# Autonomous demand, Harrodian instability and the supply side*

Peter Skott†

January 22, 2016

**Abstract**

A recent literature responds to Harrodian criticisms of the post-Kaleckian model by emphasizing the role of automous demand. The response is unconvincing. Autonomous demand cannot stabilize a Harrodian economy for plausible parameter values. The exogeneity of the growth rate in automous demand, second, is itself questionable. A satisfactory Keynesian analysis of Harrodian forces must include the supply side (the labor market) and/or economic policy. Models of this kind can have both level and growth effects that resemble those derived in post-Kaleckian models.

JEL numbers: E11, E12, O41
Keywords: super-multiplier, Harrodian instability, Kaleckian models

*I thank Soon Ryoo for helpful comments.
†University of Massachusetts Amherst and Aalborg University; pskott@econs.umass.edu.

# 1 Introduction

Keynesian macroeconomics has been marginalized in the profession, and within the Keynesian tradition, post-Kaleckian models have been dominant until recently. Following Dutt (1984), Rowthorn (1981) and Marglin-Bhaduri (1990), these models have (i) focused almost exclusively on the goods market, (ii) imposed a 'Keynesian stability condition' and extended this condition to the long run, and (iii) derived wage-led results that depend on large induced variations in the utilization rate of capital.

The post-Kaleckian analysis has been met by persistent criticisms from both classical and Harrodian perspectives; e.g. Committeri (1986), Kurz (1986), Auerbach and Skott (1988), Dumenil and Levy (1999), Shaikh (2009), Skott (2012). The Harrodian version of the critique makes three interrelated points. The utilization rate of capital, first, should not be treated as an accommodating variable. As a first approximation the utilization rate must be equal to the desired rate along a warranted growth path. The warranted growth path, second, is likely to be unstable. Except by a fluke, third, the warranted growth rate will not be equal to the natural growth rate unless there is some feedback on the equilibrium condition for the goods market from the labor market and/or from economic policy.

A recent literature responds to these Harrodian criticisms by emphasizing the role of autonomous demand; contributions include Serrano (1995), Serrano and Freitas (2015), Allain (2015a), Girardi and Pariboni (2015), Lavoie (2015) and Dutt (2015). This paper focuses mainly on Lavoie's version of the autonomous-demand argument, but many of the comments carry over to other versions.

According to Lavoie, (i) the exogeneity of the growth rate of autonomous demand is plausible and has empirical support, (ii) Harrodian instability can be tamed by autonomous demand, and (iii) unlike other approaches, the autonomous-demand argument safeguards the Keynesian properties of the model. These claims are unconvincing. I shall argue that

- Autonomous demand cannot stabilize the Harrodian model for plausible parameter values.
- The exogeneity of the growth rate in autonomous demand is itself questionable.
- Keynesian models that include the supply side (the labor market) and/or economic policy can tame the Harrodian instability. They also have 'Keynesian properties' that resemble those derived in post-Kaleckian models. But although these properties may be considered desirable, the justification for the models relies on the behavioral and empirical plausibility of the assumptions, rather than on the desirability of the conclusions.

The rest of the paper proceeds as follows. Section 2 presents some technical issues in relation to Lavoie's analysis. The stability of the Harrodian version of Lavoie's model is discussed in section 3. Section 4 examines the exogeneity of the growth rate of autonomous demand and discusses methodological issues in relation to medium and long run analysis. Section 5 considers some alternative ways to stabilize the Harrodian mechanism. Section 6 concludes.

## 2 Two models and their properties

Consider a closed economy without public sector, and let investment and saving be determined by

$$\frac{I}{K} = \gamma + \gamma_u(u - u_n) \tag{1}$$

$$\frac{S}{K} = s_p\pi u/\nu - z \tag{2}$$

The notation follows that in Lavoie (2015): $I, S, K, \nu$ and $u$ denote investment, saving, the capital stock, the capital-output ratio at full capital utilization, and the utilization rate; the profit share $\pi$ is taken as exogenously given; $z = Z/K$ is the ratio of capitalist autonomous consumption to the capital stock; $\gamma_u$ and $s_p$ are positive parameters with $s_p\pi > \gamma_u\nu$. There is no inflation and all variables are in real terms. Investment, saving and output are measured net of depreciation.

Using the equilibrium condition for the goods market, $I = S$, the short-run solutions for utilization and accumulation are given by

$$u = \frac{(\gamma - \gamma_u u_n + z)\nu}{s_p\pi - \gamma_u\nu} \tag{3}$$

$$g = \frac{\gamma_u\nu z + s_p\pi(\gamma - \gamma_u u_n)}{s_p\pi - \gamma_u\nu} \tag{4}$$

The short-run solutions for $u$ and $g$ depend on $z$, and the value of $z$ changes endogenously. By definition we have

$$\hat{z} = \hat{Z} - \hat{K} = g_z - g \tag{5}$$

where a hat over a variable is used to indicate a growth rate ($\hat{x} = \dot{x}/x = \frac{dx}{dt}/x$). The growth rate of autonomous consumption, $g_z$, is taken to be an exogenously given constant.

Lavoie considers two variants of the model: in the first variant $\gamma$ is treated as a constant parameter; the second variant adopts a Harrodian perspective and adds a dynamic equation for the change in $\gamma$.

**Model 1** In this specification $\gamma$ is constant and, using equations (4)-(5), we get a one-dimensional differential equation for $z$:

$$\begin{aligned}\dot{z} &= z(g_z - \frac{\gamma_u\nu z + s_p\pi(\gamma - \gamma_u u_n)}{s_p\pi - \gamma_u\nu}) \\ &= z(A - Bz)\end{aligned}$$

where $A = g_z - \frac{s_p\pi(\gamma-\gamma_u u_n)}{s_p\pi-\gamma_u\nu}$ and $B = \frac{\gamma_u\nu}{s_p\pi-\gamma_u\nu}$. This equation has two stationary solutions,

$$\begin{aligned} z_1^* &= 0 \\ z_2^* &= A/B \end{aligned}$$

The parameter restrictions ensure that $B > 0$. The sign of $A$, however, is ambiguous, and the properties of the dynamic equation depends on the sign. We have

$$\begin{aligned} \frac{d\dot{z}}{dz} &= A - 2Bz \\ &= \left\{ \begin{array}{lll} -A & \text{if} & z = A/B \\ A & \text{if} & z = 0 \end{array} \right. \end{aligned}$$

Hence, if $A$ is positive, $z_2^*$ is positive and stable: for any positive initial value of $z$, we get $\lim_{t\to\infty} z = A/B$. If $A < 0$, however, it is $z_1^*$ that becomes stable: for any positive initial value of $z$, we get $\lim_{t\to\infty} z = 0$.

Lavoie considers the case where $A > 0$ and $z \to A/B$. This case requires that

$$g_z > \frac{s_p\pi(\gamma - \gamma_u u_n)}{s_p\pi - \gamma_u\nu} \tag{6}$$

The basic intuition is straightforward: if the growth rate of autonomous consumption is too low, the share of autonomous consumption will converge to zero. Thus, autonomous consumption only becomes important in this model if $g_z$ satisfies (6). Notice also that the stationary solution for $z$ is increasing in $g_z$.

**Model 2** In the Harrodian version of the model the value of $\gamma$ changes endogenously in response to deviations of actual from desired utilization. Lavoie uses the specification

$$\hat{\gamma} = \mu(g - \gamma)$$

or, equivalently,

$$\dot{\gamma} = \mu\gamma(g - \gamma) \tag{7}$$

This is a peculiar choice of functional form for $\dot{\gamma}$. Lavoie interprets $\gamma$ as representing the expected growth rate of demand, and equation (7) describes a process of adaptive expectations: if actual growth (strictly speaking, actual accumulation) exceeds expected growth, then expectations are adjusted upwards.[1] There is no reason, however, to assume that the rate of change ($\dot{\gamma}$) should be proportional to the level of $\gamma$ for any given discrepancy ($g - \gamma$). Consider three examples. The discrepancy is the same in the three examples: actual growth is

[1] The equation does not describe the adjustment of the expected growth rate of output towards actual *output growth*: actual output growth is given by $\hat{Y} = \hat{u} + g - \delta$. The alternative specification,

$$\dot{\gamma} = \mu\gamma(\hat{u} + g - \gamma)$$

generates a non-linear reduced-form expression for $\dot{\gamma}$ in terms of the state variables $\gamma$ and $z$.

two percentage points below expected growth, $g-\gamma=-0.02$. In the first example the value of actual growth is $g=0.04$, in the second example it is 0.01 and in the third $g=-0.01$. Lavoie's specification implies that the adjustment of $\gamma$ towards $g$ happens at very different speeds in the three examples. In fact, in the third example the difference between expected and actual growth converges to 1 percentage point ($\lim_{t\to\infty}\gamma=0>g=-0.01$). This oddity in the adjustment process can be avoided by using a conventional specification,

$$\dot{\gamma}=\lambda(g-\gamma) \tag{8}$$

The difference between the functional forms in (7) and (8) is of no importance for the analysis of *local* stability, as long as the adjustment parameters are calibrated accordingly, that is, as long as $\lambda=\mu\gamma^*$ where $\gamma^*=g_z$ is the stationary value of $\gamma$. In what follows I shall use the specification in (8).

Combining (4)-(5) and (8), we have a two-dimensional system in the state variables $(\gamma,z)$. There are two stationary points $(\gamma_1^*,z_1^*)=(s_p\pi u_n/\nu,0)$ and $(\gamma_2^*,z_2^*)=(g_z,s_p\pi u_n/\nu-g_z)$. The first of these is always unstable, and Lavoie considers the second. By assumption, the ratio of autonomous consumption to capital is non-negative ($z\geq 0$) and the existence of the second stationary point therefore requires that

$$g_z<s_p\pi u_n/\nu$$

The local stability of the second stationary point is determined by the Jacobian matrix evaluated at the stationary point. We have

$$J(\gamma,z)=\begin{pmatrix}\lambda\frac{\gamma_u\nu}{s_p\pi-\gamma_u\nu} & \lambda\frac{\gamma_u\nu}{s_p\pi-\gamma_u\nu}\\ -z_2^*(1+\frac{\gamma_u\nu}{s_p\pi-\gamma_u\nu}) & -z_2^*\frac{\gamma_u\nu}{s_p\pi-\gamma_u\nu}\end{pmatrix}$$

The determinant of the Jacobian is unambiguously positive. Thus, the stationary point is locally stable if the trace is negative, that is, if

$$tr=\frac{\gamma_u\nu}{s_p\pi-\gamma_u\nu}(\lambda-z_2^*)<0 \tag{9}$$

By assumption. $\frac{\gamma_u\nu}{s_p\pi-\gamma_u\nu}>0$ so the stability condition reduces to $\lambda<z_2^*=s_p\pi u_n/\nu-g_z$. This condition differs from the one given by Lavoie. The use of (8) instead of (7) does not account for the difference: setting $\lambda=\mu g_z$, the correct condition for Lavoie's specification can be written $\mu<z_2^*/g_z$ (rather than $\mu<1$, as suggested by Lavoie).[2]

[2] The second row in Lavoie's Jacobian matrix describes the partials of $\hat{z}$, rather than the partials of $\dot{z}$. It appears that the error crept in as a result of Lavoie's attempt to simplify Allain's (2015) analysis. The analysis in Serrano and Freitas (2015) and Allain (2015a) does not suffer from this technical problem.

## 3 Stability of the Harrodian case?

The stability condition is unlikely to be satisfied.[3] The interpretation of $\gamma$ as the expected growth rate provides a way to get a handle on plausible magnitudes for $\lambda$ (and $\mu = \lambda/g_z$). Assume that the initial situation is one in which $\gamma = g = 0.04$ but that the growth rate then drops to 0.02 and stays at this new lower value. The expected growth rate adjusts gradually to this new state of affairs, and it would seem reasonable to assume that expected growth has closed half the gap and dropped to 0.03 within something like 2 years. For this to be achieved the value of $\lambda$ has to be equal to 0.35.[4] The corresponding value for $\mu = \lambda/g_z$ is about 10.

The ratio of autonomous consumption to the capital stock is determined endogenously by the model, but it is possible to say something about plausible empirical magnitudes. Lavoie assumes that workers spend what they earn and that autonomous consumption is a fraction of capitalist consumption. It would seem unreasonable to suppose that, on average, autonomous consumption makes up more than one third of total capitalist consumption (that is, one third of the consumption out of profits). Even this proportion seems quite high. Total capitalist consumption is given by $C_p = \pi Y - S_p = \pi Y - (s_p \pi Y - Z)$. If $s_p = 1/2, \pi = 1/4$ and $Y/K = 1/2$, we now have[5]

$$z = \frac{Z}{K} \leq \frac{1}{3}\frac{C_p}{K} = \frac{1}{3}[\frac{1}{2}\frac{1}{4}\frac{1}{2} + z]$$

or

$$z \leq \frac{1}{32}$$

With $\lambda \approx 0.35$ and $z_2^* \leq 1/32$, the stability condition is not even close to being satisfied.[6] Another way to make this point is to observe that a $z$ value above 0.35 is required for stability if $\lambda = 0.35$. Thus, if the output capital ratio is 1/2, stability requires that capitalists' autonomous consumption make up more than 70 percent of aggregate income.

One can quibble with the detailed assumptions behind the calculations, but the orders of magnitude are such that I find it hard to see how autonomous capitalist consumption could stabilize Lavoie's Harrodian economy. Moreover, to achieve stabilization, the growth rate would have to be extremely low. Unlike Lavoie's first variant, the Harrodian version of the model implies an inverse

[3] Lavoie correctly notes (footnote 6) that his seemingly innocuous (but incorrect) condition $\mu < 1$ is quite restrictive.

[4] If $g$ is constant, equation (8) implies that

$$\gamma(t) = g + (\gamma(0) - g)e^{-\lambda t}$$

Hence, if $\gamma(2) - g = 0.5(\gamma(0) - g)$, we have $e^{-2\lambda} = 1/2$ or $\lambda = (\ln 2)/2 \approx 0.35$.

[5] The values of $\pi$ and $s_p$ may seem low. Recall, however, that output, saving and profits are measured net of depreciation. With a depreciation rate of 0.05, the corresponding values for the gross profit share and the saving rate out of gross profits are 0.35 and 0.64.

[6] The expression for $z_2^*$ ($z_2^* = s_p \pi u_n/\nu - g_z$) can be used to find the implied value of $g_z$. Using the benchmark values for $\pi, s_p$ and $Y/K$, and setting $z_2^* = 1/32$, we get $g_z = 1/32$.

relation between $g_z$ and $z^*$: the stationary solution for $z_2^*$ is given by $z_2^* = s_p\pi u_n/\nu - g_z$. Thus, if $z_2^* \geq 0.35$

$$g_z \leq s_p\pi u_n/\nu - 0.35$$

For all plausible parameter values the growth rate would be negative.

Unlike Lavoie, Allain (2015) takes government consumption to be the autonomous component of demand. This changes some details in the calculation, but the stability condition turns out to be similar. Using the notation in this paper, local stability in Allain's model requires that $\lambda < s_p\pi u_n/\nu - g_z = s_p\pi z^*$, where $z^* = G/K$ is the ratio of autonomous government consumption to capital. If $s_p\pi = 1/8, u_n/\nu = 1/2$ and $\lambda = 0.35$, the required growth rate would be $-29$ percent, and the ratio of government consumption to aggregate income would need to exceed (an impossible) 280 percent. Putting it differently, for empirically plausible values of $s_p\pi z^*$, the speed of adjustment in the Harrodian investment function (the value of $\lambda$) would need to be extremely low in order to achieve local stability.[7] With $G/Y = 1/4$ and $Y/K = 1/2$, we would need $\lambda < 1/64$, and (using the procedure in footnote 5) it would take at least 45 years for the expected growth rate $\gamma$ to complete half of the adjustment towards a new, constant growth rate $g$.

There is an intuitive reason for these results. In order to provide a significant amount of stabilization, the share of autonomous demand has to be high. Since the stationary solution is characterized by $u = u_n$, an increase in the share of autonomous consumption must squeeze either non-autonomous consumption or investment. In Lavoie's version of the argument it cannot squeeze non-autonomous consumption (if it did, 'autonomous consumption' would not be autonomous); in Allain's specification, an increase in $G/K$ reduces consumption because of the rise in taxes, but the reduction does not offset the rising share of government consumption, and investment has to do part of the adjustment. If the steady-growth share of investment in output is squeezed, however, the growth rate must drop. Thus, autonomous consumption has stabilizing effects only insofar as it reduces the growth rate.

This reasoning also explains another implication of the model which (to my knowledge) has gone unnoticed. Even if the stationary point were to be locally stable, the stability would be of the corridor variety. A slow-growing autonomous component cannot stabilize the system if the initial position is one with a low value of the autonomous demand ratio $z$ and/or a high value of the expected growth rate $\gamma$. To see this in a simple way, consider the dynamics starting from a position in which $\gamma > s_p\pi u_n/\nu$. With this starting point, the value of $\dot{\gamma}$ will be positive for any non-negative value of $z$ and since $\dot{\gamma}$ is increasing in $\gamma$, the instability result follows.

[7] The stability conditions are not quite the same for Allain and Lavoie (contrary to Lavoie's footnote 7). The reason for the difference lies in the effects of a change in autonomous demand in the two specifications. In Lavoie's version there is no offset to an increase in autonomous consumption; in Allain's specification, a rise in government consumption is matched by a rise in taxes which reduces private consumption. As a result, a larger share of autonomous consumption is required for local stability in Allain's model (assuming the same Harrodian adjustment parameter).

Corridor stability can be an interesting phenomenon, but in some sense the autonomous-demand argument has tried to prove the wrong result. Consistency of the stylized facts with a Harrodian investment dynamics does not require that the steady growth path be locally asymptotically stable. The facts are consistent with local instability as long as stabilizing forces prevent cumulative divergence and keep the dynamics bounded (as in Skott 1989). Local stability of the corridor variety, by contrast, is at odds with the evidence unless it can be shown that the corridor is reasonably wide.

# 4 The exogeneity assumption and 'the long run'

Lavoie suggests that the assumption of an exogenously given, constant growth rate of capitalist autonomous consumption has empirical support. This claim is surprising. The rich (capitalists) may leave some components of their consumption untouched in bad times. But that is not sufficient. Luxury consumption is notoriously cyclical,[8] and if one component of capitalist consumption (luxury yachts and dinners at five star restaurants) adjusts strongly, total consumption can be income-determined even if other components grow at a relatively constant rate. In fact, it may be difficult to think of any consumption component of the rich that is truly autonomous. Food consumption would be an obvious candidate, but although the rich will never go to bed hungry, the demand for Chateau Lafite or Beluga Caviar may fall in a recession; the composition of food consumption and the total spending on food may depend strongly on income, even for the rich. While not conclusive, these observations indicate a need for evidence to back up the exogeneity assumption.

Lavoie highlights three studies. Wen (2007), first, finds that consumption growth Granger causes investment growth, and that the causal relation is unidirectional; investment growth does not Granger cause consumption growth. The relevance of this study is unclear. Lavoie's own model implies that workers' consumption as well as part of capitalist consumption is income dependent, and income is related to investment. Thus, if empirical studies had shown consumption to be independent of income, they would have much more radical implications. But of course we have overwhelming evidence that consumption does depend on income – there may be disagreements over the importance of lagged income and expected future income, but the notion that aggregate consumption evolves without any influence from income has few takers. And would any Keynesian economist view aggregate demand as independent of investment?

Wen's results say very little about the issues at hand. To illustrate this point,

[8] Consider the great recession. According to the Daneshkhu and Simonian (2009),

> "luxury goods were the worst hit retail category in the last two months of 2008. Sales fell more than 34 per cent between November 1 and December 24, compared to the same period in 2007."

consider a variation on the Hicks-Samuelson multiplier-accelerator model. Let

$$\begin{aligned} I_t &= \beta_1 Y_{t-1} - \beta_2 Y_{t-2} \\ C_t &= \alpha Y_t \\ Y_t &= C_t + I_t \end{aligned}$$

With these assumptions, there are no autonomous demand components.[9] Straightforward manipulations imply that the change in investment can be written

$$\begin{aligned} \Delta I_t &= I_t - I_{t-1} = \frac{\beta_1}{\alpha}((C_{t-1} - C_{t-2}) - \frac{\beta_2}{\alpha}(C_{t-2} - C_{t-3}) \\ &= \frac{\beta_1}{\alpha}\Delta C_{t-1} - \frac{\beta_2}{\alpha}\Delta C_{t-2} \end{aligned}$$

The change in consumption is

$$\Delta C_t = \alpha \Delta Y_t = \alpha(\Delta C_t + \Delta I_t)$$

or

$$\begin{aligned} \Delta C_t &= \frac{\alpha}{1-\alpha}\Delta I_t \\ &= \frac{\beta_1}{1-\alpha}\Delta C_{t-1} - \frac{\beta_2}{1-\alpha}\Delta C_{t-2} \end{aligned}$$

A Granger causality test along the lines of Wen would show unidirectional causation from changes in consumption to changes in investment. There is no autonomous demand, however; investment is the only predetermined demand component in any short period; the dynamics are driven by investment; and essentially the multiplier-accelerator mechanism represents a simplified version of the Harrodian argument.

The example is not being offered because it represents a good model of actual income dynamics (it does not) but because unlike more general Harrodian

[9] Following Serrano (1995), Serrano and Freitas' (2015) short-run investment function is given by

$$I = hY$$

The proportional, contemporaneous relation between $I$ and $Y$ is unusual, and I know of no compelling reason – empirical or theoretical – for the exclusion of predetermined investment in the short run. Since they exclude lagged income effects on consumption, their model requires some source of autonomous demand in order to produce a positive short-run level of output.

There is no such requirement in the dynamic multiplier-accelerator model. The short-run equilibrium for output is given by

$$Y_t = \frac{\beta_1}{1-\alpha}Y_{t-1} - \frac{\beta_2}{1-\alpha}Y_{t-2}$$

The stationary solution to this difference equation has $Y_t = 0$, but the stationary solution need not be stable. If, say, $\beta_1/(1-\alpha) = 2$, $\beta_2/(1-\alpha) = 0.9975, Y_0 = 1$ and $Y_1 = 1.15$, the solution can be written

$$Y_t = 2(1.05)^t - 0.95^t$$

Thus, $Y_t$ is positive for all $t \geq 0$ and asymptotically the growth rate converges to 0.05.

specifications which include the capital stock and utilization rates explicitly, the simplifications lead to reduced forms that closely resemble those estimated by Wen. The example shows that income-determined consumption can be compatible with the absence of any Granger causation from investment growth to consumption growth as well as with Granger causality from consumption growth to investment growth. In fact, Granger causality from consumption to investment is exactly what the Harrodian model predicts. In a capitalist economy firms invest because they believe that investment will generate future profits. Beliefs about the additional profits from new investment, in turn, will be informed by past levels and changes in demand; if consumption follows output closely, the result is Granger causality from consumption to investment. Indeed, it is a bad habit for Keynesian economists to talk about investment as being 'independent'. Investment levels may be largely predetermined in the short run, but investment is induced as soon as we move beyond the short run.

The other two studies focus mainly on household residential investment, exports and government expenditure (Fiebiger 2014 and Girardi and Pariboni 2015). These variables are not included in Lavoie's model and the connection to the model would seem tenuous. Even if (quite implausibly) one were to take residential investment as independent of income and interest rates, this demand component is known to be highly volatile: the time pattern for residential investment bears no resemblance to Lavoie's autonomous demand with its constant growth rate. Government consumption as a source of stabilizing autonomous demand was discussed above in relation to Allain (2015a). Using exports as the source of autonomous consumption, finally, would seem to involve a fallacy of composition. A single country may be stabilized by exports – just as a single household can increase its wealth by reducing consumption or a single unemployed worker may gain employment by offering to work for a low wage – but this argument clearly does not carry over to the capitalist system as a whole.

The reference to Girardi and Pariboni's results is puzzling for another reason. It is hard to see how their results can be taken as corroboration of Lavoie's autonomous-demand argument. Commenting on their VECM regressions, Girardi and Pariboni explicitly point out that "the empirical evidence shows that causality runs not only from Z to Y, as expected, but also from Y to Z" (p. 27). They are also careful to note that "Granger causality does not necessarily entail true causality" (p. 33), and their finding that changes in the growth rate affect the share of investment in income is simply what a Harrodian argument would predict: if the utilization rate fluctuates around a constant desired value, an increase in the growth rate must raise the investment-output ratio. The finding is inconsistent, however, with benchmark Kaleckian models in which an increase in the saving rate reduces the growth rate.

To be clear, I am not suggesting that there no exogenous components of aggregate demand in the short and medium run. Military buildup in times of tension is a simple example on the side of government consumption. A more pertinent recent example may be the consumption effects of stock market or housing bubbles. A bubble can lead to a prolonged elevation in the growth rate of consumption, even if income lags behind. But there would be something odd about taking the autonomous component of the growth of consumption in a bubble economy as the basis for the stabilization of a Harrodian economy. If, for the sake of the argument, we assume that 'autonomous demand growth' could indeed stabilize the economy for the duration of the bubble, it would seem incumbent on the theorist to extend the analysis beyond the medium run – the bubble period – and to consider what happens when the bubble bursts. Thus, while there may have been insufficient attention to the medium-run effects of bubbles and financial deregulation on household consumption and investment, the way to approach these issues is not, in my view, to add a component of autonomous demand with an exogenous growth rate to an otherwise unchanged growth model. The question is not whether bubbles can affect the saving rate and have induced effects on investment. Of course they can. The question is whether macroeconomic models of the medium and long run should be anchored in autonomous consumption with an unexplained and exogenously given growth rate, and secondly, whether housing bubbles, military buildups or other autonomous movements in demand can be expected to stabilize a Harrodian economy. As argued above, the answer to both parts of this question must be a clear no.

Could it not be argued that in a world of fundamental uncertainty it may be dangerous to push the analysis into the long run and that a medium-run analysis with exogenous movements in autonomous demand give us a good starting point? Lavoie appears to be making an argument along these lines (and other post-Keynesians have done the same; e.g. Dutt (1997) and Hein (2014)). Lavoie concedes that "in the long run there is no truly exogenous variable" (p. 23) but suggests that "neo-Kaleckian authors never had a long-run steady state in mind" (p. 4). This defense raises several questions. Lavoie's own analysis is de facto 'long run'. Lavoie – along with Allain, Serrano and Freitas and Dutt – consider the local stability of a steady-growth solution that is contingent on a constant growth rate of autonomous demand. A local stability analysis of this kind has little interest from a short to medium run perspective unless the convergence to steady growth is fast. This condition fails to be satisfied. The steady growth path can only be stable if the convergence is very slow. To see this in a simple way, recall that for plausible parameter values the half-life of the adjustment of the expected growth rate $\gamma$ to actual growth would have to be at least 45 years using Allain's specification (see p. 6 above). In Lavoie's version, the lower bound on the half-life is reduced to about 22 years.[10]

One could react to these observations by abandoning the local stability analysis and replacing the constant growth rate of autonomous demand with a time-varying but still exogenous path for autonomous demand – a new sunspot theory for autonomous demand.[11] Lavoie has not carried out this kind of analysis, but a bubble argument might seem to fit an approach with time-varying autonomous demand; bubbles provide a temporary boost to aggregate demand, followed by

[10] Lavoie's version requires that $\lambda < z_2^*$, and the benchmark values suggested that $z_2^* \leq 1/32$. The condition $\lambda < 1/32$ implies that the half-life exceeds $(\ln 2)/(1/32)$.

[11] The autonomous demand component in Girardi and Pariboni's (2015) empirical analysis is highly volatile.

a crash.[12] Even as a starting point for the analysis of bubble-generated fluctuations in demand, however, it would not seem promising to assume that the bubbles develop completely independently of movements in income and employment; movements in income and employment influence monetary policy, for instance, with derived effects on asset prices. More promising, even if quite complex, would be an analysis that integrates endogenous medium-run movements in, for instance, financial practices (a la Minsky) or the strength and militancy of workers (a la Kalecki 1943) with short-run movements in aggregate demand and employment; see Ryoo (2010) and Skott (1990) for attempts in this direction.

At a broader level, the rejection of long-run analysis is misguided. Long-run analysis can be useful, even under fundamental uncertainty. Formal economic models give us a way to examine the logical implications of particular mechanisms. The investment function is a case in point. The presence of uncertainty does not invalidate the notion that capitalist firms invest if new capacity is expected to increase profits. The Harrodian model formalizes this argument in a simple and transparent manner, and makes it possible to examine the logic and implications of the argument. Formalization also enables the analysis of quantitative issues: one can examine what parameter restrictions are needed to obtain particular results, as in section 3 above.

Needless to say, the dynamics of a stylized model will never get to be played out in their pure form in any real economies. All models – and verbal arguments – leave out many aspects of reality. We can be sure that unexpected events will happen – new inventions may revolutionize production, political movements may force radical shifts in the legal and institutional framework of the economy, or wars may throw an economy into turmoil. But uncertainty and the knowledge that 'something' is bound to happen do not justify a neglect of the medium and long-term consequences of the *mechanisms that are being studied*. Some policy interventions – stop all investment and use the resources to increase current consumption, for instance – may be able to boost welfare in the short term. But that does not make it good policy to eliminate investment. Uncertainty and the possibility that a large meteor may destroy all life does not justify the truncation of the analysis at the short run.[13]

# 5 Alternatives

A stripped-down Harrodian model of the goods market does not provide a good story for real-world economies: we do not generally see cumulative divergence

[12] Lavoie explicitly refers to "lines of credit based on the vaue of real estate" as a source of autonomous consumption (p. 26).

[13] Along the same lines, growth-based arguments for progressive redistribution (e.g. Lavoie and Stockhammer 2013) carry little weight if the predicted growth is short-lived. The long-term effects of redistribution in the absence of unforeseeable shocks must be considered. Recent critiques of the wage-led literature include Carvalho and Rezai (2014), Blecker (2014), Palley (2014), Nikiforos (2015), von Arnim and Barrales (2015b) and Skott (2015).

from a steady growth path. Advanced economies fluctuate, but the movements in the employment rate typically stay within a relatively narrow range.

Lavoie presents his analysis as a "response to those who believe there are Harrodian instability mechanisms at work" (p. 13). Autonomous consumption is offered as a way to reconcile Harrodian investment dynamics with the stylized facts. For the reasons presented above I do not find the autonomous consumption approach very promising, and there are other, much more plausible ways of complementing the Harrodian mechanism. Two of them seem particularly important: feedback effects from the labor market and policy intervention.

Consider a process of upward Harrodian divergence. Utilization rates above the desired level lead to rising accumulation rates which boost aggregate demand and raise utilization even further. This process is subject to obvious supply-side limits: there is an upper limit on the utilization rate and prolonged periods of high growth will run into labor constraints. These supply-side constraints affect firms' decisions before the absolute limits are reached.[14] Tight labor markets influence firms' investment and price/output decisions. Why invest in new capacity if it is becoming increasingly difficult to find workers to operate the new capacity? Why try to expand output if tight labor markets make it impossible to attract workers without having to raise wages above what other firms are paying? Tightening supply constraints and the associated changes in prices and profit margins also have derived effects on saving.[15] More generally, as emphasized by Marx and Kalecki, high employment can be bad for 'discipline in the factories' (Kalecki 1943), and this can lead to adverse effects on firms' employment and investment decisions. In short, the supply side – in a broad sense – provides a ceiling on upward divergence through a variety of mechanisms.

It is harder to establish a floor under the downturn. The same factors that establish the ceiling will work in reverse. With high unemployment firms can pick and choose from an ample supply of well-qualified workers, and the general business climate will benefit from weak and disciplined workers. Using US data, Skott and Zipperer (2012) find strong effects of the employment rate on both the accumulation rate and the growth rate of output. Other endogenous mechanism may supplement these forces. Skott (1989, p. 242) suggests the possibility that "low rates of employment cause an upsurge in small scale business" and that the employment rate may "influence the share of saving in income (low employment rates implying low shares of saving)"; the dependence of saving rates on employment is explored by Allain (2015b). Still, the world has never seen a pure capitalist economy, and these forces may not always be sufficiently powerful to prevent downward divergence. Non-capitalist sectors – traditional agriculture, for instance, or a public sector – have always coexisted with the capitalist sector,

[14] Not all firms will hit capacity ceilings at the same time. These variations across firms also contribute to a smooth aggregate response as the ceilings are approached.

[15] Price movements are fast (relative to movements in output) in Marshall/Kaldor versions of the story (Skott 1989) and slow (relative to movements in output) in Robinson/Steindl versions (Flaschel and Skott 2006). These differences in relative adjusment speeds are irrelevant for present purposes.

and capitalist economies may not be viable without the stabilizing influence of these non-capitalist sectors.

The public sector is the most prominent non-capitalist sector in advanced economies and the source of autonomous demand in Allain's (2015a) analysis. Like Allain, Fazzari et al. (2013) introduce government consumption into a Harrodian model. Unlike Allain, they use a ceiling defined by full employment to curtail upward divergence, but autonomous demand provides the floor, and they take the growth rate of autonomous demand to be exogenous.[16] Policy makers, however, do not increase government consumption at a constant, exogenously given growth rate, and government budgets are not always balanced, as assumed by Allain. Taxes change, both as a result of automatic stabilizers and because of discretionary policy; government consumption varies because of exogenous events (e.g. military spending), because of advances in technology and income that generate additional demands and make it possible to meet those demands (e.g. health spending as new treatments become available) and because of discretionary stabilization policy (e.g. stimulus packages like the American Recovery and Reinvestment Act of 2009). Monetary policy, the favorite mainstream instrument for stabilization, also comes into play.[17] Most of the contributions to the huge literature on fiscal and monetary stabilization pay little or no attention to Harrodian forces. Several recent contributions, however, do focus explicitly on the stabilization of a Harrodian economy (Franke 2015, Ryoo and Skott 2015).

The supply-side (labor market) and policy approaches to stabilization would seem much more promising than arguments based on the exogenously given growth rate of some autonomous component of aggregate demand. They have an added advantage: the equalization of the warranted and natural growth rate is intrinsic to both the feedback effects from the labor market and the stabilization via policy This equalization is required for consistency with the stylized facts for advanced economies. Thus, in the autonomous-demand approach, some mechanism will be required to ensure that autonomous demand grows at the natural rate.

Commenting on possible discrepancies between the natural rate of growth and the growth of autonomous consumption, Lavoie points to residential investment as a possible solution. The growth in the active population, he suggests, fuels the demand for housing and provides a source of autonomous demand that grows at the natural rate. The notion that residential investment grows at the natural rate $n$ does not meet simple behavioral and empirical tests. Residential investment is extremely volatile and its average long run growth rate is roughly the same as that of GDP, not that of employment or population. This is not sur-

[16] The steady growth path is locally unstable and the model generates endogenous cycles. The cyclical property does not require the equality between the growth rate of autonomous demand and the natural growth rate. The predicted growth pattern, however, "seems somewhat unrealistic" (Fazzari et al., 2013, p.17) unless the growth rate of autonomous demand as assumed equal to the natural rate of growth.

[17] Recent (post-) Keynesian contributions include Lima and Setterfield (2014) and Jayadev and Mason (2014).

prising. Housing takes many forms, even in advanced economies. McMansions sprout when economies are booming and interest rates low; young people stay with their parents longer than otherwise when conditions are bad; per capita square footage and amenities increase with per capita income. Demography plays a role in housing demand. But it is a great leap from this observation to a claim that population growth *determines* the growth in housing demand. There is an additional leap in claiming that an increase in household spending on housing has no effects on household spending on other consumption (that is, that spending on housing is autonomous in the sense of the model).

Are there no drawbacks to invoking the supply side and active policy as the stabilizing forces? In his abstract Lavoie highlights the fact that the autonomous-demand approach safeguards the main Keynesian message. He returns to this theme repeatedly in the paper as well as in the conclusion:

> We, thus, have reached a conditional proof that neo-Kaleckian results such as the paradox of thrift or the paradox of costs can be preserved even if the economy systematically comes back towards a constant normal rate of utilization, as long as we interpret neo-Kaleckian results as averages measured during the period of transition. This is achieved by taking into account an autonomous growth component ... (p. 24)

This is a curious argument. The autonomous-demand model can produce level effects that fit the 'paradox of thrift' and the 'paradox of cost'. But the paradox of thrift – the contractionary level effect of a rise in the saving rate – can also be found in models based on feedback effects from the labor market (e.g. Skott (1989, 2015) and von Arnim and Barrales (2015a)): in these models an increase in the saving rate reduces the employment rate and the ratio of saving to the labor supply. If the labor supply grows at a given rate, this conclusion translates into a level effect of the same kind as the one discussed by Lavoie. The paradox of cost – a positive effect of a rise in the real wage on profits – ceases to be well-defined in models in which the real wage is itself an endogenous variable. One can examine, however, the effects of changes in parameters that influence wage and price determination. As an example, an increase in the degree of competition (a reduction, ceteris paribus, in the markup and an increase in real wages) leads to a rise in employment and profits in Skott (1989).

Autonomous demand is neither necessary nor sufficient to 'safeguard Keynesian conclusions'.[18] Keynesian conclusions can be derived without any reliance on autonomous demand components that grow at an exogenous rate. These similarities in conclusions across different models may be interesting, but the safeguarding of specific, desirable conclusions – whether Keynesian, Marxian or neoliberal – is not a good criterion for model selection. The case for including the supply side and economic policy rests on behavioral plausibility and empirical evidence.

[18] Lavoie himself notes a caveat: asymmetric adjustments during a cyclical convergence to the stationary state could reverse the result.

## 6 Conclusion

The literature on autonomous demand seems to accept the Harrodian investment argument, and the growing consensus on the limitations of the post-Kaleckian specification of investment should be welcomed. The implications and relevance of autonomous demand for Harrodian issues can be questioned, however. The share of autonomous demand would have to be extremely high and the growth rate extremely low in order to stabilize the Harrodian dynamics. The premise behind the analysis is shaky, moreover, both theoretically and empirically: it is unclear why the trajectory of a significant proportion of aggregate demand would be independent of past, current and expected future income

There are other ways of taming the Harrodian dynamics, but post-Keynesian macroeconomists sometimes seem to have an aversion to any supply-side argument. This aversion can make an autonomous-demand route attractive, but the aversion is a little hard to understand. The supply side matters, and there is nothing particularly Keynesian about an exclusive focus on the demand side of the goods market.[19] Keynesians rightly criticize contemporary macroeconomics for its neglect of aggregate demand. The answer is not to adopt a reverse Say's law and assume that whatever is demanded will be supplied.

## References


[1] Allain, O. (2015a) Tackling the instability of growth: a Kaleckian-Harrodian model with an autonomous expenditure component , *Cambridge Journal of Economics*, 39 (5), pp. 1351–1371.

[2] Allain, O. (2015b) "Demographic Growth, Harrodian (In)Stability and the Supermultiplier". Mimeo (paper presented at the 19th Conference of the Research Network Macroeconomics and Macroeconomic Policies (FMM), Berlin, October 2015.

[3] Auerbach, P. and Skott, P. (1988) "Concentration, competition and distribution". *International Review of Applied Economics*, 2, pp. 42–61.

[4] Blecker, R. (2014) "Wage led versus profit-led demand regimes: the long and the short of it". Mimeo.

[5] Carvalho, L. and Rezai, A. (2014). "Personal Income Inequality and Aggregate Demand." Working Papers, Department of Economics 2014-23, University of São Paulo (FEA-USP).

[6] Committeri, M. (1986) "Some comments on recent contributions on capital accumulation, income distribution and capacity utilization". *Political Economy: Studies in the Surplus Approach,* 2 (2), pp. 161–86.


[19] The need for greater attention to the supply side has been pointed out by, among others, Palley (2002) and Setterfield (2013).

[7] Daneshkhu, S. and Simonian, H. (2009) "Luxury goods succumb to the cycle". *Financial Times*, http://www.ft.com/intl/cms/s/0/7702cf42-f153-11dd-8790-0000779fd2ac.html#axzz3x8lf4iC5

[8] Dumenil and Levy (1999) "Being Keynesian in the short term and classical in the long term: the traverse to classical long-term equilibrium". *Manchester School*, 67 (6), pp. 684-716.

[9] Dutt, A.K. (1984) "Stagnation, income distribution and monopoly power". *Cambridge Journal of Economics*, 8, pp. 25-40.

[10] Dutt, A. K. (1997) "Profit-rate equalization in the Kalecki-Steindl model and the overdetermination problem". *Manchester School*, 65 (4), pp. 443–51.

[11] Dutt, A.K. (2015) "Growth and distribution with exogenous autonomous demand growth and normal capacity utilization". Mimeo (paper presented at the Workshop on Analytical Political Economy, Tohuko University, November 2015).

[12] Fazzari, S.M., Ferri, P.E., Greenberg, E.G. and Variato, A.M. (2013) "Aggregate demand, instability and growth". *Review of Keynesian Economics*, 1(1), pp. 1-21.

[13] Fiebiger, B. (2014) "Semi-autonomous household expenditures as the causa causans of postwar U.S. business cycles: the stability and instability of Luxemburg-type external markets". Mimeo.

[14] Flaschel, P. and Skott, P. (2006) "Steindlian Models of Growth and Stagnation". *Metroeconomica*, 57:3, pp. 303-338.

[15] Girardi, D., Pariboni, R. (2015) "Autonomous demand and empirical growth: some empirical evidence". Working paper 714, Department of Economia Politica e Statistica, University of Sienna.

[16] Hein, E. (2014) *Distribution and Growth After Keynes*. Elgar.

[17] Jayadev, A. and Mason, J. (2014) "Functional Finance and Sound Finance in the light of Tinbergen's rule". Mimeo.

[18] Kalecki, M (1943) "Political aspects of full employment". Reprinted in M. Kalecki, *Selected essays on the dynamics of the capitalist economy*, Cambridge: Cambridge University Press, 1971.

[19] Kurz, H. (1986) "Normal positions and capital utilization". *Political Economy*, 2, pp. 37-54.

[20] Lavoie, M. (2015) "Convergence towards the normal rate of capacity utilization in neo-Kaleckian models: the role of non-capacity generating autonomous expenditures". *Metroeconomica*, doi: 10.1111/meca.12109

[21] Lavoie, M. and Stockhammer, E. eds (2013) *Wage-led growth – an equitable strategy for economic recovery.* ILO and Palgrave Macmillan.

[22] Lima, G.T. and Setterfield, M. (2014). "The Cost Channel of Monetary Transmission and Stabilization Policy in a Post-Keynesian Macrodynamic Model," *Review of Political Economy*, 26(2), pp. 258-281.

[23] Marglin, S., Bhaduri, A. (1990): 'Profit Squeeze and Keynesian Theory', in Marglin, S., Schor, J. (eds): *The Golden Age of Capitalism - Reinterpreting the Postwar Experience*, Clarendon, Oxford.

[24] Nikiforos, M. (2014) "Distribution-led Growth in the Long Run". Working Paper No. 814, Levy Economics Institute of Bard College

[25] Palley, T. (2002) "Pitfalls in the theory of growth: an application to the balance-of-payments-constrained growth model". In M. Setterfield (ed.) *The economics of demand-led growth*. Elgar.

[26] Palley, T. (2014) "Rethinking wage vs profit-led growth theory with implications for policy analysis". Mimeo.

[27] Palley, P. (2015). "Monetary Policy at the Zero Lower Bound and After: A Reassessment of Quantitative Easing and Critique of the Federal Reserve's Proposed Exit Strategy". *Metroeconomica*, 66(1), pp. 1-27.

[28] Rowthorn, B. (1981): 'Demand, real wages and economic growth'. *Thames Papers in Political Economy,* autumn.

[29] Ryoo, S. (2010) "Long waves and short cycles in a model of endogenous financial fragility". *Journal of Economic Behavior and Organization* 74, pp. 163–186

[30] Ryoo, S. and Skott, P. (2015) "Fiscal and monetary policy rules in an unstable economy". Working Paper 2015-15, University of Massachusetts.

[31] Serrano, F. (1995) "Long period effective demand and the Sraffian supermultiplier" *Contributions to Political Economy*, 14, pp. 67–90.

[32] Serrano, F., Freitas, F. (2015) "Growth rate and level effects: the adjustment of capacity to demand and the Sraffian supermultiplier". *Review of Political Economy*, 27(3), pp. 257-281.

[33] Setterfield, M. (2013) "Exploring the supply side of Kaldorian growth models". *Review of Keynesian Economics*, 1(1), pp. 22-36.

[34] Shaikh, A. (1991) "Wandering around the warranted growth path: dynamic nonlinear solutions to the Harrodian knife-edge". In Nell, E. J., Semmler, W. (eds): *Nicholas Kaldor and Mainstream Economics: Confrontation or Convergence?*, Macmillan, London.

[35] Skott, P. (1989) *Conflict and Effective Demand in Economic Growth*. Cambridge: Cambridge University Press.

[36] Skott, P. (1990) "Class Conflict and Accumulation" In C. Ruhl and G. Mongiovi (eds) *Macroeconomic Theory: Diversity and Convergence*, Edward Elgar, pp. 208-221.

[37] Skott, P. (2012) "Theoretical and empirical shortcomings of the Kaleckian investment function". *Metroeconomica*, 63 (1), pp. 109–138.

[38] Skott, P. (2015a) "Growth cycles and price flexibility". *Review of Keynesian Economics*, 2015, 3(3), pp. 374-386.

[39] Skott, P. (2015b) "Weaknesses of 'wage-led growth'. Mimeo.

[40] Skott, P. and Zipperer, B. (2012) "An empirical evaluation of three post-Keynesian models". *Intervention – European Journal of Economics and Economic Policies*, 9 (2), pp. 277–308.

[41] von Arnim, R. and Barrales, J. (2015a) "Demand-driven Goodwin cycles with Kaldorian and Kaleckian features". *Review of Keynesian Economics*, 3(3), pp. 351-373.

[42] von Arnim, R. and Barrales, J. (2015b) "Longer run distributive cycles: Wavelet decompositions for US, 1948{2014.". Mimeo.

[43] Wen, Y. (2007) "Granger causality and equilibrium business cycle theory". *Federal Reserve Bank of St. Louis Review*, May–June, pp. 195–205.