the SFC model presented here are: first, the rate of profit will be positive in a long-run equilibrium without positive net investment, regardless of whether firms target capacity or profitability when making their investment decisions; second, wealth holders' consumption decisions determine the equity yield in both scenarios, no matter the assumption made for the *q*, but can only determine the profit rate when Tobin's *q* is not flexible enough to provide room for corporations; and third, government expenditures have a short-term impact (in both closures) on profits, but not a persistent long-run effect, given the assumption of no growth – and therefore of a balanced budget in the long-run. Moreover, the model can also be regarded as a contribution to the 'profits without investment' debate, because it stresses that wealth holders' consumption is a natural driver of profitability in the long-run (with or without growth), and it is not just associated to a specific period the history of capitalism – i.e. the financialisation period.

Finally, the importance of wealth holders' consumption for the profit rate in the Piketty's $r > g$ debate has been analyzed. It has been explained that the largest part of such a gap is given exclusively by capitalists' consumption; in the no-growth case, the relationship is stripped down to its essentials, because is in this extreme case where the contribution of growth to the profit rate is nil. Moreover, it has been advocated that the empirical $r > g$ series can be better understood using the growth-plus-consumption formulation, rather than technological considerations. Therefore, the evolution of capitalists' consumption will be the crucial variable for the evolution of the $r > g$ series.

Although the model sheds some light on some long-run processes, it has many simplifications that can potentially impinge on its overall conclusions. First, short-term dynamics have not been modelled in detail (in especial very little has been said about the way people make expectations), and in the case of equity markets they are paramount. Second, the institutional setup has been greatly simplified, with no financial sector at all. As we will see, the introduction of a financial sector with banks will not pose any major problems to the conclusions reached so far, but financial intermediaries will be needed in order to have a complete picture of a modern capitalist economy. And third, one of the major shortcomings of the model presented above is that households' portfolio decisions were absent. Such portfolio decisions (and firms' financing decisions) in an economy with multiple assets are also needed to understand the full process of asset valuation and how the relative yields of the different assets are determined.

The following chapters will remedy these deficiencies and will address two points raised in this chapter. The first one is the importance of having a theory for Tobin's q (and valuation metrics) in a growing economy. The second one is to develop a theory for the equity yield in a growing economy using the insight that wealth holders can largely determine it through their consumption decisions – so, in this case, the impact of growth on the equity yield will be studied as well. The former point will be tackled in the third Chapter; the latter, in the fourth one.

Appendix I: numerical values used in the simulations

	Closure 1	*Closure 2*
ψ*	0.65	0.86
α_1	0.10	0.10
κ	2	–
δ	0.05	0.05
φ	0.12	−1.5
q	0.7	–
G	20	20
r^T	–	0.07
β	–	5
First simulation	$\Delta G = 5$	$\Delta G = 5$
Second simulation	$\Delta\alpha_1 = 0.02$	$\Delta\alpha_1 = 0.02$

** For closure 2 is the sum of the share of wages, depreciation and taxes in national income*

Chapter 3. A Post-Keynesian Theory for Tobin's *q* in a Stock-Flow Consistent Framework

1. Introduction

Tobin's *q* is defined as the ratio of the 'going price in the market for exchanging existing assets' to their 'replacement or reproduction cost' (Tobin & Brainard, 1977).[42] Since the seminal works of Brainard and Tobin (Brainard & Tobin, 1968; Tobin, 1969; Tobin & Brainard, 1977), Tobin's *q* has become an important theoretical construct widely used both by financial practitioners to assess current stock market conditions (Smithers, 2009) and by academics, who have used *q* as the main explanatory variable in investment functions (Hayashi, 1982). However, none of the two groups have offered an explanation of the movements of *q* through time: the first group has usually assumed mean-reversion for the *q* series (with no strong theoretical justification) while the second has been more interested in the role of *q* as an exogenous variable, not as an endogenous one.

The present chapter offers an alternative macroeconomic vision of *q* based on the 'Cambridge corporate model' developed by Kaldor and others in the 1960s and 1970s (Kaldor, 1966; Marris, 1972; Moore, 1975; Moss, 1978). The Cambridge corporate model was originally proposed as a solution for the Harrod-Domar knife-edge dilemma, where equity valuation (not technology, as in the neoclassical framework, nor income distribution, as in the original Cambridge model) was the adjusting variable that brought overall savings and investment in equilibrium. This model can be reinterpreted as a macroeconomic theory for the valuation of equity markets – i.e. as a theory explaining *q*. This new interpretation offers two important conclusions: first, it finds a *negative long-run relationship at the macroeconomic level between growth rates and valuation ratios;* this is in contrast to firm-level equity valuation models (e.g. dividend, residual income and free-cash-flow discounted

[42] In fact, the first person to propose this ratio at the macroeconomic level was Kaldor (1966), who called it the 'valuation ratio'. In this chapter, the words 'Tobin's *q*' and 'valuation ratio' will be used interchangeably.

models), which suggest the opposite.[43] Second, the causality goes from investment and animal spirits to q, whereas the neoclassical model (Hayashi, 1982) stresses the importance of q on investment decisions.[44] This simple Kaldorian framework has been able to explain remarkably well the experience of the last decades in developed countries, where lower growth rates have been associated with higher valuation ratios. However, the Kaldorian framework has at least two important shortcomings: first, it is based on a real economy framework without money where equities are the only financial asset (Davidson, 1968; Kregel, 1985) and, second, the modelling of firms' financing decisions is simplistic in that it assumes fixed dividend payout and share issue ratio. In other words, dividend and financing decisions are made independent of financial market conditions.

I generalise and extend the Kaldorian model to address these shortcomings. This will be done through a medium-scale SFC model, which allows for a more sophisticated treatment of the financial aspects of the economy with a richer asset-liability structure. The model is a generalisation because it contains Kaldor's key behavioural function but also includes some realistic features missing in the original model, such as endogenous money, financial markets, cost-push inflation, corporate leverage and fiscal and monetary policy. I thus address the first shortcoming. In terms of behavioural assumptions, the model follows established post-Keynesian theory, but I deviate in one important aspect. In contrast to the Kaldorian model and to the standard SFC literature (Godley & Lavoie, 2007; Dos Santos & Zezza, 2008; Le Heron & Mouakil, 2008; Van Treeck, 2008), financing and dividend policy decisions are considered to be interdependent following Gordon (1992, 1994). The model features

[43] The insight that higher growth rates lead to lower valuation ratios has profound implications both for policy makers and market participants. The importance of market valuations for policy makers have been argued in length in Smithers (2009), who argues that central bankers should pay more attention to financial market valuations and not exclusively price inflation. For market participants, it is useful to have an idea whether markets are 'expensive' or not. However, at the macro level, traditional fundamental equity valuation methods applied to the valuation of whole indices will not work if the Kaldorian insight applies – because these discounted cash-flows methods will tell you that higher growth rates should lead to higher valuations.

[44] Although Tobin and Brainard did not develop formally this reverse causation issue, they briefly hinted at this dependence of q on investment decisions; 'We agree that q's are partly endogenous variables, that investments can influence q's as well as vice versa, and that the lags between exogenous changes in q and investment could be "long and variable"' (Tobin & Brainard, 1990, p. 548).

endogenous dividend pay-out and share issuance and thus addresses the second shortcoming.

The first aim of the model is to demonstrate that post-Keynesian theory, using a reasonable set of assumptions, can offer a robust theoretical explanation for the behaviour of *q* over the long-run. While the present SFC model features both short-term and long-term dynamics, its focus is, like Kaldor's, on *long-run* steady-state positions. The modelling of short run dynamics will be minimalistic; in particular I bypass all the interesting asset price dynamics highlighted by the Minskyan theory of financial markets and behavioural finance (Thaler, 2005).[45] I do so not because these issues are not important – indeed they are – but because I argue that *even in steady growth equilibrium without speculation or any other specific behavioural bias,* post-Keynesian theory offers a distinct explanation of *q*.

The second aim of the model is to contrast the results that follow from a Cambridge corporate model against the results that follow once the core elements of this model are broadened to include: i) an equity-market equilibration process and (2) other variables and equations that are needed to set up a proper stock-flow consistent set of structural equations. In effect, the simplified Cambridge corporate model is forced to fit in a complete SFC framework in order to see whether the core results of that model are supported or overturned. The main mechanism of the Cambridge corporate model (i.e. the structural supply and demand for shares) in a richer accounting framework allows to appreciate the tension between, on the one hand, the structural determinants of *q* – coming from the engineering of supply-demand equations and ignoring the factors surrounding financing considerations – and on the other hand the factors that emerge once financing and equity-price setting is introduced with more realistic behavioural equations.

One word about the usefulness of the Kaldorian model may be worth it. One might ask the reason to adopt the Cambridge corporate model rather than, say, a modern Kaleckian framework. Since roughly the 1980s, Kaleckian models have become the workhorse for post-Keynesian economists and a lot of research has been conducted

[45] For a discussion of a possible research agenda in common between post-Keynesian economics and behavioural finance, see Jefferson & King (2010).

along these lines. The advantages of the Kaleckian framework over the Cambridge one are now well-known and can be succinctly summarised in two points: first, capacity utilization plays a prominent role not only in the short run, but also in the long-run (following thus Kalecki's insights), and second, the model is truly demand-led, because it avoids the Cambridge dichotomy of adjustment in quantities in the short-run, but adjustment in prices (income distribution) in the long-run. Said that, the equity market has never been properly addressed in the Kaleckian framework, and in that sense the Kaldorian framework presents an advantage. Moreover, I argue the Kaldorian framework is the simplest possible economic model keeping some economic meaning that can deal with equity prices, and that is certainly an advantage in understanding some basic crucial mechanisms. Additional work could then (and should) be carried out in a Kaleckian framework to see how the results would differ.

The main findings of the present post-Keynesian model are as follows. First, the original two long-run relationships of the Kaldorian model, between q and growth rates and q and propensities to consume, hold. Second, in contrast to the Kaldorian model, simulations show that the way investment is financed matters, not only for q, but also for output, employment and prices. Finally, as in Kaldor's, the level of q does not tend to 1 even in the long-run, contradicting thus the neoclassical q theory where the equilibrium level of q is 1. This last finding has far-reaching consequences for the Miller-Modigliani (M&M) dividend irrelevance proposition (Miller & Modigliani, 1961), which states that the value of a corporation is independent from its dividend policy. Although the theory was originally under attack by corporate finance theorists (Lintner, 1962; Gordon, 1963; Walter, 1963), now it is commonplace in finance and has been widely used as a micro-foundation for many neoclassical macro models.[46] More recently, the M&M propositions have been accused of being an important theoretical justification for the financial behaviour that drove the world into the global financial crisis (Pasinetti, 2012). Under the banner of 'leverage and dividend policy does not matter' many corporations engaged in long-run detrimental policies

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[46] This is the case in most real-business cycle and new-Keynesian models. See, for instance, Christiano *et al.* (2005) and Smets & Wouters (2007). In these models, the institutional setup is irrelevant (it does not matter who owns what), so that capital structure (and dividend policy) is irrelevant. In addition, no clear picture of the role of financial intermediaries in the system is provided.

– not only for shareholders, but for the economy as a whole; '[t]he theorem has in this way led theorists (and financial operators!) to believe that increasing indebtedness has no counter-indications, without considering that an absolutely necessary assumption for reaching such a conclusion is that corporations must always remain in the same category of risk, which of course is impossible if the corporation's indebtedness increases' (Pasinetti, 2012).[47] I show that the M&M dividend proposition will *only* hold when *q* is equal to 1, a condition that in a post-Keynesian model will be only fulfilled by chance.

The structure of the chapter is as follows. Section 2 reviews the literature on *q*, with special emphasis on the theoretical literature and on the main features of the Cambridge corporate models. Section 3 revisits the original Cambridge corporate model in a SFC fashion and then introduces a more complete model, which due to its scale will be studied using simulations. Section 4 explains the implications of the post-Keynesian *q* theory for the validity of the M&M dividend proposition. Section 5 concludes.

2. Literature review

This section will review the role of Tobin's *q* in different theoretical models. Because the discussion is focused on theoretical issues, the empirical literature of the influence of *q* on investment decisions will be only briefly mentioned. Section 1 will deal with a diverse pool of views, ranging from Keynes's early insights on *q* to the more modern neoclassical frameworks, while Section 2 will deal with the role of *q* in the Cambridge corporate models.

[47] On the other hand, Stiglitz (1969, 1974) has 'generalised' the M&M results so as they do not depend on the existence of 'risk classes'. Unfortunately, the generalisation comes with some cost: it is unrealistically assumed (as M&M do) that individuals can borrow at the same interest rate as corporations and that bankruptcy cannot take place – so bankruptcy costs are avoided. These stringent conditions raise the question of the usefulness of the generalisation for real-world purposes.

1. *Views on Tobin's q*

Keynes (1936, chp. 12) was the first one to admit that 'the daily revaluations of the stock exchange, though they are primarily made to facilitate transfers of old investments between one individual and another, inevitably exert a decisive influence on the rate of current investment. For there is no sense in building up a new enterprise at a cost greater than that at which a similar existing enterprise can be purchased; whilst there is an inducement to spend on a new project what may seem an extravagant sum, if it can be floated off on the Stock Exchange at an immediate profit.' Brainard & Tobin (1968) and Tobin (1969) were the first contributions to take up Keynes's idea in a formal model; the latter was an extension of the original Hicks IS-LM model with an LM curve depending on a vector of asset prices rather than on a single interest rate, while the former was one of the first contributions in dealing with macro models embedded in a rigorous accounting structure and can be regarded as an early forerunner for the class of models advocated here – models based on the SFC methodology. On the other hand, a similar interpretation of Keynes's idea was offered by Minsky (2008a), whose framework is largely similar to Tobin's, where investment depends on the difference between the demand price and the supply price of capital goods.[48]

In neoclassical theory, as in Brainard and Tobin's seminal papers, q plays the main role in investment decisions, but uses a more restricted microeconomic rational behaviour setting.[49] This implementation was developed by Lucas & Prescott (1971), Yoshikawa (1980) and Hayashi (1982), and since then q has become the 'preferred theoretical description of investment' (Fischer & Merton, 1984, p.29) in a neoclassical framework and is featured as such in advanced textbooks (Carlin & Soskice, 2006; Romer, 2012). One reason for its success is that the model can be derived from the

[48] For a discussion of the differences between Minsky and Brainard and Tobin's framework, see Crotty (1990) and Palley (2001).

[49] However, Brainard and Tobin's framework is quite different from the neoclassical one. As they admit: 'We are so far from being thorough-going neoclassicals that we are quite comfortable in believing that corporate managers [...] respond to market noise and are in any case sluggish in responding to the arbitrage opportunities of large deviations of "q" from par' (Tobin & Brainard, 1990, p. 548). Furthermore, Tobin (1984, pp. 6–7) expressed serious reservations about the 'efficiency of financial markets', citing approvingly Keynes's idea of markets driven by non-informed, herding behaviour.

maximising behaviour of a single representative firm operating in competitive markets and facing adjustment costs. Such adjustment costs can be either internal (installation and other costs) or external (new investment induced by a higher level of q bids up the price of capital goods), but the workings of the theory are the same in both cases (Romer, 2012, p. 408). The relevant q for the neoclassical theory of investment is *marginal q*, that is, the ratio of the market value of a marginal unit of capital to its replacement cost.[50] The equilibrium value for q is 1; if, for whatever reason, the actual value is above that level, wealth-maximising firms will find profitable investment projects and then will push down the marginal efficiency of capital (i.e. the rate of profit), given the assumption of a production function with decreasing marginal factor returns.

There have been several theoretical criticisms to this framework. First, marginal q is an unobservable variable, so '[t]he managerial investment decision-making *process* cannot possibly be guided by an unobservable variable' (Crotty, 1990, p. 538, *emphasis in the original*). Second, perfect capital markets are assumed, and shareholders and managers are *conflated* into a single agent (Crotty, 1990). The assumption of perfect capital markets rules out the possibility of long periods of time where actual values deviate from fundamentals, so managers always receive relevant information from the stock market for their investment decisions. The conflation of shareholders with managers implies that firms do not exist in the neoclassical framework and that managers as a class do not have different goals from shareholders. Third, as Palley (2001, p. 665) notes, if firms and shareholders have different expectations about future cash-flows, q equilibrium will be different from unity. Fourth, managers will maximise shareholders' wealth choosing the most appropriate technique for a given technology – i.e. the rate of profit is given by a production function. However, it is well-known that the use of production functions for determining the rate of profit is problematic (Cohen & Harcourt, 2003; Felipe & Fisher, 2003; Felipe & McCombie, 2013).

[50] Under constant returns on the adjustment costs, it can be shown that marginal and average q coincide (Hayashi, 1982). Moreover, other influences such as monopoly power, downward-sloping product demand curves and a large share of dated capital can produce discrepancies between the marginal and the average q. See Romer (2012, p. 415).

The empirical evidence for the neoclassical investment function has been quite disappointing (Summers, 1981; Abel & Blanchard, 1986; Chirinko, 1993): 'Their explanatory power is low and serial correlation or dynamic structures including the lagged dependent variable are common. In addition, other variables [...] are often significant in the equations even though the standard formulation of *Q* models does not provide a satisfactory rationale for their inclusion' (Blundell *et al.*, 1992). Even when the *q* variable is found to be statistically significant (Blundell et al., 1992), its economic significance is very low. Furthermore, the adjustment costs estimates found in some studies are usually far too large to be reasonable (Summers, 1981). Some of these problems stem directly from the theoretical assumptions of the model. For instance, the assumption of perfect financial markets, where actual prices cannot deviate from fundamentals, does not reflect observed stock market behaviour: 'Sentiment creates a problem for the *q* model insofar as investment decisions are based on fundamentals' (Chirinko, 1993, p. 1889). Another possible source of problems comes from the way capital stock at replacement cost is measured, because the perpetual inventory method used can be 'highly inaccurate in the face of major structural shifts', although it seems that the 'extant evidence provides little support for the capital mismeasurement hypothesis' (Chirinko, 1993, p. 1890). Pure econometrics issues (such as the choice of proper instruments) are also frequently acknowledged as an additional source of problems (Blundell *et al.*, 1992, pp. 234–235).

Finally, a word about the role of inflation on *q* is needed. In neoclassical theory, inflation should not have any influence on *q*, because that would mean that agents suffer money illusion. Nor in canonical equity valuation models, where it is supposed that equity should be properly valued using real values and taking into account inflation (Stimes, 2011). Tobin and Brainard (1977, pp. 241–242) listed a number of reasons why inflation could affect *q*, even when inflation was fully anticipated by the agents,[51] because of the structure of corporate taxes[52] and because '[n]ominal interest rates do not accurately incorporate inflation premiums' (p. 242). On the

[51] In the case of unanticipated inflation, it will have 'additional non-neutral effects' (p.242).
[52] They argue, correctly in our view, that corporate earnings include depreciation based on original cost, so profits will be overstated and then taxes will be higher too.

empirical side, the studies on the issue show that valuation ratios are negatively influenced by inflation. Faria and Mollick (2010) presents an econometric study for the US from 1953 to 2000, showing the impact of inflation on q and arguing that the q paradox of being lower than 1 can be explained not only through periods of 'Schumpeterian innovation', but through 'the role of inflation, showing that inflation affects Tobin's q negatively' (pp. 402–403), because 'if the commodity market price better reflects inflation than the financial market price, then q decreases with inflation' (p. 415). With a different emphasis, Modigliani & Cohn (1979) presented additional empirical evidence of the US stock market since the 1950s to the 1980s, arguing that the main reason why valuation multiples (such as the price-earnings ratio) can be lower in an inflationary environment is because investors commit two 'money-illusion' mistakes: first, they do not acknowledge the increase in value due to a reduction in the real burden of liabilities and, second, they use a nominal interest rate to discount future cash-flows – which reduces discounted-value calculations.

2. *Cambridge corporate models*

The simplest post-Keynesian long-run macroeconomic model that deals with the determination of the business profit rate is the basic dual-class Cambridge model (Kaldor, 1955; Robinson, 1956; Pasinetti, 1962). In this model, the rate of profit is given by the growth rate of investment divided by capitalists' propensity to consume. In such a framework the main results are framed in a distributive context of workers and capitalists. The model has been extended to include a government sector (Dalziel, 1991; Pasinetti, 1989; Steedman, 1972), and a financial sector (Palley, 1996; Park, 2006).[53]

In a strand of this literature launched by Kaldor (1966), this 'dual-class structure' was changed by a 'corporate structure', in which the relevant distinction was not any longer between workers and capitalists but rather between households and firms.[54]

[53] For a thorough review of the Cambridge model literature, see Baranzini & Mirante (2013).
[54] This corporate structure does not actually preclude the analysis of income distribution between capitalists and workers, as it is shown in Moss (1978), where a dual-class income distribution analysis is proposed in the framework of a corporate economy. In these models, capitalists are not placed in

This change in the scope of the institutional setup was motivated by the criticisms of Samuelson & Modigliani (1966) directed towards the validity of the Cambridge model (and Pasinetti's result of workers' savings irrelevance for the profit rate), and more precisely to what they regarded as the assumption of 'the existence of identifiable classes of capitalists and workers with 'permanent membership' – even as rough first approximation' (Samuelson & Modigliani, 1966, p. 271). In his rejoinder, Kaldor (1966, p.310) considered the high propensity to save out of profits 'something which attaches to the nature of business income, and not to the wealth (or other peculiarities) of the individuals who own property.'

The change from a dual-class structure to a corporate one was not just mere window dressing, but had important implications for the workings of the model. In the dual-class model, the adjustment to full-employment output occurs through the change in the average propensity to save of the economy – weighted by workers' and capitalists' participation in total savings. For instance, an increase in the growth rate raises investment needs, which will be fulfilled through an increase in the rate of profit (via the Cambridge equation) and thus an increase of the profit share (given a constant capital-output ratio) in total income – which in virtue of the capitalists' higher propensity to save, will bring the investment-savings condition in equilibrium. On the other hand, in the Cambridge corporate model the adjustment occurs in the stock market: consumption has to reach a certain level (through the capital gains component embedded in the consumption function) in order to close the gap between full-employment output and investment. The valuation ratio plays a crucial role in this process, reconciling corporations' desire for growth and households' desire to consume. Households' savings play a buffer role here, but now through the volume of capital gains, so the relevant measure making the adjustment is households' comprehensive savings. However, as Davidson (1968, p.259, *emphasis in the original*) pointed out, Kaldor 'has unwittingly reinstated the *deux ex machina* of the neoclassical system – the rate of interest – as the balancing mechanism, not only for maintaining equilibrium in the securities market, but also for ensuring a level of

the corporate sector but in the household sector, and as in the traditional models capitalists do not receive any wages.

effective demand always ample to secure full employment.[55] Or as Moore (1973, p.542) put it, '[t]he introduction of equities and capital gains and losses on existing assets thus provides an additional escape from the Harrod-Domar knife-edge dilemma.'

Therefore, the introduction of the corporate sector adds a high dose of realism to the Cambridge model but it also adds a new set of theoretical problems, especially those related to corporate behaviour and stock market valuation. It is no wonder that the literature has been concerned with the implications for the valuation ratio in this framework (Marris, 1972; Moore, 1973, 1975; Lavoie, 1998; Commendatore, 2003) and its relationship with the rate of profit of the economy. Moreover, this corporate framework creates a clear-cut wedge against the neoclassical framework. In neoclassical models firms are veils, and the production process is a black box – a production function. In contrast, a Cambridge corporate model allows for corporations to have their own existence and to make decisions independent from households.

Despite its simplicity, many theoretical propositions can be gleaned from this model, especially those related to q. There have been very few attempts in the literature to explain the behaviour of q using only macroeconomic features. The model's main 'predictions' are:[56] first, there is a negative relationship between q and growth rates; second, there is another negative relationship between q and capital-output ratios; and third, there is a positive relationship between q and households' savings rates.[57]

[55] The terminology used in the literature is misleading, curiously labelling as 'the rate of interest' a completely different concept, the equity yield. In fact, there is neither money nor debt in these models, so that a 'rate of interest' is hardly possible. An educated guess about the origin of this confusion would be to trace it to the fact that in the neoclassical institutional structure there are no households or firms, but rather a representative agent, and as such the difference between the rate of profit and equity yield vanishes, because the agent as household can undo his own decisions as 'entrepreneur' – the sort of arbitrage game that abounds, for instance, in the MM literature. In turn, the rate of profit has been historically considered in the neoclassical framework to be the rate of interest, given in principle that all firm's liabilities can be treated alike. Therefore, in this framework, the rate of profit, rate of interest and equity yield can be used interchangeably.

[56] The mathematical presentation of the model is succinctly presented in section 3.1 below.

[57] Kaldor (1966) conducted the analysis assuming that households' propensity to save was homogenous across all income classes (i.e. wages, dividends and capital gains), which simplifies algebraic manipulations considerably. However, in a model with three different propensities to save the link between every propensity and the valuation ratio would still be the same, positive. See Moore (1973, 1975) for the case with different propensities to save in the Cambridge corporate model.

On the other hand, regarding the profit rate, higher growth rates have a positive effect on profit rates, whereas higher retention ratios and higher new share issues have a detrimental effect on the profit rate. Finally, through Kahn's valuation formula, higher growth rates have an unequivocal positive effect on the equity yield – both through higher profit rates and a lower Tobin's *q*.

The pair of relationships between *q* and growth rates, and *q* and savings rates constitutes the core of what I call the 'Post-Keynesian theory of *q*'. Despite its simplicity, the model is able to explain remarkably well the long-run trend of *q* in, for instance, the US economy and other developed economies during the last 40 years.[58] The evidence shows that the recent higher level of *q* (Montier, 2014a; Piketty, 2014, p. 189) has been coupled with lower accumulation rates and higher propensities to save, the latter due to income redistribution to the top percentile; these effects are usually associated in the post-Keynesian literature with the financialisation process (Stockhammer, 2004; Orhangazi, 2008; Van Treeck, 2008). Moreover, there is nothing in the post-Keynesian theory to preclude *q* from being persistently different from unity, recognising the well-established fact that the mean value of *q* has been historically less than one (Montier, 2014a; Piketty, 2014). In the Cambridge corporate model, accumulation can proceed indefinitely with a *q* different from unity. Admittedly, there have been other factors that have undoubtedly played a role in the evolution of *q*, notably the increase in leverage, that are not included in the model. But the evidence taken at face value between growth rates, *q* and savings rates is in principle favourable to the post-Keynesian theory.

Another remarkable feature of the post-Keynesian/Kaldorian theory that has gone unnoticed in the post-Keynesian literature is a reverse causation issue: while mainstream theory predicts a causal link in the first round running from *q* to investment, the Kaldorian theory posits a link running from investment to *q*. While the mainstream theory supports stock market booms as drivers of corporate investment (*q* values higher than one), in the Kaldorian theory such a mechanism is irrelevant. The Kaldorian theory features the Keynesian principle that investment is

[58] Full disclaimer: all these relationships should be properly understood in a long-run context.

given by animal spirits, while in the mainstream theory investment is given by the production function through the law of the one price – the entrepreneur will carefully equalise the marginal efficiency of capital to the marginal productivity of capital (rate of profit), the latter given by the production function. Therefore, the argument over causality between *q* and investment is not a mere detail, but rather entails the approval or denial of a whole theoretical framework.

However, there are other, less favourable features in the basic Kaldorian model. There are problems of omission as well as commission. The problem of omission is that Kaldor offers an explanation of *q* based on a model without a proper financial sector. There are not banks, there is no money and there is only one financial asset. The problem of commission is in the modelling of firms' financing decisions and dividend policy. Kaldor assumes that a fixed part of profits is paid out as dividends and a fixed share of investment is financed by equity issue, independent of financial market conditions. However, in the real world, the financing decision and the dividend decision are neither independent nor completely fixed regardless of the state of capital markets. Moreover, a higher proportion of investment financed through new shares should lead to lower valuation ratios – given the higher supply of shares. Finally, one would expect that other factors not included in the model (most notably, corporate leverage, inflation, and fiscal and monetary policy) to affect the evolution of *q*. These issues will be addressed in the model presented in the next section.

3. A post-Keynesian SFC model for Tobin's *q* behaviour

In this section, the Cambridge corporate model will be revisited through a SFC model. Afterwards, a more complete model with several post-Keynesian features will be developed. The main post-Keynesian features are: endogenous money, mark-up pricing, sectors with independent motivations (especially households, firms and banks) and a theoretical framework that is demand-led. Because the model presented is quite large to be solved analytically, a set of simulations will be performed to analyse *q*'s behaviour. In particular, much emphasis will be placed on the results after a change in the growth rate of the economy or in households' propensity to consume – because these simulations can be readily compared with the original Kaldorian model. Finally, simulations involving changes in corporate financing policy or changes in the rate of inflation will be briefly discussed.

1. *The Cambridge corporate model in SFC clothing*

The Cambridge model accounting structure can be readily depicted with the help of the matrices in Tables 3.1-3.3. The balance sheet comprises two assets, real capital and firms' equity, and two sectors, households and firms. The booking method for firms' equities departs from the traditional SFC approach in which equities are recorded as a liability for the corporate sector. Here firms' net worth is made up of the accumulation of retained profits and the issue of new shares. The flows accrued to these assets are depicted in the corresponding transaction-flow matrix. Finally, a revaluation matrix is needed to take into account change in equity prices, which by definition are not included in the transaction-flow matrix.

Table 3.1. Balance-sheet of the Cambridge corporate model

Balance-Sheet	**Households**	**Firms**	Σ
Real capital		$+K$	$+K$
Equities (as financial asset)	$+p_e.e_h$		$+p_e.e_h$
Net worth	$-V_h$	$-V_f$	$-(V_h+V_f)$
Σ	0	0	0

Table 3.2. Transactions-flow matrix of the Cambridge corporate model

Transactions-Flow Matrix	**Households**	**Firms** Current	**Firms** Capital	**Σ**
Consumption	$-C_d$	$+C_s$		0
Investment		$+I_s$	$-I_d$	0
GDP [memo]		$[Y]$		0
Wages	$+WB_s$	$-WB_d$		0
Firms' profits	$+\Pi_d$	$-\Pi$	$+\Pi_r$	0
Equity issues	$-p_e.\Delta e$		$+p_e.\Delta e$	0
Σ	0	0	0	0

Table 3.3. Revaluation matrix of the Cambridge corporate model

Revaluation Matrix	**Households**	**Firms**	**Σ**
Change in firms' equity prices	$+\Delta p_e.e_{-1}$		$+\Delta p_e.e_{-1}$
Σ	$+CG$	0	$+CG$

Equations with a letter after the number are not included in the simulated model (otherwise it would be over-determined); they are presented here just to show the underlying logic of the model. The equations of the model are as follows:

Consumption supply $$C_s = C_d \quad (1)$$

Investment supply $$I_s = I_d \quad (2)$$

Labour supply $$WB_s = WB_d \quad (3)$$

The first three equations describe a demand-led economy, where consumption and investment goods are produced whenever there is some demand, while equation (3) says that the labour supply fully adjusts and there are no supply constraints in the labour market. The following equations deal with income distribution:

Business profits	$\Pi = \Pi_r + \Pi_d$	(4)
GDP	$Y = \kappa . K$	(5)
Wage bill	$WB_d = Y - \Pi$	(6)
Retained profits	$\Pi_r = I.(1 - f)$	(7)
Dividends	$\Pi_d = \Pi.(1 - s_f)$	(8)

Equation (4) is the profits accounting identity, which says that profits have to be retained or distributed as dividends. Equation (5) embodies the common assumption in the Cambridge models, where technology is assumed to be fixed coefficients, and it allows the determination of total income. Equation (6) shows that wages are a residual, following the Kaldorian reverse causation of the Ricardian model. Equations (7) and (8) show firms' equity issuing policy, given by an exogenous parameter f, and firms' dividend policy, given by an exogenous retention ratio, s_f. The following equations deal with households and firms' decisions:

Households'wealth	$\Delta V_h = WB_d + \Pi_d - C_d + CG$	(9)
Consumption function	$C_d = \alpha.(WB_s + \Pi_d + CG)$	$(10.a)$
Consumption function	$C_d = Y - I_s$	(10)
Capital stock	$K = K_{-1} + I_s$	(11)
Investment function	$I_d = g.K$	(12)
Issue of new shares	$p_e.\Delta e = f.I_d$	(13)
Households'savings	$p_e.\Delta e = WB_s + \Pi_d - C_d$	(14)

Equation (9) depicts changes in households' wealth, which are driven by two components: the first is households' savings, $(WB_d + \Pi_d - C_d)$, and the second one is capital gains. Equation (10a) is the consumption function; in Kaldor (1966) the assumption was that a uniform propensity to consume applied to all sources of income, while Moore (1973) investigated the more general case with different propensities to consume and its implications for the rate of profit and income distribution. In any case, consumption has to fill the gap between investment and full-employment GDP, and that is why total consumption is given by equation (10); capital gains (through changes in equity prices and q) are the flexible element in the equation and will ensure that consumption will gravitate towards the level given by (10). Equations (11) and (12) set the conventional exogenous investment function driven by the Keynesian animal spirits.[59] Finally, equations (13) and (14) show that the accumulation of equities in every period is given by different mechanisms for firms and for households: for the former, new issues are part of firm's financial policy, while for the latter the decision is a by-product of their consumption and portfolio decisions.

The last two equations show the critical importance of equity prices in reconciling households' and firms' decisions:

Capital gains	$CG = \Delta p_e . e_{-1}$	(15a)
Capital gains	$CG = \dfrac{C_d - \alpha_0 . WB_s - \alpha_1 . \Pi_d}{\alpha_2}$	(15)
Equity yield	$\gamma = \dfrac{(\Pi_d + CG)}{p_e . e}$	(16)
Tobin's q	$q = \dfrac{V_h}{K}$	(17)

Equation (15a) embodies a definition of capital gains but, as has been explained above, capital gains have to accommodate the level of consumption, so they will be given by equation (15). The model would be closed now, but two additional definitional equations can be added, which do not enter as arguments in any of the previous equations and then will play no role in the model; equation (16) is the definition of the equity yield and (17) is the definition of q.

One of the attractive aspects of the model is that it is easy to solve analytically. Here, the emphasis falls on solutions for the rate of profit, q and equity yield. For the rate of profit, using (4), (7), (8) and (12) the Cambridge equation is obtained:[60]

[59] The investment function should be written taking into account the capital of the previous period, not the current one. Such a strategy has been followed here in order to easily compare the notation with the Cambridge model literature.
[60] Roman numbers stand for steady-state solutions.

$$r = \frac{\Pi}{K} = \frac{g.(1-f)}{s_f} \tag{18}$$

An expression for the volume of capital gains is needed if a solution for q has to be obtained. Capital gains (Moore, 1973) can be expressed starting from the two definitions of the change in wealth:

$$\Delta W = \Delta K.q + \Delta q.K$$

$$\Delta W = \Delta e.p_e + \Delta p_e.e$$

Rearranging:

$$CG = \Delta K.q + \Delta q.K - \Delta e.p_e$$

And plugging the investment- financing definition into the previous expression:

$$CG = \Delta K.q + \Delta q.K - (I - s_f.\Pi)$$

$$CG = s_f.\Pi + \Delta K(q-1) + \Delta q.K$$

$$CG = \Delta K - f.\Delta K + \Delta K(q-1) + \Delta q.K$$

$$CG = (q-f).\Delta K + \Delta q.K$$

In steady-state, $\Delta q = 0$, so the previous expression boils down to:

$$CG = (q-f).\Delta K$$

In order to obtain q solution, an equation that shows the equilibrium in the stock market is needed. Such an equation says that the supply and demand of equities has to be balanced (Kaldor, 1966, p. 317; Moore, 1973, p. 536; Lavoie, 1998, p. 420). The supply is given by the issue of new shares, $f.I$, plus the sales of shares by households who want to realise capital gains, $\alpha.(q-f)$. On the other hand, demand arises from households' savings out wages and dividends, $(1-\alpha).[WB + (1-s_f).\Pi]$, as can be checked in Table 3.2:

$$f.I + \alpha.(q-f).I = (1-\alpha).[WB + (1-s_f).\Pi]$$

Solving for q:

$$q = 1 - \frac{1 - \frac{(1-\alpha)}{g.\kappa}}{\alpha} \tag{19}$$

With the partial derivatives being: $\frac{dq}{d\alpha} < 0, \frac{dq}{dg} < 0$ and $\frac{dq}{d\kappa} < 0$. Finally, through Kahn's valuation equation, and knowing the profit rate and Tobin's q, the equity yield can be obtained:

$$\gamma = \frac{r-g}{q} + g \tag{20}$$

With $\frac{d\gamma}{dg} > 0$; the positive effect of a higher capital accumulation on profit rates is reinforced by its negative effect on the valuation ratio. Finally, the gap $r - g$ will widen as long as $s_f < (1-f)$; this condition is not very restrictive, given the empirically low values usually taken by f.

In summary, the analytical formulation can show the main features of the model: as an assumption, an investment function given by animal spirits (and independent especially from q), and as results three negative long-run relationships between output-capital ratios, propensities to consume and growth rates on the one hand, and q on the other, and finally no influence of financing decisions on q behaviour – q is independent from f. It is worth keeping in mind these results when going through the results of the next model.

2. *A more complete model*

The Cambridge model allows gleaning very general relationships between q and other macroeconomic variables, but at the cost of simplification. The model presented here depicts a more sophisticated economic system with post-Keynesian sectoral behaviour. The main post-Keynesian features are: endogenous money, mark-up pricing, sectors with independent motivations (especially households, firms and banks) and a theoretical framework that is demand-led. Because the model presented is too large to be solved analytically, simulations will be performed to analyse q's behaviour over time. I am specifically interested in three sets of shocks that will allow us to evaluate whether the conclusions of the original Kaldorian model still hold: a change in the growth rate of the economy, a change in households' propensity to consume and a change in the willingness of corporations to issue new shares. I will also briefly investigate the impact of inflation on equity prices.

The model consists of 49 equations. The three matrices that lay out the full accounting structure of the model (stocks, flows and price revaluations) can be found in the Appendix III. Except for firms' financing decisions, no pretension of originality in the behavioural assumptions is made; rather, the aim is to set up a model based on established aspects of post-Keynesian theory as far as possible. For the sake of convenience, each sector is discussed separately.

General equations and identities

The first four equations are simple accounting identities. No inventories are assumed for simplicity, so that total sales are equal to aggregate demand. Equation (1) sets government revenues coming from taxes equal to personal taxes plus corporate taxes. Equations (2), (3) and (4) are identities: (2) is GDP in nominal terms, (3) is households' disposable income (which comprises wages, plus dividends, plus bills interest payments less taxes) and (4) is GDP in real terms.[61]

$$\text{Total taxes} \qquad T_d = T_s^h + T_s^f \tag{1}$$

$$\text{Nominal GDP} \qquad Y = C_s + I_s + G_s \tag{2}$$

$$\text{Households' disposable income} \qquad YD = WB_d + \Pi_d^f + \Pi_d^b + (r_{b-1}.B_{h-1}) - T_s^h \tag{3}$$

$$\text{Real GDP} \qquad y = c + i + g \tag{4}$$

Firms' behaviour

Firms' behaviour is characterised as follows. Investment grows in real terms at a constant rate, gr_k, given by Keynesian animal spirits. More complicated investment functions have been extensively used in the literature (Dos Santos & Zezza, 2008; Lavoie & Godley, 2001; Van Treeck, 2008; Zezza, 2008), following especially the

[61] Throughout this section lowercase letters will denote real variables.

empirical work of Ndikumana (1999), but here a simpler form has been preferred.[62] Our specification of firms' financing decisions and dividend policy differs substantially from the standard treatment of the SFC literature (Godley & Lavoie, 2007; Dos Santos & Zezza, 2008; Le Heron & Mouakil, 2008; Van Treeck, 2008), which typically assumes that a fixed percentage of investment is financed through new share issues, regardless of financial market conditions, and that dividend policy is a fixed percentage of total profits. In other words, dividend policy is considered to be independent of investment financing decisions. I regard both assumptions as problematic and follow Gordon's (1994) investment financing and dividend theory instead. In Gordon's framework, the sale of shares is a supplement, and not a substitute for retained earnings in investment financing decisions; dividend policy is regarded as subordinate to investment policy and one cannot be varied independently of the other. At the mathematical level, firms' financing decisions are modelled here very much in the manner of *Tobinesque* households' portfolio decisions: the share of every financing method (retained profits, debt and equity issues) will depend on the interest rate on loans, on the share price in the stock market and on the degree of leverage. The relative equity price is modelled using the price-earnings ratio (using the trailing twelve months earnings), per_{ttm}, so firms will opt for equity issues and retained earnings when this ratio is high and shares are expensive. Once the share of retained profits is given by equation (10), firms will distribute the excess over retained profits as dividends (equation 13), so dividends will vary depending on financing decisions. Finally, equation (15) depicts firms' price policy decision as a mark-up over the unit costs of the previous period.

Nominal capital stock	$K = k.p$	(5)
Real capital stock	$k = k_{-1} + i$	(6)
Nominal investment	$I_d = i.p$	(7)
Real investment	$i = k_{-1}.gr_k$	(8)

[62] For the post-Keynesian debate on investment functions, see Hein *et al.* (2011), Hein *et al.* (2012) and Lavoie (2014, chap. 6).

Firms' total profits	$\Pi^f = Y - WB_d - (r_{l-1}.L_{d-1}) - T_s^f$	(9)
Firms' retained profits	$\Pi_r^f = I_d - p_e.\Delta e_f - \Delta L_d$	(10)
Firms' retained profits	$\frac{\Pi_r^f}{I} = f_{10} + f_{11}.r_{l-1} + f_{12}.\frac{1}{per_{ttm-1}} + f_{13}.\left(\frac{L}{K}\right)_{-1}$	(10a)
Firms' leverage ratio	$\frac{\Delta L_d}{I} = f_{20} + f_{21}.r_{l-1} + f_{22}.\frac{1}{per_{ttm-1}} + f_{23}.\left(\frac{L}{K}\right)_{-1}$	(11)
Issue of new shares	$\frac{p_e.\Delta e_f}{I} = f_{30} + f_{31}.r_{l-1} + f_{32}.\frac{1}{per_{ttm-1}} + f_{33}.\left(\frac{L}{K}\right)_{-1}$	(12)
Firms' dividends	$\Pi_d^f = \Pi^f - \Pi_r^f$	(13)
Firms' taxes	$T_s^f = \theta_f.[Y - WB_d - (r_{l-1}.L_{d-1})]$	(14)
Prices	$p = (1+\varphi).UC_{-1}$	(15)

Inflation

The labour market follows mainly Godley & Lavoie (2007, chp. 9, 10, 11): units costs are defined as the nominal wage bill divided by real income (16) and the wage bill is given by the number of workers times the nominal wage rate (17). The labour market is depicted through equation (19), which says that unions have a desired, targeted real wage that is a function of the previous target level, labour productivity and the rate of employment. Labour population, N_{fe}, is assumed to be fixed and does not grow. On the other hand, equation (20) depicts the part of the negotiation process that is included into the nominal wage rate of the current period. Equations (21) and (22) deals with labour productivity: following Zezza (2008), it is assumed that productivity grows at an exogenous rate, gr_{pr0}, minus a parameter that reflects that higher levels of capacity utilization will lead to lower levels of productivity growth.

Unit costs	$UC = \frac{WB_d}{y}$	(16)
Wage bill	$WB_d = N.W$	(17)
Inflation	$\pi = \frac{(p - p_{-1})}{p_{-1}}$	(18)
Targeted real wage	$\omega^T = \left(\frac{W}{P}\right)^T = \omega^T_{-1}.\left[1 + \Omega_0 + \Omega_1.\frac{pr_{-1}}{\omega^T_{-1}} + \Omega_2.\left(\frac{N}{N_{fe}}\right)_{-1}\right]$	(19)
Nominal wages	$W = W_{-1}.\left[1 + \Omega_3.\left(\frac{\omega^T_{-1}}{W_{-1}}\right)\right]$	(20)
Productivity	$pr = pr_{-1}.(1 + gr_{pr})$	(21)
Productivity growth	$gr_{pr} = gr_{pr0} - gr_{pr1}.u$	(22)
Capacity utilisation	$u = \frac{y}{k_{-1}}$	(23)
Number of workers	$N = \frac{y}{pr}$	(24)

Households' behaviour

The most important households' decisions are regarding their consumption and portfolio allocation. Equation (27) says that households' consumption decisions are assumed to be in real terms, depending on expected real disposable income and one-period-lagged real wealth. Expected disposable income (equation 29) is modelled in an adaptive manner, while equations (30) and (31) are the deflated values of disposable income and wealth, respectively.[63] In turn, the increase in nominal wealth in equation (25) is given by savings, $YD - C_d$, and capital gains accrued to equities. On the other hand, households' portfolio decision is a two-step process: in the first round (equation 32), households will decide how much wealth to allocate as deposits, and in the second round households will decide how to allocate the rest between equities and bills following *Tobinesque* principles: households will have some previous preferences for such allocation (parameters λ_{10} and λ_{20}), which will be modulated by the equity yield and the rate of bills of the previous period. Unlike other SFC models (Lavoie & Godley, 2001), here it is supposed for simplification that households' expectations are always fulfilled, so the wealth allocation they were planning at the beginning of period is exactly the same one that they end up with at the end of period – so no buffer role is assigned to any variable of the model.

Households'wealth	$\Delta V_h = YD - C_d + CG$	(25)
Households'taxes	$T_s^h = \theta_h . [WB_d + \Pi_d^f + \Pi_d^b + (r_{b-1}.B_{h-1})]$	(26)
Real consumption	$c = \alpha_1 . yd^e + \alpha_2 . v_{h-1}$	(27)
Nominal consumption	$C_d = c.p$	(28)
Expected real disposable income	$yd^e = yd_{-1}.(1 + gr_k)$	(29)
Disposable income	$yd = \frac{YD}{p} - \frac{\pi . V_{h-1}}{p}$	(30)
Real wealth	$v_h = \frac{V_h}{p}$	(31)
Deposits held by hh	$D_h = \sigma . V_h$	(32)
Equity held by hh	$\frac{p_e . e_h}{V_h - D_h} = \lambda_{10} + \lambda_{11} . \gamma_{-1} + \lambda_{12} . r_{b-1}$	(33)

[63] Real disposable income is not simply the deflated value of nominal disposable income, but has to be adjusted for the erosion in wealth produced by inflation. For a formal proof, see Godley & Lavoie (2007, pp.293-294).

Bills held by hh $$\frac{B_h}{V_h - D_h} = \lambda_{20} + \lambda_{21}.\gamma_{-1} + \lambda_{22}.r_{b-1} \tag{34a}$$

Bills held by hh $$B_h = V_h - D_h - p_e.e_h \tag{34}$$

Banks, government's behaviour and financial markets

Now it is time to deal with the decisions taken by banks, government, central bank and financial markets. Banks are modelled following the very well-known post-Keynesian principle that in a credit based economy money is endogenous and largely the result of commercial banks' decisions. Equations (36) and (37) determine banks' profits as the amount of interest payments of the current period and banks' dividend decisions, which distribute all their profits to households. This decision, together with that of setting the interest rate on loans (equation 38), are the only decisions that banks in this model can autonomously take. Equations (39) to (45) depict government and central bank decisions. Government decides on the growth of government expenditures based on the level of its debt in real terms as a share of real income and on the level of the unemployment in the economy. The former can be thought of as the outcome of policies based on austerity recommendations – as has been the case for the Euro area lately – while the latter can be conceived as unemployment benefits or similar anti-cyclical expenses. Equation (42) is the accounting identity for the government balance. Equation (43) says that the central bank is a residual buyer of government's debt while equation (44) is the central bank's balance sheet identity and (45) is central bank's monetary policy decision – deciding the level of the interest rate on bills.

Finally, equations (46) to (49) show financial markets equations. Equations (47) to (49) are simply definitions of well-known financial ratios: Tobin's *q*, price-earnings ratio and equity yield, respectively. Another measure for *q*, commonly called *equity Tobin's q* (which measures the value of equity in the stock market against its replacement value), could be easily retrieved, subtracting corporate debt both in the numerator and in the denominator of (47). On the other hand, the price-earnings ratio in equation (48) anchors on the trailing-twelve-months corporate earnings. Finally, equation (49) is the common definition of the equity yield.

Banks' reserves	$\Delta H_b = \Delta D_d - \Delta L_s$	(35)
Banks' profits	$\Pi^b = r_{l-1} . L_{s-1}$	(36)
Banks' dividends	$\Pi_d^b = \Pi^b$	(37)
Interest rate on loans	$r_l = \overline{r_l}$	(38)
Gov. expenditures	$G_d = g.p$	(39)
Growth of gov. expenditures	$g = g_{-1} . (1 + gr_{gov})$	(40)
Growth of gov. expenditures	$gr_{gov} = gr_0 - gr_1 . \left(\frac{\frac{B}{p}}{y}\right)_{-1} + gr_2 . \left(1 - \frac{N}{N_{fe}}\right)_{-1}$	(41)
Government bills	$\Delta B = (G_d + r_{b-1} . B_{-1}) - (T_d + r_{b-1} . B_{cb-1})$	(42)
Bills held by CB	$\Delta B_{cb} = \Delta B - \Delta B_h$	(43)
Currency	$\Delta H_{cb} = \Delta B_{cb}$	(44)
Interest rate on bills	$r_b = \overline{r_b}$	(45)
Capital gains	$CG = e_{-1} . (p_e - p_{e-1})$	(46)
Tobin's q	$q = \frac{p_e . e_h + L_d}{K}$	(47)
Price – earnings ratio ttm	$per_{ttm} = \frac{p_e . e_h}{\Pi^f}$	(48)
Equity yield	$\gamma = \frac{\Pi_d^f + CG}{p_{e-1} . e_{h-1}}$	(49)

The model is now complete with 49 equations, 49 variables and 30 parameters. A 'redundant equation' is left: an accounting identity is implied in the set of logical relations with variables already explained in some other equation. This identity will always be verified by the watertight accounting structure of the model. This equation says that Central Bank's high-powered money is equal to banks' reserves:

$$H_b = H_{cb}$$

The only price-equilibrating mechanism in the model takes place in the equity market, where the equity price fluctuates to accommodate the equity supply (given by firms and households who wish to sell their shares) with the equity demand (given by households who wish to buy shares).[64]

A final cautionary note should be added on the effect of inflation accounting on Tobin's *q*. In the real world, the way the nominal capital stock is measured in the System of National Accounts is through the perpetual inventory method (PMI). In the PMI method, the current value of the capital stock is obtained cumulating investment flows and adding some assumptions about the profile of equipment depreciation and the level of prices. For both depreciation and prices estimates are needed, because it 'requires being able to observe the evolution of the market prices of all corporate fixed assets, which is impossible given the enormous variety of assets of different vintages and the lack of centralized markets for many of them' (Piketty & Zucman, 2013, p.8). Although the quality of estimates has greatly improved over time, some doubt persist about the accuracy of the data. In particular, there has been some debate of the impact of these measuring choices on the reported level of Tobin's *q*.[65] For instance, it is argued that the persistent level of Tobin's q lower than 1 has been due to the way capital at replacement cost is overstated in the National Accounts (e.g. with lower depreciation rates).

In the model presented above, the capital stock was calculated as the general level of prices times the stock of real capital, which means that the whole stock of nominal capital (not only the new capital vintages, but the old ones too) is revalued every period. Although this is the way followed in the literature (Godley & Lavoie, 2007, Ch. 11), an alternative way could be to define the stock of nominal capital as the nominal

[64] For the details, see Appendix II.
[65] For a succinct summary, see Piketty & Zucman (2013, pp. 27–31).

capital of the previous period plus nominal investment (being nominal investment simply the product of the general level of prices and real investment).[66] If this inflation approach had been followed, some results of the simulations would have changed (especially the negative relation between q and growth rates, although not the relation between share issues and q), so we should be careful in interpreting the results because they are highly sensitive on how inflation is taken into account. Although neither the method used in the literature nor the capital-stock-plus-nominal-investment method are the ones followed by national accountants (so it is hard to compare some of the results of the current model with the trends displayed in National Account data), they clearly show the limitations of a specific inflation modelling strategy and probably of the underlying data from the National Accounts. For our case, it is explained in the next chapter that once the effect of inflation is removed, the analytical steady-state solutions show that the relation between q and real growth rates (and q and propensities to consume) is robust and follows quite naturally from a fairly standard post-Keynesian model.

3. *Simulations*

The parameter selection for the baseline scenario was done in such a way to ensure that the main ratios mimic either established values used in the literature (e.g. for the capital-output ratio, income distribution, etc.) or, when that was not possible, stylized facts of the US economy from 1960 to 1990. In particular, for the non-financial corporate sector the latter approach was followed, since there is not any common calibration procedure in the literature yet. In this regard, the stylized facts were: i) the issuance of new corporate shares is positive (in contrast to the share buybacks of the last few decades); ii) the 'pure' dividend pay-out ratio (without taking into account share buybacks) has been around 40-60% and iii) the leverage ratio (interest-bearing debt to total assets) is around 10-15%. The leverage ratio in the baseline scenario is slightly higher than its 'historical norm', because in the national accounts equity is valued at market values, whereas in my model I followed historic

[66] This alternative way to model inflation in the stock of nominal capital (and the problems associated with different modelling strategies) was pointed out to me by Antoine Godin.

cost. Because in general a discrepancy between market value and historic cost will exist, the leverage ratio will be different depending on which measure is used.

On the other hand, following Caiani *et al.* (2014) I run some robustness checks (setting the parameter to 90% or 110% of the value used in the baseline scenario) with the most relevant variables in order to briefly investigate the stability of the model. It seems that the solutions are not substantially changed in qualitative terms for most of the parameters.[67] However, although the qualitative results for the valuation ratios remained the same, inflation and labour dynamics showed some variation across the checks, which may point out that variations in the labour market assumptions are especially crucial and sensitive. Also, shocks to labour productivity parameters (not reported in the graphs) keeping at the same time constant baseline values showed to have unstable influences for a wide range of values.

An increase in the growth rate of the economy

The first simulation will deal with an increase in the growth rate of the capital stock, gr_k, which from a Keynesian point of view can be regarded as an increase in animal spirits. Figures 3.1a to 3.1d show the results. The first chart confirms the Kaldorian conclusion that higher growth rates yield lower valuation ratios. However, not much attention should be placed in this case to short-term results, given the way financial markets have been introduced in the picture, because one should expect that financial markets should include higher growth rate expectations into equity prices in the short-run – the empirical evidence suggests that markets almost always overreact. In any case, the secular decline in the long-run can be explained by the increase in the inflation rate, which affects not only financial market indicators but corporations' return on equity as well, through higher values of capital at replacement cost. This result is in contrast to the Cambridge model, where higher growth rates lead to higher profit rates. Here, although economic activity improves (both in the short-run and in the long-run), the fact that the return on equity is measured with capital in nominal values (as it should) leads to a decline of the return on equity over time.

[67] In Appendix 5 the summary of the qualitative results of the robustness checks can be found.

Figure 3.1a. First simulation: increase in animal spirits, gr_k

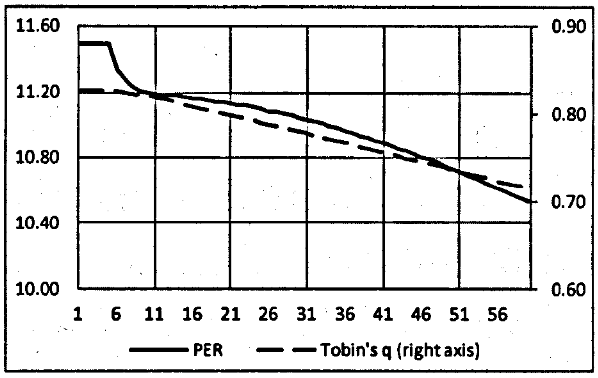


Figure 3.1b. First simulation: increase in animal spirits, gr_k

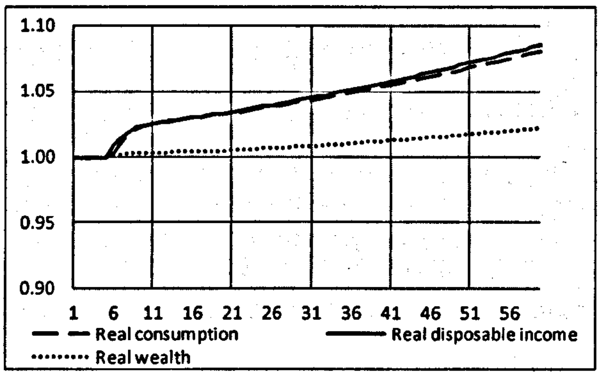


Figure 3.1c. First simulation: increase in animal spirits, gr_k

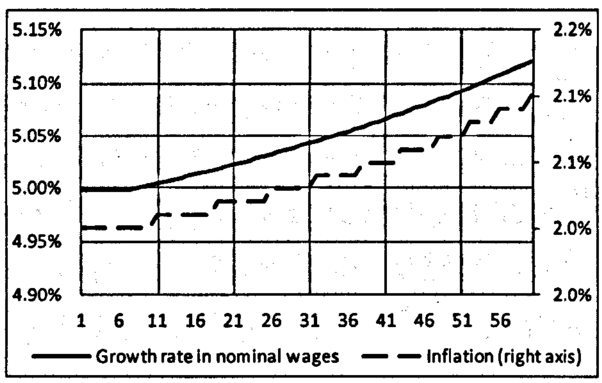
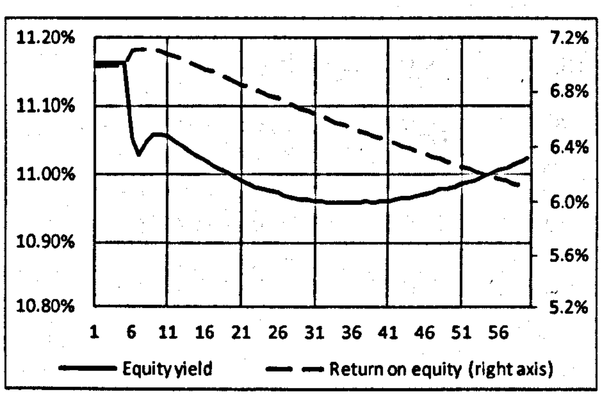


Figure 3.1d. First simulation: increase in animal spirits, gr_k



An increase in the propensity to consume out of wealth

Our second simulation will deal with another parameter of the Cambridge corporate model, a change in the propensity to consume out of wealth. Figures 3.2a to 3.2d shows the implications of an increase in this parameter. This increase has the expected Keynesian results affecting positively consumption and disposable income – both in the short and in the long-run. The unemployment rate improves due to higher levels of income and firms enjoy a higher level of profitability as well. This is in contrast to the Kaldorian model, where households' behaviour does not have any impact on the long-run profit rate. However, higher levels of consumption are balanced with lower levels of real wealth, which provoke the sale of shares and a fall in stock market valuations, confirming the negative relationship between propensities to consume and valuation ratios. Higher levels of inflation push up the replacement cost of fixed capital and contribute additionally to the fall in q. Although the equity yield improves both in the short and in the long-run (higher dividend yields are the result of both higher profits and lower equity prices), which creates a rebalancing effect in households' portfolio towards equities (increasing then their price), this effect is not enough to compensate for households' desire to reduce their wealth level relative to their income.

Figure 3.2a. Second simulation: increase in the propensity to consume out of wealth

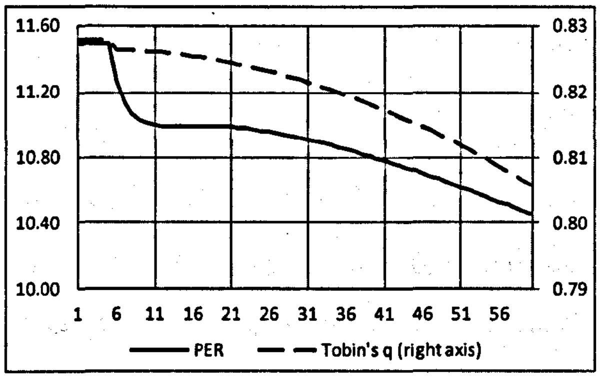


Figure 3.2b. Second simulation: increase in the propensity to consume out of wealth

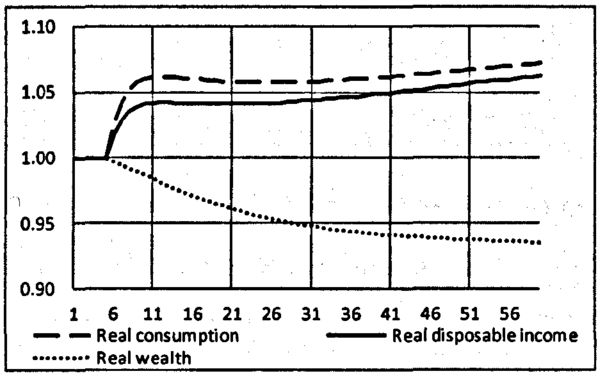


Figure 3.2c. Second simulation: increase in the propensity to consume out of wealth

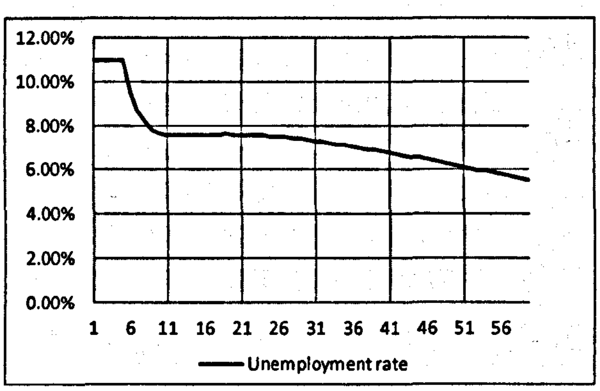
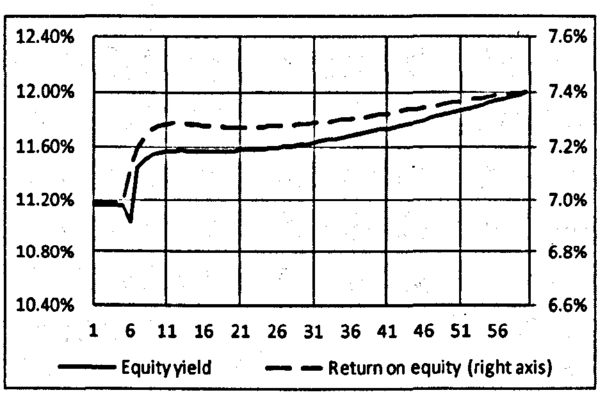


Figure 3.2d. Second simulation: increase in the propensity to consume out of wealth



A decrease in the share of new share issues

The third simulation will deal with a change in the policy of new share issues. Figures 3.3a to 3.3d summarises the main effects of a permanent reduction in the proportion of investment financed out of new issues. Given the reduction in the supply of shares, the valuation metrics increase notably in the short run and they keep increasing in the long-run. The Kaldorian model suggested that firms' financing policy should not have any long-run effect on q, but here that is not the case. The increase in valuation metrics has negative effects on the equity yield, given that shareholders have to buy the same assets at higher prices. In turn, a lower equity yield leads to a lower share of equities in households' portfolio. Finally, the way investment is financed matters for aggregate output: the last chart shows that unemployment is higher both in the short and in the long-run, which impact on corporate profitability through lower levels of return on equity. This effect is the opposite expected by the Cambridge model, where lower levels of share issuance should lead to an increase in the profit rate. However, the unemployment rate here is not fixed and matters for the level of profitability. This simulation can be conceptually thought as an increase in the degree of 'financialisation' (Stockhammer, 2004; Orhangazi, 2008), and the results track the main predictions of the literature: higher valuation ratios in the new steady-state and lower levels of output and employment. An additional feature could be added: lower levels of shareholder profitability, because of higher stock market valuations.[68]

[68] Montier (2014b) presents additional evidence against shareholder value maximisation, showing how equity returns were higher in the period 1940-1990 than since then.

Figure 3.3a. Third simulation: decrease in new share issuance, f_{30}

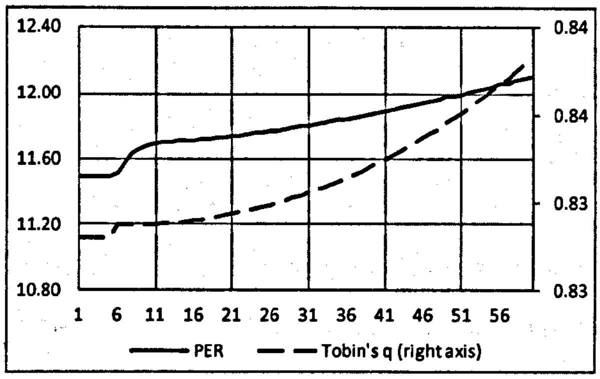


Figure 3.3b. Third simulation: decrease in new share issuance, f_{30}

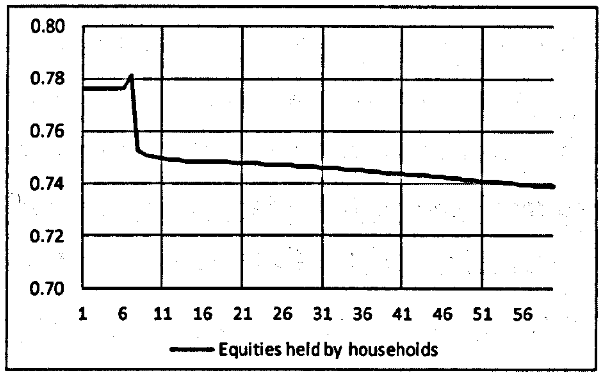


Figure 3.3c. Third simulation: decrease in new share issuance, f_{30}

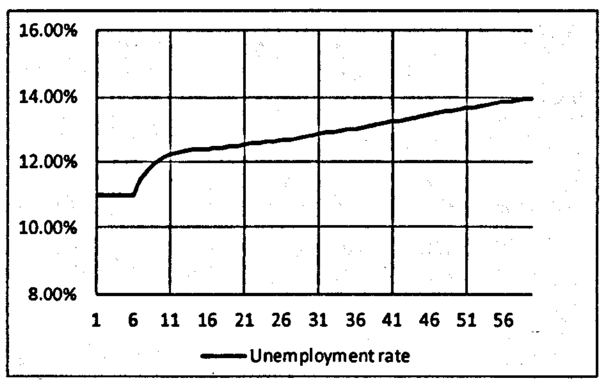
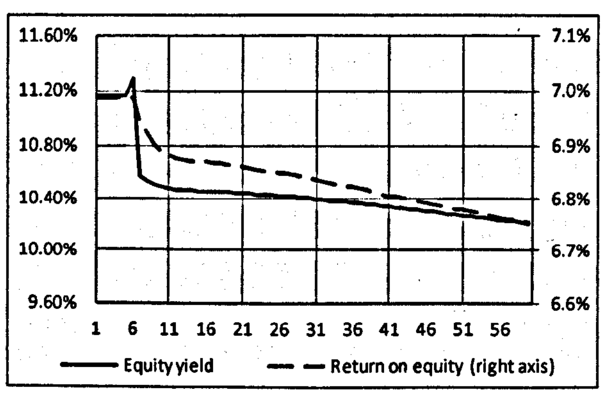


Figure 3.3d. Third simulation: decrease in new share issuance, f_{30}



An increase in the exogenous expected inflation term

Finally, an increase in the exogenous inflation term, Ω_0, is addressed. The results are shown in Figure 3.4a-d. An increase in the exogenous inflation term has a negative effect on consumption, through lower levels of real wealth, and then in income and employment. But the most important results concern the valuation metrics and return on equity: both valuation metrics (PER and q) and the return on equity decline. The lower levels of valuation metrics imply that equity valuation is not neutral to inflation in this model, whereas the lower levels of the return on equity imply that stocks are *not a perfect hedge against inflation*, even in our case where firms can pass higher costs (given that the mark-up is given) into prices.

Summing up, in our SFC post-Keynesian q model two of the insights of Kaldor's original model are confirmed: higher growth rates and higher propensities to consume lead to lower levels of q. However, my richer model with an explicit financial sector and treatment of firms' financing decisions (that regards investment and financing decisions of firms as interdependent) does find that share issuance affects q. Unsurprisingly, here firms' investment decisions affect output, employment and income distribution. Thus, one of the key features of the present model is that firms influence q through investment decisions as well as through their financing policy. Finally, as in Kaldor's, q does not tend to 1 even in the long-run, so accumulation can proceed persistently above or below that level.

Figure 3.4a. Fourth simulation: decrease in exogenous inflation, Ω0

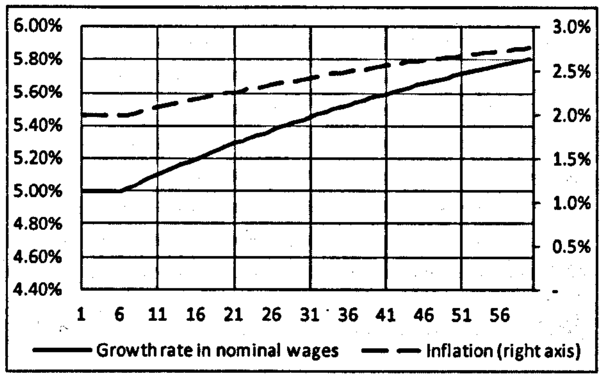


Figure 3.4b. Fourth simulation: decrease in exogenous inflation, Ω0

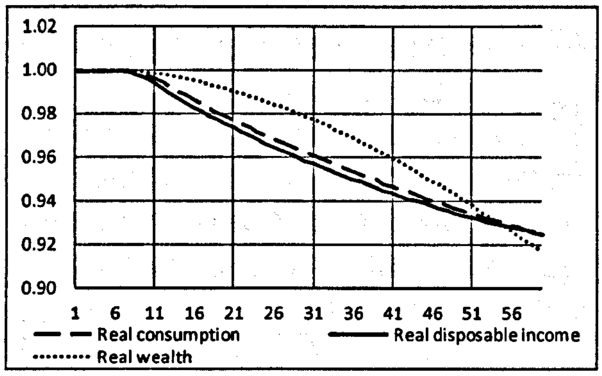


Figure 3.4c. Fourth simulation: decrease in exogenous inflation, Ω0

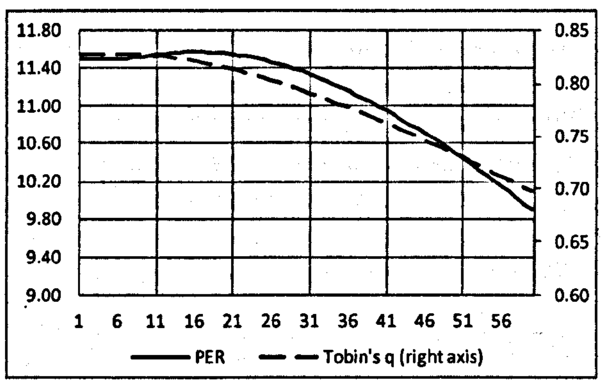
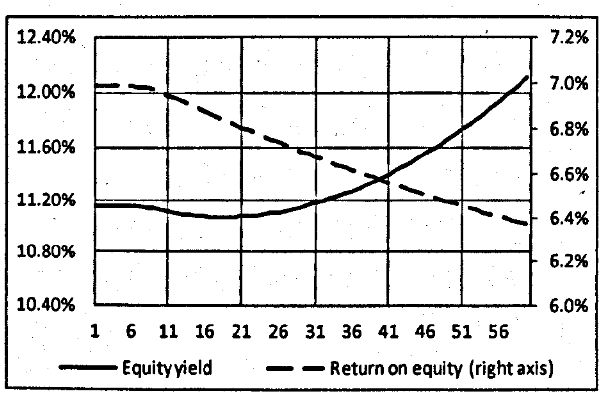


Figure 3.4d. Fourth simulation: decrease in exogenous inflation, Ω0



4. Post-Keynesian q and the M&M dividend irrelevance proposition

The previous post-Keynesian model and its findings for *q* are at variance with those of neoclassical theory. There, households and firms are mixed (so firms' decisions as such do not exist) and a single representative rational agent takes their place. While in the post-Keynesian tradition investment is driven by animal spirits and quantity-variables (e.g. capacity utilization or output), in the neoclassical framework all that is needed is the (unobservable) marginal *q*. The fulfilment of this maximising rule will assure that in equilibrium *q* will be 1 and that any discrepancy from this level will be corrected by individual agents adjusting their capital stocks. On the other hand, the previous section suggests that in a post-Keynesian model the condition of *q* to be equal to 1 in the long-run will be only fulfilled by chance, given that no equilibrium mechanism exists in the model to bring *q* back to unity; firms take their investment, dividend and financing decisions not solely having in mind equity prices (as in the neoclassical model),[69] and the behaviour of the rest of the sectors taken together does not guarantee that *q* should converge to 1. I am going to show that the implications of this non-convergence for the Miller & Modigliani (M&M) dividend irrelevance proposition are profound.

The M&M dividend irrelevance proposition was first put forward by Miller & Modigliani (1961) as a companion to the capital structure irrelevance proposition presented three years before (Modigliani & Miller, 1958). The M&M dividend proposition states that the value of a company is independent of its dividend policy. Intuitively, the reason is as follows: an individual investor, given its portfolio constraints and risk-return objectives, will be indifferent between receiving cash-flows as dividends or as capital gains and, moreover, he will be able to undo corporate decisions by creating 'home-made' dividends. For instance, if the company decides, *ceteris paribus*, to reduce the volume of dividends, the investor could still sell his/her shares at a higher price (because not-distributed dividends increase a firm's book value and thus share price) obtaining then realised capital gains, which offset the

[69] Moreover, there is nothing in our model (or in the post-Keynesian tradition) that suggests that equity prices only incorporate the relevant information for managers so as they can make 'rational' investment decisions. In other words, no efficient market hypothesis is assumed here.

dividend reduction. This arbitrage argument is no different in essence to the one proposed by M&M for corporate financial structure irrelevance: there, personal leverage was supposed to be a perfect substitute for corporate leverage, so if there were an 'undesired' change in the corporate financial structure policy, the investor could still borrow or lend to attain his portfolio risk-return objectives again and 'undo' corporate decisions.[70]

In the mainstream, this framework is usually considered to 'work' as long as no 'market imperfections' are present. These market imperfections are, among others: different tax rates for dividends and capital gains, asymmetric information (managers may want to signal corporate prospects through dividend policy) and other corporate imperfections such as inefficient managers who may squander cash – making it preferable to pay out dividends. Recently, some conclusions coming from the behavioural finance literature cast doubt on such an idealized world and add another field to the debate of the relevance of the M&M propositions; in particular, experiments have shown that individuals pay attention to the source from which they receive income, engaging in mental accounting (Thaler, 1990, 1999): the way an investor in the real world receive his income (i.e. dividends or capital gains) matters for the valuation process. Finally, the M&M proposition, which is basically an argument derived from micro-conditions, is not necessarily applicable at a macro level; such methodological problems have already emerged in many macro neoclassical frameworks with micro-foundations, due to the well-known fallacy of composition problems (Taylor, 2004; King, 2012).

The M&M dividend proposition and *q* can be linked through a valuation equation devised by Kahn (1972),[71] which says that *q* can be expressed as a function of the rate

[70] For a thorough critique of not just the M&M propositions, but of the whole finance and investment neoclassical theory, see Gordon (1992, 1994). For additional recent critiques, see Glickman (1997), Pasinetti (2012) and Wood (2013).

[71] As far as we know, Kahn was the first to apply this formula to the corporate sector as a whole. It is true that in Kaldor (1966) and Marris (1972) a rich discussion of the valuation ratio (Tobin's *q*) was presented, but as Kaldor admitted he did not realise that the valuation ratio could be expressed in this alternative way. For a proof of this formula in a world with leverage, see Appendix of Chapter 4.

of profit (return on equity here), r, the equity yield, y, and the growth rate of the economy, g.[72] The equation is as follows:

$$q = \frac{r-g}{y-g}$$

Only in the case $r = y$, then q will be one. It turns out that the effect of dividend policy on company valuation depends on the values taken by r and y. Table 3.7 shows the valuation of a hypothetical common share under four different scenarios.[73,74]

Table 3.7. Summary of valuations under different scenarios

Book value per share	*100*
Return on equity [r]	*7.0%*
Equity yield [y], scenarios 1 and 2	*7.0%*
Equity yield [y], scenarios 3 and 4	*6.0%*

Scenario	1 *Nil pay-out, r = y*	2 *Full pay-out, r = y*	3 *Half pay-out, r > y*	4 *Full pay-out, r > y*
Book value [1]	*100.0*	*100.0*	*100.0*	*100.0*
Discounted residual earnings [2]	-	-	*40.0*	*16.7*
Total value [1+2=3]	***100.0***	***100.0***	***140.0***	***116.7***
Price to book (Equity q) [3/1]	*1.00*	*1.00*	*1.40*	*1.17*

Table 3.7 shows that dividend policy is irrelevant only when the rate of profit (return on equity) is equal to the equity yield or, in other words, when q is equal to 1: in this case, the pay-out ratio chosen by the firm does not matter, because the value of the enterprise will remain constant. However, this is not the case when the previous equality does not hold and q is different from 1: changes in pay-out ratios will affect the value of the company,[75] because the difference between r and y makes that dividends and capital gains are not any longer in the same footing. In the first two scenarios, the value remains the same because it is financially equivalent to receive

[72] A precision has to be made. For convenience, the q used in this section and computed with this formula is the 'equity q' – i.e. market value of equity to its replacement cost (assets net of debt). The equity q (or 'leveraged q') is related to the traditional q in the following way: $q_e = \frac{q-l}{1-l}$, where l is the leverage ratio (debt to total assets). As one would expect, when q is equal to 1, then equity q will be equal to 1 as well. Therefore, for the M&M discussion and its validity when q is different from 1, it does not matter to use the traditional q or the equity q.

[73] At the macro level, these restrictions seem to be the normal state of affairs, as can be checked in Piketty's (2014) historical evidence on his famous $r > g$. The rate of return in Piketty has to be understood as our yield here.

[74] The example is taken from Penman (2011, ch. 2), but modified and adapted for our purposes. However, Penman does not explicitly discuss the case when $r \neq y$. The technical details of the four scenarios can be found in Appendix IV.

[75] For brevity's sake, only the case when $r > y$ is considered here.

dividends and reinvest them at the market rate than to accumulate unrealised capital gains (through higher equity prices) because of higher retained profits. However, in the other two cases, the rate of return is higher than the equity yield, so the investor is better off if the company decides to reinvest the earnings rather than to distribute them as dividends – i.e. the investor would obtain a lower reinvestment rate in the market in the latter case.

Therefore, from an empirical standpoint, as long as q is not equal to unity the M&M dividend irrelevance proposition will not hold, because dividends and unrealised capital gains cannot be treated as financially alike. An empirical analysis of q is beyond the scope of this paper, but suffice it to say that the historical evidence in the developed countries since 1950 shows that q has been persistently different from 1 – and trending up or down for whole decades. This is crucial empirical evidence for the relevance of corporations' dividend decisions on equity valuations.

5. Conclusions

The present chapter has proposed a post-Keynesian q theory at the macroeconomic level based on Kaldor's (1966) seminal paper and on the contributions of the Cambridge corporate model literature. The Kaldorian model provides two important macroeconomic long-run relationships, between q and the growth rate of the economy and q and propensities to consume. I claim that these relationships alone can provide new valuable insights on long-run relationships between financial (equity) markets and macroeconomics. The medium-scale SFC post-Keynesian model has improved the simplistic monetary and financial framework of the Kaldorian model and of the model presented in Chapter 2 and has shown that in this enriched setup these two long-run relationships still hold. The model has also addressed, following Gordon (1992), the interdependence between firms' financing decisions and dividend policy, and aspect often overlooked but crucial for the understanding of financial markets. On the other hand, the model does find that share issuance (and more generally, firms' financing decisions) affects q, whereas in the Kaldorian model q was independent of firms' financing policy. Furthermore, the Kaldorian insight that, in general, q will be different from 1 in the long run, is confirmed by numerical simulations. Independent sectors with different motivations make possible that accumulation can proceed with q levels different from unity.

The non-convergence of q to 1 impinges on the validity of the Miller-Modigliani dividend irrelevance proposition, which states that dividend policy should not affect the value of an enterprise. The standard valuation exercise proposed here has shown crystal clear the relationship between valuation ratios and dividend policy. As long as q is different from 1, the dividend policy will affect valuation and hence the M&M proposition will not hold, because in this case capital gains and dividends cannot be considered financially equivalent – investors will be better off with a different dividend policy. And I claim that this nexus between valuation ratios and dividend policy for understanding the relevance of the M&M proposition lets us use the empirical evidence in a clear way to test the merits of the proposition. The empirical evidence says that q values have been persistently different from one since we have some kind of evidence (I will discuss this evidence in detail in Chapter 4). Economic theory should consider a q different from 1 as part of the financial markets *stylized facts*. Post-Keynesian macroeconomic theory can explain this, even in the absence of speculation or other persistent behavioural biases.

After a moment of reflection, it is no wonder that the findings of the post-Keynesian framework presented here are so at variance with the neoclassical framework. Since the 19th century, a*ll* the neoclassical theory has advanced the idea that, after all, we do not need the concept of 'firm' for understanding capitalist economies. What all is needed is a rational agent that takes care of maximising profits as an entrepreneur during the day and of maximising utility as a household during the night. Actually, in this light, the Modigliani-Miller attempt of neutralising firms' leverage and dividend policy for equity valuation is just one more step (one could say the final step) in the process of neutralising the firm as a concept. If corporate leverage is a perfect substitute of personal leverage (the key assumption of the whole M&M theory), then it follows that firms' leverage policy is of no importance for shareholders. So, the firm is not only irrelevant regarding the production process, as it was case in neoclassical theory up to the 1950s, but it is also irrelevant regarding finance. On the other hand, in the post-Keynesian framework the concept of firm has always played an important role – as in the Kaleckian theory, where market structure determines functional income distribution. Therefore, the results of the post-Keynesian framework presented here only reflect the fact that enterprises are not only a crucial part for the production process, but also for the way financial markets work today. The role of Tobin's *q* and other financial metrics in any theoretical framework is, therefore, not just a matter of detail, but rather it entails completely different views of the world.

Finally, I would like to finish mentioning two shortcomings of the model that may have become apparent. The first one is the simplification of short-term financial market behaviour – e.g. how households form their expectations. The second one is that the complexity of the model precludes from any rigorous investigation of the analytical solutions of the steady-state. It seems that, in this case, both shortcomings together make difficult to provide a unified solution, for a better treatment of short-term dynamics would complicate the model much more, making it even more intractable and difficult to understand. I will thus try to address the second shortcoming and I will propose a model in the next chapter where analytical solutions can be obtained. At least, we could get some relief from Joan Robinson's advice when she stated that 'a model which took account of all the variegation of reality would be of no more use than a map at the scale of one to one.'

Appendix I. Values used in the simulations

List of parameter values

$gr_k = 0.0294$	$\theta_h = 0.236$	$\alpha_2 = 0.02$
$f_{20} = 0.125$	$\varphi = 0.32$	$\sigma = 0.4$
$f_{21} = -13.1$	$\Omega_0 = 0.003$	$\lambda_{10} = 0.5$
$f_{22} = 15.1$	$\Omega_1 = 0.0110$	$\lambda_{11} = 4$
$f_{23} = -2$	$\Omega_2 = 0.0150$	$\lambda_{12} = -4$
$f_{30} = 0.1$	$\Omega_3 = 0.046$	$gr_0 = 0.035$
$f_{31} = 3.5$	$N_{fe} = 1.1$	$gr_1 = 0.01$
$f_{32} = -5$	$gr_{pro} = 0.031$	$gr_2 = 0.012$
$f_{33} = 1.5$	$gr_{pr1} = 0.005$	$r_l = 0.035$
$\theta_f = 0.27$	$\alpha_1 = 0.85$	$r_b = 0.03$

Appendix II. Equilibrium solutions for the share price and number of shares

The share price reconciles the supply and demand of shares here – in fact, it is the only price equilibrium mechanism in the model. If we start from the equations of new shares issues and households' portfolio allocation:

$$\frac{p_e.\Delta e_f}{I} = f_{30} + f_{31}.r_{l-1} + f_{32}.\frac{1}{per_{ttm-1}} + f_{33}.\left(\frac{L}{K}\right)_{-1} \tag{12}$$

$$\frac{p_e.e_h}{V_h - D_h} = \lambda_{10} + \lambda_{11}.\gamma_{-1} + \lambda_{12}.r_{b-1} \tag{33}$$

And letting be:

$$\mu = \lambda_{10} + \lambda_{11}.\gamma_{-1} + \lambda_{12}.r_{b-1}$$

$$\beta = \left[f_{30} + f_{31}.r_{l-1} + f_{32}.\frac{1}{per_{ttm-1}} + f_{33}.\left(\frac{L}{K}\right)_{-1}\right].I$$

The equity price and the number of shares can be expressed as:

$$e = e_{-1} + \frac{\beta}{p_e}$$

$$p_e = \frac{\mu.(V_h - D_h)}{e} = \frac{\mu.(1-\sigma).V_h}{e}$$

And rearranging in the price equation (because some part of households' wealth is due to change in equity prices):

$$p_e = \frac{\mu.(1-\sigma).[V_{h-1} + S + e_{-1}.(p_e - p_{-1})]}{e}$$

$$p_e.e - \mu.(1-\sigma).[e_{-1}.(p_e - p_{e-1})]$$
$$= \mu.(1-\sigma).(V_{h-1} + S)$$

$$p_e.[e - e_{-1}.\mu.(1-\sigma)] + [\mu.(1-\sigma)].(e_{-1}.p_{e-1})$$
$$= \mu.(1-\sigma).(V_{h-1} + S)$$

$$p_e = \frac{\mu.(1-\sigma).[(V_{h-1} + S) - (e_{-1}.p_{e-1})]}{e - [e_{-1}.\mu.(1-\sigma)]}$$

And letting be:

$$\eta = \mu.(1-\sigma).[(V_{h-1} + S) - (e_{-1}.p_{e-1})]$$

The number of shares will be equal to:

$$e = e_{-1} + \frac{\beta}{p_e} = e_{-1} + \frac{\beta.\{e - [e_{-1}.\mu.(1-\sigma)]\}}{\eta}$$

$$(e - e_{-1}).\eta - \beta.e = -\beta.[e_{-1}.\mu.(1-\sigma)]$$

$$e = \frac{e_{-1}.[\eta - \beta.\mu.(1-\sigma)]}{(\eta - \beta)}$$

And finally the price:

$$p_e = \frac{\beta}{(e - e_{-1})}$$

Appendix III. Matrices of the model

Table 3.4. Balance-sheet matrix of the model

Balance-sheet	Households	Firms	Banks	Government	Central Bank	Σ
Real capital		$+K$				$+K$
Equities	$+p_e.e_h$					$+p_e.e_h$
Reserves (HPM)			$+H_b$		$-H_{cb}$	0
Bills	$+B_h$			$-B$	$+B_{cb}$	0
Deposits	$+D_h$		$-D_d$			0
Loans		$-L_d$	$+L_s$			0
Net worth	$-V_h$	$-V_f$	–	$+V_g$	–	$-(V_h + V_f - V_g)$
Σ	0	0	0	0	0	0

Table 3.5. Revaluation matrix of the model

Revaluation matrix	Households	Firms	Banks	Government	Central Bank	Σ
Real capital		$+\Delta p.k_{-1}$				$+\Delta p.k_{-1}$
Equities	$+\Delta p_e.e_{h-1}$					$+\Delta p_e.e_{h-1}$
Σ	$+\Delta p_e.e_{h-1}$	$+\Delta p.k_{-1}$	0	0	0	$+(\Delta p_e.e_{h-1} + \Delta p.k_{-1})$

Table 3.6. Transaction-flow matrix of the model

Transactions-flow matrix	Households	Firms		Banks		Government	Central Bank		Σ
		Current	Capital	Current	Capital		Current	Capital	
Consumption	$-C_d$	$+C_s$							0
Investment		$+I_s$	$-I_d$						0
Government expenditures		$+G_s$				$-G_d$			0
GDP [memo]		$[Y]$							0
Wages	$+WB_s$	$-WB_d$							0
Firms' profits after tax	$+\Pi_d^f$	$-\Pi^f$	$+\Pi_r^f$						0
Taxes	$-T_s^h$	$-T_s^f$				$+T_d$			0
Interest on loans		$-r_{l-1}.L_{d-1}$		$+r_{l-1}.L_{s-1}$					0
Banks' profits	$+\Pi_d^b$			$-\Pi^b$					0
Interest on bills	$+r_{b-1}.B_{h-1}$					$-r_{b-1}.B_{-1}$	$+r_{b-1}.B_{cb-1}$		0
Central Bank profits						$+r_{b-1}.B_{cb-1}$	$-r_{b-1}.B_{cb-1}$		0
Change in reserves					$-\Delta H_b$			$+\Delta H_{cb}$	0
Change in equities	$-p_e.\Delta e_h$		$+p_e.\Delta e_f$						0
Change in bills	$-\Delta B_h$					$+\Delta B$		$-\Delta B_{cb}$	0
Change in deposits	$-\Delta D_h$				$+\Delta D_d$				0
Change in loans			$+\Delta L_d$		$-\Delta L_s$				0
Σ	0	0	0	0	0	0	0	0	0

Appendix IV. Equity valuation scenarios for the M&M theorem

The main assumptions for the equity valuation exercise are as follows.

In order to value the stock, a method of residual earnings is used, given that in one scenario the pay-out is zero, so a Gordon-dividend model (M. J. Gordon & Shapiro, 1956) would not perform the task, given that there are no dividends to discount. In the residual earnings method, the value of a stock is the sum of current book value plus future discounted residual earnings, which are defined as the difference between the return on equity, r, and the equity yield, γ, times previous period book value (Penman, 2011). Because the firm in question is an ongoing concern, a terminal value has to be added in order to take into account the part of value accruing in the distant future; for such terminal value, a formula for continuous compounding growth is applied. In any case, it is important to note that the residual earnings valuation model is financially equivalent to the sum of the discounted book value, plus the discount value of dividends in the projected horizon plus the value of discounted residual earnings beyond the projected horizon. The tables below show that both methods yield the same results.

For simplicity, it is assumed that future earnings are known with certainty. It is not implied whatsoever that in the real world equity analysts face such an easy task, but rather it is a useful device for assessing a stock's *intrinsic value* – the common assumption in the M&M literature. Book value is equity at historic cost in the balance sheet. The difference between earnings and dividends in every period cumulates into the book value figure. The return on equity, the level of current earnings divided by the book value of the previous period, is 7%, and is equal to the equity yield in the first two scenarios – in the other two scenarios the equity yield is lower than the return on equity.

Table 3.8 reports the first two valuation scenarios. The first scenario assumes a valuation with a nil pay-out ratio. Starting with a book value of 100, this book value will be increased through retained earnings. Although the book value increases every year, residual earnings are every year zero (because of the assumption $r = \gamma$), so that the value of this stock is simply the book value. On the other hand, the second scenario is assumed that dividends are paid in full. In such a case, the book value remains flat *sine die* because dividends flow out of the company. It can be seen that dividend policy in both scenarios does not matter, because the value of the company remains unchanged.

Table 3.9 shows a similar story but now for $r \neq \gamma$. It can be seen that in this case dividend policy matters, because the value of the company is affected by the change in dividend policy – from a value of 116.7 with a full pay-out ratio to a value of 140 with 50% as a pay-out ratio).

Table 3.8. Value of the stock under the assumption r = y

Pay-out ratio	0%				
Equity yield [y]	7%				
Return on equity [r]	7%				
	1	2	3	4	5
Earnings		7.0	7.5	8.0	8.6
Residual earnings (RE)		-	-	-	-
% in residual earnings		-	-	-	-
Dividends		-	-	-	-
Book value	100.0	107.0	114.5	122.5	131.1
Value	**100.0**				
Book value	100.0				
Discounted RE 2015		-			
Discounted RE 2016			-		
Discounted RE 2017				-	
Discounted RE 2018					-
Terminal value					-
Book value discounted	100.0				
Dividends discounted		-	-	-	-
Value	**100.0**				

Pay-out ratio	100%				
Required return [y]	7%				
Return on equity [r]	7%				
	1	2	3	4	5
Earnings		7.0	7.0	7.0	7.0
Residual earnings (RE)		-	-	-	-
% in residual earnings		-	-	-	-
Dividends		7.0	7.0	7.0	7.0
Book value	100.0	100.0	100.0	100.0	100.0
Value	**100.0**				
Book value	100.0				
Discounted RE 2015		-			
Discounted RE 2016			-		
Discounted RE 2017				-	
Discounted RE 2018					-
Terminal value					-
Book value discounted	76.3				
Dividends discounted		6.5	6.1	5.7	5.3
Value	**100.0**				

Table 3.9. Value of the stock under the assumption $r \neq y$

Pay-out ratio	50%
Equity yield [y]	6%
Return on equity [r]	7%

	1	2	3	4	5
Earnings		7.0	7.2	7.5	7.8
Residual earnings (RE)		1.0	1.0	1.1	1.1
% in residual earnings		-	*3.5%*	*3.5%*	*3.5%*
Dividends		3.5	3.6	3.7	3.9
Book value	100.0	103.5	107.1	110.9	114.8
Value	**140.0**				
Book value	100.0				
Discounted RE 2015		0.9			
Discounted RE 2016			0.9		
Discounted RE 2017				0.9	
Discounted RE 2018					0.9
Terminal value					36.4
Book value discounted	90.9				
Dividends discounted		3.3	3.2	3.1	3.1
Residual earnings discounted					36.4
Value	**140.0**				

Pay-out ratio	100%
Required return [y]	6%
Return on equity [r]	7%

	1	2	3	4	5
Earnings		7.0	7.0	7.0	7.0
Residual earnings (RE)		1.0	1.0	1.0	1.0
% in residual earnings		-	-	-	-
Dividends		7.0	7.0	7.0	7.0
Book value	100.0	100.0	100.0	100.0	100.0
Value	**116.7**				
Book value	100.0				
Discounted RE 2015		0.9			
Discounted RE 2016			0.9		
Discounted RE 2017				0.8	
Discounted RE 2018					0.8
Terminal value					13.2
Book value discounted	79.2				
Dividends discounted		6.6	6.2	5.9	5.5
Residual earnings discounted					13.2
Value	**116.7**				

Appendix V. Robustness checks

Symbol	Description	90%	110%
gr_k	Growth rate of real capital stock	Similar	Faster
α_1	Marginal propensity to consume out of disposable income	Faster	Slower
φ	Mark-up	Similar	Similar
gr_{pr1}	Elasticity of productivity to capacity utilisation	Similar	Faster
Ω_0	Labour market parameter	Similar	Similar
Ω_1	Labour market parameter	Slower	Faster
Ω_2	Labour market parameter	Slower	Faster

Chapter 4. A Post-Keynesian Theory for the Yield on Equity Markets

1. Introduction

This final chapter puts forward a novel post-Keynesian theory for the determination of returns on equity markets in the long-run. In doing so, the basis of the theoretical framework is informed by two conclusions reached in previous chapters: first, equity returns can largely be explained by wealth holders' consumption decisions, and second, the negative relationship between growth rates and valuation metrics (here, Tobin's q and price-earnings ratio) is an important step to understand the workings of equity markets in advanced capitalist economies.

At first sight, the topic can seem hardly novel. Empirical studies (benefitted from better and longer data) dealing with equity returns in a long-run perspective have been gaining popularity especially since the 1970s (Siegel, 1992, 2008), and long-run growth models dealing with rates of profit have been around for more than 70 years (Von Neumann, 1945; Kaldor, 1955; Solow, 1956). Furthermore, new research on psychology applied to economics (Thaler, 2005) has been brought to the table in order to understand financial markets and market behaviour in the short-run. Despite of this toolkit, I argue that the theory is falling in some respects behind the empirical studies. First, by their very nature, behavioural economics can offer few insights on the stock market behaviour in the long-run and its relationship with macroeconomics.[76] Second, in the traditional growth models, the rate of profit earned by a corporation is assumed to be equal to the equity yield earned by an investor in equity markets –actually, both concepts are usually used interchangeably. This means that is implicitly assumed that Tobin's q is always equal to one, whose corollary is valuation in financial markets does not matter. It will be seen that empirically rates of return and equity yields can diverge from each other significantly for very long periods of time. Finally, the 'new' theoretical growth models with microfoundations (R. E. Lucas, 1978; Mehra & Prescott, 1985) that try to address specifically equity returns are known by their poor descriptive power and off-the-

[76] The lack of contributions of behavioural economics to macroeconomics so far is a well-known fact in the literature. See Thaler (2015, pp. 349–352) for a discussion.

mark real-world predictions; '[u]nfortunately, when confronted with financial market data on stock returns, tests of these models have led, without exception, to their rejection.' (Mehra, 2006, p. 12)

The intellectual lineage of the post-Keynesian theory presented here dates back to Kaldor (1966) and other contributions to the Cambridge corporate model (Marris, 1972; Moore, 1973; Moss, 1978), which (to my knowledge) were the first ones to include explicitly financial markets in long-run growth models. As it was explained in the previous chapter, in these contributions the valuation ratio (Tobin's *q*) is the variable that adjusts as to ensure full employment and full capacity utilisation. The full-employment-of-resources assumption should not be taken as something that normally happens in the real world, but rather as a set of logical relations that would occur if a constant use of the available resources has to be preserved; 'I should look, therefore, at the previous analysis simply and more generally as a logical framework to answer interesting questions about what *ought* to happen if full employment is to be kept over time, more than as a behavioural theory expressing what actually happens' (Pasinetti, 1962, p. 279, *emphasis in the original*).

As in the previous chapters, the theory will be presented through a Stock-Flow Consistent model, which will track the financial linkages between sectors and will distinguish between market prices and book values – a crucial distinction for a theory of the equity yield. The main 'post-Keynesian' features of the model are: investment given by animal spirits (through a Harrodian investment function), a demand-led economy, full-capacity utilisation in the long-run and endogenous money.[77] The aim of the model is twofold. First, to derive analytical solutions and provide some additional intuition to the insight of Chapter 3, namely, that *q* (and, in general, valuation metrics) is inversely related with growth rates in the long-run. And second, show that standard post-Keynesian macroeconomic models, once equity markets are explicitly introduced and taken into account seriously, have some very distinctive predictions for long-run returns on equity markets. As in the previous chapters, the

[77] The assumption of full-capacity utilisation is not shared by all post-Keynesians. Especially, Kaleckians will find this assumption difficult to swallow. For a summary of the issues regarding this debate, see Lavoie (2014, Chap. 6).

focus will be on steady-state positions, and very little will be said about short-term behaviour. Again, I think these issues are important, but I think as well that a lot can be learnt from the study of long-run positions and that post-Keynesian theory offers an important set of still unexplored insights in this regard.

The main propositions of the post-Keynesian theory for the yield can be summarised as follows. The original negative Kaldorian relations, between q and growth rates and q and propensities to consume, reported in Chapter 3, are confirmed again – as well as the fact that q can be different from unity in the long-run. Second, the relation between higher propensities to consume (out of wealth) and higher equity yields (relation presented in Chapter 2 in a world without growth and just one asset) is confirmed too, being thus wealth holders' consumption decisions a powerful driver of equity returns in the long-run. Third, the post-Keynesian theory can be readily testable (because all of its variables are observable) and can accommodate several empirical facts, as the (lack of) relation between growth in GDP per capita and equity yield, known in the literature as the 'growth puzzle' (Ritter, 2012; Dimson, *et al.*, 2014). And fourth, post-Keynesian theory offers a distinctive approach for the determination of the yield of equity markets in the long-run, being such a yield the consequence of the evolution of effective demand, and not the result of agents' risk preferences, as the neoclassical framework suggests.

This last conclusion, that the equity yield of the overall market is not the result for 'bearing risk', is one of the novel and prominent features of the post-Keynesian theory proposed here, and it is in stark contrast to neoclassical finance. In mainstream finance (Mehra & Prescott, 1985; Mehra, 2003, 2006, 2008), the beta of consumption is what determines the riskiness of equity relative to the risk-free asset.[78] Because rational agents want to smooth future consumption, for a given level of risk aversion higher levels of risk are associated with higher returns; investors have to be rewarded if they have to hold the riskier asset. In the post-Keynesian theory proposed here, the equity yield is rather the result of effective demand and of the

[78] At the micro level, portfolio theory says that the return on an asset is a function only of its beta – i.e. its volatility, measured through its variance, respect to a relevant benchmark. So both at the micro and the macro level the return of an asset in the neoclassical framework is given by some volatility measure.

interaction of several macroeconomic variables which do not bear any relationship with the mainstream concept of volatility. In other words, *in the post-Keynesian model the traditional concept of risk is thrown away, and the equity yield can be computed without any mention to it – and without any mention to a risk-free asset.* Furthermore, it will be shown that, in any case, risk can be defined at the macroeconomic level in many ways and not only in the neoclassical sense of volatility, and that if the definition of risk put forward by Myron Gordon (1987, 1994; Gordon & Rosenthal, 2003; Binswanger, 2009), as the probability of firms of going bankrupt, is chosen, then the traditional positive risk-return relationship breaks down and *higher returns are associated with lower levels of risk* – because lower growth will imply lower equity yields and at the same time a higher probability of going bankrupt. The introduction of different risk measures at the macroeconomic level (as, for instance, the Gordonian one) has thus harmful consequences for mainstream finance.[79] Therefore, in general, I conclude that very little can be said *a priori* about risk and return at the macro level.

The structure of the chapter is as follows. Section 2 reviews some evidence on equity returns, Tobin's *q* and growth rates. Section 3 discusses several theoretical approaches that try to explain the return on equities, with especial reference to the mainstream framework (encapsulated in the equity-premium literature) and the Kaldorian model. In Section 4 a post-Keynesian model is introduced, which will highlight the main features of what is called here the post-Keynesian theory for equity markets, and it will be used to address the growth puzzle. Section 5 is a short digression on the absence of a risk measure in the post-Keynesian theory for determining equity returns. Section 6 concludes.

[79] I do not want to advocate here for the Gordonian measure of risk as something that should be included in a post-Keynesian macro model. Rather, *I will use it as a theoretical construct that once introduced in a macroeconomic model yields predictions opposed to mainstream finance*. In other words, I will use it to show that the concept of risk is quite elusive, and that equally reasonable risk definitions can yield completely different results.

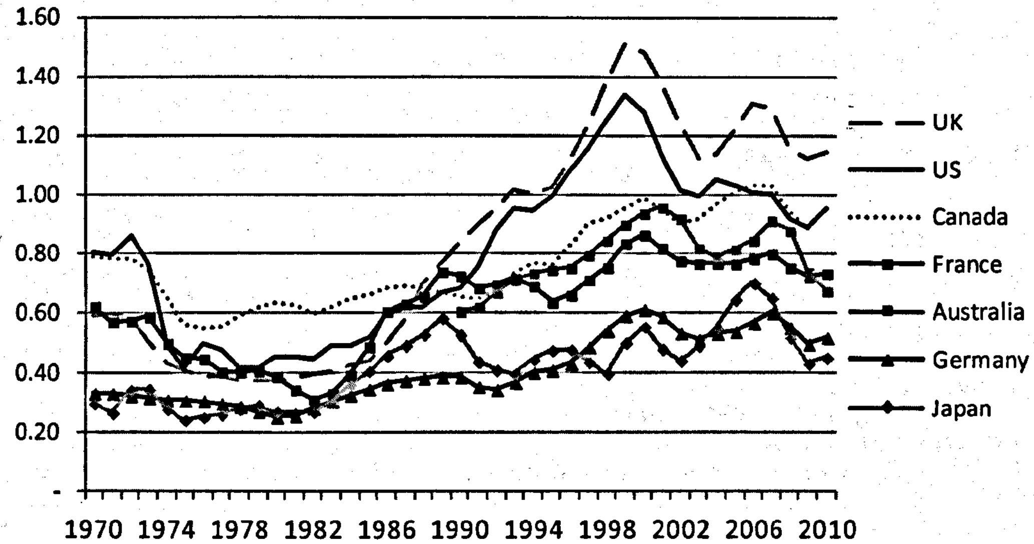
2. Some empirical evidence

The aim of this section is to present the empirical evidence from which the post-Keynesian theory presented here has been informed. The focus is on Tobin's *q* (used here as measure of stock market valuations over time) and on the relationship between real equity returns (equity yield) and GDP per capita growth rates from a long-run perspective.

Tobin`s *q* is defined as the ratio of the market value of total assets of the whole corporate sector to their replacement cost. In general, it is acknowledged that the measure of Tobin's q at the macro level is, operationally speaking, quite difficult. On the one hand, although the market value of quoted companies is quite easy to get, there are many companies that are not listed, a fact that complicates statisticians' work considerably and suggest that maybe 'the value of the shares in closely held firms are under-stated in some countries and time periods' (Piketty & Zucman, 2013, p. 30). On the other hand, the replacement cost of the corporate sector is not directly observable but rather retrieved through the perpetual inventory method, which reconstructs firms' assets cumulating past investment flows. Although theoretically sound, the implementation of the method has a number of drawbacks: it has to include assumptions of the depreciation and obsolescence of capital goods of very different nature and it is 'notoriously difficult to track the price evolution of a number of capital goods. When statisticians fail to properly account for quality improvement, inflation is over-stated and capital stocks at current prices are also over-stated' (Piketty & Zucman, 2013, p. 29).

With all these remarks in mind, figure 4.1 shows the evolution of Tobin's *q* in a group of developed economies since the 1970s:

Figure 4.1.Tobin's *q* in some developed economies, 1970-2013



Source: Thomas Piketty, Capital in the 21st Century, p. 189

Standard economic theory clearly predicts that Tobin's *q* should be equal to 1 (Hayashi, 1982; Carlin & Soskice, 2006; Romer, 2012), for that values different from one would encourage/discourage investment (because managers always maximize shareholders' wealth), bringing back thus *q* values to one. However, the empirical evidence since the 1970s seems to be quite consistent across countries: until the 1990s in all countries *q*'s were substantially lower than 1, being even as low as 0.3 in Germany and Japan in the 1970s.[80] Since then, and coinciding with a new period of *financialisation* (Stockhammer, 2004; Orhangazi, 2008; Van Treeck, 2008), there has been an upward trend in all countries, with a more pronounced rise in Anglo-Saxon countries. In the previous chapter, this phenomenon of higher valuations was explained using what I called the post-Keynesian theory for *q*, claiming that higher valuations were mainly the direct result of lower economic growth.[81,82] The rationale

[80] See Piketty and Zucman (2013) for a summary of the different reasons put forward on why Tobin's *q* has been less than one in national accounts.

[81] For a summary of several stock market valuation metrics for the US market, see López Bernardo (2015). It is clear that the effects of higher valuation metrics are not only confined to Tobin's *q*, but it applies to other financial measures as well.

[82] This can be the main reason for the upward trend, but by no means the only one. Accounting reasons and sociological reasons can have played a role too. As an accounting reason, one could cite the growth in significance of intellectual property in company value, whose only relevant evaluation is a market-based, as opposed to an historic one. This development should make Tobin's *q* going up, because the market value of a company discounts all the future cash-flows coming from these intangibles but the book value takes little notice of them, so in a society with high volumes of intangibles *q* should be

for that result is that the way the investment-savings equilibrium condition operates is not exclusively through quantities, as in standard Keynesian models, but through the valuation of assets as well. The previous graph also suggests that, *assuming* a constant dividend yield and earnings growth rate, shareholders have fared very well in terms of just valuation gains – e.g. a shareholder in US in the 1970s buying assets at a *q* of 0.8 could have sold the same assets at a *q* of 1 thirty years later. The negative link between growth rates and valuation ratios will be incorporated in the post-Keynesian model developed below as one of its main features, and it will help to understand an important channel of the impact of growth rates on equity yields.

So far the discussion has focused on the relationship between *valuation and growth*. To understand the link between *growth and returns*, it can be useful to use the Grinold-Kroner (2004) equity yield decomposition, which is an identity.[83] The decomposition breaks down the equity yield as follows:[84]

$$\gamma = \gamma_d + g_\pi - g_e + \left(\frac{per}{per_{-1}} - 1\right)$$

Where γ_d is the dividend yield (dividends received divided by the market value of equities lagged one period), g_π is the growth of profits, g_e is the growth of the number of shares and $\left(\frac{per}{per_{-1}} - 1\right)$ is the change in the valuation multiple, using the price-earnings ratio as the relevant multiple. The previous decomposition will be used in Section 4 to understand the impact of a change in the growth rates on the equity yield.

The relationship between real equity returns and real GDP per capita growth can be seen in Figure 4.2. The negative relationship between these two variables, which is quite opposite to what someone could expect, has been labelled in the literature as the 'growth puzzle' (Siegel, 2008; Ritter, 2012; Dimson *et al.* 2014), because higher

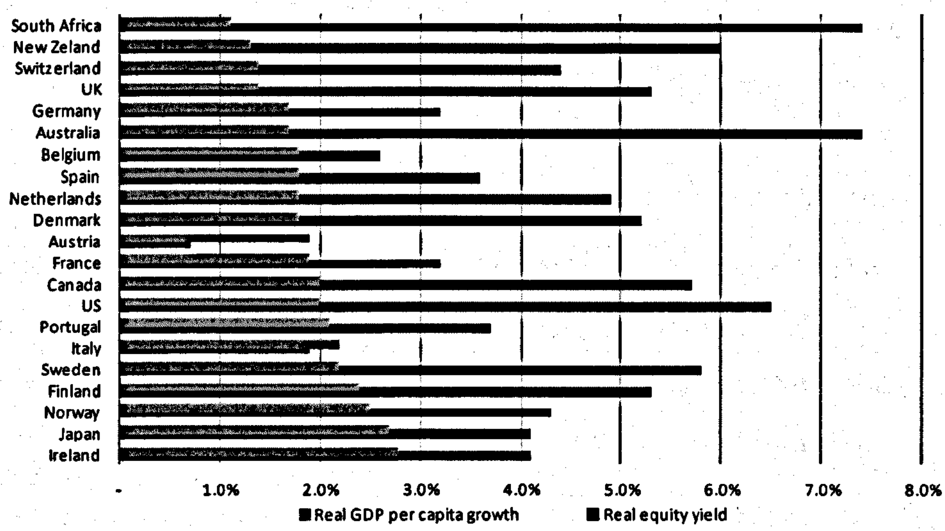
higher. A sociological reason could stress the lagged effect of 1970s inflation on accounting practices, a time when the concept of 'replacement cost' began to be taken seriously by accountants.

[83] Because it is an identity it both applies to the valuation of individual assets and whole indices. In Grinold and Kroner (2004) is used to analyse the historical decomposition of the S&P 500.

[84] Grinold and Kroner assume a positive rate of inflation in order to calculate the nominal return; because the model presented below is in real terms, the inflation component has been assumed away for the present formulation.

growth rates do not seem to automatically translate into higher shareholders' returns:

Figure 4.2. Equity yield and per capita GDP growth in selected developed economies, 1900-2013



Source: Credit Suisse, Global Investment Returns Yearbook 2014, p. 17. The correlation between the series is-0.29.

Several explanations have been advanced to solve the puzzle. The first one is that once investors realised the potential growth of an economy, they bid up the price of the stocks, so growth expectations are already included in prices, pushing thus down future equity returns (Ritter, 2012, p. 11).[85] Another explanation, advanced by Bernstein and Arnott (2003), is that this analysis does not take into account small, non-listed firms. In countries with a large share of non-listed companies, these small companies (and also government enterprises[86]) may have been the main source of economic growth, but this economic growth will not be related with the capitalization of big firms. Finally, some people argue that because the historical experience of countries is so different, especially in those countries that suffered the two World Wars, caution should be applied when drawing conclusions from these series. However, as Dimson *et al.* (2014, p. 17) admit, the 'lack of a positive correlation was not attributable to two catastrophic world wars. In the post-1950 period, the

[85] But as Ritter (2012, p.11) shows with a simple numerical example, even if stock prices were as twice higher in one country as another, the difference of returns would have been just 0.6% a year.
[86] For a survey of the importance of government in economic growth and the development of new technologies, see Mazzucato (2013).

correlation between growth in per capita GDP and stock-market performance, whether judged by real dividend growth or by real returns, remained indistinguishable from zero.'

The growth-puzzle results are also robust to the inclusion of developing economies in the analysis. Table 4.1 shows the same data as Figure 4.2 but now for developing economies:

Table 4.1. Equity yield and per capita GDP growth in selected developing economies

Country	Years	Real per capita GDP growth	Equity yield
Argentina	1988-2011	2,4%	10,4%
Brazil	1993-2011	2,0%	13,3%
Chile	1988-2011	4,0%	14,1%
China	1993-2011	9,4%	-5,5%
India	1993-2011	5,1%	4,1%
Jordan	1988-2011	0,9%	1,2%
Malaysia	1988-2011	3,9%	6,8%
Mexico	1988-2011	1,2%	15,0%
Philippines	1988-2011	1,8%	3,1%
Portugal	1988-2011	1,9%	-0,9%
Russia	1995-2011	3,6%	-6,8%
South Korea	1988-2011	4,7%	4,2%
Taiwan	1988-2011	4,3%	4,9%
Thailand	1988-2011	4,1%	5,4%
Turkey	1988-2011	2,4%	5,0%

Source: Ritter (2012). The correlation of the sample between real returns and economic growth is -0.41.

Although the time spam is notably shorter for developing economies (in China, for instance, the two main indices, Shenzhen and Shanghai, began to operate for the first time as late as 1993) and the institutional structure is most likely to vary widely across the sample, the table shows at least that the conventional wisdom of 'higher growth rates lead to higher returns' cannot be taken automatically for granted, even in the case of developing economies.

3. Some views on the equity yield

The early analytical growth models developed in the first half of the 20th century were probably the first theoretical structures where some formal insights for shareholders' returns might be obtained (Von Neumann, 1945; Kaldor, 1955; Solow, 1956). One important (and implicit) feature of these models is that the valuation of real capital at market prices is always equal to its value at replacement cost, which means that Tobin's *q* is always equal to one. This simplifying assumption allows in these models to proceed very quickly treating indifferently the firms' rate of profit (firms' net profits divided by shareholders' equity or capital at replacement cost, depending whether leverage is assumed or not) and the equity yield, and actually what is mentioned in these models is the rate of profit.[87] For instance, in old neoclassical models without microfoundations, as Solow's, the rate of profit is given by the marginal product of capital, which in turn, given the assumption of *q* equal to one, means that shareholders' return is equal to the marginal product of capital. Therefore, in these frameworks all the conclusions for the rate of profit can be easily transposed to equity markets.

The new neoclassical models that provide a framework for thinking about the equity yield are the consumption utility models, which date back to the 1970s (Lucas, 1978; Breeden, 1979). For our purposes, these models present two novel features in comparison to the old ones: first, the determination of the equity yield is framed in the broader question of the 'equity risk premium' (Mehra & Prescott, 1985), so a risk-free asset is needed to say something about the equity yield, and second, the model features rigorous microfoundations through a representative agent that maximises discounted utility derived from consumption over time. The model is permeated by the idea from portfolio theory that excess returns (over the risk-free asset) are a premium for bearing risk;[88] in the consumption utility literature, this risk is defined as the covariance of the asset return with consumption; as Mehra (2003, p. 55) succinctly puts it: 'assets that pay off when times are good and consumption levels are high (i.e., when the incremental value of additional consumption is low) are less desirable than those that pay off an equivalent amount when times are bad and

[87] It can be easily shown that, through Kahn's valuation formula (1972), when *q* is assumed to be equal to 1, the rate of profit is equal to the equity yield. In other words, the assumption of a *q* equal to one means the equalization of the rate of profit and the equity yield. See Appendix I for Kahn's expression in a world with leverage.

[88] In the financial literature, this idea is encapsulated in the capital asset-pricing model (CAPM). In the CAPM, the return of a risky asset is given by the return of the risk-free asset plus the risk premium times the beta of the asset. Higher betas (i.e. higher volatility of the asset in comparison to the benchmark) will lead to higher returns. See discussion in Section 5 for further explanation.

additional consumption is both desirable and more highly valued. Thus, assets that pay off when times are good must offer a premium to induce investors to hold them.'

The empirical predictive power of the consumption utility model was called into question by Mehra and Prescott's (1985) seminal paper, where the inability of the model to accommodate the empirical fact of historical high equity premiums over the risk-free rate (around 6%) was dubbed by them as a 'puzzle.' To understand why, they assumed the following utility function:

$$E_t \sum_{s=0}^{\infty} \beta^s \frac{(c_{t+s})^{1-\alpha}}{(1-\alpha)}$$

Where β is the time preference for the representative agent and the coefficient α in this specification has two implications: '[w]hen alpha is large, individuals want consumption in different *states* to be highly similar: they dislike risk. But individuals also want consumption in different *dates* to be similar: they dislike growth in their consumption profiles'(Kocherlakota, 1996). In their model, the solution for the equity premium is simply the α times the variance of the growth rate of consumption (Mehra, 2003, p. 58). And because consumption historically has not fluctuated enough, the risk aversion coefficient has to be very high in order to accommodate the empirical facts – well above 30.[89] To get an idea of the order of magnitude needed in the relative risk aversion coefficient to fit the theory with the facts, Mankiw & Zeldes (1991) provide a clear example. They offer a gamble to an individual with a 50 percent chance of consumption of $100,000 and a 50 percent chance of consumption of $50,000. If such an individual displayed a coefficient of 30, then he would be indifferent between this lottery and a certain amount of $51,209, which is certainly at variance with common observation.[90]

Given the low equity yield (or narrow risk-premium) predicted by the model, several routes have been taken (in the form of 'refinements' of the utility function) in the

[89] In Mehra and Prescott (1985, p.154) was reported that values between 1 and 2 should be the norm, but they established a limit of 10 in order to show the inconsistency of the results. Fischer Black reported that the puzzle could be solved with values for alpha of 55 and for beta of 0.55 (Mehra, 2003, p. 59).

[90] However, many economists simply believe that such high values for the risk aversion coefficient are plausible, because people are more risk-averse than it is usually thought. See references in Kocherlakota (1996, p. 52).

consumption-model literature in order to improve the bad predictive power of the model to the empirical facts.[91] Most of them have addressed the issue from a change in the agent's preference structure, as in the case of models with habit persistence (Constantinides, 1990; Campbell & Cochrane, 1999). In these models, risk aversion changes with the cycle, because people become less risk averse as consumption and wealth increase – and vice versa. Another route proposed to solve the puzzle has been to introduce heterogeneous agents and incomplete markets; in these cases, the premium is explained either by transaction costs differential between trading stocks and bonds (Heaton & Lucas, 1996) or by the 'Junior can't borrow effect' (Constantinides *et al.*, 2002), where younger generations do not have access to borrowing in order to increase their exposure to equity. Finally, solutions that deal with the possibility of large depressions (but that ex-post do not materialize) have been also put forward as a solution to the puzzle (Rietz, 1988; Barro, 2005), given that people will demand a higher equity premium a priori in case these events materialise in the future.

The behavioural literature has also offered an explanation for the determination of the equity yield. As in the neoclassical case, the behavioural explanation has been framed in the debate of the equity premium puzzle, so the solution is aimed to explain the gap of equity returns against bonds, rather than the level of equity returns in itself. However, the way the utility function is defined departs radically from the neoclassical formulation. In Benartzi & Thaler (1995), the first paper along behavioural lines, the utility function is based on a combination of prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992), mental accounting (Thaler, 1990) and narrow framing. This combination was dubbed by the authors as 'myopic loss aversion'. The behavioural utility function derives utility from changes in wealth (people are loss averse in prospect theory, and the magnitude of this aversion is that losses are roughly valued twice in comparison to gains), rather than consumption directly. Because people are loss averse, then it means that the evaluation period of their portfolios matters; short-term historical series for stocks are usually more

[91] For thorough surveys of the different ways to fix the original model, see Kocherlakota (1996), Mehra (2006), Salomons (2008) and Mehra (2008).

volatile than the longer ones, and if people are presented with this information (narrow framing) then they will tend to consider stocks riskier than they really are. They found in their simulations that the evaluation period used by investors in order to replicate the historical equity premium experience was one year, which they considered reasonable, given that '[i]ndividual investors file taxes annually, receive their most comprehensive reports from their brokers, mutual funds, and retirements accounts once a year, and institutional investors also take the annual reports most seriously.' (1995, p. 83) In summary, one can conclude that behavioural theory would explain the historical movements in the equity yield by changes in the frequency of portfolio revaluation.[92] Barberis *et al.* (2001) build upon this framework but includes countercyclical risk aversion through the 'house money effect' (people will take more risks with money gained quickly), and hence the volatility of equity prices will be amplified. They conclude that 'we find that loss aversion cannot *by itself* explain the equity premium; incorporating the effect of prior outcomes is a critical ingredient as well' (2001, p.4, *emphasis in the original*).

Post-Keynesians have never directly addressed the problem of the determination of returns in equity markets. Although some considerations about equity markets were put forward by Minsky (2008a, 2008b) in his analysis of business cycles, they were aimed to explained the feedback mechanisms by which the economy moved from hedged positions to Ponzi positions, rather than to explain the sources of equity market returns. However, the Kaldorian model (Kaldor, 1966) explained in Chapter 3 did indirectly provide a determination for the equity yield – but, as Kaldor himself admitted later, he was not aware of that. Because the model has been explained in detail in the previous chapter, only the essentials for the equity yield will be reviewed here. In order to retrieve the solution for the equity yield in the Kaldorian model,

[92] The theory has never been used to study the movements of the equity premium over time, but rather its historical mean. If the statement in the main text is correct, then it would imply that nowadays, when the equity premium is lower than the average of the 20th century, people evaluate their portfolios less often (and hence they demand a lower risk premium). It seems to me that to be an explanation very difficult to support, given that one would expect that institutional changes and technology make easier for nowadays investors to check their portfolio regularly – implying thus a higher equity premium, not a lower one.

remember that the solutions for the rate of profit (i.e. Cambridge equation) and Tobin's q were:

$$r_k^* = \frac{g(1-f)}{s_f}$$

$$q^* = s_h \frac{\left(\frac{\kappa}{g} - 1\right)}{(1 - s_h)}$$

Where r_k is the rate of profit (total profits divided by capital at replacement cost), g is the natural growth rate of the economy, f is the proportion of investment financed by new shares, s_f is the firms' retention ratio, s_h is the propensity to save out of all types of income (wages, dividends and capital gains), κ is the output-capital ratio, q is Tobin's q and star variables denote steady-state solutions. Kahn's (1972) formula relates the equity yield with the rate of profit and Tobin's q as follows:

$$\gamma^* = \frac{r_k^* - g}{q^*} + g$$

And substituting the rate of profit and Tobin's q in Kahn's equation:

$$\gamma^* = \frac{g\left(\frac{(1-f)}{s_f} - 1\right)}{q^*} + g = \frac{g(1 - s_h)\left(\frac{(1-f)}{s_f} - 1\right)}{s_h\left(\frac{\kappa}{g} - 1\right)} + g$$

One can draw many important insights from the Kaldorian model – results that have not received much attention so far by the fact that the equity yield was not presented explicitly. First, the equity yield is the result of several macroeconomic variables given jointly by households and firms' decisions and not just the result of rational representative agent's preferences. Second, the predictions from the Kaldorian model can be contrasted empirically, given that all the variables included in the equation (unlike the neoclassical model) are observable. Third, the model features the insight from Chapter 2 that shareholders can determine their own returns through consumption (lower values for s_h are associated with a higher equity yield), a sort of Levy-Kalecki profit equation but applied to financial markets. Fourth, the model can accommodate the growth puzzle, because it is not clear *a priori* the relationship between growth rates and equity yield – it can be either positive or negative, depending on parameter values. And fifth, and most important, the equity yield is not a reward for bearing risk, but rather the outcome of a particular macroeconomic environment. In fact, in contrast both to the CAPM (where the beta of the asset is all what is needed for the determination of the asset return) and the neoclassical consumption model (where the beta of consumption is all what is needed for the determination of asset returns), no risk measure is needed here in order to give a verdict on the equity yield. Even more, in the Kaldorian model (and in the post-Keynesian model proposed below) there is no need of a risk-free rate upon which to add a risk premium – the model allows to determine the equity yield quite independently from the risk-free asset, whatever the asset chosen to be the risk-free asset.[93] In summary, the so much beloved concept in mainstream finance of reward for bearing risk as source for returns is irrelevant in the Kaldorian macro framework – rather it is the other way round, once the yield is determined at the macro level, then individual investors face their portfolio decisions and calculate how much risk they want to assume for a given state of the market.[94]

Finally, the empirical literature is made up of papers written mostly by participants in the financial industry that try to forecast the equity yield (or rather, the equity premium) using historical norms (or simple mechanisms such as mean-reverting series), and as such most of the time there is no a particular theory backing the results (Arnott & Bernstein, 2002; Grinold & Kroner, 2004; Grinold, Kroner, & Siegel, 2011). The main aim of the papers is to help managers with their portfolio allocation process through the calculation of what the relative returns of equity and bonds will be in the future, and so take the relevant rebalancing portfolio decisions in order to attain higher returns for their clients.

[93] In the Kaldorian model there was not an interest-bearing asset, but the equity yield could still be computed. In the model proposed below, households can choose in their portfolio decision banking deposits that pay an interest rate. However, as it will be seen, such an interest rate does not play any role in determining the equity yield.
[94] In section 5 some additional remarks will be made about the meaning of risk at the macro level.

4. A Post-Keynesian model

This section proposes an analytically tractable post-Keynesian model. A more realistic version but similar in spirit, with both inflation and fiscal and monetary policy included, has been presented in the previous chapter. The purpose here is twofold: first, show analytically that in a stripped-down model the negative link between growth rates and q's holds (to give some intuition why it happens), and second, study the impact of growth rates on equity yields. The model is considered to be post-Keynesian because is demand-led, money is endogenous, households and firms have different motivations (crucially, firms as independent entities have to decide their dividend policy and how to finance investment) and investment is driven largely by animal spirits. In particular, the model belongs to the family of full-capacity utilization; such a choice has been taken in order to simplify algebraic manipulations and to make the argument easier to follow, but it is acknowledged that some work should be done in the future relaxing this assumption. First, the accounting structure and the behavioural assumptions will be explained, and afterwards the steady-state solutions and some economic implications for the equity yield will be discussed.

1. *The accounting matrices*

Every fully-fledged SFC model starts with the description of the accounting structure of the economy. Such a structure is depicted in Tables 4.1 – 4.3.

Table 4.1 is the balance-sheet, showing the stocks and their distribution across sectors. Three sectors and four assets are assumed. Positive entries denote and asset while negative entries a liability. New worth represents the excess of every sector's assets over its liabilities, and only in the case of banks is assumed to be zero –a simplifying assumption that will allow us to proceed quickly. Firms invest in real capital, which is financed through debt, new shares and retained profits. For simplification, firms do not hold any financial assets. On the other hand, households can save either in equities or deposits – so they are not forced to save everything in equities, as in Kaldor's model. It is assumed households not take on debt in order to buy financial assets for speculative purposes. Finally, commercial banks grant loans to firms and take deposits from households.

Table 4.1.Balance-sheet matrix of the model

Balance-sheet	Households	Firms	Banks	Σ
Real capital		$+K$		$+K$
Equities	$+p_e.e_h$			$+p_e.e_h$
Deposits	$+D_h$		$-D_d$	0
Loans		$-L_d$	$+L_s$	0
Net worth	$-V_h$	$-V_f$	–	$-(V_h+V_f)$
Σ	0	0	0	0

Table 4.2 gathers the flows in the economy: the upper part deals with real flows (such as consumption, dividends, etc.) while the lower part deals with flow-of-funds items (changes in the sectors' balance-sheet positions). Positive entries denote inflows of cash while negative entries denote outflows. Households consume and their disposable income is made up of wages, dividends (from firms and banks) and interest from their deposits, while their savings can be allocated every period to equities and deposits. Firms sell their products and pay wages, dividends and interest on their existing stock on loans. Finally, banks' operations are simplistic enough and they consist on one type of revenue (interest on loans) and one type of expense (interest on deposits). They are assumed to pay out all of their profits.

Table 4.2.Transactions-flow matrix of the model

Transactions-flow matrix	Households	Firms		Banks		Σ
		Current	Capital	Current	Capital	
Consumption	$-C_d$	$+C_s$				0
Investment		$+I_s$	$-I_d$			0
GDP [memo]		$[Y]$				0
Wages	$+WB_s$	$-WB_d$				0
Firms' profits	$+\Pi_d^f$	$-\Pi^f$	$+\Pi_r^f$			0
Banks' profits	$+\Pi_d^b$			$-\Pi^b$		0
Interestonloans		$-r_{l-1}.L_d$		$+r_{l-1}.L_{s-1}$		0
Interestondeposits	$+r_{d-1}.D_{h-1}$			$-r_{d-1}.D_{d-1}$		0
Change in equities	$-p_e.\Delta e_h$		$+p_e.\Delta e_f$			0
Change in deposits	$-\Delta D_h$				$+\Delta D_d$	0
Change in loans			$+\Delta L_d$		$-\Delta L_s$	0
Σ	0	0	0	0	0	0

Finally, Table 4.3 shows the capital gains that take place in this economy. Due to its simplicity, the only assets that can suffer revaluations through time are shares. The revaluation matrix shows that such revaluation is a gain (or a loss, depending on the sign) for the household sector, but it does not have any other effect in any other sector, since equity in the firms' balance sheet is recorded at book (replacement) value, not market value.

Table 4.3.Revaluation matrix of the model

Balance-sheet	Households	Firms	Banks	Σ
Equities	$+\Delta p_e.e_{h-1}$	–	–	$+\Delta p_e.e_{h-1}$
Σ	$+\Delta p_e.e_{h-1}$	–	–	$+(\Delta p_e.e_{h-1})$

2. The model (24 equations plus 10 parameters)

The model will be presented discussing the equations for every sector separately.[95]

General identities

The economy is considered to be demand-led, which implies that the supply of consumption and investment goods, $C_s$and I_s, will always adjust to their demands – i.e. firms will always supply the goods demanded by the public in a timely fashion. Equations (1) and (2) are the GDP and households' disposable income definitions, respectively. In this economy, households will receive as income wages, dividends (both from firms and banks) and interest on their banking deposits.

$$Y = C_s + I_s \tag{1}$$

$$YD = WB_d + \Pi_d^f + \Pi_d^b + (r_{d-1}.D_{h-1}) \tag{2}$$

Firms' behaviour

The main characteristics of firms are as follows. Firms target a certain level of profit margin after interest (equation 8) and wages are considered to be a residual (equation 3). Equation (6) features a 'post-Keynesian' investment function, which depends on the level of capacity utilization desired by firms – here taking the level of output/capital ratio as a proxy.[96] Firms will invest additional amounts if they believe that the actual amounts of output/capital ratios are higher than the target amounts. Population is assumed to be constant, so output growth in steady-state comes about by increases in labour productivity – i.e. income per capita. On the other hand, dividend policy and new equity issuance are given by equations (9) and (11), respectively. Equation (9) follows Kaldor (1966) in assuming that firms finance a fixed proportion of investment through new shares – an assumption that was called into question in the previous chapter, but that for the present purposes is enough. Finally,

[95] As Marc Lavoie pointed to me in a private email, the present model is similar in spirit to the one presented in Lavoie & Godley (2001). According to him, the main behavioural differences in my case are: banks make profits, the investment function is Harrodian (Kaleckian in their case), the wage bill is a residual and the consumption function presented here displays a wealth effect. I would also add that here the way expectations are formed is simpler, but it has the advantage of delivering analytical tractable solutions for the equity variables.

[96] See Hein et al. (2011, 2012) and Lavoie (2014, ch. 6) for a summary of the debate.

debt is assumed to play a buffer role, covering the funds for investment after retained profits and new shares have been depleted.[97]

$$WB_d = Y - \Pi^f - (r_{l-1}.L_{d-1}) \tag{3}$$

$$K = K_{-1} + I_s \tag{4}$$

$$I_d = g.K_{-1} \tag{5}$$

$$g = g_0 + g_1.(\kappa - \kappa^t) \tag{6}$$

$$\kappa = \frac{Y}{K_{-1}} \tag{7}$$

$$\Pi^f = (1 - \psi).Y \tag{8}$$

$$\Pi_r^f = s_f.\Pi^f \tag{9}$$

$$\Pi_d^f = \Pi^f - \Pi_r^f \tag{10}$$

$$p_e.\Delta e_f = f.I_d \tag{11}$$

$$\Delta L_d = I_d - \Pi_r^f - p_e.\Delta e_f \tag{12}$$

Households' behaviour

Households' wealth is increased every period through savings, $YD - C_d$, and the capital gains accrued to the equity holdings. Households consume every period out of their current income and the lagged level of wealth. It is assumed that the propensity to consume out of disposable income, α_1, is equal to unity. This assumption will simplify the algebra in the steady-state solutions, but as it will be discussed the solution for q will not be qualitatively modified. Finally, equations (15) and (16) establish that households follow a constant policy for asset allocation, given by λ.

$$\Delta V_h = YD - C_d + CG \tag{13}$$

[97] An alternatively formulation using leverage as a fixed proportion and the equity issuance as a residual was studied. The main results were also confirmed in this closure: Tobin's q (and the price-earnings ratio) still depended negatively on the growth rate and the equity yield depended positively both on wealth holders' propensity to consume and growth rates. The only difference was that when leverage is assumed to be constant, then the growth in the number of shares in the steady-state was not positively influenced by the growth rate of investment.

$$C_d = YD + \alpha_2.V_{h-1} \tag{14}$$

$$\frac{p_e.e_h}{V_h} = \lambda \tag{15}$$

$$\Delta D_h = \Delta V_h - \Delta p_e.e_h \tag{16}$$

Banks and financial markets

Banks' behaviour is simplistic, but enough for our current purposes. The main feature of financial markets here is that money is assumed to be endogenous. Banks are 'accommodative' in this framework and will always supply the amount of loans needed by firms. Banks' profits (equation 17) are simply the difference between interest from loans and interest from deposits. On the other hand, banks' profits are paid out in full (equation 18) and equations (19) and (20) say that both interest rates are under control of commercial banks.

Finally, equations (21) to (24) show financial markets equations. Equation (21) shows equity capital gains (as simply the difference in price for a given number of shares) whereas equations (22) to (24) are simply definitions of well-known financial ratios: Tobin's *q*, price-earnings ratio and equity yield, respectively. The price-earnings ratio in equation (23) anchors on the trailing-twelve-months corporate earnings, and equation (24) is the common definition of the equity yield, understood here as the total return (dividends plus capital gains) earned by an investor over a year.

$$\Pi^b = r_{l-1}.L_{s-1} - r_{d-1}.D_{d-1} \tag{17}$$

$$\Pi_d^b = \Pi^b \tag{18}$$

$$r_l = \overline{r_l} \tag{19}$$

$$r_d = \overline{r_d} \tag{20}$$

$$CG = e_{h-1}.(p_e - p_{e-1}) \tag{21}$$

$$q = \frac{p_e.e_h + L_d}{K} \tag{22}$$

$$per_{ttm} = \frac{p_e.e_h}{\Pi^f} \tag{23}$$

$$\gamma = \frac{\Pi_d^f + CG}{p_{e-1} \cdot e_{h-1}} \tag{24}$$

The model is now complete with 24 equations, 24 variables and 10 parameters. A 'redundant equation' is left: an accounting identity is implied in the set of logical relations with variables already included in some other equation. This identity will always be verified by the watertight accounting structure of the model. This equation says that the demand of deposits by households will be equal to banks' supply:

$$\Delta D_d = \Delta D_h$$

3. *Steady-state solutions*

The simplicity of the model enables us to reduce the long-run properties of the system to a set of parameters – i.e. to find an analytical solution for steady-state positions. This is what will be done in this section. Special emphasis will be placed in the steady-solutions for q and γ. For γ qualitative solutions will be stressed. It is worth remembering that a steady-state position is that where all stocks and flows grow at the same rate – in our case, at the rate g_0. Therefore, in our model, the growth of every part of the system is governed by the growth of investment. Additionally, in a steady-state position every ratio has to be constant, which crucially means that in steady-state, $\Delta q = 0$.

We deal first with the four following solutions, because they can be retrieved directly. Star variables denote steady-state solutions:

$$\left(\frac{I_d}{K_{-1}}\right)^* = g_0 \tag{25}$$

$$\left(\frac{p_e \cdot \Delta e_f}{K_{-1}}\right)^* = g_0 \cdot f \tag{26}$$

$$\kappa^* = \left(\frac{Y}{K_{-1}}\right)^* = \kappa^t \tag{27}$$

$$\pi^* = \left(\frac{\Pi^f}{Y}\right)^* = (1 - \psi) \tag{28}$$

The rate of profit in steady-state, $\left(\frac{\Pi^f}{K_{-1}}\right)^*$, measured here as the return on total assets, can be easily computed now. Using (27) and (28), it yields:

$$r_k^* = \left(\frac{\Pi^f}{K_{-1}}\right)^* = \left(\frac{\Pi^f}{Y}\right)^* \cdot \left(\frac{Y}{K_{-1}}\right)^* \\ = (1-\psi).\kappa^t \tag{29}$$

The solution for the return on equity (i.e. the ratio of total profits to equity at book value), can be retrieved as:

$$r_e^* = \left(\frac{\Pi^f}{V_{f-1}}\right)^* = \left(\frac{\Pi^f}{K_{-1}}\right)^* \cdot \left(\frac{K_{-1}}{V_{f-1}}\right) = \frac{r_k^*}{(1-l^*)} \\ = \frac{(1-\psi).\kappa^t}{(1-l^*)} \tag{30}$$

In a world without leverage, l would be nil and obviously the return on assets would be equal to the return on equity, $r_k^* = r_e^*$.

As to obtain the solution for q, the starting point is the consumption function:

$$C_d = YD + \alpha_2.V_{h-1}$$

Dividing both sides by K_{-1}, and using (25), (27), (29) and $\frac{V_h}{K} = q$, (because households' deposits are equal to firms' loans, so the only difference between V_h and K is how shares are valued), it yields:

$$Y - I = Y - \Pi_r^f + \alpha_2.V_{h-1}$$

$$\kappa^t - g_0 = \kappa^t - \kappa^t.(1-\psi).s_f + \alpha_2.q^*$$

$$q^* = \frac{\kappa^t.(1-\psi).s_f - g_0}{\alpha_2} \tag{31}$$

The importance of the result is that as long as a fixed output/capital ratio, a fixed dividend policy and the previous consumption function are assumed, then it can be shown that the valuation ratio will depend negatively in the long-run on the growth rate of the economy and on the marginal propensity to consume, Kaldor's two original results. However, unlike Kaldor's model, dividend policy matters, because now q equilibrium level depends on the retention ratio. Furthermore, it is worth pointing out that equity valuation will not depend at all on the way households' make their expectations, so it would not have made a difference to have assumed a more realistic behaviour for households' portfolio decisions – say, a *Tobinesque* closure. This result relies crucially on the way firms' dividend policy has been modelled: if we had assumed (as I did in the previous chapter) a variable firms' retention ratio (for instance, depending on the state of capital markets), then households' portfolio behaviour could have had an effect through changes in the equity yield and then changes in the dividend policy – firms would issue new shares and retain profits depending on stock prices and interest rates on loans, so dividend policy would not be independent of financial market conditions.[98] However, q would still be influenced by the rest of the factors, so even in this case q would be determined by real factors, and not exclusively by financial (or psychological) ones. Finally, in order to have a positive solution for q, what is needed is that $\kappa^t.(1-\psi).s_f > g_0$, given that $\alpha_2$will always be greater than zero – a condition which empirically is easily justified.

The partial derivatives are:

$$\frac{\partial q}{\partial g_0} = -\frac{1}{\alpha_2} < 0$$

$$\frac{\partial q}{\partial \kappa^t} = \frac{(1-\psi).s_f}{\alpha_2} > 0$$

$$\frac{\partial q}{\partial \alpha_2} = -\frac{\kappa^t.(1-\psi).s_f - g_0}{\alpha_2^2}; if\ \kappa^t.(1-\psi).s_f > g_0, then\ \frac{\partial q}{\partial \alpha_2} < 0$$

$$\frac{\partial q}{\partial s_f} = \frac{\kappa^t.(1-\psi)}{\alpha_2} > 0$$

$$\frac{\partial q}{\partial \psi} = -\frac{\kappa^t.s_f}{\alpha_2} < 0$$

[98] For a model with a variable dividend policy assumption, see the previous chapter, where a *Tobinesque* firms' financing investment behaviour is put forward.

Before proceeding, it would be worth considering why the assumption of a marginal propensity to consume out of disposable income equal to one is not crucial for our purposes. If a more generalized consumption function were assumed:

$$C_d = \alpha_1.YD + \alpha_2.V_{h-1}$$

Similarly, it could be boiled down to:

$$\kappa^t - g_0 = \alpha_1.\left[\kappa^t - \kappa^t.(1-\psi).s_f\right] + \alpha_2.q^*$$

$$q^* = \frac{\kappa^t.\left[1-\alpha_1.(1-(1-\psi).s_f)\right] - g_0}{\alpha_2}$$

Being the difference the correction factor, $(1-\alpha_1)$.

Other equity valuation metrics can be computed as well. For instance, the price-earnings ratio, per, can be retrieved as follows:

$$\begin{aligned} per^* = \left(\frac{p_e.e_h}{\Pi^f}\right)^* &= \left(\frac{K}{\Pi^f}\right)^*.\left(\frac{p_e.e_h}{K}\right)^* \\ &= \frac{(1+g_0)}{r_k^*}.\frac{(V_h - L_d)}{K} \\ &= \frac{(1+g_0).(q^* - l^*)}{(1-\psi).\kappa^t} \end{aligned} \qquad (32)$$

With the partial derivative respect to the growth rate:

$$\frac{\partial per}{\partial g_0} = \frac{\left[\frac{r_k^*.s_f - g_0}{\alpha_2} - (1-f) + \frac{r_k^*.s_f}{g_0}\right] + (1+g_0).\left(-\frac{1}{\alpha_2} - \frac{r_k^*}{g_0^2}\right)}{{r_k^*}^2}$$

The second term of the expression, $(1+g_0).\left(-\frac{1}{\alpha_2} - \frac{r_k^*}{g_0^2}\right)$, is negative and larger than the first term between brackets. Therefore, as in the case of Tobin's q, the impact of growth rates on the per steady-state solution is negative.

For the sake of completeness, now we turn to the solution for the leverage ratio, l. Starting from equation (12) and dividing by the stock of capital lagged one period:

$$\Delta L_d = I_d - \Pi_r^f - p_e.\Delta e_f$$

$$L_{d-1}.g_0 = I_d.(1-f) - \Pi^f.s_f$$

$$\left(\frac{L}{K}\right)^* = l^* = (1-f) - \frac{(1-\psi).\kappa^t.s_f}{g_0} \tag{33}$$

With a positive first partial derivative respect to the growth rate of the economy.

Finally, the steady-state solution for the equity yield can be obtained as follows. The equity yield steady-state solution in a world with debt is:[99]

$$\gamma^* = \frac{r_e^* - g^*}{q_e^*} + g^*$$

Where q_e is equity q (the ratio of the value of equity at market prices to its replacement cost) and the rest of symbols have already been defined. Remembering that equity q and Tobin's q have the following relationship, $q_e = \frac{q-l}{1-l}$, the equity yield is then:

$$\begin{aligned}\gamma^* &= \frac{r_e^* - g^*}{q_e^*} + g^* = \frac{r_e^* - g_0}{\frac{q^* - l^*}{1-l^*}} + g_0 \\ &= \frac{r_k^* - g_0.(1-l^*)}{q^* - l^*} + g_0 \\ &= \alpha_2.\left(\frac{r_k^* - g_0.(1-l^*)}{r_k^*.s_f - g_0 - l^*.\alpha_2}\right) \\ &+ g_0\end{aligned} \tag{34}$$

A couple of remarks can be made about this expression. First, as in the mainstream framework, the equity yield depends positively on the propensity to consume out of wealth, α_2. In the consumption utility framework, if agents get impatient and want to consume more they will raise the discount rate and then the premium for 'bearing risk'. However, in the post-Keynesian framework presented here the way an increase in the propensity to consume out of wealth affects positively the equity yield is not through agents' preferences, but rather through effective demand – as it will be seen in a while. Second, it can be seen that in the extreme case of a value of zero for the leverage ratio, the previous expression would get greatly simplified and would boil down to:

[99] See Appendix I.

$$\gamma^* \approx \alpha_2 + g_0 \qquad (34a)$$

Equation (34a) says that the equity yield can be expressed simply as the sum of the marginal propensity to consume out of wealth plus the growth rate of the economy – a result in line with the findings of Chapter 2.[100] Given the empirical evidence in developed countries of α_2 being greater than g_0, wealth holders' consumption decisions emerge as a powerful driver of shareholder profitability in the long-run. Therefore, as it is explained in the next section, any study (as the empirical evidence presented in Section 2) that tries to address shareholders' returns across countries only focusing on growth rates misses a large piece of the picture; the differences across countries on equity yields can be due to differences in consumption rather than in growth rates.[101]

In equation (34) the growth rate does not only have direct effects on the equity yield, but it also has indirect effects through the leverage ratio. Substituting (33) in (34):

$$\begin{aligned} \gamma^* &= \alpha_2.\left(\frac{r_k^* - g_0.(1-l^*)}{r_k^*.s_f - g_0 - l^*.\alpha_2}\right) + g_0 \\ &= \alpha_2.\left(\frac{r_k^*.(1-s_f) - g_0.f}{r_k^*.s_f - g_0 - \alpha_2.(1-f) + \frac{\alpha_2.r_k^*.s_f}{g_0}}\right) + g_0 \end{aligned} \qquad (35)$$

If, for simplification, the following term, $r_k^*.s_f - g_0 - \alpha_2.(1-f) + \frac{\alpha_2.r_k^*.s_f}{g_0}$, is denoted with the Greek letter φ, the partial effect of an increase in the growth rate on the equity yield is:

$$\frac{\partial \gamma}{\partial g_0} = \frac{-\alpha_2.f.\varphi - \left[r_k^*.(1-s_f) - g_0.f\right].\left(-1 - \frac{\alpha_2.r_k^*.s_f}{g_0^2}\right)}{\varphi^2} + 1$$

[100] If one compares (34) against (34a) it is obvious that in the latter the effect of growth rates on equity yields is unambiguously positive. In this case, the dilution effect is missing and the expression says that the dividend yield is simply the marginal propensity to consume out of wealth.

[101] Actually, if leverage is ruled out again, the marginal propensity to consume multiplies the following expression:

$$\left(\frac{r_k^* - g_0}{r_k^*.s_f - g_0}\right)$$

Which is greater than one given that $s_f < 1$. In other words, the consumption effects on the equity yield are even larger than those assumed in the simplified formulation of the text.

And the sign is undetermined, depending on the values attached to the various parameters. In order to provide some intuition to the previous expression, remember that the equity yield can be decomposed using the Grinold-Kroner decomposition, which says that:

$$\gamma = \gamma_d + g_\pi - g_e + \left(\frac{per}{per_{-1}} - 1\right) \qquad (36)$$

The question is how every component will react to a change in the growth rate of the economy.[102] Beginning with the last component, in steady-state all ratios have to remain constant by definition, so the last part of the expression, $\left(\frac{per}{per_{-1}} - 1\right)$, will be zero – which means that no return coming from ratio revaluations will accrue to shareholders in steady-state.

On the other hand, the growth in profits, g_π, has to be equal in steady-state to the growth of the economy (if income distribution has to remain constant), so:

$$g_\pi^* = g_0 \qquad (37)$$

The growth in the number of shares g_e is given by:

$$\begin{aligned} g_e^* &= g_0 - g_0.\left(1 - \frac{f}{q^* - l^*}\right) = \frac{g_0.f}{q^* - l^*} \\ &= \frac{\alpha_2.g_0.f}{r_k^*.s_f - g_0 - \alpha_2.(1-f) + \frac{\alpha_2.r_k^*.s_f}{g_0}} \end{aligned} \qquad (38)$$

With the partial derivative respect to the growth rate being:

$$\frac{\partial g_e}{\partial g_0} = \frac{\alpha_2.f.\varphi - (\alpha_2.g_0.f).\left(-1 - \frac{\alpha_2.r_k^*.s_f}{g_0^2}\right)}{\varphi^2} > 0; if\ \varphi > 0$$

[102] It can be checked that (34), obtained from Kahn's equation, can also be obtained through the Grinold-Kroner decomposition – i.e. plugging (37), (38) and (39) into (36):

$$\begin{aligned} \gamma &= \gamma_d + g_\pi - g_e + \left(\frac{per}{per_{-1}} - 1\right) \\ &= \frac{\alpha_2.\kappa^t.(1-\psi).(1-s_f)}{\kappa^t.(1-\psi).s_f - g_0 - l^*.\alpha_2} + g_0 - \alpha_2.\left(\frac{g_0.(1-l^*) - \kappa^t.(1-\psi).s_f}{\kappa^t.(1-\psi).s_f - g_0 - l^*.\alpha_2}\right) \\ &= \alpha_2.\left(\frac{r_k^* - g_0.(1-l^*)}{r_k^*.s_f - g_0 - l^*.\alpha_2}\right) + g_0 \end{aligned}$$

The previous expression will be positive as long as $\varphi > 0$, given that the second part of the numerator, $(\alpha_2.g_0.f).\left(-1-\frac{\alpha_2.r_k^*.s_f}{g_0^2}\right)$, will always be positive by definition. The positive sign is one would expect: a higher growth rate and thus higher investment needs propel a higher growth rate in the number of shares.

And finally, the dividend yield, y_d, can be computed as follows:

$$y_d^* = \left(\frac{\Pi_d^f}{p_{e-1}.e_{h-1}}\right)^* = \left(\frac{\Pi_d^f}{K_{-1}}\right)^* . \left(\frac{K_{-1}}{V_{h-1}-L_{d-1}}\right)^*$$
$$= \frac{r_k^*.(1-s_f)}{q^*-l^*} \qquad (39)$$
$$= \frac{\alpha_2.r_k^*.(1-s_f)}{r_k^*.s_f - g_0 - \alpha_2.(1-f) + \frac{\alpha_2.r_k^*.s_f}{g_0}}$$

With the partial derivative being:

$$\frac{\partial y_d}{\partial g_0} = \frac{-[\alpha_2.r_k^*.(1-s_f)].\left(-1-\frac{\alpha_2.r_k^*.s_f}{g_0^2}\right)}{\varphi^2} > 0$$

The previous expression is always positive. Intuitively, the growth rate has a positive effect on the dividend yield for two reasons: first, it increases the volume of dividends through a higher growth rate in earnings (firms' retention ratio is fixed) and, second, it reduces the valuation of the assets through the negative relation between growth rates and valuation metrics, so even for a given volume of dividends the dividend yield would be higher because assets are now cheaper at market prices.

Overall, the impact of the growth rate on the equity yield and its components can be summarised as follows (expected signs in superscripts):

$$\gamma^{+/-} = y_d^+ + g_\pi^+ - g_e^+$$

A priori, a change in the growth rate has an undetermined effect on the equity yield: on the one hand, higher growth rates boost equity returns through higher dividend yields and earnings growth, but they also drag shareholder profitability through a dilution effect – a higher growth in the number of shares. This dilution effect makes that shareholders have an ever-decreasing share of the pie of corporate earnings. If the dilution effect is large enough, it can outstrip the improvement in the dividend yield and in the earnings growth. I think that this possibility of the dilution effect of being greater than the other two components, together with two additional factors addressed in the following paragraph, accounts largely for an explanation of the growth puzzle. In other words, the dilution effect is an important part of the explanation, but not the only one.

There are two additional factors for the growth puzzle that have not been analytically dealt with so far. First, the previous analysis has almost been exclusively carried out comparing steady-state positions, but it is clear that, as Joan Robinson (1966, p. 308) remarked, '[b]efore appealing to reality [...] we need to allow for some further complications, including the fact that no period of actual history is a golden age.' Here, the use of comparative statics has been a useful device to highlight some aspects of the equity markets at the macro level that have not been studied in the literature so far. But this simple method has its drawbacks. In particular, one of the assumptions of steady-state analysis is that, by definition, valuation metrics (i.e. Tobin's *q*, price-earnings ratio) remain constant. But the actual series for equity yields across countries are not coming from economies in steady-state positions, which means that the valuation metrics for all these countries have not been constant all these years. In other words, the equity yield has been affected by changes in the valuation multiples. It turns out that valuation multiples are not independent of the growth rate of the economy: higher growth rates have a depressing effect on valuation, as equations (33) and (34) clearly show. This means that investors will face unrealised capital gains if growth rates go up. Changes in valuation multiples due to changes in growth rates thus add to the dilution effect in explaining the negative impact of growth on equity yields. And second, the studies dealing with the growth puzzle tacitly assume that growth in GDP per capita is the most important determinant for explaining differences in equity yields across countries. However, equation (36a) has shown that wealth holders' consumption is also an important source for wealth holders' returns. Therefore, it may well be the case that equity yield differences across countries are largely the result of different consumption patterns, rather than simply differences in GDP per capita growth rates.[103]

In summary, the results of the model can be stated in the following way. First, the negative 'Kaldorian' relations between growth rates, propensities to consume (out of wealth) and Tobin's q are confirmed here. Second, the equity yield is the result of effective demand considerations and is not the consequence of rational agents' inter-temporal preferences over consumption. Third, the equity yield is a macroeconomic phenomenon and not the result of bearing some kind of risk (in my model, the concept of equity premium over a risk-free asset is not needed). In particular, shareholders' consumption decisions are a powerful driver of equity returns, which has clear reminiscences with Kalecki's ideas on corporate earnings, but now for the valuation of assets in financial markets. And fourth, a simple post-Keynesian model provides a theoretical robust explanation that can account for the growth puzzle: higher growth rates have positive effects on dividend yields and earnings growth, but they also trigger higher growth rates in the number of shares, being thus the overall effect undetermined.

5. Further considerations on equity yields and risks at the macroeconomic level

To those who think that some relation between risk and return at the macro level must exist, it may seem striking that no mention to risk is needed to say something about equity returns in the post-Keynesian theory reported above. Equity returns were mainly given by the level of effective demand (crucially, through shareholders' consumption decisions) and there was little room for 'a premium of bearing risk', as in mainstream finance. In this section, I will explain why the introduction of risk and

[103] See Paiella (2009) for a survey of the literature that estimates marginal propensities to consume out of wealth. It is reported there that such estimates vary across countries, being generally higher in the US and Canada than in the euro area. The values found for the US are in the range of 3% - 6%. Needless to say, such variation (even if it were just one percentage point) has large effects for the equity yield. In the simplified equation (39a) presented above, an additional percentage point in the marginal propensity to consume out of wealth would fully translate to the level of the equity yield. And one percentage point of difference in the equity yield will result in the long-run in a very huge difference.

return at the macro level is problematic and how it can be a serious challenge for mainstream finance.

To begin with, it should be pointed out that if one wants to advocate for a risk-return framework for determining equity returns at the macro level, the first thing that has to be done is to define the meaning of 'risk'. It seems that in economic theory the consensus has been quite overwhelming. In micro portfolio theory, since the seminal contributions of Markowitz (1952), Sharpe (1964) and Lintner (1965), risk has been defined as the volatility of the return of an asset. Such a definition was suitable for mathematical manipulation and especially for exercises in constrained maximisation – the so-much-beloved tool of mainstream economists. At the macro level, in the consumption-utility models explained in Section 3, the volatility chosen is the volatility of an asset respect to consumption. But the idea, and the definition of risk, is the same as at the micro level: investors should be rewarded for bearing volatility.

It is not clear why the relevant measure of risk for equity holders at the macroeconomic level should be the volatility of consumption. If it is assumed, as mainstream finance does, that shareholders are rational agents, that the only thing that matters for them is present and future consumption and, more important, that the only way to obtain utility is through consumption, then the definition of risk as volatility may have some merit. But, obviously enough, if one plays with different definitions, the results will change. For instance, Myron Gordon advanced the idea that the relevant risk for a firm (and for shareholders) is the 'risk of going bankrupt' (Gordon, 1987, 1994; Gordon & Rosenthal, 2003). In a capitalist system, firms strive to maximise the probability of long-run survival.[104] According to him, a non-growth policy (a strategy where net investment is zero and investment is carried out simply for replacement purposes) is not feasible for capitalists in the long-run, because 'each capitalist would face a high probability of going bankrupt within a relatively short

[104] Gordon and Rosenthal's (2003) model is a microeconomic model where individual accumulation at the level of the firm is studied. In their model, firms can accumulate either real capital or financial wealth (made up by the difference between cash, receivables and bonds and payables and debt). Depreciation for real assets is explicitly modelled. Every firm also follows a fixed consumption expenditure policy – which they depict as capitalists' consumption plus administration cost (2003, p. 27). Finally, it is assumed that the rate of return of capital is a random variable for every individual firm. The variability in the profit rate is what makes possible for firms to go bankrupt over time – given consumption and investment decisions.

period of time, with a large fraction of the capitalists actually going bankrupt' (M. J. Gordon, 1987, p. 533). Through numerical simulations (M. J. Gordon & Rosenthal, 2003), they showed that firms can only attain reasonable prospects of survival through 'high rate of net investment, make the gross profit on production greater than the sum of the expenditures on administration, other non-production activities, investment and dividends' (Gordon & Rosenthal, 2003, p. 43).[105] In summary, higher growth rates increase the probability of long-run survival and reduce the risk of going bankrupt.

The previous framework could be conceptually grafted into the post-Keynesian model presented here. In the model, the relationship between growth and equity yield in steady-state is unclear, although as I mentioned, in comparing different steady-states (for given propensities to consume and changes in valuation multiples ruled out) higher growth rates should lead to positive effects on the equity yield – because the dilution effect will normally be lower than the equity yield and the growth in earnings together. If this is the case, then the introduction of a Gordonian definition of risk in a post-Keynesian framework leads to counterintuitive results for mainstream finance. A higher (lower) growth rate will lead to higher (lower) equity yields but, at the same time, will reduce (increase) the probability of going bankrupt and thus the risk borne by shareholders. In the new situation shareholders would be enjoying higher (lower) levels of return with lower (higher) levels of risk, and the relation between risk and return would be negative. From mainstream finance, that could not be possible, for in this situation the shareholders would be enjoying a sort of 'free lunch' (and a free lunch is not a dear concept in mainstream finance), higher returns with lower levels of risk – and the whole exercise of constrained optimisation would be very different. But even if the Gordonian measure of risk is included in our post-Keynesian framework, the system will still be ruled by the level of effective demand – in other words, the risk story will be an important one for individual

[105] Gordon's model is not absent from many problems. For instance, he assumes that the rate of profit for every firm will be a random variable, regardless of investment and capitalists' consumption behaviour. But it is clear that even if that is true for an individual firm, it cannot be the case for the system as a whole. However, one does not have to endorse the model in order to endorse the Gordonian definition of risk.

shareholders and firms, but returns will still be determined at the macro level by effective demand.

As a conclusion, it may worth pointing out that this problem of the definition of risk is not something that exclusively happens at the macro level due to some methodological considerations. Similar problems have also appeared in the literature at the micro level. Fama and French (1992), for instance, found that in contrast to the CAPM, '[t]wo easily measured variables, size (ME) and book-to-market equity (BE/ME), provide a simple and powerful characterization of the cross-section of average stock returns for the 1963-1990 period' (1992, p. 429) – although then they interpreted the results as measuring the riskiness of stocks.[106] Financial practitioners have also expressed similar complaints. For instance, Buffett (1993) has explained that:

> 'Academics, however, like to define investment "risk" differently, averring that it is the relative volatility of a stock or portfolio of stocks - that is, their volatility as compared to that of a large universe of stocks. Employing data bases and statistical skills, these academics compute with precision the "beta" of a stock - its relative volatility in the past - and then build arcane investment and capital-allocation theories around this calculation. In their hunger for a single statistic to measure risk, however, they forget a fundamental principle: It is better to be approximately right than precisely wrong.
>
> For owners of a business - and that's the way we think of shareholders - the academics' definition of risk is far off the mark, so much so that it produces absurdities. For example, under beta-based theory, a stock that has dropped very sharply compared to the market - as had Washington Post when we bought it in 1973 - becomes "riskier" at the lower price than it was at the higher price. Would that description have then made any sense to someone who was offered the entire company at a vastly-reduced price?'

[106] See Penman (2011, pp. 26–27) for a critique of Fama and French's interpretation of book values in determining equity returns. For a review of the empirical studies on the CAPM, see Fama and French (2004).

6. Conclusions

This final chapter has built into the insights of the previous chapters and has proposed a novel and comprehensive post-Keynesian theory that explains the return of equity markets in the long-run. The main features of the theory can be summarised as follows. First, there is a negative relationship between Tobin's q (and valuation metrics in general) and economic growth. Second, the effect of economic growth on dividend yields and earnings growth is positive, but the effect of the former on the growth in the number of shares can be negative, which makes the relationship between equity returns and economic growth undetermined a priori. Third, wealth holders' consumption emerges as a crucial driver for shareholder profitability in the long-run, being such a result very close to Kalecki's theory of profits, but now applied to financial markets. And fourth, in the post-Keynesian theory the equity yield is determined by aggregate demand, and no mention to a risk-return relation is needed. It has been explained that the second feature, together with the first and the third one, can provide a full account of the empirical anomaly known as the 'growth puzzle'. But because the present analysis has largely been conducted through the study of steady-state positions, future studies should be conducted to elucidate the importance of ever-changing valuations for existing shareholders as well as empirical analysis to confirm the importance in determining equity returns of different consumption patterns across countries.

At another, more philosophical level, the post-Keynesian theory advanced here has serious implications for traditional mainstream finance and can change the way we understand how returns in equity markets are generated in the real world. If, indeed, the role of risk in determining equity returns is as little as the previous theory suggests, then the role of effective demand and its proper management through active fiscal and monetary policies becomes paramount, not only for income and employment, but for shareholders' returns as well. In this regard, the theory seems to be at least quite optimistic. First, because it suggests that there is nothing that cannot be done about the future prospects of shareholders' returns, one of the main engines of capitalism. And second, because the policy implications are that encouraging effective-demand policies are not only beneficial in the long-run only for workers and the captains of industry, but for shareholders as well.

Appendix I: Expression for the equity yield as a function of the equity q in the steady-state

Starting from the expression that says that the equity yield is the sum of dividends and capital gains divided by the equity (at market value) of the previous period:

$$\gamma = \frac{\Pi_d^f + CG}{p_{e-1}.e_{h-1}} = \frac{(1-s_f).\Pi^f}{K_{-1}.(q-l)} + \frac{I.(q-l-f)}{K_{-1}.(q-l)}$$

$$= \frac{(1-s_f).r_k + g.(q-l-f)}{q-l}$$

$$= \frac{r_k - (r_k.s_f + g.f)}{q-l} + g$$

And remembering that in virtue of the accounting identity: $g = s_f.r_k + f.g + l.g$, the previous expression becomes:

$$\gamma = \frac{r_k - (g - l.g)}{q-l} + g$$

Finally, remembering that the return on equity, $r_e = \frac{\Pi^f}{K_{-1}-L_{-1}}$, can be expressed as $r_e = \frac{r_k}{(1-l)}$, and equity q, $q_e = \frac{p_e.e_h}{K-L}$, can be expressed as $q_e = \frac{q-l}{1-l}$, then the yield can be expressed as:

$$\gamma = \frac{r_k - (g - l.g)}{q-l} + g$$

$$= \frac{r_e.(1-l) - (g - l.g)}{q_e.(1-l)} + g$$

$$= \frac{r_e - g}{q_e} + g$$

Which is the same expression presented in Moss (1978) and Moore (1973, 1975), but now taking into account of the fact that leverage has to be dealt with: here, both the rate of profit and q are levered variables.

Chapter 5. Conclusions and some directions for further research

This thesis presents a post-Keynesian framework to understand some features of equity markets in the long-run. The main contribution of the thesis is to propose a theory for equity markets using well-grounded post-Keynesian macroeconomic contributions, and is therefore relevant both to students of equity markets and of post-Keynesian economics.

The core of the argument relies on the importance of effective demand for determining equity returns. Ever since Keynes and Kalecki's seminal contributions, post-Keynesians have recognised the importance of effective demand for business cycles, unemployment and prices. But they have never integrated the role of effective demand with the behaviour of equity prices. Equity prices have almost always been deemed in post-Keynesian theory driven by either people's expectations in the short-run (e.g. Minsky's framework) or by a never-mentioned mechanism (one could say implicit theorising) that says that in the long-run Tobin's q should be equal to 1 (e.g. the Cambridge and Kaleckian growth models): in such approaches, one can use indifferently wealth at market prices or capital at replacement cost. I have shown here that a short-run analysis based on expectations and business cycles, although useful, is not the whole story, and that the assumption of a q equal to 1 in the long-run runs against empirical evidence and post-Keynesian theory itself; post-Keynesian theory has always recognised different roles and motivations for households and firms: *such a recognition is the theoretical cornerstone for a theory of q different from 1 in the long-run.*

In the second Chapter the relation between the profit rate and growth was explored in a (very) long-run context. It was suggested that even in the absence of growth in capitalist economies, the profit rate earned by corporations can still be positive given the effect exerted by wealth holders' consumption decisions. For equity markets, this result is important and has to be taken into account before any research can be conducted on asset valuations, because if one expects for some reason that corporate profits will disappear or tend to decline in the future, it logically follows that the market value of the assets will tend to zero – because there will no future cash-flows to discount, so that assets will be worthless. From a post-Keynesian standpoint the assumption of an economy without growth may have been artificial, but it is the right assumption to make if one wants to understand what else drives profits when economic growth falters.

In the third Chapter a more complete post-Keynesian model was proposed to study the behaviour of Tobin's q (and valuation metrics in general), but now in a growing economy. The chapter was motivated by the idea that, empirically, q has greatly diverged from one, and that such a discrepancy can create a very large gap between the return on capital earned by corporations and the equity yield earned by shareholders. The Chapter explained that the Cambridge corporate models can be fruitfully reinterpreted as a theory for equity markets. It also demonstrated that in a more sophisticated institutional setup with portfolio allocation, endogenous firms' financing decisions, and a government and banks, the main insights of the Cambridge corporate model are still valid. These insights are: a negative long-run relation between valuation and growth rates, a negative long-run relation between valuation and propensities to consume, and the possibility that Tobin's q may not be 1 even in the long-run. This last result was developed as a critique of the Miller-Modigliani dividend irrelevance theorem, because as long as q is different from 1 dividend policy will affect equity valuation.

In the fourth Chapter the results of the third one were generalised; the results are more general because the fourth Chapter studies the relationship between equity yield and growth, whereas the third Chapter dealt with the relation between equity valuation and growth. Chapter 4 also weighs in on the controversy of the empirical relation between growth and returns, and using post-Keynesian theory shows that such a lack of relation can be explained by the different effects of growth rates on dividend yields, earnings growth rates and growth in the number of shares, respectively. The effect of economic growth on dividend yields and earnings growth is positive, but the effect of the former on the growth in the number of shares can be negative, which makes the relationship between equity returns and economic growth undetermined a priori.

As suggested above, the main results of the post-Keynesian theory for equity markets (and of the thesis) can be summarised as follows. First, aggregate demand determines the return on shares and their valuation in the market. Second, Tobin's q is inversely related to the growth rate of the economy in the long-run and inversely related to the marginal propensities to consume. Third, Tobin's q can be different from 1 even in the long-run. And fourth, wealth holders' consumption decisions are a major driver of the equity yield in the long-run. This last feature is similar in spirit to the Levy-Kalecki profit equation, but now takes into account not the rate of profit (return on capital), but the return on shares (return on wealth).

The thesis also shows that post-Keynesian macroeconomic theory (broadly defined) is better equipped to deal with asset valuations and financial markets in general than mainstream theory. In an ever-changing world, where institutions (and especially financial ones) evolve in order to face new economic realities, the focus on the institutional setup highlighted by post-Keynesian theory, and often ignored by the representative-agent mainstream models, is crucial to understanding the evolution of asset returns over time.

At this point I would like to point out some future directions of research that were outside of the scope of this thesis, but that nevertheless can be considered as natural directions to follow.

The marginal propensity to consume out of wealth plays a crucial role in this framework. It not only influences valuation ratios, but the return on shares as well. However, I have always assumed throughout the thesis that such a propensity is exogenous. But such an assumption was a simplification and we should not make this assumption in real world economies. In particular, there are two possible ways to integrate an endogenous marginal propensity to consume out of wealth, keeping at the same time some real-world economic meaning.

First, one could think of a dual class model, splitting our homogenous household sector into two classes, capitalists and workers. Because each class will have a different set of assets and different values for the propensities to consume out of wealth, the average marginal propensity to consume out of wealth *of the whole sector* will vary according to different economic conditions and it will not be fixed, as before. It must be noted here that what matters for our theory is not the marginal propensity to consume of some class (as it was assumed in the original Cambridge model), but of the whole economy. Such an analysis could shed some light on the link between wealth inequality and asset returns. Contrary to what many economists seem to imply, a lower marginal propensity to consume out of wealth due to higher wealth inequality (given the assumption that wealthier people tend to consume less out of their wealth) will lead to lower equity returns. So even if at the micro level it makes sense for some people to keep accumulating wealth, at the macro level this is just another race-to-the-bottom example, depressing overall asset returns and, in the end, even the accumulation of the thriftiest people.

Second, it has been stressed that the proposed theory is framed in a long-run context. Although for many investors the long-run framework (say, decades) may not be very relevant, for some institutional investors the long-run is all that matters. In particular, the economics of pensions could benefit from a better understanding of equity markets in the long-run. A model could be envisaged in which there are two populations: workers and retirees. Workers would have a lower propensity to consume out of wealth (they save for retirement) while retirees (putting bequest motives to one side) would have a higher marginal propensity to consume. Again, what matters for the working of the equity theory is the overall marginal propensity to consume out of wealth. In this model, the overall marginal propensity to consume would move according to the weights of the different groups in total population. If this is the case, a higher proportion of retirees would imply a higher marginal propensity to consume out of wealth and thus a higher equity yield, ceteris paribus. The lower growth rate of the economy due to an aging society would be balanced by a higher marginal propensity to consume out of wealth, so that the effect on the equity yield would be mitigated and thus the consequences of an aging population on the future equity yield would not be as dire as many people suggest.

In addition to the marginal propensity to consume out of wealth, future research should also focus on the importance of changing prices for shareholders' return. The analysis proposed here has focused on steady-state solutions, and so it has missed what happens during the movement from one steady-state to another. At first sight, this seems like a conventional critique of comparative statics, but in the case of equity analysis it has an additional dimension. By definition, valuation metrics are constant in a steady-state. But we know that if there is a change in growth rates, post-Keynesian theory predicts a change in Tobin's *q*. Such a change would have important consequences for the shareholders of the original steady-state, because during the transition to the new steady-state they will observe how the relative value of their wealth changes. Imagine an increase in the growth rate of the economy: shareholders buying shares in the new steady-state will likely enjoy higher equity yields, but the old shareholders will have been suffering the transition from the original position, because an increase in the growth rates will reduce the valuation of their original wealth. Summing up, both transitional dynamics and the speed (and magnitude) of adjustment matters when analysing shareholders' returns.

The rewards of the production process for shareholders in a capitalist economy have always been hailed as one of the main drivers of modern capitalist societies. Understanding what determines and will determine in the future such returns is, therefore, a task that should play a primary role in the research agenda of the economics profession.

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