

Wage-led versus profit-led demand: what have we learned? A Kalecki-Minsky view

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Abstract

The Bhaduri-Marglin model has become a widely used workhorse model in heterodox macroeconomics and it has given rise to two dozen or so empirical studies, which at times have given conflicting results. Neo-Kaleckians and neo-Goodwinians have applied different estimation strategies, with the former typically estimating behavioural equations, while the latter have often used reduced-form demand equations. Further differences include the lag structure, the output measure, the control variables and the sample. The paper, firstly, tries to clarify the terms of the debate. While neo-Kaleckians interpret the model as medium-term, partial-equilibrium goods market model, neo-Goodwinians are interested in the interaction of demand and distribution and regard the model as a long-run model with short-run cycles. Second, we elaborate a Kalecki-Minsky view of the economy as characterised by a wage-led demand regime and cycles driven by financial fragility. Many of the reported results may suffer from omitted variable bias as they do not include financial control variables. At least in the recent past, financial effects on demand have been much larger in size than distribution effects. A wage-led Minsky model with reserve army distribution function gives rise to pseudo-Goodwin cycles.

Keywords: wage-led growth, Bhaduri-Marglin model, Post Keynesian Economics, Minsky cycles

JEL codes: B50, E11, E12, E20

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Introduction

The Bhaduri-Marglin model has become a widely used workhorse model in heterodox macroeconomics. It has proven fruitful in two different contexts. First, there is a economic policy-oriented debate, which seeks to establish the conditions under which a wage-led growth policy may be appropriate and how it can be formulated (e.g. Lavoie and Stockhammer 2013, Stockhammer and Onaran 2013). Second, there is a more theory-oriented debate between neo-Kaleckians and neo-Goodwinians. Both have generalised and reformulated their arguments in Bhaduri-Marglin frameworks and thus, in principle, ought to be comparable now. However, they have used the model for somewhat different purposes, which has given rise to potential misunderstandings. This paper contributes to the second debate.

The Bhaduri-Marglin model has given rise to two dozen or so empirical studies, which at times have given conflicting results. Neo-Kaleckians and neo-Goodwinians have applied different estimation strategies, with the former typically estimating behavioural equations, while the latter have often used reduced-form demand equations. Further differences include the lag structure, the output measure, the control variables and of course the sample.

The paper has a twofold aim. First, we try to clarify the terms of the debate. We argue that while neo-Kaleckians interpret the model as medium-term, partial-equilibrium goods market model, neo-Goodwinians are interested in the interaction of demand and distribution and regard the model as a long-run model with short-run cycles. Second, we elaborate a Kalecki-Minsky view of the economy as characterised by a wage-led demand regime and cycles driven by financial fragility. We argue that many of the reported results may suffer from omitted variable bias as they do not include financial control variables. We summarise evidence that, at least in the recent past, financial effects on demand have been much larger in

size than distribution effects. We also argue that a wage-led Minsky model with reserve army distribution function does give rise to pseudo-Goodwin cycles.

The paper is structured as follows. Section 2 outlines the Bhaduri-Marglin model. Section 3 gives some theoretical context for the neo-Kaleckian and the neo-Goodwinian interpretation of the Bhaduri-Marglin model. Section 4 reviews the existing empirical literature. Section 5 summarises some recent empirical findings on the relative size of distributional and financial effects on demand. Section 6 outlines a Minsky model with a wage-led demand regime and provides evidence that it generates pseudo-Goodwin cycles. Section 7 concludes.

The Bhaduri-Marglin model

This section will briefly present the Bhaduri and Marglin (1990) model. While in the classical Kaleckian model (for a closed economy) an increase in the wage share will always lead to an increase in demand (Kalecki 1954, Blecker 1999), the Bhaduri-Marglin model offers more flexibility. Here profit-led as well as wage-led demand regimes are possible since a positive effect of profits on investment is allowed for. The question whether the positive effect of wages on consumption or the negative effect of profits on investment is larger, becomes an empirical one. In an open economy additional negative effects will also operate through net exports. While neo-Kaleckians tend to treat income distribution as exogenous, neo-Goodwinians seek to endogenize it.

Aggregate expenditures, Y^{exp} , is the sum of consumption, C , investment, I , net exports, NX , and government expenditure, G . All variables are in real terms. In a general formulation, consumption, investment and net exports are written as function of income (Y), the wage share (W), and some other control variables (summarized as z). These latter are assumed to be independent of output and distribution. Aggregate demand thus is:

$$Y^{\text{exp}} = C + I + NX + G \quad (1)$$

In the consumption function the basic assertion is that wage incomes and profit incomes are associated with different propensities to consume. The Kaleckian and Marxist assumption is that the marginal propensity to save is higher for capital incomes than for wage income; consumption is therefore expected to increase when the wage share rises.

$$C = C(Y, W, z_C), \text{ with } C_Y, C_W > 0 \quad (2)$$

The standard investment function in a Bhaduri-Marglin model is a function of demand and the wage share. Standard investment function would also feature the long-term real interest rate or some other measure of the cost of capital (Chirinko 1993). The latter is part of z_I . Implicitly Bhaduri and Marglin (1990) have in mind business investment and there is no discussion of residential investment.

$$I = I(Y, W, z_I), I_Y > 0, I_W < 0 \quad (3)$$

Net exports are a negative function of domestic demand, a positive function of foreign demand, and will depend negatively on unit labour costs (ULC), which are an indicator of international competitiveness. ULC are by definition closely related to the wage share.

$$NX = NX(Y, W, z_{NX}), \text{ with } NX_Y, NX_W < 0 \quad (4)$$

Government expenditures are considered a function of output (because of automatic stabilisers) and exogenous variables. However as this paper focuses on the private sector, this will play no further role in our analysis.

$$G = G(Y, z_G), G_Y < 0 \quad (5)$$

In the goods market equilibrium income is equal to aggregate demand ($Y^* = Y = Y^{\text{exp}}$).

$$Y^* = Y(W, z_C, z_I, z_{NX}, z_G) \quad (6)$$

Differentiating Y^* with respect to W and collecting terms gives

$$\frac{dY^*}{dW} = \frac{h_2}{1-h_1} \quad (7)$$

where $h_1 = \left(\frac{\partial C}{\partial Y} + \frac{\partial I}{\partial Y} + \frac{\partial NX}{\partial Y} + \frac{\partial G}{\partial Y} \right)$ and $h_2 = \left(\frac{\partial C}{\partial W} + \frac{\partial I}{\partial W} + \frac{\partial NX}{\partial W} \right)$.

The term $1/(1-h_1)$ in equation 7 is a multiplier that, in contrast to simple textbook multipliers, includes the effects of changing demand on investment and has to be positive for stability. The sign of the total derivative will therefore depend on the sign of the numerator. h_2 is the sum of the partial derivatives of the components of demand with respect to income distribution. This sum is *private excess demand*, that is, the change in demand caused by a change in income distribution given a certain level of income. It is impossible to sign h_2 a priori, since we hypothesize that $\partial C/\partial W > 0$, $\partial I/\partial W < 0$, and $\partial NX/\partial W < 0$. The sum of these effects can therefore only be determined empirically, which is why the Bhaduri-Marglin model has inspired so much empirical interest.

The total effect of the increase in the wage share on aggregate depends on the relative size of the reactions of the components of GDP, namely consumption, investment and net exports to changes in income distribution. If the total effect is positive ($\partial Y^*/\partial W > 0$), the demand regime is called *wage-led*. If it is negative ($\partial Y^*/\partial W < 0$), it is called *profit-led*.

For both theoretical and policy reasons it is important to distinguish between domestic and external effects. While individual countries can increase demand by increasing exports, the world as a whole, of course, cannot. In other words, the external component can give rise to a fallacy of composition problem. The *domestic sector* in this case is defined with respect to consumption and investment only, assuming that the net export position does not change (as would be the result if wages were to change simultaneously in all countries). If

consumption reacts more sensitively to an increase in the wage share than investment, domestic demand will be wage-led. If we add the effects of the foreign sector, i.e. the changes in net exports, we obtain the aggregate effect in an *open economy*.

Most macroeconomic models pay little attention to the effects of income distribution on consumption and investment. Only in the net exports function does income distribution usually play a role, albeit in an indirect way. Typically export and import functions include a price term and prices are thought to depend (among other things) on unit labor costs. Unit labor costs are closely related to the wage share.

The Bhaduri-Marglin model is often complemented by a distribution function. Indeed, the original papers do depict such a distribution or ‘producers’ equilibrium’ curve, but say remarkably little about it. The authors seem to suggest that the curve can be either upward or downward sloping, and clearly are more interested in the demand equation. Indeed, the following literature differs on how much it has used a distribution function. While researchers coming out of the Goodwin tradition, routinely complement the demand equation with a distribution equation and are very much interested in the interactions between the two, researchers coming out of the Kaleckian tradition have typically been quite content in using the model for partial equilibrium goods market analysis and assuming distribution to be given exogenously. This is not to say that Kaleckians do not have anything to say on the determinants of distribution. Indeed, they have highlighted financialisation, globalisation, the rise in market power of firms and welfare state retrenchments as key determinants (Hein 2015, Stockhammer 2016). However, Kaleckians have tended to discuss the determinants of income distribution and the demand regimes separately.

Neo-Kaleckians and neo-Goodwinians. A first clarification

The Bhaduri- Marglin model is a Keynes Marx synthesis model. It allows for classical or Marxist results in a Keynesian, demand-led economy. The Bhaduri-Marglin model has since become a widely used baseline model for both post-Keynesians and Marx/Goodwin inspired researchers. However, it is important to realise that those two groups of researchers have used the model for different purposes and in different forms. Before we go into the details of the different estimation strategies and findings, it will be helpful to reflect on the role of the Bhaduri-Marglin model within the neo-Kaleckian and neo-Goodwin traditions.

For the neo-Kaleckians¹ the Bhaduri-Marglin is a generalisation of the wage-led Kaleckian model. Kaleckian interpret the effects identified as partial-equilibrium, medium-term goods markets effects. The context in which the Bhaduri-Marglin model is used is best illustrated with respect to Keynes' discussion of the effect of wage cuts on employment in Chapter 19 of the General Theory (Keynes 1973). Keynes forcefully makes the point that the neoclassical argument that an increase in wages will have a negative effect on employment, or in other words, that the effective labour demand curve is downward sloping, must first demonstrate that a wage cut will have a positive effect on expenditures and thus effective demand. Keynes' discussion is concerned with the effects of a *nominal* wage cut and thus analyses the reaction of prices to the change in wage costs, the effects on the real money stock and real debt effects.² Kaleckians tend to think of the wage share as determined by mark up pricing and thus regard the wage share as the relevant wage variable.³ From this angle the Bhaduri-Marglin model allows to specify the conditions under which a change in the wage share has expansionary or contractionary effects depending on the relative size of

¹ We use the term neo-Kaleckians for those Kaleckians, who use the Bhaduri-Marglin model, and thus allow for the possibility of profit-led demand regime whereas the Kaleckian model is always wage led.

² While Keynes does not use this terminology, he suggests (but does not demonstrate) that domestic demand is wage led with respect to nominal wage, at least in a recession.

³ For recent post-Keynesian discussions of the labour demand curve see Lavoie (2003), Stockhammer (2008, 2011).

the effects it has on consumption, investment and net exports. A wage-led demand regime is a necessary condition for a wage-led employment regime, i.e. an upward sloping effective labour demand curve.⁴ This has had two implications for empirical research. First, Kaleckians have shown great interest in the behavioural equations for consumption, investment, exports and imports. Second, the models estimated have been interpreted as partial-equilibrium goods market models. They are not typically part of a fully specified macro model, in particular there is no canonical neo-Kaleckian theory of the distribution and labour market outcomes that is routinely used to supplement the goods market analysis.⁵

For the neo-Goodwinians the Bhaduri-Marglin model has allowed a generalisation of the Goodwin model, which is a business cycle model. The original Goodwin model is a supply-side model of distributional cycles that assumes that Say's Law holds: capacity is fully utilised and there are no demand constraints on output (Goodwin 1967). This is achieved by the assumption that workers spend all their wages for consumption and capitalist invest all their profits. Changes in income distribution thus effect output via supply-side effects (the size of the capital stock determined by investment), not via demand. However, the Goodwin model can be generalised in a demand-led economy (e.g. Desai 1973, Taylor 2004, Flaschel 2009). The Bhaduri-Marglin model allows to clarify that in a demand-led economy the Goodwin argument assumes that demand is profit led (in conjunction with a pro-cyclical wage share). The main interest in the neo-Goodwinian literature using Bhaduri-Marglin models is thus on the interaction of the demand regime with the distribution function (and in some cases with other functions such as the monetary policy reaction function). The

⁴ For employment to be wage led in a wage-led demand regime labour productivity must relatively inelastic with respect to the wage share.

⁵ The Kaleckian literature on open economy models (Blecker 1998, von Arnim et al 2014) does discuss the effects of exchange rate movements on the mark up and thus goes beyond the exogenous mark up assumption of much of the neo-Kaleckian literature, but it does not offer an explicit analysis of labour market outcomes.

analysis of the effects of changes in distribution on the components of demand, consumption, investment and net export has received much less attention.

There is thus an important difference in how neo-Kaleckians and neo-Goodwinians view how the goods market interacts with the labour market. Neo-Kaleckians (or Keynesians more generally) regards the labour market as lacking a self-adjustment mechanism. The feedback from unemployment to demand (i.e. falling wages or a falling wage share), is likely to be counterproductive. For Kaleckians this effect need not be large, it is the sign that matters, because wage-led demand effects imply that a wage cut in the recession is unlikely to have positive employment effects (as Keynes argued in Chapter 19 of the *General Theory*). In contrast, Neo-Goodwinians regard the goods market as anchored in a labour market equilibrium, but their main interest is the cycles around that equilibrium. One implication of this is that for neo-Goodwinians the demand effects of distribution need to be large since they drive the business cycle in these models. That differs from Kaleckians, for whom the drivers of the business cycle are to be found elsewhere (in the accelerator mechanism or debt cycles). Kaleckians have so far done little to analyse how the business cycle mechanism impacts on the distribution-led demand regimes. Stockhammer and Michell (2017) is one of the few papers that looks at how Minsky cycles interact with distribution-led demand regimes and will be discussed in section 6.

We have encountered here two of the pervasive features of the debate between neo-Kaleckians and neo-Goodwinians: First, for Kaleckians the behavioural equations, in particular the investment function, are of prime interest. To convince a Kaleckian that demand is profit-led, one would have to show her the results for the investment function. Kaleckians are also eager to see the relative size of domestic versus trade affects, because the two would have very different policy implications. On the other hand neo-Goodwinians, often content themselves in presenting results of aggregate demand, with many papers not

even discussing the effects on investment, consumption and net exports. Second, while Kaleckians content themselves with an analysis of the goods markets, for the neo-Goodwinians the whole point of the analysis is to see the interactions between the demand equation and the distribution equation.

This has led to some misunderstandings. Several neo-Goodwin authors have contrasted two types of distributional cycles: Goodwin cycles with a profit-led demand and pro-cyclical wage share (a reserve army distribution function) and a Kaleckian cycle, with wage-led demand and a counter-cyclical wage share. This can be found e.g. in Diallo et al (2011 Figure 5) and Kiefer and Rada (2015, Figure 2).

Figure 1. Goodwin and anti-Goodwin cycles in Kiefer and Rada (2015).

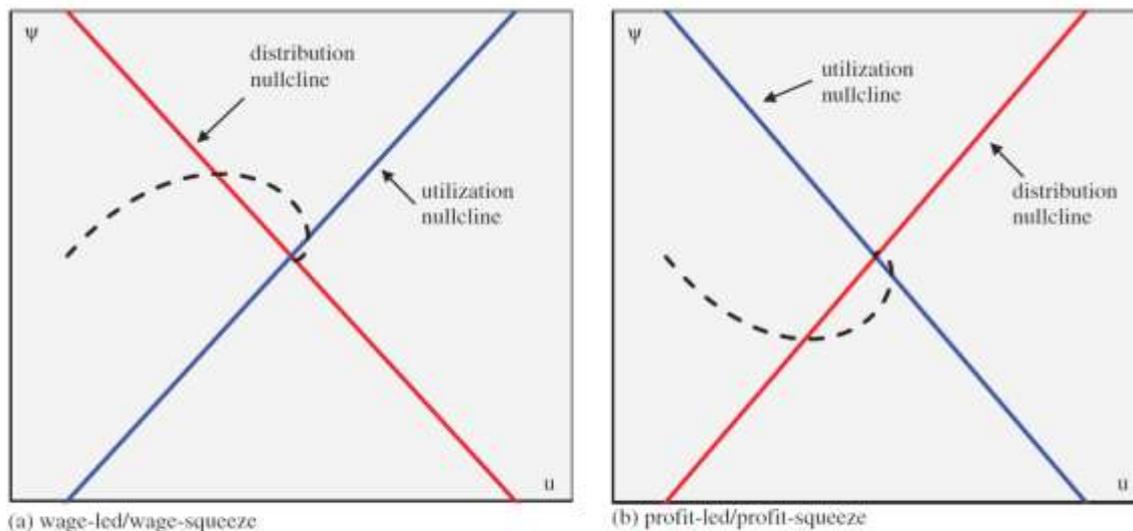


Fig. 2. Graphical representation of a structuralist Goodwin model

Source: Kiefer and Rada (2015, Figure 2)

The discussion then implies that the wage-led demand and counter-cyclical wage share is what Kaleckians must have assumed (Diallo et al 2011, Kiefer and Rada 2015). The alternative, in this view, thus is Goodwin cycles versus anti-Goodwin cycles. We think that

this is a misunderstanding. Neo-Kaleckians do not assume such distribution cycles. Indeed for Kaleckians the Bhaduri-Marglin model is not directly related to their business cycle theory at all. It is the neo-Goodwinians' interest in distribution cycle that leads them to perceive of the Kaleckian model as a business cycle model. The discussion here is complicated by the fact that there is no canonical Kaleckian business cycle model. For Kalecki investment-capacity interactions were the key cycle mechanism (Sawyer 1985, chapter 3), but most modern neo-Kaleckians would regard changes in the financial variables as key for explaining contemporary business cycles. We will return to the issue of Minsky cycles in a wage-led economy in section 6. Here, we conclude by stating while for neo-Goodwinians it is tempting to interpret a wage-led regime as one with anti-Goodwin cycles, neo-Kaleckians would regard it as an equivalent to saying that the economy is not anchored in an equilibrium rate of unemployment (Stockhammer 2004). It should be noted as a shortcoming that neo-Kaleckians have not made explicit their business cycle theory in the context of the Bhaduri-Marglin model.

Some comments on the empirical literature

The Bhaduri-Marglin model has now been estimated by more than a dozen papers. These papers differ along several dimensions. Table 1 gives an overview of available studies for selected advanced economies. We note a majority of studies find wage-led domestic demand regimes and a majority, albeit a smaller one, also find wage-led total demand regimes. However, for almost all countries there is at least one study that reports profit-led demand.

Table 1: A summary of the results on the demand regimes in selected developed economies

	Domestic Demand		Total Demand	

	<i>wage-led</i>	<i>Profit-led</i>	<i>wage-led</i>	<i>Profit-led</i>
Euro area	SOE09, OG14		SOE09, OG14	FP07,
Germany	BB95, NS07, HV08, SHG11, SS11		NS07, HV08, SHG11, OO15	BB95
France	BB95, NS07, ES07, HV08, SS11		(SO04), NS07, HV08, OO15	BB95, SE07
NL	NS07, SS11, OO15	HV08	NS07, OO15	HV08
Austria	SE08, HV08, SS11, OO15			SE08, HV08, OO15
UK	BB95, NS07, HV08, OG14, OO15	SS11	BB95, NS07, HV08, OG14, OO15, JMM16	
Japan	BB95	NS07	OG14	BB95, NS07
USA	BB95, HV08, OSG11, (SS11), OG14	NS07	BB95, HV08, OSG11, OG14	(SO04), NS07, BFT06, DFKP11, NF12
PANEL	H14, SW16		H14, SW16	KR15

BB95: Bowles and Boyer (1995), BFT08: Barbosa-Filho and Taylor (2006), DFKP11 Diallo et al (2011), FP07: Flaschel and Proano (2007), JMM16: Jump and Mendieta-Munoz (2016), H14: Hartwig (2014), HV08: Hein and Vogel (2008), KR15: Kiefer and Rada (2015), NS07: Naastepad and Storm (2007), NF12: Nikiforos and Foley (2012), OG14: Onaran and Galanis (2014), OO15: Onaran and Obst (2015), OSG11: Onaran et al (2011), SE08: Stockhammer and Ederer (2008), SHG11: Stockhammer et al (2011), SOE09: Stockhammer et al (2009), SS11: Stockhammer and Stehrer (2011), SW16: Stockhammer and Wildauer (2016)

Table 2 gives an overview of the methodological differences. First, we note that Kaleckians tend to estimate behavioural equations for investment, consumption and net exports whereas Goodwinians tend to estimate a reduced-form demand equation. Second, while Kaleckians typically include contemporaneous effects, a big part of the Goodwinians estimate lag-only effects to avoid endogeneity problems. However, this is not a sharp dividing line. Naastepad and Storm (2007) and Stockhammer and Stehrer (2011) are Kaleckians who estimate lag only specification, whereas Flaschel and Proano (2007) and Diallo et al (2011) are neo-Goodwinians who allow for contemporaneous effects. Third, the models differ in whether they focus on short-run or long-run effects. Forth, the estimations

differ on what variable they use for the demand term. While most neo-Kaleckian models use GDP, neo-Goodwinians use some measure of capacity utilisation. Fifth, there is a difference in terms of the control variables. While a large part of the literature uses very few controls, some recent papers allow for more controls (Onaran et al 2011, Stockhammer and Wildauer 2016). In particular, we will argue, financial control variable are of interest.

Table 2. Methodological differences in the estimation of Bhaduri-Marglin models

	Neo-Kaleckians	Neo-Goodwinians
C, I, X, M vs Y	C, I, X, M (bottom up)	Y (top down)
Contemporaneous effects or lags only?	Mostly with contemp effects With contemporaneous effects: SOE09, OG14, OO15 lags only: BB95, SN07, SN12, SS11	Mostly lags only With contemp effects: FP07, DFKP 11 Lags only: BFT06, KR15
Short-run or long-run effects?	flexible	Mostly long run
Output or capacity utilisation?	Output	capacity utilisation
Control variables: hardly any controls	SOE09, OG14, OO15, SN07, SN12, SS11	FP07, DFKP 11, BFT06, KR15
Control variables: Financial controls	OSG11, SW16	

BB95: Bowles and Boyer (1995), BFT08: Barbosa-Filho and Taylor (2006), DFKP11 Diallo et al (2011), FP07: Flaschel and Proano (2007), JMM16: Jump and Mendieta-Munoz (2016), H14: Hartwig (2014), HV08: Hein and Vogel (2008), KR15: Kiefer and Rada (2015), NS07: Naastepad and Storm (2007), NF12: Nikiforos and Foley (2012), OG14: Onaran and Galanis (2014), OO15: Onaran and Obst (2015), OSG11: Onaran et al (2011), SE08: Stockhammer and Ederer (2008), SHG11: Stockhammer et al (2011), SOE09: Stockhammer et al (2009), SS11: Stockhammer and Stehrer (2011), SW16: Stockhammer and Wildauer (2016)

We will take a closer look at the results in Barbosa-Filho and Taylor (2006), because this paper has been the starting point for several other papers (Carvalho and Rezai 2015,

Kiefer and Rada 2015) and Stockhammer and Stehrer (2011) have presented a robustness analysis from the Kaleckian side. Barbosa-Filho and Taylor (2006) estimate a two equation VAR with a demand equation and a distribution equation. The demand equation thus is:

$$Y = f(Y_{t-1}, Y_{t-2}, W_{t-1}, W_{t-2}) \quad (8)$$

The model is estimated for the US economy using quarterly data and the cyclical component of the HP filter. The specification uses two lags and no contemporaneous effects to avoid endogeneity problems. Compared to equation (6) we note the absence of any control variables and the extensive use of lags. In a second step, the effects for individual components of demand are then decomposed from the aggregate results. This is a top down approach compared to the estimation strategy used by the Kaleckian studies.

Table 3 summarises their results regarding the demand regime.⁶ Barbosa-Filho and Taylor find a profit-led demand regime, as the total effect of wage (ΣW) is negative. However, we note three important issues. First, the effect of changes in the wage share is small (-0.09), whereas the effect of changes in Y is large (0.72).⁷ The economically substantial effects of changes in the wage share thus crucially depend on the self-amplifying demand effects. This means that if there were additional control variables, they would also have a powerful effect on demand, because the own feedbacks of demand will amplify any shock, even if the original shock was small.⁸ Second, the effect of the change in the wage share on demand alternates over time. The coefficient on WS(t-1) is +0.3 and that on W(t-2) is -0.39. This begs

⁶ The demand regime refers to the slope of the goods market equilibrium (or IS) curve. As the model is a Goodwin model with a distribution curve, the general equilibrium outcome of, say, a distributional shock will be determined by the demand regime as well as by the distribution curve.

⁷ Both variables are expressed as the cyclical components of the HP filter and in logarithms, so they can be directly compared.

⁸ Another interesting property of the results is that the signs of the coefficients of Y(t-1) and Y(t-2) alternate, with the first one being larger than unity. The structure is akin to the reduced form of multiplier-accelerator model with dampened oscillations. In other words the own effects of Y will give rise to oscillations, independent of distribution dynamics.

the question whether $\beta_{W,t-1} = -\beta_{W,t-2}$. Barbosa-Filho and Taylor do not report an F test on this hypothesis, but given the standard errors of the coefficient estimates, it is unlikely that this hypothesis would be rejected. Changes in the wage share would then have *no* long-run effect on demand.⁹

Third, the results for the behavioural equations do not conform to the Goodwin model. Barbosa-Filho and Taylor report a strongly negative effect on consumption, a negative effect on investment and on net exports and a strong positive effect on government expenditures. The (negative) effect of an increase in the wage share on consumption is larger than those on investment and net exports combined, i.e. the profit-led demand is driven by consumption, which is at odds with behavioural assumptions of the neo-Goodwin model. The discussion by Barbosa-Filho and Taylor does not address the perverse consumption equation and its implications. They interpret their results as supportive of the neo-Goodwin model. However, this is misleading. While the paper's results do support a profit-led demand regime, they do *not* support the Goodwin story: In the neo Goodwin model profit-led demand is driven by investment and consumption is wage led.

Table 3. Summary results of Barbosa-Filho and Taylor (2006)

	Y(t-1)	Y(t-2)	W(t-1)	W(t-2)	ΣY	ΣW
Y	1.20	-0.49	0.30	-0.39	0.72	-0.09
C	0.38	-0.14	-0.13	-0.05	0.24	-0.17
I	0.80	-0.39	0.19	-0.31	0.41	-0.11

⁹ The auto-regressive distributed lag (ARDL) model, such as the one estimated by Barbosa-Filho and Taylor, encompasses various other time series specifications, including the error correction model. Thus an ARDL model allows for the calculation for the long-run (cointegrating) effects. If $\beta_{W,t-1} = -\beta_{W,t-2}$ the long-run effect is of W is zero.

NX	-0.21	0.15	-0.16	0.16	-0.07	-0.05
G	0.23	-0.1	0.39	-0.15	0.14	0.25

Based on Barbosa-Filho and Taylor 2006, Table 1. Note: Y is the defined as the output gap

Stockhammer and Stehrer (2011) have tried to replicate the demand equation with a focus on the short run effects. But they estimate the system bottom up, i.e. they estimate the investment and the consumption equation and expanded the analysis to cover twelve OECD countries for the period 1970:1 to 2007:2. The behavioural equations estimated are

$$C = f(Y_{t-1}, \dots, Y_{t-8}, W_{t-1}, \dots, W_{t-8}) \quad (9)$$

$$I = f(Y_{t-1}, \dots, Y_{t-8}, W_{t-1}, \dots, W_{t-8}) \quad (10)$$

Compared to equations (2) and (3) we note the absence of control variables and extensive use of lags. They experiment with the lag length and find that results are indeed sensitive to the lag length included. For the USA they confirm that a lag length of two gives a profit-led regime (in line with Barbosa-Filho and Taylor), but a lag length of four gives wage-led results. In other words, the results are not robust.

Stockhammer and Stehrer (2011) report more wage-led than profit-led results and make two interesting observations. First, the consumption differential is substantial and statistically significant in most countries. For most countries a higher wage share is associated with higher consumption expenditures. The investment effects of the wage share are often not statistically significant and tend to be sensitive to the specification. Second, for those countries for which they find wage-led demand regimes, the signs for the consumption function and the investment function are mostly consistent with expectations. However in those countries where profit-led demand regimes are reported (e.g. the UK), the results often rely on perverse consumption effects, but do not seem to be driven by strong investment effects.

Stockhammer and Stehrer conclude that the Kaleckian story can explain the wage-led demand regimes but those countries that have profit-led demand do not fit the Goodwin story. Those countries rely strongly on the effect of profits on consumption rather than on investment. The link between profits and investment does not seem to be strong and reliable enough to carry the weight of the Goodwin story of the business cycle. The substantial number of perverse effects in Stockhammer and Stehrer (2011) and Barbosa-Filho and Taylor (2006) raises the need to think about control variables as omitted variables are a possible explanation.

The relative size of distributional and financial effects

In the recent post-Keynesian literature Minsky models play a prominent role, next to Kaleckian models. Minsky models have at their core a financial cycle that operates either thorough the indebtedness of business or households or, in some version, an asset price cycle. Most of the research on these models so far is theoretical (Keen 1995, Asada 2001, Fazzari et al 2006, Charles 2007, Ryoo 2013). There are few empirical tests of these models yet and the relation to the Kaleckian literature is not usually made explicit, despite Minsky's own building on Kalecki and the sympathy of most Minskians. Thus it would be premature to offer a grand synthesis between the two. However, we want to report two specific attempts to fuse Kaleckian and Minsky models and we begin with an empirical attempt to integrate Minsky mechanisms into a Bhaduri-Marglin model.

Stockhammer and Wildauer (2016) extend a Bhaduri-Marglin model for measures of personal income inequality as well as measures of property and financial wealth and private debt. They estimate a panel of 18 OECD countries covering the period 1980 to 2013 with annual data. Their aim is to assess the effects of distribution and wealth on aggregate demand in a neo-Kaleckian framework. This allows to calculate the relative growth contributions of

these effects for different country groups. The consumption and investment equations estimated are:

$$C = C(Y, W, Q, WH, WF, DH, \Delta DH), \quad (11)$$

With $C_Y, C_W, C_{WH}, C_{WF}, C_{\Delta DH} > 0, C_{DH} < 0, C_Q = ?$

$$I = I(Y, W, i, Q, WH, WF, DH, DB) \quad (12)$$

With $I_Y, I_{WF}, I_{\Delta DB}, I_{\Delta DH} > 0, I_i, I_{DB}, I_{DH} < 0, I_W, I_Q, I_{WH} = ?$

where Q, WH, WF, DH and DB are, personal income inequality, housing wealth, financial wealth, household debt, and business debt respectively. Compared to equations (2) and (3) there is liberal use of controls, which are all related to financial factors. In addition to standard effects of Y and W this approach allows to evaluate the effect of changes in personal income distribution and in wealth and debt variables.¹⁰ Stock prices and real estate prices are wealth measures and are expected to have a positive effect on consumption and investment, but there are several competing hypotheses on the role of debt. In PK models household debt has a dual influence on consumption since it provides a source of finance, thus having a positive impact on consumption but also leads to servicing costs which depress consumption if the MPC out of interest income is low (Dutt 2006; Nishi 2012a; Hein 2012a), i.e. $\frac{\partial C}{\partial DH} < 0$ and $\frac{\partial C}{\partial \Delta DH} > 0$. Therefore the overall effect is not a priori clear.

Total investment consists of business investment and residential investment. This has not been fully recognised by the literature on Bhaduri-Marglin models, which has treated

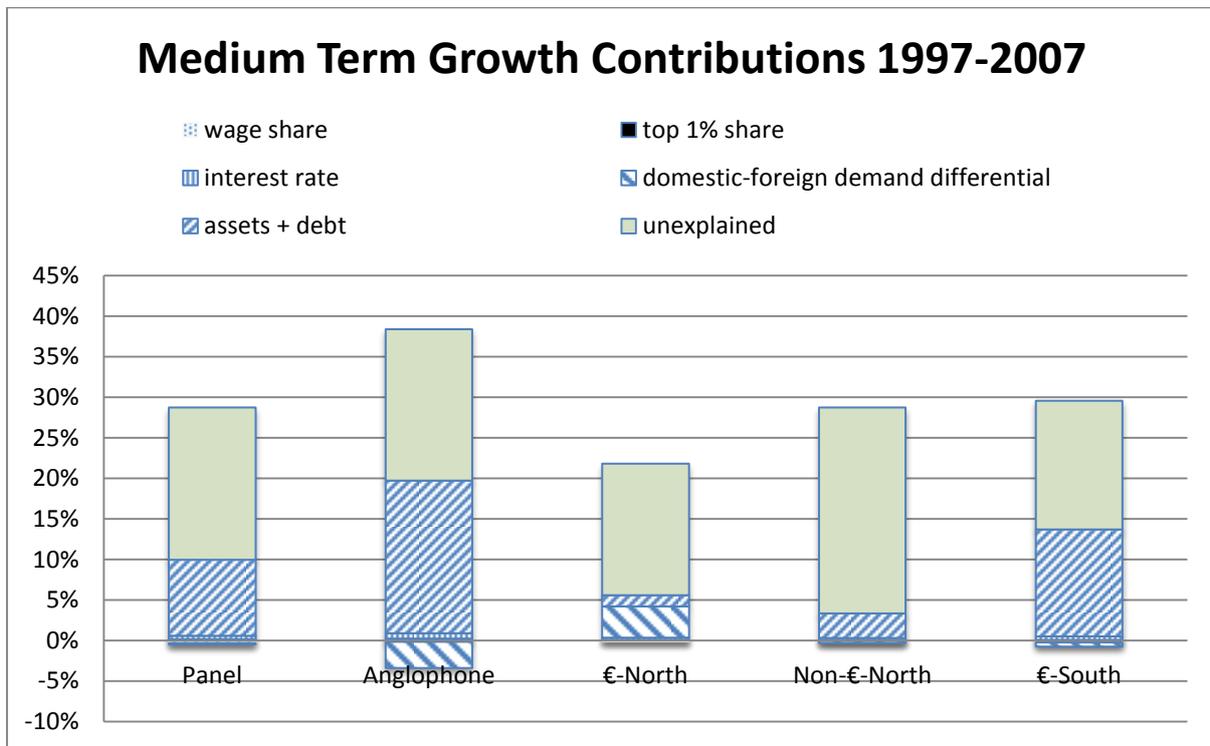
¹⁰ There are conflicting views on the effects of personal distribution. First, the standard Kaleckian assumption is that the poor have a higher marginal propensity to consume, which would imply a negative effect of inequality on consumption. In contrast the consumption cascades argument that has recently become popular in heterodox macroeconomics holds that households care about consumption and income relative to their peers (here: the income group above). Thus, an increase in inequality has a positive effect on consumption (Frank (1985), Frank et al. (2014)). Several authors have incorporated these assumptions in Kaleckian macroeconomic models (Kapeller and Schütz 2014; Belabed et al. 2013).

investment is if it were all business investment. Residential investment is likely to be determined by a similar set of variables as consumption expenditures, i.e. our investment function will also depend on the wage share, housing and financial wealth, and household debt. First, while business investment will depend negatively on the wage share, residential investment may also react positively to changes in the wage share if wage earners own homes. The overall effect of the wage share on investment is thus ambiguous. Second, property prices are a cost for residential investment and thus rising housing wealth may have a negative effect. However, increasing property prices raise household wealth may improve access to credit (because of the rising value of collateral). This will have a positive effect on residential investment. Theoretically, the effect of housing wealth on investment is thus ambiguous.

Stockhammer and Wildauer estimate this model (as well as the foreign sector block) for a panel of OECD countries, using mostly difference specifications and allowing for contemporaneous effects. They find statistically significant and robust consumption effects, and statistically significant, but less robust investment effects. Overall, they find that domestic demand is wage led. However, they report that the effects of distribution on demand are small relative to those of the debt and asset price variables. Figure 2 illustrates this by calculating the growth contributions for the decade prior to the crisis (1997-2007). This clearly indicates that the financial variables are several orders of magnitude above those of distribution variables.¹¹ This is true for the total panel, but even more so for the Anglophone and southern Euro area countries. However, even for the northern Euro area countries and other Nordic countries, which did not experience a real estate bubble in this period, the distributional demand effects are relatively small.

¹¹ They do not find statistically significant effects of personal income distribution.

Figure 2. Distribution effects versus asset and debt effects 1997-2007, according to Stockhammer and Wildauer 2016)



Note: based on Stockhammer and Wildauer (2016), Table 6. Anglo-American (Australia, Canada, the United Kingdom and the United States), Euro-North (Austria, Belgium, Germany, Finland, and the Netherlands), Euro-South (Spain, Italy and Ireland), non-Euro-North (Denmark, Switzerland, Norway and Sweden), Panel: all countries.

Pseudo-Goodwin cycles in a wage-led Minsky model

Given the evidence on the strong wealth effects, the question arises what type of cycles such a finance-driven economy would exhibit if it were characterised by a wage-led demand regime. Unfortunately the development of the neo-Kaleckian model and the recent surge in interest in Minsky models have large proceeded independently of each other. Most neo-Kaleckian models have a rudimentary treatment of debt and wealth and most Minsky models do not explicitly model distribution dynamics.

Stockhammer and Michell (2017) present a highly stylized Minsky model with a wage-led demand regime and a reserve army distribution function to analyse the cyclical behaviour. The dynamics of the model are driven by a Minsky interaction, where higher demand leads to rising financial fragility, i.e. rising debt-to-income ratios, and higher fragility leads to lower growth. Higher demand leads to lower unemployment, which has positive effects on the wage share. Demand is wage-led. In the simplest version, the model is composed of the following three dynamic equations:

$$\dot{F} = F(-1 + pY) \quad (13)$$

$$\dot{Y} = Y(1 - F + sW) \quad (14)$$

$$\dot{W} = W(-c + rY - W) \quad (15)$$

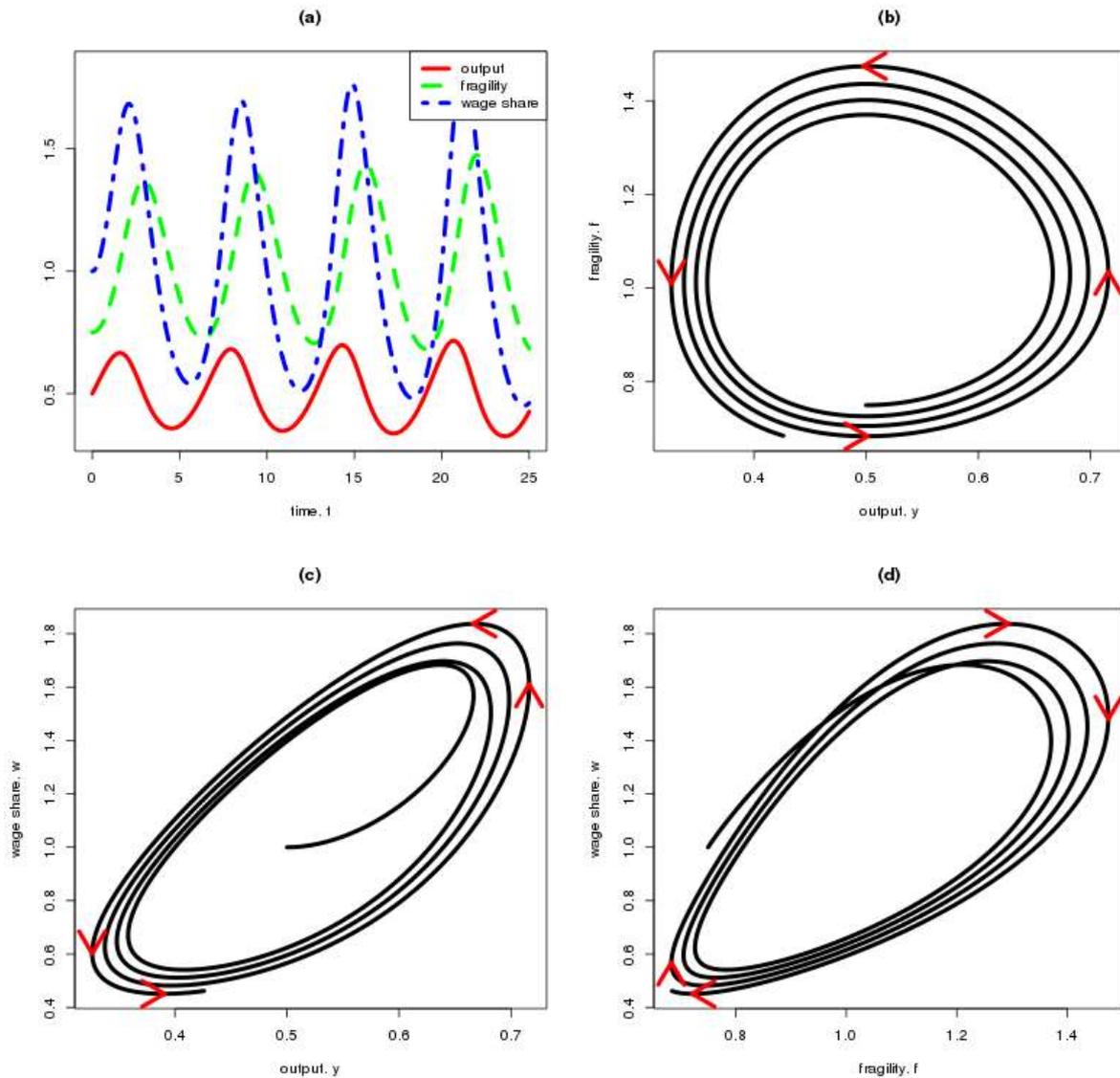
Equation (13) is financial fragility, F , which is positively related to output. Equation (14) is the demand equation that has a negative impact of fragility and a positive one of the wage share. It is the dynamic counterpart to equation (6) with financial fragility as a shift variable. Equation (15) is a reserve-army distribution function that depends positively on

output and negatively on wage share.¹² To simplify analysis all equations follow the predator-prey-model format and several parameters have been set to unity.

Remarkably, this model gives rise to what is labelled ‘pseudo-Goodwin cycles’, i.e. counter-clockwise oscillations in output and wage share space, which are not generated by the Goodwin mechanism. Goodwin’s mechanism is not in operation because a wage-led demand regime is assumed. The pseudo-Goodwin cycle is generated as a side effect as distribution is dragged along by fluctuations in output that are driven by financial factors. Figure 3 illustrates this.

¹² The negative effect of the wage share on the change of the wage share helps stabilise the wage share. The cyclical dynamics of the system are not affected by the inclusion of this term, but the stability properties can be affected.

Figure 3. Pseudo-Goodwin cycles in a wage-led Minsky model



Source: Stockhammer and Michell (2017), Figure 4. Model simulated with parameters $c = 1, p = 0.95, r = 1.6$ and starting values of $f = 0.7, y = 0.7, w = 0.8$

This is an important finding because Figure 4.c, if viewed in isolation, can easily be interpreted as support for the existence of Goodwin cycles, and if the corresponding data were estimated in a demand equation and wage share equation this might lead to spurious results in support for a profit-led demand regime.

Conclusion

The Bhaduri-Marglin model is widely used in modern heterodox macroeconomics, but it has at times delivered conflicting results. Thus neo-Kaleckians and neo-Goodwinians have derived different conclusions. Neo-Kaleckians have found that in most countries domestic demand is wage led, that the marginal propensity to consume out of wages is substantially and robustly larger than those of capital profit incomes, and that profit effects on investment are less robust and sensitive to the specification. Neo-Goodwinians have concluded that total demand is typically profit led. This paper has tried to offer some clarification. First, we have argued that the Bhaduri-Marglin model has been used for different purposes. Neo-Kaleckians regard it as partial-equilibrium goods market model, while neo-Goodwinians have used it to analyse distribution-demand interactions. This has led to different estimation strategies. The neo-Kaleckian literature uses a single equation approach to estimate the behavioural equations. Neo-Goodwinians have estimated reduced-form demand equations, usually as part of a two equation system of income and distribution. There are numerous technical differences between different studies, including the lag structure, variable definition, control variables, and data frequency, which makes it difficult to identify the source of the different results.

Second, we have argued that the omission of financial factors in the analysis is a major shortcoming of the existing literature. Empirically, there is evidence that demand effects of real estate prices and debt tend to be orders of magnitudes larger than those of distributional variables, at least in the recent past. Theoretically a Minsky model with a wage-led demand regime and a reserve army-distribution function generates pseudo-Goodwin cycles. Estimating such a system without recognising the key role of financial factors will give biased results.

As regards future empirical work, we end with four recommendations. First, researchers should present more robustness analyses and, specifically, should attempt to replicate past studies alongside their own results. Second, future studies should make more effort to include control variables, in particular financial variables. Third, the existing literature has so far largely ignored the state sector and government policies. Given the size of the state sector and the cyclical nature of government budget deficit, its omission in the analysis can bias the results of distributional effects. Forth, essentially all the available literature is based on the decades of the postwar period and the neoliberal era. Heterodox macroeconomics would benefit from using available data sets that cover longer historical periods.

In addition to these recommendations, what can neo-Kaleckians and neo-Goodwinians do to convince the other side that their perception of the economy is correct? Neo-Kaleckians should develop more explicitly their theory of income distribution and what they regard as the business cycle mechanism. Neo-Goodwinians should provide evidence on the behavioural equations, in particular on the investment function that, in their view, is the key demand component that drives profit-led demand.

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