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A Keynesian contribution to the theory of equity yields

López Bernardo, Javier
Wildauer, Rafael

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Abstract

This paper offers a Keynesian theory, in a Stock-Flow Consistent framework, to understand equity returns and their links with economic growth and consumption decisions from a long-run perspective. The main features of such a theory can be summarised as follows. First, there is a negative relationship between Tobin's *q* 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 is negative (i.e. a 'dilution effect'), which makes the relationship between equity returns and economic growth undetermined *a priori*. Third, consumption decisions emerge as crucial drivers for shareholder profitability in the long-run. And fourth, in the Keynesian theory the equity yield is determined by aggregate demand, and no theory of risk is needed. Finally, the Keynesian theory will be compared against the mainstream financial theory, which features the famous risk-return nexus where asset returns are given by the volatility of the asset respect to consumption. It will be claimed that the use of risk for determining equity returns at the macroeconomic level is problematic, and that depending on the risk definition assumed, the risk-return relationship can be either positive or negative – being thus such a nexus of little theoretical significance and posing serious problems for mainstream finance.

Keywords:

Equity yield, Dividend yield, Tobin's *q*, Stock-flow consistent models, Neoclassical finance.

JEL classification:

E12, E22, E44, G10, O42.

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López Bernardo, J. ✉ Credit analyst at BrightGate Capital. Email: javierlbernardo@gmail.com.
Wildauer, R. Greenwich University.

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Una contribución keynesiana a la **teoría del rendimiento de las acciones**

López Bernardo, Javier
Wildauer, Rafael

Resumen

Este artículo ofrece una teoría keynesiana, a través de un modelo stock-flujo, para entender los rendimientos de las acciones y su relación con el crecimiento económico y las decisiones de consumo desde una perspectiva de largo plazo. Los principales rasgos de dicha teoría se resumen a continuación. En primer lugar, hay una relación negativa entre la *q* de Tobin y el crecimiento económico. En segundo lugar, el efecto del crecimiento económico sobre la rentabilidad por dividendo y el crecimiento de los beneficios es positivo, pero su efecto sobre el crecimiento en el número de acciones es negativo ('efecto dilución'), lo que hace que la relación entre crecimiento económico y el rendimiento de las acciones sea indeterminada *a priori*. Tercero, las decisiones de consumo emergen como un factor crucial de la rentabilidad de los accionistas a largo plazo. Y cuarto, en la teoría keynesiana presentada aquí, la rentabilidad de las acciones viene dada por la demanda agregada, sin tener que recurrir a ninguna teoría del riesgo. Finalmente, dicha teoría keynesiana será comparada con la teoría financiera neoclásica, en la que se enfatiza el famoso vínculo entre riesgo y rentabilidad y en donde los retornos de los activos están dados por sus volatilidades respecto al consumo. Argumentaremos que el uso del riesgo para determinar rentabilidades a nivel agregado es problemático, y que dependiendo de la definición de riesgo asumida, la relación riesgo-rentabilidad puede ser tanto positiva como negativa – siendo de este modo dicha relación de poca significación teórica, lo que presenta serios problemas para la teoría financiera neoclásica.

Palabras clave:

rendimiento de las acciones, rentabilidad por dividendo, *q* de Tobin, modelos stock-flujo consistentes, teoría financiera neoclásica.

I. Introduction

This paper puts forward a Keynesian theory for equity market returns in the long-run. The basis of the theoretical framework is informed by two insights that will be developed here: first, equity yields can largely be explained by the growth rate of the economy and consumption decisions, and second, there is a negative relationship between growth rates and valuation metrics (e.g. Tobin's *q*) at the macroeconomic level. We claim these two insights are crucial steps to understand the workings of equity markets in advanced capitalist economies.

At first sight, the topic seems hardly novel. Empirical studies (benefitted from better and longer data) explaining long-run equity returns have been gaining popularity since the 1970s (Siegel, 1992, 2008), and traditional long-run growth models dealing with rates of profit have been around for more than 70 years (Von Neumann, 1945; Kaldor, 1956; Solow, 1956). Furthermore, new research on psychology applied to economics (Thaler, 2005) has been brought to the table in order to understand short-run market behaviour. Despite of these developments, we argue that the theory is falling behind in some respects the empirical studies. First, by their very atomistic nature, behavioural economics alone cannot offer all the insights on long-run stock market behaviour and its relationship with macroeconomics.[1] Second, in traditional growth models, the profit rate earned by a corporation is invariably assumed to be equal to the equity yield earned by a shareholder – actually, both concepts are almost always used interchangeably.[2] This means that it is implicitly assumed that Tobin's *q* is equal to one, financial markets' valuation is always in line with fundamentals (profitability) and that valuation in financial markets does not matter. However, the empirical evidence shows that profit rates and equity yields can significantly diverge from each other for very long periods of time. Finally, the 'new' microfounded growth models (Lucas, 1978; Mehra and Prescott, 1985) that address equity returns are known for their poor descriptive power and off-the-mark real-world predictions.

The intellectual lineage of the Keynesian theory presented here dates back to Kaldor (1966) and the post-Keynesian 'Cambridge corporate model' literature (Marris, 1972; Moore, 1973; Moss, 1978), which (to our knowledge) represented the first attempt to include equity markets in long-run models.[3] Although the first goal of Kaldor (1966) was to provide theoretical support for Pasinetti's theorem (i.e. work-

[1] See Thaler (2015, pp. 349–352) for a discussion.

[2] We will use throughout the paper the terms 'equity yield', 'equity return' and 'yield' interchangeably. Equity yield should be understood as the ratio of dividends plus capital gains earned by a shareholder over a time period divided by the purchase price. For the sake of exposition, such a time period will be one year in this paper.

[3] More specifically, our Keynesian model could be labelled as 'post-Keynesian', given that it has several features of the post-Keynesian tradition. The main tenets of this tradition can be briefly summarised as: i) the importance of effective demand on economic processes ii) the crucial role of income (and wealth) distribution iii) endogenous money and iv) the important role of finance ('it is not a veil') to understand modern economies. For an extensive treatment of this school of thought, see Lavoie (2014).

ers' savings do not play any role in determining the macroeconomic profit rate) in a corporate economy, subsequent contributions focused on interesting equity valuation issues raised by this framework. In Kaldor's model (Kaldor, 1966), 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 a real world phenomenon, but rather as a set of logical relations that would keep a constant use of resources; '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*).

But the Kaldorian corporate model also offered three new distinctive (and still unexplored) insights: first, there is a *negative long-run relationship at the macroeconomic level between growth and q* (in contrast to firm-level equity models); second, there is a negative relationship between *propensities to consume and q*; and third, q can be different from one even in a long-run equilibrium. These insights will be expanded and grafted into the theory of the yield proposed here.

Such a theory will be presented through a simple post-Keynesian SFC model, tracking sectorial financial linkages and distinguishing market prices from book values – a crucial distinction for a theory of the yield. The main features of the model are: a demand-led economy, an investment function reacting to quantities (capacity utilization) rather than prices, a behavioural distinction between households and firms (usually amalgamated in mainstream models) and an exogenous income distribution. The aim of the model is twofold. First, to derive long-run analytical solutions for the equity yield and q in a stylised framework (explaining, at the same time, some very-often overlooked financial equations that must be fulfilled in *every* economic model), and second, to 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 equity returns.*[4] The focus will be on steady-state positions, and nothing will be said about short/medium-term behaviour. These issues are important, but a lot can be learnt from the study of long-run positions; in this regard, post-Keynesian theory offers an important set of still unexplored insights.

The main propositions of the Keynesian equity yield theory put forward here can be summarised as follows. The 'Kaldorian' negative relations, between q and growth and

[4] The importance of having a correct understanding of equity returns is not fully appreciated in the literature. Such an importance is not only to have an intuition about prospective shareholders' returns, but also because equity returns are important to assess financial stability issues in general, and in particular to understand the pension and insurance businesses – businesses that, due to their size, are crucial in modern financial systems.

q and propensities to consume, are confirmed – as well as the fact that *q* can be different from one even in the long-run. Second, the effect of economic growth on dividend yields and earnings growth is positive, but its effect on the growth of the number of shares is negative (i.e. a 'dilution effect'), which makes the relationship between equity returns and economic growth undetermined a priori. Third, there is a positive relation between propensities to consume and equity yields, thus consumptions decisions (*and wealth holders consumption decisions too*) are a powerful driver of long-run returns. And fourth, post-Keynesian theory offers a distinctive explanation of long-run equity returns, being that these long-run returns are given by effective demand considerations, and not only by agents' risk preferences, as the neoclassical framework suggests (Mehra, 2008).

This last conclusion, that the yield of the overall market is not only the result for 'bearing risk', is in stark contrast to neoclassical finance. There (Mehra and Prescott, 1985; Mehra, 2003, 2006, 2008), the beta of consumption is what determines the riskiness of equity relative to a risk-free asset.[5] 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 must be rewarded if they have to hold the riskier asset. In the theory proposed here, the yield is rather the result of effective demand and of the interaction of several macroeconomic variables which do not bear any relationship with the mainstream concept of volatility. In other words, *in our Keynesian model the traditional concept of risk is thrown away, and the yield can be computed without mentioning it at all – and without referring to a risk-free asset as the point of reference*. Furthermore, we will show that, in any case, risk can be defined 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 and Rosenthal, 2003; Binswanger, 2009), as the probability 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 yields and at the same time a higher probability of going bankrupt. The introduction of different risk measures (e.g. the Gordonian one) has thus harmful consequences for mainstream finance.[6] Therefore, we conclude that very little can be said *a priori* about risk and return at the macro level, and that *a more useful approach is to think in terms of effective demand,* not in terms of risk.

The structure of the paper is as follows. Section 2 reviews some evidence on equity returns, *q* and growth rates. Section 3 discusses several theoretical approaches to ex-

[5] At the micro level, portfolio theory says that the return on an asset is only a function of its beta – i.e. its volatility compared 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 volatility considerations.

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

plaining equity returns, with special reference to the equity-premium literature and the Kaldorian model. In Section 4 a post-Keynesian model is introduced, which will present the features of what we have dubbed the Keynesian theory of the equity yield. Section 5 is a short digression on the risk-return relationship. Section 6 concludes.

2. Equity markets relationships and some empirical evidence

The aim of this section is twofold. First, lay out basic financial concepts that will be needed in the model presented below. The relationships behind these concepts are almost never spelled out in detail in any macroeconomic model, but they are needed if we want to gain a macroeconomic understanding of equity markets. And second, present the empirical evidence from which the post-Keynesian theory has been informed. The focus is on q (used as measure of market valuations) and equity yields.

To begin with, it is important to keep in mind that the value of a share can be obtained with the Gordon dividend model (Gordon and Shapiro, 1956), which says that the value of a stock is the discounted value of all future dividends.

$$P_0 = \frac{\Pi_{d+1}}{\gamma - g_\pi}$$

Where P_0 is the current value of the stock, Π_{d+1} is the dividend expected in the next period, γ is the equity yield (discount rate) and g_π is the dividends growth rate. Dividing both sides by the book value of the equity, BV_0:

$$\frac{P_0}{BV_0} = \frac{r(1-s_f)}{\gamma - g_\pi}$$

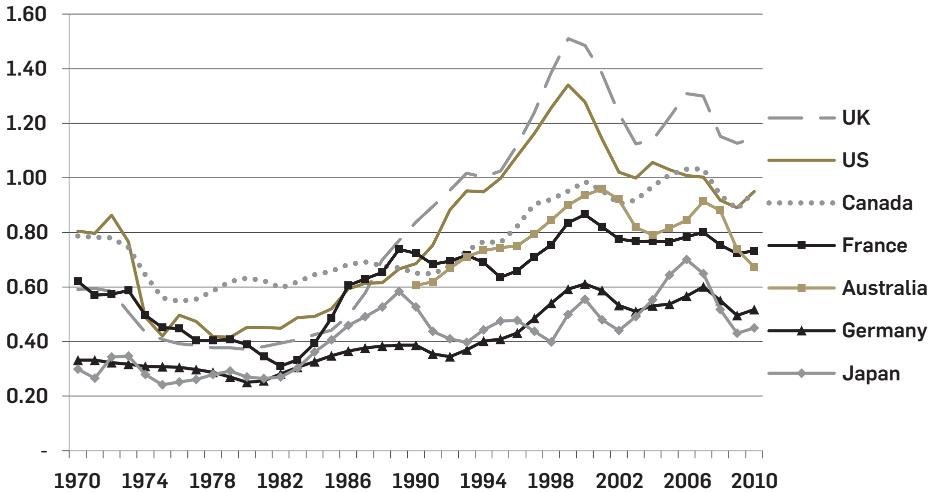
Where r is the return on equity and s_f is the retention ratio. This expression says that the price-book ratio (used here as a rough approximation for q)[7] depends positively on the dividends growth rate, *ceteris paribus*. Higher dividend growth not only leads to higher equity prices in absolute values, but also higher valuation ratios.

At the macroeconomic level, however, valuation metrics do not seem to follow such a tight relationship. Figure 1 shows the evolution of q in a group of developed countries since the 1970s:[8]

[7] q measures the market value *of the firm* (equity plus liabilities) against its replacement cost. The price-book ratio, on the other hand, compares the market value *of the equity* against its book value.

[8] 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 q, but it applies to other financial measures as well.

Figure 1. Tobin's *q* in some developed economies, 1970-2013



SOURCE: PIKETTY (2014)

It is acknowledged that the measure of *q* at the macro level is, operationally speaking, quite difficult. On the one hand, although the market value of quoted companies is easy to get, there are many companies that are not listed, which complicates statisticians' work considerably; 'the value of the shares in closely held firms are under-stated in some countries and time periods' (Piketty and Zucman, 2013, p. 30). On the other hand, the replacement cost of the corporate sector is not directly observable but retrieved through the perpetual inventory method, which reconstructs firms' assets cumulating past investment flows. Although theoretically sound, its implementation has a number of drawbacks: it has to include assumptions about depreciation and obsolescence of capital goods of 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 and Zucman, 2013, p. 29).

Standard neoclassical theory clearly predicts that *q* should be equal to one (Hayashi, 1982), given that values different from one would encourage/discourage investment (managers always maximize shareholders' wealth), thus bringing *q* back to one. However, the empirical evidence since the 1970s seems to be quite uniform across countries: until the 1990s *q*'s were substantially lower than 1, being even as low as 0.3 in Germany and Japan in the 1970s. Since then, and coinciding with a new period of *financialisation* and *lower* growth rates (Stockhammer, 2004; Orhangazi, 2008; Van Treeck, 2008), there has been an upward trend in valuation ratios across countries – with a more pronounced rise in Anglo-Saxon countries. We claim that, contrary to traditional microeconomic valuation models, higher valuations are mainly due to

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lower economic growth.[9] The rationale for that result is that the way the investment-savings equilibrium condition operates is not only through quantities, as in standard Keynesian models, but through asset valuation as well. The negative link between growth and valuation will be incorporated in the post-Keynesian model developed below as one of its main features, helping to understand an important channel of the impact of growth on yields.

To see the relevance of q in determining equity returns, an equation that relates both variables is needed. Kahn (1972) proved that, in equilibrium, q can be expressed as:[10]

$$q = \frac{r-g}{\gamma-g} \tag{1}$$

where γ is the equity yield, r is the return on equity (profits divided by the capital stock) and g is the growth rate of the economy. In other words, q will be equal to one as long as the profit rate earned by corporations is equal to the yield earned by shareholders. Economic theory usually assumes that both concepts are the same, but a glance at the empirical track-record suggests otherwise: low q levels imply that yields have been higher (sometimes much higher) than profit rates. In other words, shareholders have been able to buy businesses consistently at cheap prices; in this regard, Keynes' insight that '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 [...] if it can be floated off on the Stock Exchange at an immediate profit' (1936, ch. 12), has not in general proved to be correct.

Finally, it must be added that although the equity yield can be expressed as a function of q, the profit rate and the growth rate, it can also be decomposed into an identity that shows its drivers over time.[11] Such decomposition breaks down the yield as follows:[12]

$$\gamma = \gamma_d + g_\pi - g_e + \left(\frac{PE}{PE_{-1}} - 1\right) \tag{2}$$

Where γ_d is the dividend yield, g_π is the growth of profits, g_e is the growth of the number of shares and $\left(\frac{PE}{PE_{-1}} - 1\right)$ is the change in the trailing twelve months price-earnings

[9] This may be the main reason, but by no means the only one. Accounting reasons and sociological reasons may have played a role too. 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 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. 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. Another hypothesis, not explored here but that emerges naturally from the model presented below, is that higher levels of income (and wealth) inequality lead to higher valuation ratios through changes in the propensities to consume. See also Piketty and Zucman (2013) for a summary of why q has been less than one.

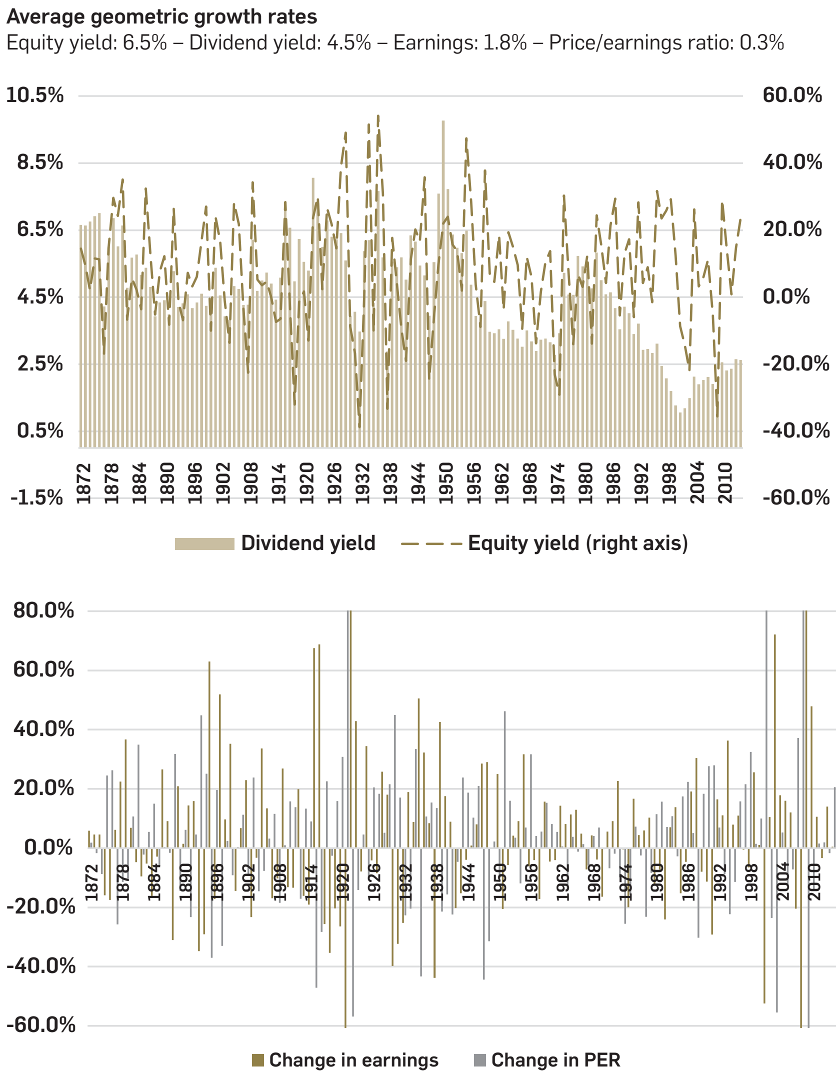
[10] That equilibrium condition has been fairly common in the financial literature, but to my knowledge Kahn was the first one to include it in a macroeconomic discussion of equity markets.

[11] Because it is an identity it both applies to individual assets and whole indices. See Grinold and Kroner (2004) for details.

[12] For the sake of exposition, this is an approximation that drops second-order terms. The approximation is accurate when growth rates in earnings and price-earnings ratios are small (which is usually the case), but not during and after large stock-market corrections.

ratio. Equation (2) is important because it allows us to focus on the long-run determinants of the equity yield. For the US, equation (2) is as follows[13]:

Figure 2. Equity yield and its decomposition, US Real S&P Composite Stock Price Index, 1872-2014



SOURCE: SHILLER (2015)

Although the total yield has been quite volatile in the short-run as the top chart shows, over the long-run shareholders have been able to realise on average a 6.5% return in real terms – well above the average growth rate of the economy. The dividend

[13] The earnings growth is on a share adjusted basis, that is, once the issue or repurchase of shares are taken into account.

yield has been, in quantitative terms, the most important source of equity returns, and until the 1990s, pretty stable – around 4%. Since the 90s, however, more expensive stocks coupled with rising amounts of share buybacks as a way to distribute cash (due to tax purposes) have reduced dividend yields to unprecedented levels. On the other hand, earnings growth is quite volatile over the cycle, but in the long-run has been similar to the growth rate of the US economy – which means that the corporate profit share has been roughly constant. Finally, although changes in valuation multiples (PE here) exert a large influence in the short-run, over the long-run its influence is almost nil; although in recent decades valuations, on average, have been persistently higher, from a very long-run perspective shareholders have not been able to benefit from an ever-increasing 'valuation expansion'.

Summing up, q values have not been equal to one and have displayed an upward trend – so the equity yield has been consistently higher than profit rates. On the other hand, the biggest item in determining equity returns is the dividend yield, which has been relatively stable but has declined in recent decades. The growth in earnings has been, not surprisingly, roughly equal to the growth rate of the economy, and although volatile in the short-run, it has significantly contributed to long-run shareholders' returns. Finally, although it attracts a great hype among market participants, the importance of changes in valuation multiples is dwarfed (unless stocks have been bought at the peak of a bubble) by the other two drivers.

3. Theoretical views on the equity yield

The early analytical growth models developed in the first half of the 20th century were the first ones from which formal insights about shareholders' returns could be derived (Von Neumann, 1945; Kaldor, 1956; 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 q is always equal to one. This simplifying assumption allows these models to proceed very quickly treating indifferently the firms' profit rate (firms' net income divided by total capital at replacement cost) and the equity yield. The concept which is explicitly used in these models is the profit rate. For instance, in Solow (1956), the profit rate is given by the marginal product of capital, which in turn, given the assumption of q equal to one, means that shareholders' returns are equal to the marginal product of capital. Therefore, in these frameworks all the conclusions for the profit rate can be easily transposed to the equity yield.

More recent neoclassical models that provide a framework for the equity yield are the consumption utility models (Lucas, 1978; Breeden, 1979). 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 and 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;[14] 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 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 historically high equity premiums over the risk-free rate (around 6%) was dubbed by them as a 'puzzle'. To understand why, consider 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 can be interpreted as risk aversion: '[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 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 (α) has to be very high in order to accommodate the empirical facts – well above 30.[15] To get an idea of the order of magnitude needed to reconcile theory with facts, Mankiw and Zeldes (1991) provide a clever 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.[16]

[14] 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.

[15] 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).

[16] 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).

Given the low yield (or narrow risk-premium) predicted by the model, several routes have been taken (i.e. 'refinements' to the utility function) to improve the model's poor predictive power.[17] Most of them have addressed the issue changing the structure of preferences, as in the case of models with habit persistence (Constantinides, 1990; Campbell and 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 differentials between trading stocks and bonds (Heaton and Lucas, 1996) or by the 'Junior can't borrow effect' (Constantinides *et al*., 2002), where younger generations do not have access to borrowing 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 equity premium puzzle debate, so the solution is aimed to explain the gap of equity returns against bonds, rather than the level of equity returns themselves. However, the way the utility function is defined departs radically from the neoclassical formulation. In Benartzi and Thaler (1995), the first paper along behavioural lines, the utility function is based on a combination of prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992), mental accounting (R. 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, the evaluation period of their portfolios matters; short-term series for stocks will be more 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. Benartzi and Thaler 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, behavioural theory would explain the historical movements in the equity yield by changes

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

in the frequency of portfolio revaluation.[18] Barberis *et al.* (2001) build upon this framework but include 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 equity returns. Although some considerations are put forward by Minsky (2008a, 2008b) in his analysis of business cycles, they are aimed to explain the feedback mechanisms by which the economy moves from hedged positions to Ponzi positions, rather than to explain the source of equity returns. However, the Kaldorian model (Kaldor, 1966) did indirectly provide a determination of the yield. A detailed and updated explanation of the Kaldorian model has been recently provided by López Bernardo *et al.* (2016), so only the essentials will be reviewed here.

Unlike Solow's (1956) growth model, where the adjustment to full-employment output occurs through changes in the capital/labour ratio, in Kaldor's (1966) long-run model such an 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. Tobin's q 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. In this way, changes in Tobin's q do not only ensure equilibrium in the securities market, but also ensure full-employment output.

In order to retrieve the solution for the yield in the Kaldorian model, the solutions for the profit rate (i.e. Cambridge equation) and q are:

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

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

Where r is the rate of profit (total profits divided by capital at replacement cost), g is the natural growth rate of the economy in the steady state, f is the proportion of investment financed by new shares, s_f is the firms' retention ratio, s_h is the propensity

[18] 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 us 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.

to save out of all types of income (wages, dividends and capital gains), κ is the output-capital ratio and star variables denote steady-state solutions. Plugging both solutions into equation (1) yields:

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

Several important insights from the Kaldorian model can be drawn – results that have not received much attention so far by the fact that the yield was not explicitly presented. First, the yield is the result of several decisions jointly taken by households and firms. Second, the elements of the Kaldorian model (unlike the neoclassical concepts of the discount factor and risk aversion) can be directly observed. Third, the model features the insight that shareholders can determine their own returns through consumption (lower values for s_h are associated with a higher equity yield). And fourth, and most important, the equity yield is not a reward for bearing risk, but rather a macroeconomic outcome. In fact, in contrast both to the capital asset-pricing model (CAPM), where the beta of the asset is all what is needed for the determination of returns, and the neoclassical consumption model (where the beta of consumption is all what is needed), no risk measure is needed here to say something about the equity yield. Even more, in the Kaldorian model (and in the 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 independently from the risk-free asset, whatever asset is chosen to be the risk-free asset.[19] In summary, the so much beloved concept in mainstream finance of 'reward for bearing risk' is irrelevant in the Kaldorian framework. Rather, it is the other way round: once the yield is determined at the macro level, individual investors take their portfolio decisions and calculate how much 'risk' they want to assume for a given state of the market.[20]

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 not a particular theory backing the results (Arnott and Bernstein, 2002; Grinold and Kroner, 2004; Grinoldm *et al*., 2011). The main aim of these 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.

[19] In the Kaldorian model there was not an interest-bearing asset, but the equity yield could still be computed. In the model proposed below, the government issues currency to finance the deficits, so as in Kaldor's, no interest-bearing asset will be assumed here.

[20] In section V some additional remarks will be made about the meaning of risk at the macro level.

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4. A Keynesian model

This section proposes an analytically tractable post-Keynesian model. Its purpose is twofold: first, show analytically in a stripped-down framework the negative link between growth and q, and second, study the impact of growth and propensities to consume on equity yields. Although these two issues may seem to be unrelated at first glance, they are not: if one wants to say something about yields, a valuation theory is needed first – because the yield is largely determined by the prices at which stocks are acquired. The model is considered to be Keynesian (post-Keynesian) because it is demand-led, distribution is exogenous, households and firms have different motivations (crucially, firms are independent entities that have to decide their dividend policy and how to finance investment) and investment is driven largely by animal spirits. The model takes inspiration from Serrano (1995), Allain (2015), Lavoie (2016), Hein (2016) and the supermultiplier literature in assuming an autonomous non-capacity expenditure component that in our case is government expenditure (as in Allain, 2015, and Hein, 2016), which in the steady-state determines the growth rate of the economy.

First, the accounting structure and the behavioural assumptions are presented, and afterwards the steady-state solutions and the implications for the equity yield are discussed. As we said, although it would be useful to discuss short-term and medium-term behaviour, for the sake of space such discussions will not be carried out. These discussions can be found, however, in other papers of the post-Keynesian tradition.[21]

4.1. 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 1 – 3.

Table 1 presents the balance-sheet, showing the stocks and their distribution across sectors. The balance-sheet is similar to the one used by Hein (2016), although there are some differences. Three sectors and three assets are assumed here, whereas Hein (2016) follows the Kaleckian tradition and splits the household sector into workers and rentiers. Firms invest in real capital, which is financed by new shares and by retained profits (Hein (2016) assumes all profits are handed out as dividends). For simplification, firms do not hold any financial assets. On the other hand, households accumulate either equities or currency – so they are not forced to save everything in equities, as in Kaldor's model. Government covers its deficit by issuing currency, which

[21] See Hein *et al.* (2011), Lavoie (2014), Hein (2014) and Lavoie (2016).

is a non-interest bearing asset. In Godley-Lavoie's (2007) terminology, there is no credit in the economy, and the only money in circulation is 'outside money'.

● **Table 1. Balance-sheet matrix**

Balance-sheet	Households	Firms	Government	Σ
Real capital		$+K$		$+K$
Equities	$+p_e.e$			$+p_e.e$
Currency	$+M_h$		$-M$	0
Net worth	$-V_h$	$-V_f$	$+-V_g$	$-(V_h+V_f-V_g)$
Σ	0	0	0	0

Table 2 gathers the flows of the economy. Households consume and their disposable income is made up of wages and dividends, while their savings can be allocated every period to equities and currency. Firms sell their products and pay wages, dividends and issue new shares. Government has to decide its government expenditures, and for simplicity taxes on income have been assumed away.

● **Table 2. Flow matrix**

Transactions-flow matrix	Households	Firms		Government	Σ
		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	$+\Pi_d$	$-\Pi$	$+\Pi_r$		0
Change in currency	$-\Delta M_h$			$+\Delta M$	0
Change in equities	$-p_e.\Delta e$		$+p_e.\Delta e$		0
Σ	0	0	0	0	0

Finally, Table 3 shows the capital gains that take place in this economy. Due to its simplicity, the only assets that can suffer revaluations 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 3. Revaluation matrix**

Revaluation matrix	Households	Firms	Government	Σ
Equities	$+\Delta p_e.e$			$+\Delta p_e.e$
Σ	$+\Delta p_e.e$	0	0	$+(\Delta p_e.e)$

4.2. The model

4.2.1. Firm behaviour

The main characteristics of firms are as follows. Equation (5) features a Kaleckian investment function, which depends on gr_0 (interpreted either as Keynesian animal spirits or as a secular growth rate in sales) and the difference between the target and the current level of capacity utilization – here taking the level of the output/capital ratio as a proxy. Following also the Kaleckian framework, income distribution is exogenous (8) and dividend policy and new equity issuance are given by equations (11) and (12), respectively. Unlike Kaldor (1966), we assume that the decision to issue shares is the residual –new capital will only be issued if there are not enough retained profits to finance accumulation.

$$Y = C + I + G \tag{3}$$

$$I = gr_i \, . \, K_{-1} \tag{4}$$

$$gr_i = g + gr_1.(\kappa - \kappa^t) \tag{5}$$

$$K = K_{-1} + I_d \tag{6}$$

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

$$WB = \varphi \, . \, Y \tag{8}$$

$$\Pi = Y - WB \tag{9}$$

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

$$\Pi_r = s_f \, . \, \Pi \tag{11}$$

$$p_e . \Delta e = I - \Pi_r \tag{12}$$

4.2.2. Household behaviour

Households' wealth (17) is increased every period through savings, $YD - C$, and capital gains accrued to shares. Households consume (13) every period out of their current income and the lagged level of wealth. Unlike Kaldor (1966) and Lavoie and Godley (2001), households do not consume out of capital gains, but rather out of wealth. Finally, equations (16) and (17) establish that households follow a simple constant policy for asset allocation, given by λ. A more sophisticated Tobinesque approach could have been included, but this simplification will help us to find more tractable steady-state solutions.

$$C = \alpha_1 . YD + \alpha_2 . V_{h-1} \tag{13}$$

$$YD = WB + \Pi_d \tag{14}$$

$$M_h = V_h - p_e.e \tag{15}$$

$$\frac{p_e.e_h}{V_h} = \lambda \tag{16}$$

$$\Delta V_h = YD - C + CG \tag{17}$$

4.2.3. Government behaviour and financial markets

Government behaviour is highly stylised: taxes are assumed away and government expenditure grows at a constant rate (18). The resulting deficit is entirely financed issuing new currency (eq.19). Finally, equations (20) to (22) describe financial market dynamics. Equation (22) shows equity capital gains whereas equations (20) and (21) are simply definitions of q and the equity yield, respectively. The yield should be understood, of course, as the total return (dividends plus capital gains) earned by an investor over a year.

$$G = G_{-1}.(1+g) \tag{18}$$

$$\Delta M = G \tag{19}$$

$$q = \frac{p_e.e}{K} \tag{20}$$

$$\gamma = \frac{\Pi_d + CG}{p_{e-1}.e_{-1}} \tag{21}$$

$$CG = e_{-1}.(p_e - p_{e-1}) \tag{22}$$

4.3. 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. Special emphasis will be placed on the steady-solutions for q and γ . For γ qualitative solutions will be stressed. We use the notion of a steady-state as a position of the economy where all stocks and flows grow at the same rate – in our case, at the rate g. Therefore, in our model, the growth of every part of the system is governed by the growth of government expenditures. Additionally, in a steady-state position every ratio must be constant, which for us crucially means that in a steady-state all valuation metrics are constant, hence $\Delta q = 0$.

We deal first with the 'real side' of the model. Starting from equations (3) to (12), and remembering that in steady-state all variables grow at the same rate and that expectations are fulfilled, the solutions are as follows:

$$\kappa^* = \left(\frac{Y}{K_{-1}}\right)^* = \kappa^t \tag{23}$$

$$\pi^* = \left(\frac{\Pi}{Y}\right)^* = (1-\varphi) \tag{24}$$

$$r^* = \left(\frac{\Pi}{K_{-1}}\right)^* = (1-\varphi)\kappa^t \tag{25}$$

$$\left(\frac{p_e \cdot \Delta e}{K_{-1}}\right)^* = \left(\frac{I - \Pi_r}{K_{-1}}\right)^* = g - (1-\varphi)\kappa^t s_f \tag{26}$$

$$f^* = \left(\frac{p_e \cdot \Delta e}{I}\right)^* = 1 - \frac{(1-\varphi)\kappa^t s_f}{g} \tag{27}$$

Equations (26) and (27) show that, unlike in Kaldor (1966), the issue of new shares in the steady-state depends positively on the growth rate of the economy. Higher growth rates lead to a higher share of investment financed by new issues.

More solutions concerning the real side of the economy can be obtained:

$$\left(\frac{G}{M_{-1}}\right)^* = g \tag{28}$$

$$\left(\frac{YD}{K_{-1}}\right)^* = \kappa^* - r^* s_f = \kappa^t [1 + s_f (\varphi - 1)] \tag{29}$$

Equation (28) is the stock-flow norm for government accounts in the steady-state, whereas equation (29) can be obtained from (23) and the fact that the only difference between GDP and household disposable income is firms' retained profits.

Next a solution for q will be obtained. But first some algebraic manipulations are needed. To start, the wealth-capital ratio is expressed as a function of the disposable income to wealth ratio. Plugging the consumption function (13) into the wealth accounting identity (17) gives us:

$$\begin{aligned} V_h = V_{h-1} + (YD - C) + CG \\ = (1-\alpha_1) YD + (1-\alpha_2) V_{h-1} \\ + CG \end{aligned}$$

$$g + \alpha_2 - (1-\alpha_1)\left(\frac{YD}{V_{h-1}}\right)^* = \left(\frac{CG}{V_{h-1}}\right)^* \tag{30}$$

Second, considering that $\left(\frac{p_e \cdot e}{V_h}\right)^* = \lambda$, we can express q as:

$$q^* = \left(\frac{p_e \cdot e}{V_h}\right)^* \left(\frac{V_h}{K}\right)^* = \lambda \left(\frac{V_h}{K}\right)^* \tag{31}$$

Third, the ratio of capital gains to the capital stock is needed. It must be said that the importance of this equation for a fully-fledged SFC model can hardly be underestimated, because it relates a revaluation variable (capital gains) to a stock variable, but for some reason such a relationship has not been used so far in the SFC literature. This expression was first presented by Moore (1973) in a discussion of the Cambridge corporate model in a levels formulation, and it is presented here dividing both sides of $CG^{*}=I(q^{*}-f^{*})$ by K_{-1}:

$$\left(\frac{CG}{K_{-1}}\right)^{*}=g\,(q^{*}-f^{*}) \tag{32}$$

Multiplying both sides of equation (30) by $\left(\frac{V_{h-1}}{K_{-1}}\right)$ and using (31) and (32) leads to:

$$(g+\alpha_2)\left(\frac{V_{h-1}}{K_{-1}}\right)-(1-\alpha_1)\left(\frac{YD}{K_{-1}}\right)^{*}=\left(\frac{CG}{K_{-1}}\right)^{*}$$

$$(g+\alpha_2)\left(\frac{q^{*}}{\lambda}\right)-(1-\alpha_1)\,(u^{*}-r^{*}s_f)$$
$$=g\,(q^{*}-f^{*})$$

Solving for q:

$$q^{*}=\frac{\kappa^{t}\{1-\alpha_1\,[1-s_f\,(1-\varphi)]\}-g}{\dfrac{g+\alpha_2}{\lambda}-g} \tag{33}$$

The importance of the result is that if a fixed dividend policy, fixed preferences for households' portfolio decisions and the previous discussed consumption function are assumed, it can be shown that q will depend negatively in the long-run on the growth rate of the economy and on the marginal propensities to consume. These are Kaldor's two original results.[22] However, unlike in Kaldor's model, dividend policy matters, because now the equilibrium level of q depends on the retention ratio. Finally, q also depends on the functional income distribution. It is worth stressing again that even in this long-run equilibrium there is no mechanism to ensure that q will tend to one: firms' decisions on pricing, dividend policy and capital accumulation, on the one hand, and households' consumption and portfolio decisions, on the other, ensure that q will be unity in the long-run only by fluke.[23] The partial derivatives of the previous expressions are as follows:[24]

$$\frac{\partial q}{\partial g}=\frac{-z-\mu\left(\frac{1}{\lambda}-1\right)}{z^{2}}<0 \tag{34}$$

$$\frac{\partial q}{\partial \alpha_1}=\frac{\kappa^{t}[s_f\,(1-\varphi)-1]}{z}<0 \tag{35}$$

[22] $\kappa^{t}\{1-\alpha_1\,[1-s_f\,(1-\varphi)]\}$ must be greater than g in order to keep economic meaning.

[23] The fact of q being different from one in the long-run has serious implications for the Modigliani-Miller theorems. See López Bernardo *et al.* (2015) for an explanation.

[24] Let $\frac{g+\alpha_2}{\lambda}-g$ be denoted by z and $\kappa^{t}\{1-\alpha_1\,[1-s_f\,(1-\varphi)]\}-g$ by μ.

$$\frac{\partial q}{\partial \alpha_2} = \frac{-\mu \frac{1}{\lambda}}{z^2} < 0 \tag{36}$$

$$\frac{\partial q}{\partial \lambda} = \frac{\mu (g+\alpha_1)}{z^2 \lambda^2} > 0 \tag{37}$$

$$\frac{\partial q}{\partial s_f} = \frac{\kappa^t \alpha_1 (1-\varphi)}{z} > 0 \tag{38}$$

$$\frac{\partial q}{\partial \varphi} = \frac{-\kappa^t \alpha_1 s_f}{z} < 0 \tag{39}$$

At the risk of being repetitive, q depends negatively on the growth rate of the economy and on the propensities to consume. But there are also some other results. First, q depends negatively on the wage share – so the intuition that higher profit shares lead to higher valuations is confirmed here. Second, the result that higher values of λ push valuation ratios up is also intuitively obvious. And finally, higher retention ratios lead to higher valuations. This result is at variance with mainstream finance, which says that the value of a company does not depend on dividend policy – one of the Modigliani-Miller propositions. Here, however, firms' dividend policy has a permanent effect on valuations even in the long-run.

Moving to the equity yield, in order to understand what determines long-run yields, we need first the partial derivatives of the wealth-capital ratio. Such a ratio can be expressed as times the inverse of the share of equities in households' total wealth:

$$\left(\frac{V_h}{K}\right)^* = \left(\frac{V_h}{p_e \cdot e}\right)^* = \left(\frac{p_e \cdot e}{K}\right)^* = \frac{q^*}{\lambda} = \frac{\kappa^t \{1-\alpha_1 [1-s_f (1-\varphi)]\} - g}{g(1-\lambda)+\alpha_2} \tag{40}$$

With the partial derivatives respect to the growth rate and the marginal propensities to consume being:

$$\frac{\partial \left(\frac{V_h}{K}\right)^*}{\partial g} = \frac{-g(1-\lambda)-\alpha_2-\mu(1-\lambda)}{[g(1-\lambda)+\alpha_2]^2} < 0 \tag{41}$$

$$\frac{\partial \left(\frac{V_h}{K}\right)^*}{\partial \alpha_1} = \frac{\kappa^t [s_f (1-\varphi)-1]}{g(1-\lambda)+\alpha_2} < 0 \tag{42}$$

$$\frac{\partial \left(\frac{V_h}{K}\right)^*}{\partial \alpha_2} = \frac{-\mu}{[g(1-\lambda)+\alpha_2]^2} < 0 \tag{43}$$

The solutions for the equity yield can finally be obtained. Such a solution could be retrieved using equation (1), because we have the steady solutions for the profit rate and for q , but that would be long and hardly informative. Instead, equation (2) is used, repeated here for convenience:

$$\gamma = \gamma_d + g_\pi - g_e + \left(\frac{per}{per_{-1}} - 1\right) \quad (2)$$

The question is then how every component will react to a change in the growth rate of the economy. 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 – no return coming from revaluations will accrue to shareholders in steady-state. And as it was explained in Section 2, this result is not a bad approximation at all to what shareholders have been getting from 'revaluations in the ratios' over long investment periods.

On the other hand, it is clear that the growth in earnings, g_π , has to be equal in steady-state to the growth of the economy, so:

$$g_\pi^* = g$$

We argue that the most important component to understand the equity yield in the long-run is the dividend yield, for two reasons. First, it was explained in Section 2 that in the long-run the dividend yield has been the most powerful driver for shareholders' returns. And second, valuation issues are crucial to understand the dividend yield – so the previous conclusions about q will be useful here. The dividend yield can be retrieved as follows:

$$\gamma_d = \left(\frac{\Pi_d}{p_e e_{-1}}\right)^* = \left(\frac{\Pi_d}{K_{-1}}\right)^* \left(\frac{V_{h-1}}{p_e \cdot e_{-1}}\right)^* \left(\frac{K_{-1}}{V_{h-1}}\right)^* = \frac{\kappa^t (1-\varphi)(1-s_f)}{\lambda} \left(\frac{K_{-1}}{V_{h-1}}\right)^*$$

Because the dividend-capital ratio, $\left(\frac{\Pi_d}{K_{-1}}\right)^*$, and the inverse of the equity share in total wealth, $\left(\frac{V_{h-1}}{p_e \cdot e_{-1}}\right)^*$, do not depend either on the growth rate nor on the propensities to consume, the only effect of these variables on the dividend yield can be through the capital-wealth ratio. The partial derivative respect to the growth rate and the propensities to consume will be the opposite of (41), (42) and (43):

$$\frac{\partial \gamma_d}{\partial g} > 0 \quad (44)$$

$$\frac{\partial \gamma_d}{\partial \alpha_1} > 0 \quad (45)$$

$$\frac{\partial \gamma_d}{\partial \alpha_2} > 0 \quad (46)$$

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 earnings growth (firms' retention ratio is fixed) and, *most importantly*, it reduces the valuation of the assets through the negative relation between the growth rate and, so even for a given volume of dividends the dividend yield would be higher because assets are now cheaper at market prices. The same reason applies to the marginal propensities to consume.

Finally, coming to the last component of Equation (2), the growth in the number of shares, g_e , can be expressed as:

$$g_e^* = g - g\left(1 - \frac{f^*}{q^*}\right) = \frac{g.f^*}{q^*}$$

And it has been shown that $\frac{\partial f}{\partial g} > 0$ and $\frac{\partial q}{\partial g} < 0$, so:

$$\frac{\partial g_e}{\partial g} > 0 \tag{47}$$

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. But also more shares are needed because they are issued at lower q values – because growth rates have a negative impact on q.

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

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

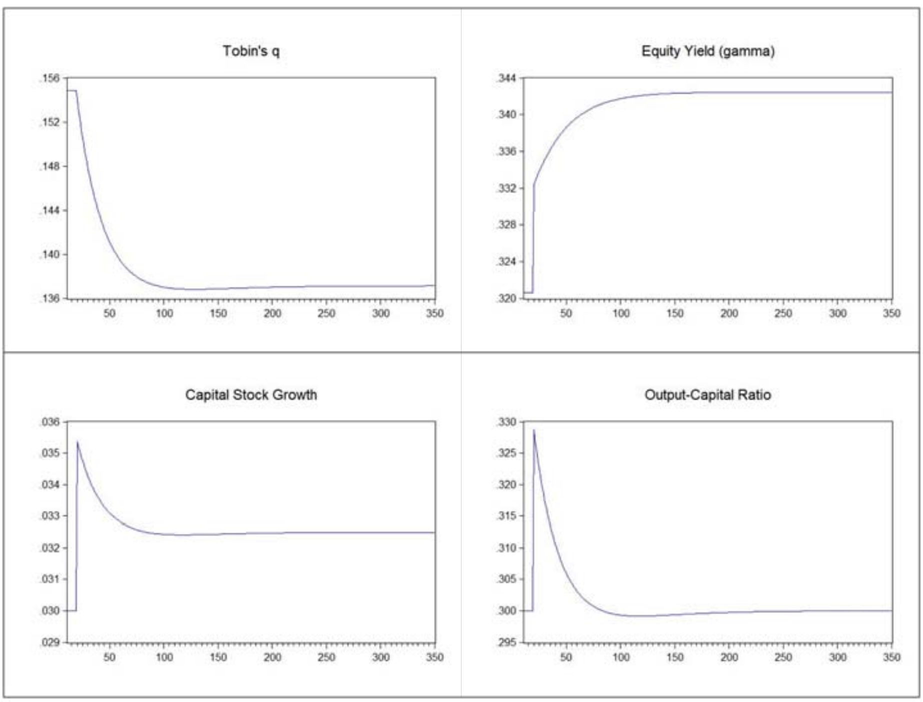
A priori, a change in the growth rate has an undetermined effect on the equity yield: on the one hand, higher growth rates boost equity returns through higher dividend yields and earnings growth, but they also drag shareholder profitability through a dilution effect – a higher growth in the number of 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.

4.4. Simulation analysis

This section carries out simulations based on a plausible set of parameter values to demonstrate the model's stability. Since the aim of the paper is to investigate the impact of growth rates and consumption decisions on equity returns, two simulations will be conducted: first, a change in the growth rate of the economy, and second, a change in the marginal propensity to consume out of wealth. The simulations will focus on the evolution of Tobin's q and equity returns, and as such they do not intend to be comprehensive, but rather to show that the new steady-state solutions are stable under a reasonable set of parameters.

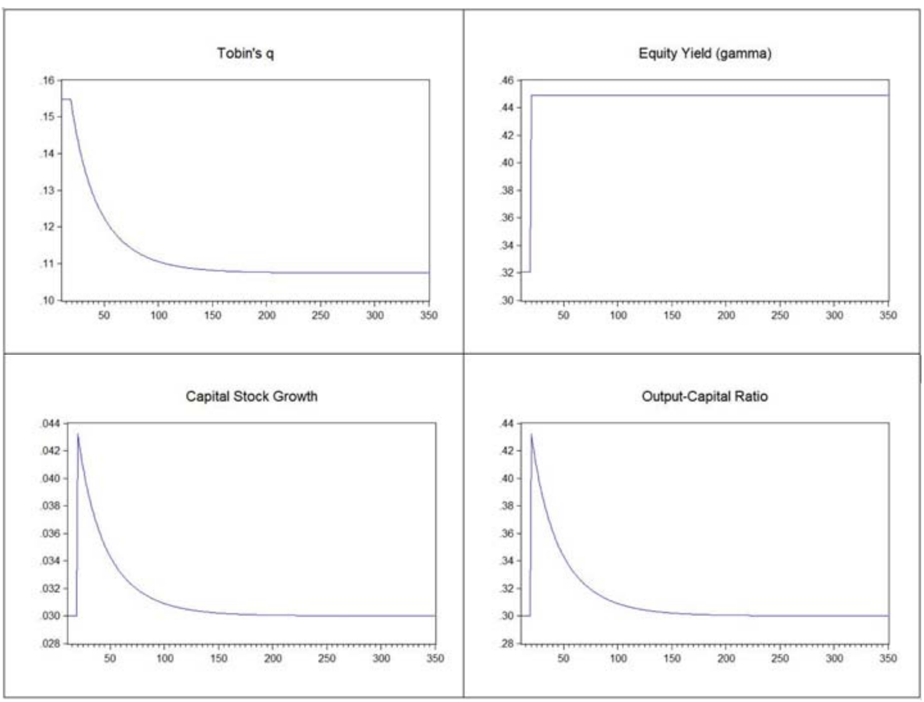
The parameter values are as follows: The target output-capital ratio κ^t is 0.3, the investment sensitivity to deviations from that target ratio gr_1 is 0.1, the wage share φ is 0.75, the retention ratio s_f is 0.39, the propensity to consume out of income α_1 is 0.9, the propensity to consume out of wealth α_2 is 0.05, the proportion of household wealth held in equities λ is 0.4 and the growth rate of the economy, which is given by the growth rate of government expenditures, g is 0.03. In addition to the steady-state solutions, we choose the following starting values: the level of GDP $y = 100$ and the number of shares $e = 10$.

■ Figure 3. **Simulating an exogenous and permanent increase in the growth rate from 3% to 3.25%**



Starting from the steady state, the first scenario simulated is an exogenous increase in the growth rate of the economy from 3% to 3.25%. Figure 3 shows the response of the variables in which we are interested: First, in the top left, the response of Tobin's q. As already derived theoretically, a higher growth rate results in lower valuations. The new steady state level of q stabilizes around 0.13, after gradual decline from the initial steady state of 0.15. The mechanism at work is that firms finance part of their higher investment due to increased government spending by issuing new shares. The combination of the newly issued shares with the initial growth in share prices would lead households to end up holding more than 40% (λ) of their wealth in shares. Thus, due to their given portfolio preferences prices, share prices must decline in order to be compatible with households' portfolio decisions. The equity yield, in the upper right quadrant of Figure 3, increases from initially 0.32 and stabilizes at approximately 0.34 after about 150 periods. Higher yields in response to an increase in the growth of the economy represent strong dividend growth coupled with slower share price increases and lower valuations. The lower part of Figure 3 shows the growth rate of the capital stock (bottom left) and the output-capital-ratio (bottom right). The capital stock growth rate increases from the previous steady state of 3%, after an initial overshoot, to the new steady state of 3.25%. The output-capital ratio which is used as a proxy for capacity utilization overshoots from its initial steady state of 0.3 before the government spending shock but stabilizes again at 0.3 after about 200 periods. Overall, the simulation confirms the theoretical results derived and shows that for the given set of parameters, the model returns to a steady state after the system is exposed to a permanent shock.

■ Figure 4. **Simulating an exogenous and permanent increase in the MPC out of wealth from 5% to 8%**



The second simulation presented in Figure 4 shows the model response to a permanent increase in the propensity to consume out of wealth from 5% to 8%. In response to

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this change, Tobin's q falls from its initial steady state value slightly larger than 0.15 to a new steady state of about 0.11 after 200 periods. The mechanism at work is that firms increase their capital spending in response to higher consumption and higher capacity utilization in the form of the output-capital ratio (bottom right). These additional investments are partially financed by issuing new shares which, as in the previous scenario, households are only willing to hold at lower share prices in order to sustain their portfolio allocation of keeping 40% of their wealth in shares. The lower share prices bring down Tobin's q. The effect on the equity yield is an immediate increase from approximately 0.32 to a new steady state value of approximately 0.45, again due to lower share price growth combined with a jump in dividends. The growth rate of the capital stock (bottom right) returns to its initial steady state value of 3% after overshooting in response to higher consumption as does the capital-output-ratio. This simulation also demonstrates that the model is stable and returns to a steady state after a permanent change in the propensity to consume out of wealth.

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

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 households and shareholders' consumption decisions) and there was little room for 'a premium of bearing risk', as in mainstream finance. In this section, we will explain why the introduction of a risk-return trade-off at the macro level is problematic, being thus a serious analytical problem 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 hitherto 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 in the early days of mainstream finance and especially for exercises in constrained optimization. At the macro level, in the consumption-utility models reviewed in Section 3, the volatility chosen is the volatility of an asset with respect to consumption. But the idea in both cases is the same: 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 to them is present and future consumption and, more importantly, that the only way to obtain utility is through consumption, then the definition of risk as volatility may still 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 and Rosenthal, 2003). In a capitalist system, firms strive to maximise the probability of long-run survival.[25] 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 period of time, with a large fraction of the capitalists actually going bankrupt' (Gordon, 1987, p. 533). Through numerical simulations (Gordon and Rosenthal, 2003), they showed that firms can only attain reasonable prospects of survival through a 'high rate of net investment, making the gross profit on production greater than the sum of the expenditures on administration, other non-production activities, investment and dividends' (Gordon and Rosenthal, 2003, p. 43).[26] In summary, higher growth rates increase the probability of long-run survival and reduce the risk of going bankrupt.

Gordon's framework could be conceptually grafted into the Keynesian framework presented here. In our model, the relationship between growth and equity yield in the steady-state is unclear, although as we argued there are good reasons to think that such a relationship is positive. If this is the case, the introduction of a Gordonian definition of risk in a post-Keynesian framework leads to counterintuitive results from a mainstream-finance point of view. 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 shareholder class 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 Keynesian framework, the system will still be ruled by the level

[25] 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 costs (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.

[26] 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 structure of the model in order to endorse the Gordonian definition of risk.

of effective demand – in other words, the risk story will be an important one for individual shareholders and firms, but returns will still be crucially determined at the macro level by effective demand considerations.

As a final thought, it may be worth pointing out that this 'risk-definition problem' 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), just to point out a classic example, 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, rather than interpreting the results as the outcome of market mispricing.[27] 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?'*

6. Conclusions

This paper has proposed a novel Keynesian theory that explains the return of equity markets in the long-run. Its main features can be summarised as follows. First, there is a negative relationship between q and 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 is negative, which makes the relationship between equity returns and

[27] 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).

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economic growth undetermined a priori. Third, consumption decisions (especially shareholders' own consumption decisions) emerge as crucial drivers for long-run shareholder returns. And fourth, in the Keynesian theory the yield is determined by aggregate demand, and no theory of risk is needed. These conclusions are the natural outcome of the Kaldorian adjustment process, through changes in stock market valuations, to attain full-employment output: Tobin's q has to adjust if corporations' desire for growth and households' desire to consume have to be reconciled.

At this point, we would like to point out some future directions of research that were outside of the scope of this paper, but that nevertheless can be considered as natural directions to follow. The propensity to consume out of wealth plays a crucial role in this framework. It does not only influence q, but it also influences the equity yield. However, it has been assumed that it is exogenous. This is a simplification. In particular, there are two possible ways to integrate an endogenous propensity to consume out of wealth and giving at the same time some additional insights.

First, one could think of a dual class model, splitting our homogenous household sector into two classes, capitalists and workers. Because every 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 anymore. It must be noted here that what matters for our theory is not the propensity to consume of some class, but of the whole economy. This extension could shed light on the link between wealth inequality and asset returns. Contrary to what many economists seem to think, a lower propensity to consume out of wealth due to higher wealth inequality (given the 'Keynesian' assumption that wealthier people tend to consume less out of their wealth) would 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, at 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 a long-run period (say, decades) may not be very relevant, for some institutional investors the long-run is all that matters. In particular, the economics of pensions (and insurance) could benefit from a better understanding of equity markets in the long-run. A model could be envisaged such as there are two populations: workers and retirees. Workers would have a lower propensity to consume out of wealth (they save for retirement) while retirees (bequests motives aside) would have a higher one. Again, what matters for the workings of the theory is the overall marginal propensity to consume out of wealth. In this model, it 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 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 the impact of lower growth on yields would not be so strong and thus the consequences of an aging population on future yields would not be as dire as many people think.

At another, more philosophical level, the 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 policiy becomes paramount, not only for income and employment, but for shareholders' returns as well. In this regard, the proposed theory is an optimistic one: Effective-demand management in the long is not only beneficial for workers and the captains of industry, but for shareholders as well.

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