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Zero Lower Bound (ZLB) Economics: The Fallacy of New Keynesian Explanations of Stagnation²

Revised January 2016

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Keywords: zero lower bound (ZLB), stagnation, New Keynesianism, nominal rigidities

JEL refs.: E0, E10, E12, E20, E40, E50

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² This paper was presented at the meeting of the Brazil Keynesian Association held in Uberlandia, Brazil on August 19 – 21, 2015. I am grateful to Duncan Foley, Tom Michael, Mark Setterfield and Matias Vernengo for many helpful comments. All responsibility for any errors is my own.

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This paper explores zero lower bound (ZLB) economics. The ZLB is widely invoked to explain stagnation and it fits with the long tradition that argues Keynesian economics is a special case based on nominal rigidities. The ZLB represents the newest rigidity. Contrary to ZLB economics, not only does a *laissez-faire* monetary economy lack a mechanism for delivering the natural rate of interest, it may also lack such an interest rate. Moreover, the ZLB can be a stabilizing rigidity that prevents negative nominal interest rates exacerbating excess supply conditions.

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1. The search for an explanation of stagnation

Having been surprised by the financial crisis of 2008 and the Great Recession, mainstream economics has been further surprised by the onset of stagnation following the Great Recession. In the immediate aftermath the expectation was that the economy would experience a V-shaped recovery in response to massive monetary and fiscal stimulus. That expectation is epitomized by former Federal Reserve Chairman Ben Bernanke's claim in March 2009 about "green shoots" of recovery.² The expectation of a V-shaped recovery then gave way to an expectation of a U-shaped recovery, which in turn morphed into an L-shaped recovery that was christened as "stagnation" by

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² Bernanke first referred to green shoots in a March 15, 2009 television interview on *CBS Sixty Minutes*. Subsequently, he referred to them again in a commencement speech to the Boston College School of Law on May 22, 2009.

Larry Summers in a speech at the IMF on November 8, 2013.³

The unexpected emergence of stagnation has prompted a search for a theoretical explanation. That search has now converged on the idea of the zero lower bound (ZLB) to nominal interest rates which supposedly obstructs clearing of the loanable funds market for full employment saving and investment. As a result, ZLB economics has become the new orthodoxy that saves so-called “new Keynesian” economics.

This paper explores the ZLB new orthodoxy. It is both a critique of ZLB economics and an affirmation of Keynes’ (1936) view regarding the potential inability of interest rates to restore full employment. The conclusion is the economic logic of the ZLB hypothesis is faulty, negative nominal interest rates may not solve the demand shortage problem, and negative nominal rates may even aggravate the problem. The paper’s theoretical argument is that demand shortage is not due to the ZLB, but rather to the existence of non-produced stores of value, including money. This problem was clearly identified by Keynes in *The General Theory*:

“Unemployment develops, that is to say, because people want the moon; -- men cannot be employed when the object of their desire (i.e. money) is something which cannot be produced.... There is no remedy but to persuade the public that green cheese is practically the same thing and to have a green cheese factory (i.e. a central bank) under public control (Keynes, 1936, p.235).”

With regard to content, the paper explains why unemployment may persist even if the nominal interest rate is negative. It also shows that in a zero or negative nominal interest rate environment, firms are likely to engage in debt-financed equity buy-backs. This provides an explanation of the increase in debt-financed buy-backs that has been observed over the past several years.

³ Unfortunately, Summers makes no reference to the fact that the prospect of stagnation had been identified much earlier by those critical of mainstream economics (See Foster and Magdoff, 2009; Palley, 2009a, 2012, 2014). This continues a pattern, among mainstream economists, of citation failure and turning a blind eye toward work outside the mainstream.

More broadly, the conclusion of the paper is that ZLB economics promotes a false understanding of current problems and, thereby, blocks the path to solutions. It promotes pre-Keynesian misunderstandings of the role and adjustment capabilities of interest rates, which keeps economics locked into a failed orthodoxy. Viewed in this light, ZLB economics is a classic example of gattopardo economics (Palley, 2013a). Gattopardo economics refers to change that keeps economics the same. The ZLB explanation of stagnation introduces a new nominal rigidity that keeps macroeconomics locked into old ways of understanding the economy.⁴

2. The origins of ZLB economics

The ZLB approach to stagnation was pioneered by Krugman (1998) who originally developed it to explain Japan's stagnation after the collapse of its asset price bubble in 1991. Now, in collaboration with Eggertsson, Krugman has elaborated the story to explain the stagnation that has followed the US financial crisis of 2008 (Eggertsson and Krugman, 2012).

The Eggertsson – Krugman approach is part of the New Keynesian research paradigm. That paradigm takes the classical macro model and add frictions which prevent the economy from equilibrating at full employment. Viewed in that light, the ZLB constitutes the most recently invented friction.

The simplest version of the classical macro model is given by the following fourteen equation model:

$$(1) \quad y = f(N, K) \quad f_1 > 0 \quad f_{11} < 0$$

$$(2) \quad N = N(w) \quad N_1 > 0$$

$$(3) \quad w = w/p = f_N$$

$$(4) \quad AD = y$$

⁴ Furthermore, the notion of the ZLB is has now been disproved in practice by the European Central Bank, the Swiss National Bank, and the Swedish Riksbank which have all set negative nominal rates.

$$(5) AD = C + I + G + X - M$$

$$(6) C = C([1-t]y, r, z_C) \quad C_1 > 0, C_2 < 0, C_3 > 0$$

$$(7) I = I(y, r, z_I) \quad I_1 > 0, I_2 < 0, I_3 > 0$$

$$(8) M = M([1-t]y, r, z_M) \quad M_1 > 0, M_2 < 0, M_3 > 0$$

$$(9) D = G - ty$$

$$(10) S = y - C - D + M - X$$

$$(11) L = L(y, i, z_L) \quad L_1 > 0, L_2 < 0, L_3 > 0$$

$$(12) H/p = L$$

$$(13) i = r + \pi$$

$$(14) \pi = \{E[p] - p_{-1}\}/p_{-1}$$

y = real output, N = employment, K = capital stock, w = real wage, w = nominal wage, p = price level, AD = aggregate demand, C = aggregate consumption, I = aggregate investment, G = government purchases, X = exports, M = imports, t = tax rate, r = real interest rate, z_C = consumption shift factor, z_I = investment shift factor, z_L = real money demand shift factor, D = government budget deficit or surplus, S = aggregate saving, L = real money demand, i = nominal interest rate, H = nominal money supply, π = expected inflation, $E[p]$ = rationally expected price level, p_{-1} = last period's price level. The exogenous variables are $K, G, t, X, H, z_C, z_I, z_L,$ and p_{-1} . The endogenous variables are $y, N, w, p, C, I, L, M, D, S, r, \pi,$ and $E[p]$.

Equation (1) is the aggregate production function in which real output (y) is a concave function of employment (N) and the capital stock (K). Equation (2) is the labor supply function in which labor supply (N) is a positive function labor of the real wage ($w = w/p$). Equation (3) has the real wage equal to the marginal product of labor (f_N). Equation (4) is the goods market clearing condition requiring aggregate demand (AD) equal output. Equation (5) is the definition of AD

which is equal to the sum of real consumption spending (C), planned investment spending (I), government spending (G) and exports (X) minus imports (M). Equation (6) determines aggregate consumption. It is a positive function of disposable income, a negative function of the real interest rate, and a positive function of a shock/shift term. Equation (7) determines aggregate investment. It is a positive function of aggregate income, a negative function of the real interest rate, and a positive function of a shock/shift term. Equation (8) determines import spending which is a positive function of disposable income, a negative function of the real interest rate, and a positive function of a shock/shift term. Issues regarding the real exchange rate are abstracted from for purposes of simplicity. Equation (9) defines the government deficit which is bond financed. Equation (10) defines aggregate saving. Equation (11) determines real money demand. It is a positive function of aggregate income, a negative function of the nominal interest rate, and a positive function of a shock/shift term. Equation (12) is the money market equilibrium condition and has real money demand equal to real money supply. The real money supply is endogenous and depends negatively on the price level, but the nominal money supply is exogenous. Equation (13) defines the real interest rate, and equation (14) defines expected inflation.

The economic logic of the model is as follows. Given the structure of the economy (as described by the equations of the model) and the exogenous variables, agents form rational expectations of the model's implied equilibrium solutions and equilibrium price level. Given the non-stochastic nature of the above model, and assuming approximate model linearity, that implies⁵

$$(15) E[p] = p$$

Thereafter, given the expected price level, firms and workers set a nominal wage that yields the expected equilibrium real wage. Firms then employ the profit-maximizing level of employment

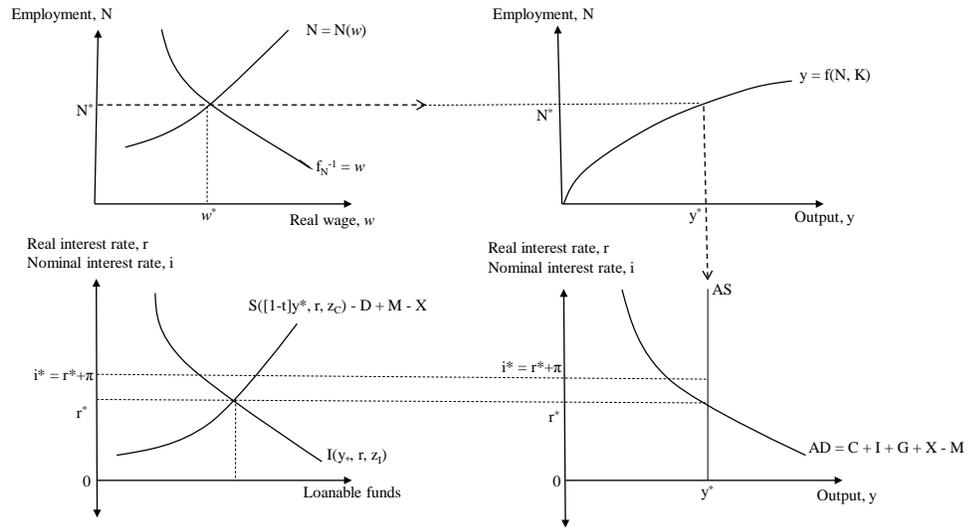
⁵ The assumption of model linearity is one of the critical and implausible technical assumptions of new classical macroeconomics in its application of rational expectations methodology to macro models.

consistent with that real wage, thereby determining the level of output. The real interest rate then adjusts in the loanable funds market to ensure that AD equals aggregate supply (AS). Aggregate saving (the supply of loanable funds) is thereby brought into alignment with aggregate desired investment (the demand for loanable funds). Lastly, the price level adjusts to bring real money supply into equilibrium with real money demand. This accords with the classical and monetarist traditions in which the monetary forces determine the price level.

The model is illustrated in Figure 1. The top left hand panel describes the labor market in which the real wage and employment are determined on the basis of the expected price level. The top right hand panel shows the aggregate production function which determines the level of output given the level of employment. The lower right panel shows the goods market in which the real interest rate adjusts to bring AD into alignment with AS. The lower left panel shows the market for loanable funds in which the real interest rate equilibrates the demand for loanable funds (I) and the supply of loanable funds ($S - D + M - X$). The loanable funds market is the economic mechanism that coordinates saving and planned investment, thereby ensuring goods market equilibrium consistent with full employment output.⁶

⁶ The above specification of the classical macro model is block recursive as the labor market, the goods market and the money market interact in a one-way direction. Equations (1) – (3) determine supply-side equilibrium. Given those solutions, equations (4) – (9) determine demand-side equilibrium. Thereafter, equations (10) – (12) determine money market equilibrium. The solution process therefore flows recursively down in a one-way direction. Metzler (1951) added a Pigou real balance effect to consumption which results in the real money supply impacting AD. That change complicates the classical model and undoes its three segment block recursive structure by making the equilibrium solution for the goods and money markets simultaneous.

Figure 1. The classical macro model



The ZLB becomes relevant if the nominal interest rate cannot adjust to deliver the full employment equilibrium real interest rate needed to clear the goods and loanable funds markets. This is illustrated in Figure 2. A negative consumption shock ($z_C' < z_C$) shifts the supply of loanable funds function to the right, generating a full employment equilibrium real interest rate of $r^* < 0$. Given the nominal interest rate is at the ZLB so that $i = 0$, the real interest rate is $r' = -\pi > r^*$. Consequently, both the goods market and loanable funds market are in excess supply at this real interest rate (even though it is negative).

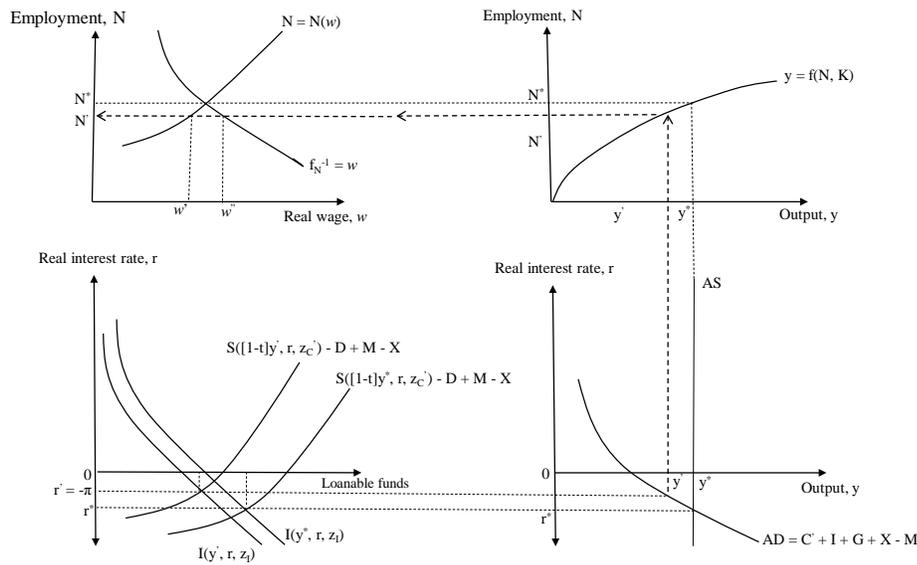
ZLB economics therefore adds the following auxiliary assumption regarding output determination

$$(16) y = \text{Min}[y^*, AD(y, r')] \quad AD_1 > 0, AD_2 < 0$$

This condition is a Keynesian short-side output determination condition. When the goods market is in excess supply (i.e. AD is less than full employment output) and the real interest rate cannot adjust downward to clear the market because of the ZLB, the level of output adjusts to equilibrate

with AD. In the goods market (lower right-hand panel) this adjustment is characterized by a leftward movement up along the AD schedule and a reduction of output to y' . In the loanable funds market (lower left-hand panel) it is characterized by a leftward shift of both the supply of and demand for loanable funds. These twin shifts are brought about by reduction of output which reduces private sector saving and investment.⁷ Note, the assumption is that the supply of loanable funds falls by more than the demand so that the prevailing real interest rate rises even though it is still negative ($0 > r' > r^*$).⁸ Stagnation persists as long as the prevailing real interest rate is greater than the full employment real interest rate. If deflation sets in stagnation can worsen as that raises the prevailing real interest rate.

Figure 2. The classical macro model with a ZLB constraint owing to a negative consumption shock ($z_C' < z_C$).



The above classical model with a ZLB illuminates the essential macroeconomics of New

⁷ Having investment depend on the level of output assumes the existence of Keynesian accelerator effects. In a strictly neoclassical model the marginal efficiency of investment is determined by purely technical conditions and is independent of the level of output. In such a model, the demand for loanable fund (planned investment spending) would not shift in response to the reduction in output and the interest rate would rise further.

⁸ This accords with the Keynesian multiplier stability condition whereby saving is more sensitive than investment to changes in income.

Keynesian ZLB economics. The one significant twist of New Keynesian economics that distinguishes it from old fashioned classical macroeconomics is the addition of a central bank that engages in interest rate targeting. Thus, rather than having the loanable funds market set the interest rate, the central bank takes over the interest rate setting function. It does so via a four step procedure. First, it announces an inflation target (that must be credible). Second, it estimates the full employment real interest rate (i.e. the natural rate of interest). Third, it announces a nominal interest rate target that is equal to the inflation target plus the estimated natural rate of interest. Fourth, it sets the money supply to hit the nominal interest rate target. The central bank therefore plays the role of a “pseudo-loanable funds market”. It implicitly targets the natural rate of interest which, according to the model, is possible as long as it can adjust the nominal interest rate. However, problems arise if the natural rate of interest is negative and the nominal interest rate is at the ZLB.⁹

3. Applications of ZLB economics to stagnation

The previous section has described the theory of the ZLB economics. This section explores how ZLB economics has been used to explain stagnation.

(3.1) Deleveraging: Eggertsson and Krugman (2012)

The first application to be examined is Eggertsson and Krugman’s (2012) deleveraging hypothesis. They argue that after the financial crisis some households decided to repair their balance sheets by paying back debt and deleveraging. This process caused an increase in the full employment supply

⁹ In the above simple classical model the central bank can always hit its estimated natural rate by raising its inflation target which the bank can hit by increasing the money supply. The above model was presented for illustrative purposes to show the essential macroeconomics behind ZLB economics. More sophisticated New Keynesian models add price level inertia and also make expected inflation a function of the future price level rather than the current price level. Those modelling changes explain why the central bank cannot raise inflation to lower the real interest rate and circumvent the ZLB. That gives New Keynesian models an escape hatch for explaining why central banks have not been able to avoid stagnation. However, after so many years of quantitative easing policy that has increased the money supply, the explanation is wearing thin. This policy experience suggests there is something wrong with the New Keynesian theory of inflation which is essentially monetarist – but that is material for another paper.

of saving (loanable funds), necessitating a fall in the full employment real interest rate. However, that fall was blocked off by the ZLB, resulting in an excess supply of loanable funds. Eliminating that excess supply has imposed a contraction of income and employment for the duration of the deleveraging process.

Accounting for deleveraging requires distinguishing between the consumption spending of creditor (type A) and debtor (type B) households. Analytically, it can be captured by re-specifying the consumption function as follows:

$$(17) C = C_A + C_B$$

$$(18) C_A = C([1-t]\alpha y + R, r) \quad 0 < C_{A1} < 1, 0 < \alpha < 1$$

$$(19) C_B = [1-t][1-\alpha]y - R$$

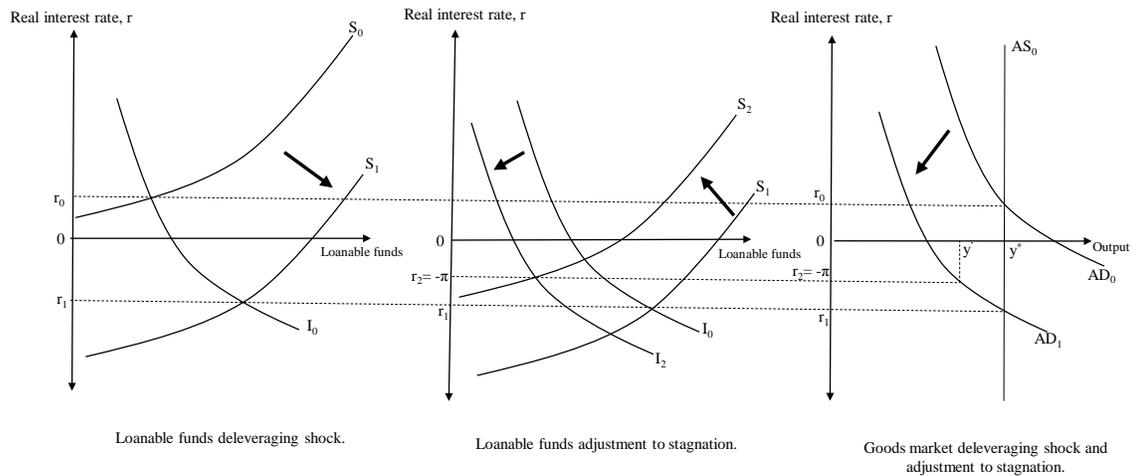
C_A = consumption of creditor households, C_B = consumption of debtor households, α = share of income going to creditor households, R = debt repayment. The important feature is that deleveraging renders debtor households liquidity constrained so that they have a marginal propensity to consume of unity which is greater than that of creditor households. At the same time, deleveraging transfers income from debtors to creditors. The combination of different MPCs and the transfer of income then causes an increase in aggregate saving that necessitates a fall in the real interest rate to maintain full employment.¹⁰

The Eggertsson – Krugman deleveraging ZLB story of stagnation is illustrated in Figure 3. The left-hand panel shows the initial full employment equilibrium in the loanable funds market that is disturbed by a deleveraging shock that increases saving and the supply of loanable funds, requiring a negative real interest rate which is blocked off by the ZLB. The middle-panel shows the subsequent loanable funds market adjustment in response to the reduction in income resulting

¹⁰ This mechanism of income transfers and different debtor – creditor propensities to consume is identical to that used by Palley (1994) to construct a Keynesian debt driven model of the business cycle.

from insufficient AD triggering the short-side rule. Lower income results in reduced supply of and demand for loanable funds. The right-hand panel shows the adjustment process in the goods market. The economy is initially at full employment with a positive real interest rate of r_0 . The deleveraging shock shifts the AD schedule down, requiring a negative full employment real interest rate of r_1 . Stagnation then causes a movement left up-along the new AD schedule and the economy settles below full employment with an output of y' and a real interest rate of $r_2 < 0$.

Figure 3. The Eggertsson – Krugman deleveraging ZLB story of stagnation.



(3.2) Secular stagnation: Summers (2014)

The second application to be examined is Summers' (2014) revival of Alvin Hansen's (1939) secular stagnation hypothesis. Hansen developed the hypothesis in the late 1930s in an attempt to explain the depth and duration of the Great Depression. According to Hansen, secular stagnation in the US was the result of three principal factors: the closing of the western frontier, decline in population growth, and a change in the nature of technical progress that had reduced investment demand relative to full employment saving.

In the Keynesian model these factors cause a permanent decline in investment demand that

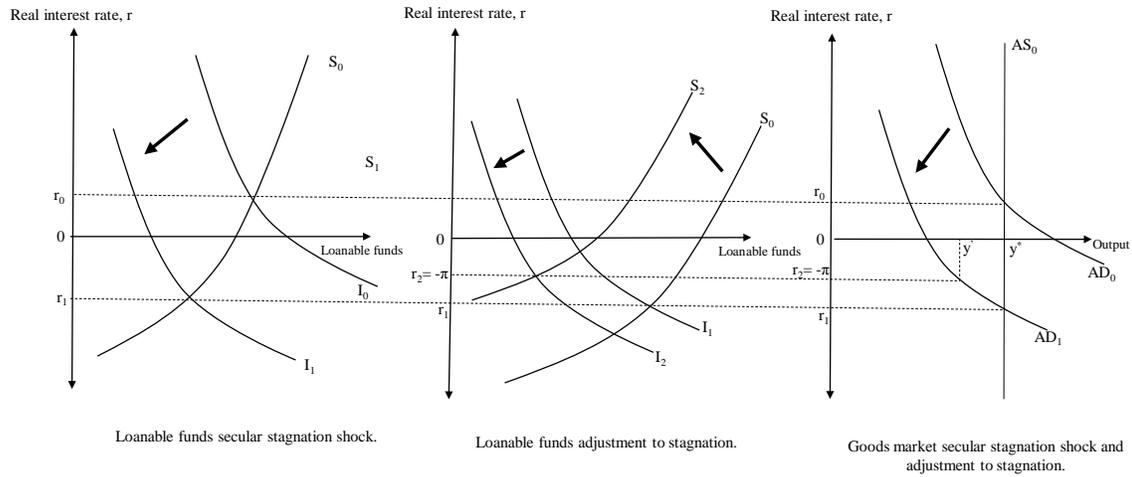
the economy has no automatic means of offsetting, resulting in persistent demand shortage. In the New Keynesian model the real interest rate can adjust, thereby maintaining full employment.

Explaining stagnation therefore requires combining Hansen's argument with the ZLB.

Figure 4 describes how the secular stagnation story works under ZLB economics. The left-hand panel shows the initial full employment equilibrium in the loanable funds market that is disturbed by the investment demand shock which shifts the demand for loanable funds leftward. This lowers the full employment real interest rate to r_1 . However, adjustment is blocked off by the ZLB which prevents the nominal interest rate from adjusting downward to the needed rate. The middle-panel shows the subsequent loanable funds market adjustment in response to output contraction compelled by the short-side output determination rule. Lower income results in reduced supply of and demand for loanable funds. The right-hand panel shows the full adjustment process in the goods market. The economy is initially at full employment with a positive real interest rate of r_0 . The investment demand shock shifts the AD schedule down, requiring a negative full employment real interest rate of r_1 . The ZLB blocks that adjustment, causing a movement up-along the new AD schedule and the economy settles below full employment with an output of y' and a real interest rate of $r_2 < 0$.¹¹

¹¹ If the inflation rate is zero ($\pi = 0$) the economy will settle at a new real interest rate of zero so that $r_0 = i = 0$.

Figure 4. The Hansen – Summers secular stagnation ZLB story.



(3.3) Global saving glut: Bernanke (2005)

The third application of ZLB economics is Bernanke's (2005) global saving glut hypothesis in which the global economy suffers from a saving glut, principally caused by excess saving in China. The Bernanke hypothesis was advanced in the middle of the housing bubble to explain low US long-term interest rates. However, when combined with ZLB economics, it can be applied to explain stagnation.

The economics of the saving glut is observationally equivalent to the Eggertsson – Krugman deleveraging hypothesis as shown in Figure 3. The supply of Chinese saving increases imported Chinese goods into the US economy. That increases the supply of loanable funds, shifting the loanable funds supply schedule to the right and simultaneously lowering the AD schedule in the goods market. If the saving glut is large enough, maintaining full employment output may need a negative real interest that may be infeasible because of the ZLB. In that case, output will contract according to the logic of ZLB economics, causing a reduction in the supply of and demand for loanable funds. That process eventually equilibrates the economy at a reduced

level of real economic activity with a negative real interest equal to the rate of inflation.¹²

(3.4) *Worsened income inequality*

The fourth application to be examined is the role of worsened income inequality.¹³ Once again, incorporating this argument requires disaggregating consumption spending, this time into spending by high and low income households. This can be done by re-specifying consumption spending as follows:

$$(20) C = C_A + C_B$$

$$(21) C_A = C_A([1-t]\alpha y, r) \quad 0 < C_{A1} < 1, C_{A2} < 0, 0 < \alpha < 1$$

$$(22) C_B = C_B([1-t][1-\alpha]y, r) \quad 0 < C_{B1} < C_{B1} < 1, C_{B2} < 0$$

C_A = consumption of high income households, C_B = consumption of low income households, α = share of income going to high income households. The important feature is that high income households have a lower marginal propensity to consume than low income households ($C_{A1} < C_{B1}$).

An increase in the share of income (α) going to high income households increases inequality, lowers aggregate consumption and increases aggregate saving. Analytically, the effect is identical to deleveraging. In terms of Figure 3, an increase in income inequality results in an

¹² The Bernanke saving glut hypothesis has been widely misinterpreted as a Keynesian argument that emphasizes the problem of demand leakage. In fact, as shown above and as argued by Palley (2012, 2015), it is a classical argument constructed in terms of loanable funds theory. According to its logic, in the pre-2008 financial crisis period China was offering loanable funds at a subsidized interest rate. That constitutes a gift that should have been good for the US economy. If there were any problems, they were because the financial system misallocated those resources. That is a very different interpretation from the misleading spin surrounding the saving glut hypothesis. That spin engages in bait and switch: the bait is the language of saving glut which gives the hypothesis a Keynesian appearance; the switch is the fact that it is a classical argument, which explains why Bernanke refused to criticize globalization or advocate Keynesian measures aimed at limiting the damage done by Chinese imports.

¹³ Interestingly, this argument has not yet been invoked by proponents of ZLB economics – and it has been explicitly rejected by Krugman (2013). The reason for this rejection appears to be twofold. First, mainstream economic theory views household propensity to consume as independent of household income. Second, prior to the financial crisis of 2008, US income inequality increased for over two decades but the aggregate saving rate declined. That suggests higher income households do not have a higher propensity to save. Palley (2012, 2015) provides counters to both of these arguments showing how financialization permitted and encouraged increased borrowing by lower income households that covered over the negative AD effects of increased income inequality.

increase in aggregate saving because of the lower propensity to consume of high income households. Consequently, the supply of loanable funds shifts right and the AD schedule shifts left. Maintaining full employment equilibrium therefore requires a fall in the real interest rate, which may not be possible owing to the ZLB. This shows how new Keynesian ZLB economics can also easily capture ideas about the AD effects of income inequality, long-associated with Post Keynesian economics.

4. Empirical critique of applications of ZLB economics to explain stagnation

The previous sections have described ZLB economics and how it has been used to explain stagnation. The next two sections provide two different critiques of ZLB economics. The first is an empirical critique of applications of ZLB economics to explain stagnation. The second is a theoretical critique of ZLB economics.

With regard to empirical critique, the Eggertsson - Krugman (2012) deleveraging story of excess saving and demand shortage has gained widespread attention. However, it is empirically unconvincing. Table 1 shows US non-financial business debt has actually been increasing quite fast since 2011. US household debt also shrank little during the Great recession and it too has been increasing since 2012. Furthermore, a significant part of the reduction in household debt likely came from default and debt write-offs, which likely increases aggregate demand and reduces aggregate saving by relieving debtors of their obligations.

Table 1. Growth of US household and non-financial business debt (%).
 Source: Financial Accounts of the United States, Federal Reserve, Fourth Quarter 2014.

	2008	2009	2010	2011	2012	2013	2014
Households	1.1	0.0	-1.1	-0.2	1.5	1.5	2.9
Business	5.8	-4.3	-0.9	3.0	4.8	5.1	5.9

Summers' (2014) revival of Alvin Hansen's (1939) secular stagnation story has also gained considerable attention given the combination of Summers' standing and the fact that he presented it at a blue ribbon IMF gala attended by the mainstream elite. However, it makes little sense in terms of explaining the unexpected failure to recover from recession. According to the mainstream narrative the economy experienced a deep recession caused by the financial crisis. However, prior to the crisis the economy was viewed as strong and the neoliberal economic policies of the prior twenty-five years (globalization, deregulation, increased labor market flexibility, financial innovation and corporate adoption of shareholder value maximization) were celebrated for strengthening the economy. This view was reflected in the economics profession's self-congratulatory chatter about the "Great Moderation". Secular stagnation rests on factors like declining population growth and changed character of technical progress which do not emerge overnight. That means secular stagnation is inconsistent with the profession's description of both the economy and its policy achievements prior to the recession.

The implication is that Summers' secular stagnation story is not plausible without a far deeper reconstruction of the economic history of the past thirty years. That history was shaped by

policies justified by mainstream economic theory and sold by mainstream economists, led by Summers. Reassessing history and the success of those policies compels questioning the soundness of the theory. Yet, that is something neither Summers nor the mainstream profession are willing to do. Instead, the goal is to slap a patch on existing mainstream theory by invoking secular stagnation which has suddenly emerged to explain the current stagnation.

Bernanke's (2005) global saving glut story received massive attention prior to the crisis, and it continues to garner attention as part of the family of stories explaining why the economy is trapped by the ZLB. The claim is China is saving too much and directing those savings into the US loanable funds market, thereby increasing the supply of loanable funds and lowering the full employment real interest rate. That story suffers from two fundamental microeconomic and macroeconomic critiques (Palley, 2012, 2015).

With regard microeconomics, a very substantial share of exports from China are produced by wholly foreign owned subsidiaries or joint-ventures (76 percent in 2004). China's exports and export capacity therefore reflect the production arrangements associated with globalization which have been designed and are controlled by foreign firms. It is those arrangements which explain China's exports rather than Chinese saving behavior.

With regard to macroeconomics, the saving glut story adopts a loanable funds perspective that represents Chinese producers as bringing goods to the US for sale, thereby increasing the supply of loanable funds. That is not how the transaction works. Rather than China financing the transaction, it is financed by American banks who make dollar loans to US buyers who then use those loans to purchase Chinese goods. China's central bank provides yuan in return for dollars enabling US buyers to pay their Chinese suppliers. It is the US that initially finances China trade and not China. That is reflected in China's accumulation of dollar holdings, and trade would grind

to a halt absent the willingness of US banks to initiate dollar loans.

China does not have a saving glut. Instead, it lacks the income and domestic demand to purchase the production which multinational corporations have located in China. To generate demand for that production and encourage more multinational investment, Chinese policymakers have undervalued China's currency to increase export competitiveness and export demand. That is a Keynesian strategy of export-led growth centered on an undervalued currency. It is not a loanable funds saving glut story.

In sum, ZLB economics attempts to explain the unanticipated stagnation after the Great Recession by appeal to a variety of different stories – deleveraging (Eggertsson & Krugman, 2012), sudden secular stagnation (Summers, 2014) and China's saving glut (Bernanke, 2005). All these stories appeal to the impediment of the ZLB which stops the real interest rate from adjusting downward and restoring full employment.

These ZLB stories misinterpret reality. The US economy has been on a glide-path to stagnation for the past 30 years owing to neoliberal policies that created a structural demand shortage by worsening income distribution, increasing the trade deficit and encouraging offshore investment diversion (Palley, 1998, 2002, 2012). This is evident in Table 2 which shows the highs and lows of the US federal funds rate over the past three business cycles. During this period the Federal Reserve was compelled to push its policy interest rate sequentially lower in order to open the spigot of credit and asset price inflation and retain a resemblance of full employment. It had room to do so because of the high nominal interest rates that prevailed in 1980 at the beginning of the neoliberal era of policy making. It was this process that lay behind the so-called "Great Moderation" and the perceived success of monetary policy. However, offsetting the deflationary impacts of neoliberal policy in this way could not go on forever because of the ZLB. Viewed in this

light, neoliberal policy is the cause of stagnation and hitting the ZLB is simply a symptom.

Table 2. Brief history of the federal funds interest rate, June 1981 – January 2010.
Source: Board of Governors of the Federal Reserve.

	High	Low
June 1981	19.10%	
December 1992		2.92%
November 2001	6.51	
May 2004		1.00
July 2007	5.26	
January 2010		0.10

5. Theoretical critique of ZLB economics

The previous section provided a critique of specific applications of ZLB economics to explain the current stagnation. This section provides a theoretical critique of the macroeconomic logic of ZLB economics.

(5. 1) The ZLB as the new nominal rigidity.

ZLB economics is part of the New Keynesian consensus. New Keynesianism views the macro economy as a full employment system that only fails to settle on full employment due to rigidities and market imperfections. The main rigidities concern prices and nominal wages. ZLB economics adds the nominal interest rate to the list of rigidities. In this vein, Krugman writes that there are two obstacles to full employment:

“First is the zero lower bound on the interest rate: after a sufficiently large shock, the Taylor rule may say you should keep cutting rates, but you can’t. Second is downward nominal rigidity... (Krugman, 2013)”

The net result is that after a large negative shock the central bank cannot lower nominal interest rates to stimulate demand, while downward nominal rigidity prevents the economy from benefitting from a lower price level that would generate a positive Pigou real balance effect that would supposedly stimulate consumption spending and aggregate demand.

There are two things to note. First, the new Keynesian view of the macro economy is fundamentally at odds with Keynes' (1936, Chapter 19) view as expressed in his *General Theory*. For Keynes, nominal rigidities were not the cause of unemployment and actually helped stabilize the economy.¹⁴ That means New Keynesian economics should really be termed "New Pigovian" economics (Palley, 2009b) because it adopts Pigou's (1933) market frictions approach to explaining unemployment. ZLB economics continues with this line of reasoning and is fully consistent with the theoretical line initiated by Modigliani (1944) which recast Keynesian macroeconomics as a special case of classical macroeconomics with nominal rigidities. Viewed in this light, ZLB economics is the newest rigidity aimed at saving the classical model from Keynes' (1936) critique.

Second, beginning with his original 1998 exposition, Krugman has persistently sought to give ZLB economics a Keynesian air by labelling it as a "liquidity trap". However, it lacks Keynesian foundations, as illustrated by the theoretical model presented in section II which shows ZLB economics is simply classical loanable funds analysis plus the addition of a nominal interest rate floor. This point is also made by Taylor (2014) in his dissection of Krugman's (1998) original ZLB model. Furthermore, Palley (2000) points out that Krugman misuses the term "liquidity trap" to describe the ZLB. A liquidity trap only prevails when money and bonds are perfect substitutes in portfolios. That is clearly not the case as quantitative easing (QE) operations have been able to

¹⁴ Palley (2008) shows how nominal wage and price flexibility destabilize an economy in the presence of inside debt combined with debtors having a higher marginal propensity to consume than creditors. The germ of these ideas are clearly evident in Chapter 19 of Keynes' (1936) *General Theory*.

move asset prices, including bond prices. If they were perfect substitutes, agents would be indifferent to holding assets or bonds and bond prices would not respond to central bank QE operations exchanging money for bonds.

ZLB economics derives its Keynesian flavor via the addition of a short-side production rule (see equation (16) above). That yields a Keynesian-style output response when the real interest rate is above the rate consistent with full employment ($r > r^*$) – which classical economists termed the “natural” rate of interest and Keynes (1936, p. 183) termed the “neutral” rate of interest. The output rule creates a discrete switching regime which is either classical or Keynesian. That is inconsistent with Keynes’ (1936) principle of effective demand determined output which he believed held at all times in a capitalist economy except at full employment – which Keynes (1936, p.303) explicitly defined as a position where an increase in aggregate demand yielded no increase in employment.

Parenthetically, in the presence of nominal interest rate targeting, Krugman’s real interest rate based short-side output rule implicitly makes central banks responsible for unemployment. That is because unemployment occurs whenever the nominal interest rate is too high so that $r > r^*$. Ironically, that connects ZLB economics with Milton Friedman. Friedman argued central banks were responsible for unemployment because of their erratic management of the money supply: Krugman’s ZLB economics implicitly holds central banks responsible through their interest rate policy.

(5.2) Money and non-produced assets and stores of value are the problem, not the ZLB.

ZLB economics assumes that, if the ZLB were absent, lower interest rates could solve the AD shortage problem. From a Keynesian perspective that is incorrect. The ZLB floor is not the problem: rather, it is the existence of money and other non-produced assets and stores of value that

is. Even if the central bank were to make the nominal cost of finance negative, firms might still refuse to invest sufficiently and prefer to hold money and non-produced assets instead.

The impact of these factors is illustrated by the following simple model of investment and asset allocation by firms. On the asset side, firms have an initial capital stock which they can increase via new investment, and they can also hold money and non-produced stores of value. On the liabilities side, firms are financed by a mix of equity and loans. Each asset has its own pattern of diminishing marginal returns, and there is a positively sloped supply of each type of finance.

The balance sheet of the representative firm is given by:

$$(23) K_0 + I + M + G = E + L$$

K_0 = initial capital stock, I = investment (i.e. addition to the capital stock), M = money holdings, G = non-produced stores of value, E = equity, L = Loans. All variables are in real terms and are deflated by the general price level.

Rates of asset returns and the costs of finance are given by:

$$(24) r_I = R(K_0) - \kappa(I) - \delta + \pi \quad R(K_0) \geq 0, R_K < 0, \kappa_I > 0, \kappa_{II} > 0, \kappa(0) = 0, \delta > 0$$

$$(25) r_M = i_M + \varphi(M) - \pi \quad \varphi(M) \geq 0, \varphi_M < 0, \varphi_{MM} < 0$$

$$(26) r_G = \psi(G) + \pi \quad \psi(G) \geq 0, \psi_G < 0, \psi_{GG} < 0$$

$$(27) i_L = i_F$$

$$(28) r_E = \xi(E) + \pi \quad \xi(E) > 0, \xi_E > 0, \xi_{EE} > 0$$

$$(29) r_L = i_L + \rho + \lambda(L) \quad \rho > 0, \lambda(L) \geq 0, \lambda_L > 0, \lambda_{LL} > 0$$

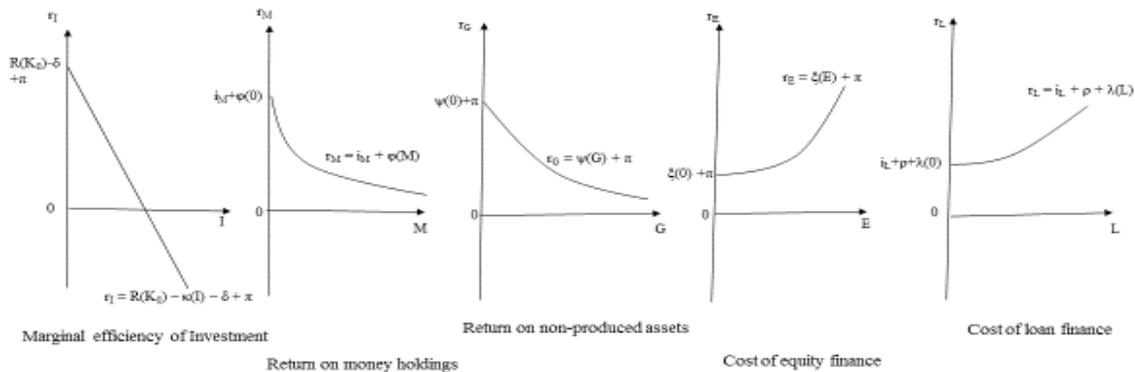
$$(30) i_M = i_F - c \quad c > 0,$$

r_I = marginal efficiency of investment, $R(K_0)$ = marginal efficiency of capital, $\kappa(I)$ = capital stock adjustment cost, δ = depreciation, π = inflation, r_M = return on money, i_M = deposit interest rate, $\varphi(M)$ = own liquidity return on money, r_G = return on non-produced stores of value, i_L = risk-free

loan rate, i_F = money market rate set by the central bank, r_E = cost of equity finance, r_L = loan rate to firms, ρ = loan administration cost, $\lambda(L)$ = default risk premium, c = deposit administration cost.

Figure 5 shows the pattern of rates of return on different assets and the interest rate associated with different sources of finance. Rates of return are subject to diminishing marginal returns, and finance interest rates increase with volume owing to rising default probability and portfolio saturation concerns. The marginal efficiency of investment eventually becomes negative owing to diminishing marginal productivity of capital and rising marginal costs of adjusting the existing capital stock. Adding capital to the existing capital stock imposes disruption costs associated with integrating new capital into the existing organization.¹⁵

Figure 5. Nominal rates of asset returns and costs of finance



In a manner of speaking, firms are real sector multi-input multi-output financial intermediaries. They take finance from different sources and use that finance to hold different types of assets that produce different returns. In equilibrium, firms equalize the marginal costs of sources of funds with marginal benefits from application of funds so that marginal rates of return

¹⁵ The supply of non-produced stores of value is fixed at g . The total real value of such stores is $G = qg/p$ where q = price of non-produced stores, p = general price level. Given g and p are fixed, an increase in G implies an increase in q . As q increases, the expected return on non-produced stores falls.

and cost are equalized. This implies the condition

$$(31) r_I = r_M = r_G = r_E = r_L$$

If firms have a minimum required real return on investment (θ), the equilibrium condition is given by $r_I - \theta = r_M = r_G = r_E = r_L$. The impact of a minimum return is to shift the MEI down, which would reduce investment spending. Such a minimum return covers against the possibility that an investment may turn sour because of fundamentally uncertain future developments such as technological or product innovation that renders the investment obsolete, new competitive entry that adversely impacts future cash flows from the investment, or future adverse macroeconomic developments that adversely impact the profitability of the investment.¹⁶ This is another place where fundamental uncertainty and Keynes' (1936) notion of animal spirits become relevant. The minimum return on investment can also be endogenous and may rise in slumps if future conditions become perceived as even more uncertain. It may also be impacted by convention and the psychology of habit. For instance, during periods of prolonged boom and unusually high returns, firms may come to ratchet up their minimum target return on equity and those targets may be slow to come down in the slump. That would in turn cause investment to fall by more during a slump, thereby deepening the slump. Such behavioral economics resonates with Keynes' *General Theory* which is full of references to conventions governing expectations.¹⁷ It also resonates with the current slump in which rate of return expectations have only gradually ratcheted down after the bursting of the credit bubble which ran from 1981 to 2007.

The solution to the firm's capital allocation and financing decision is illustrated in Figure 6.

¹⁶ In neoclassical microeconomic theory firms are viewed as an implicitly carrying out the wishes of shareholders. In that case, firms would require the same risk premium as shareholders. In post Keynesian theory firms (i.e. managers) and shareholders are distinct and separate agents so that the risk premium demanded by firms can differ from the risk premium demanded by shareholders in equity markets (Crotty, 1990; Palley, 2001). A minimum rate of return creates a wedge so that at any rate of interest the project must earn an additional θ .

¹⁷ Koutsobinas (2014/15) suggests Keynes is the first behavioral economist.

The total demand for assets is obtained by summing horizontally the different asset return schedules, and the total supply of finance is obtained by summing horizontally the different finance supply schedules. The intersection of the asset demand and finance supply schedules determines the equilibrium marginal return on assets and marginal cost of finance. The composition of the representative firms' asset holdings and financing is then determined by horizontally decomposing asset holdings and finance at the equilibrium interest rate.

Figure 6. Equilibrium financing, investment and asset holdings of firms in normal times ($i_F > 0$).
 $r_I = r_M = r_G = r_E = r_L$

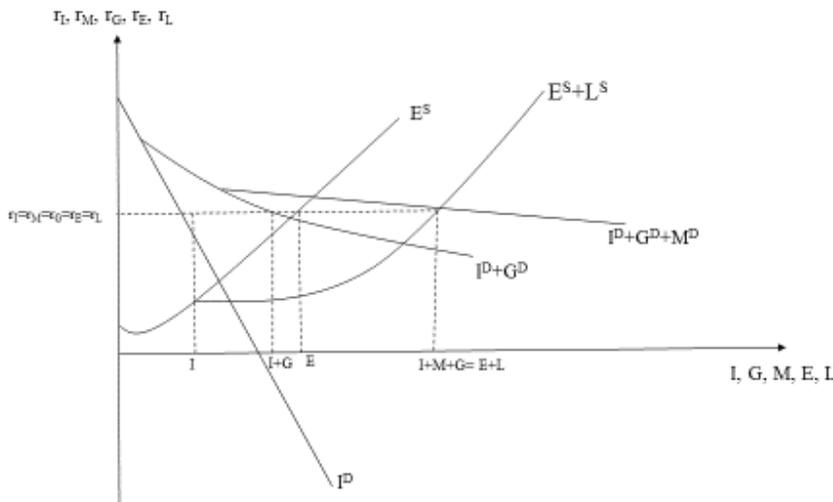


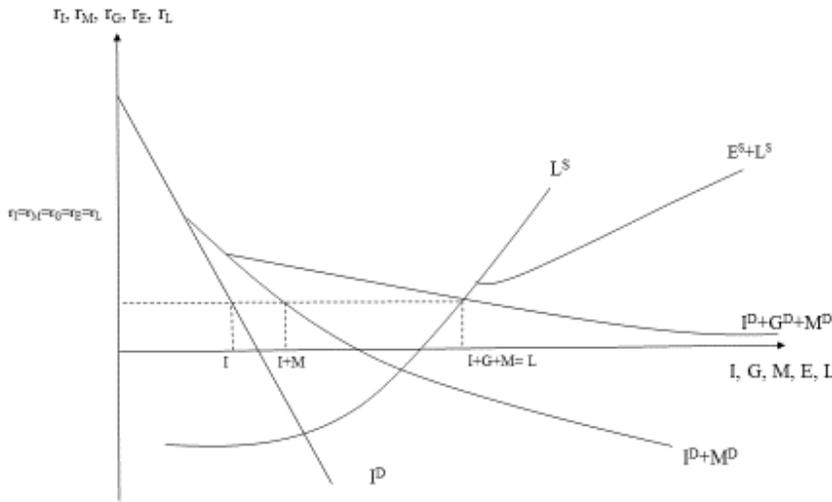
Figure 6 can be used to understand the effects of monetary policy which works by lowering the money market risk free interest rate. That lowers the cost of loan finance and shifts down the loan supply function. It also lowers the return on money holdings function by lowering the deposit rate. The total finance supply and money portion of the asset return function shift down by an equal amount since the loan supply and return on money functions are equally impacted, which leaves the total size of the firms' balance sheet unchanged. However, there is a change in the composition of the firm's balance sheet. First, firms switch from equity finance to loan finance because loan finance is cheaper. That means a lower policy interest rate induces firms to return

equity to shareholders and adopt a more risky balance sheet financing structure. Second, firms reduce their money holdings because the return on money is lower, and they increase investment (capital accumulation) and holdings of non-produced assets.

In normal times, a lower policy interest rate stimulates investment. Just how much depends on several factors including the sensitivity of the MEI to investment spending (i.e. the steepness of the MEI function) and the sensitivity of the marginal return on non-produced assets. The relative steepness of the MEI and return on non-produced assets functions determines how new borrowing is allocated to investment relative to acquisition of non-produced assets.

Now, consider abnormal times when the monetary authority wants to increase investment and sets a negative money market interest rate (as the ECB and Swiss National Bank have done). In this case, as shown in Figure 7, the loan supply shifts down and a portion of it is negative. The return on money function also shifts down and a portion of it also becomes negative. If the money market rate is sufficiently negative so that the loan rate is sufficiently low, then firms will switch completely to loan finance. They do this via share buybacks and special dividends that return all equity to shareholders. Even though the deposit rate is negative, firms still hold some money balances because the “own liquidity return” to money increases as the firm’s money holdings fall.

Figure 7. Equilibrium financing, investment and asset holdings of firms in abnormal times ($i_F < 0$).
 $r_I = r_M = r_G = r_E = r_L$



The critical point is that if the marginal return to non-produced assets is always greater than or equal to zero, there comes a point when the MEI hits zero and all extra loan finance from negative loan rates will be directed to increased holdings of the non-produced asset rather than investment. Once the MEI has fallen to zero, firms will not invest for a negative return when they can do better by acquiring additional non-produced assets. The ZLB is not the problem: the problem is the existence of non-produced assets such as cash, land, commodities like gold, assets like patents and copyrights, assets like knowhow and organizational capital embodied in existing firms, and streams of rents owned by firms with monopoly power. The price of these assets will be bid up by negative interest rates, but investment will not. Firms will borrow to return equity to shareholders and they will engage in bidding wars (e.g. take-overs) for existing assets, but they will not invest.

Interest rate insensitive investment spending is widely associated with a vertical IS schedule in the ISLM model. Historically, this feature has been interpreted as a technical feature of the investment function. However, the above analysis shows it is a product of the existence of

non-produced assets, alternative stores of value, and balance sheet re-engineering options. From that perspective, a vertical IS schedule is an intrinsically financial phenomenon rather than the product of the technical characteristics of the marginal efficiency of investment.

Microeconomic forces can amplify the pattern. For instance, if managers have a short-termist perspective because they are rewarded with unrestricted stock options, they will have a further personal incentive to engage in debt-financed equity buy-backs rather than undertake long-term profitable investment (Palley, 1997). Financialization (Palley, 2013b, chap. 2) has likely increased such behavior by encouraging and facilitating financial engineering aimed at raising the current share price.

(5.3) Additional considerations

In a truly Keynesian economy the situation may be even more problematic than described above. First, depressed (abnormal) times may be associated with an increase in fundamental uncertainty that increases the perceived own liquidity return to money ($\varphi(M)$). Thus, even though the nominal return on money is negative, firms and agents may be willing to hold it because of the increased own return.

Second, according to neoclassical capital theory the MEI schedule is determined by technological conditions. Keynes had in mind a different construct in which the MEI depended on the state of animal spirits and perceptions of the fundamentally uncertain future. In this case the MEI may shift toward the origin in bad times, making it even more difficult to increase investment.

Third, capital is long-lived and lumpy. In a multi-period model, the willingness to take on low interest rate loans to finance current investment spending will also depend on expectations of future interest rates. Even if today's loan rates are negative, firms may be unwilling to borrow to finance relatively unproductive investment if they think those investment projects will be saddled

with future high loan costs. This consideration also introduces time-consistency contradictions (Kydland and Prescott, 1977). Thus, to the extent that a lower interest rate today incentivizes investment spending, it also increases the likelihood of higher future interest rates that dis-incentivize spending. Moreover, a policy commitment to keep interest rates low in the future will be incredible because firms know that policymakers are likely to renege on that commitment if it produces policy that is sub-optimal at a future date.

Fourth, and finally, in neoclassical theory more capital can always be put to use because of smooth substitutability between capital and labor. That means it is impossible to have excess capital. However, if production is characterized by Leontieff conditions or capital is putty-clay in nature, it is possible to have idle excess capital. That excess will then act as a barrier that renders investment insensitive to negative interest rates. When firms have idle excess capacity they have no incentive to add additional capital. Microeconomic assumptions about the production function and nature of capital have major macroeconomic implications that are swept aside by the assuming smooth capital – labor substitutability.

(5.4) Can lower interest rates solve the AD shortage problem by lowering saving?

If lower interest rates cannot increase investment to solve the demand shortage problem, can they do so by lowering saving? As is well known, in pure consumption theory a lower real interest rate gives rise to both positive substitution and negative income effects. The substitution effect raises consumption and lowers saving, thereby increasing demand. The income effect lowers consumption and raises saving, thereby decreasing demand. Consequently, the effect of lower real interest rates on consumption is theoretically ambiguous – though new Keynesian loanable funds models always assume the effect is positive. Consumption can fall and saving increase in response

to a lower interest rate if the income effect dominates.¹⁸

Introducing money and negative nominal rates on money deposits may worsen the problem and make it more likely that the saving function is badly behaved and is a negative function of the real interest rate. That is because a negative deposit rate is a form of tax on money that lowers real wealth, which lowers consumption and increases saving. If banks are charged negative rates on their central bank deposits they will pass those charges on to consumers in the form of fees and negative deposit rates, and possibly even raise loan rates to recoup their costs. Just as the Pigou real balance effect is viewed as increasing wealth and consumption, so too bank fees and a negative deposit rate will reduce wealth and consumption. Behavioral economics may also matter here. A lower positive interest rate means less income: a negative interest rate imposes an additional loss of money wealth which is felt asymmetrically strongly via the endowment effect (Kahneman et al., 1990). That contributes to a larger compensating saving response.

Balanced against the negative Pigou effect, there will also be positive asset price wealth effects working in the other direction. The net impact on AD will depend then on the relative magnitudes of these effects. If households have different MPCs, it will also depend on the distribution of wealth and money holdings.

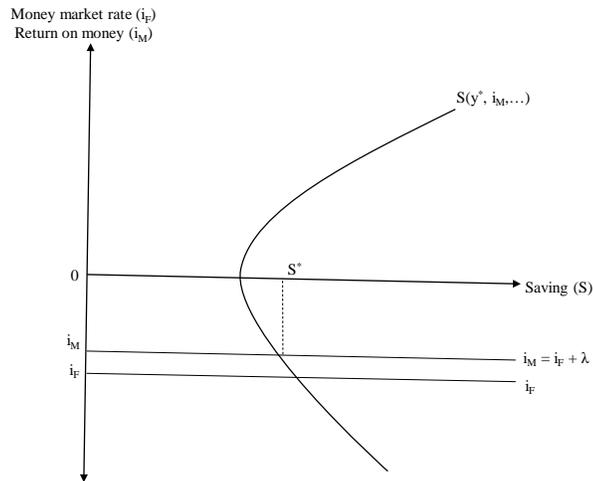
Figure 8 depicts a backward bending supply of saving in the presence of a negative money market rate. The saving function is drawn as backward bending at the ZLB.¹⁹ Below the ZLB full employment saving increases because of the dominance of the combined adverse income and money wealth effects. A negatively sloped saving function makes a lower interest rate

¹⁸ For example, consider the case of a household which lives for two periods, has a zero discount rate, income of Y in period 1 and zero income in period 2. The real interest rate is r . The optimal consumption plan has equal consumption per period so that $C_1 = C_2 = Y[1 + r]/[2 + r]$ and period 1 saving is $S_1 = Y/[2 + r]$. A lower interest rate lowers period 1 consumption ($dC_1/dr > 0$) and increases period 1 saving ($dS_1/dr > 0$).

¹⁹ For clarity of argument, Figure 8 depicts the saving function as becoming backward bending at the ZLB. However, the saving function may start to bend backward above the ZLB when interest rates are positive, or it could even be negatively sloped over the entirety of its range.

counter-productive. However, all that is needed for the interest rate – saving channel not to work is that the saving function be vertical.

Figure 8. The supply of saving in depressed times with a negative money market rate ($i_F < 0$, $\pi = 0$).



(5.5) Further issues: negative nominal interest rate and the problem of financial instability.

The above analysis has shown why negative nominal interest rates may not increase AD because investment may not increase and saving may not fall. The implication is the fundamental problem is not the ZLB. Furthermore, in addition to not solving the AD shortage problem, lowering the nominal interest rate below the ZLB could create other difficulties.

One problem already identified is it will promote risky balance sheet re-engineering. A second problem is that it will tend to promote financial disintermediation. With negative rates on deposits, agents will tend to exit money and look for other stores of value and media of exchange. This may show up in the form of precious metals inflation, commodity price inflation and land inflation. It may also show up in increased use of credit cards for transactions and introduction of new monies such as bit-coin.

A third related problem is that exit from money can produce asset price bubbles as agents

chase both yield and alternative stores of value (Palley, 2011). Those asset bubbles introduce a time-consistent policy contradiction. Policy first pushes low and negative money market interest rates to increase AD. However, should policy be successful, that will necessitate raising interest rates which risks triggering a financial crisis by bursting any bubbles.

Fourth, ultra-low and negative interest rates jeopardize business models related to insurance and retirement income provision in jeopardy. That can cause financial disruption and disintermediation in these important financial sub-sectors.

In sum, pushing money market rates below the ZLB may not only fail to solve the AD shortage problem, it may create significant financial instability. In monetary economics there is a well-worn aphorism that monetary policy is ineffective in recessions because it is like pushing on a string. A corollary proposition is that policymakers should not push so hard that they cause a knot.

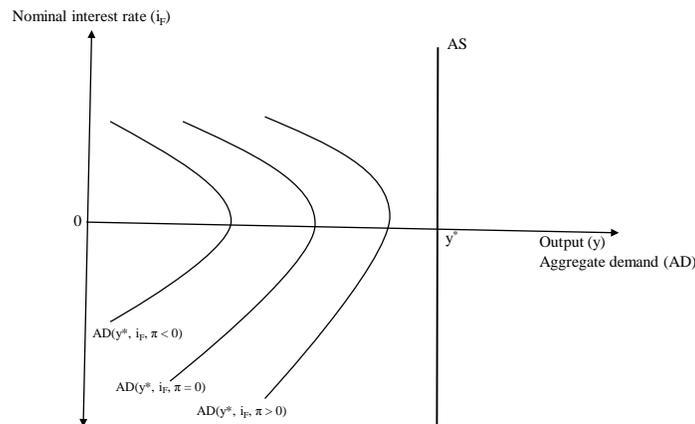
6. Non-existence of the natural rate of interest

The previous arguments make clear the fallacies of the new Keynesian ZLB argument. Central banks can lower interest rates below zero, but even if they do it may not solve the AD shortage problem and could worsen it. Far from being a solution to demand shortage, negative nominal interest rates may aggravate the problem.

Even more fundamentally, there may also be no natural rate of interest at which full employment investment is equal to full employment saving. Figure 9 illustrates the problem in terms of full employment aggregate demand (AD) – aggregate supply (AS). There is a family of AD functions conditioned on full employment output, each indexed by the rate of inflation. Lower inflation or faster deflation shifts the AD function left. As the nominal interest rate comes down the gap (excess supply) between AD and AS shrinks. However, once nominal rates go negative it

starts to increase. Given the rate of inflation, there may be no natural rate of interest that equilibrates full employment AD and full employment AS.²⁰

Figure 9. The problem of excess supply at full employment.



The ISLM diagram provides an alternative representation of the problem. The problem is not that the LM is horizontal as posited by ZLB theorists such as Krugman (1998). Instead, it is that the IS schedule is vertical or backward bending. That interpretation returns the theoretical debate about stagnation to its 1930s roots. The Keynesian position is that the IS may be vertical or backward bending before full employment, and price and nominal wage reductions may not shift the IS schedule in an expansionary direction. The early neo-Keynesians (Modigliani, 1944) misconstrued *The General Theory* in terms of the liquidity trap and a horizontal LM. Later neo-Keynesians compounded the error by arguing price and nominal wage reductions would shift

²⁰ Mirroring Figure 7, Figure 8 is drawn as having the AD schedule bend backward at the ZLB. However, it may bend backward when interest rates are positive and above the ZLB. Furthermore, for non-existence of a natural rate, all that is needed is the AD schedule be vertical.

the IS schedule in an expansionary direction, thereby enabling full employment despite the liquidity trap. Those two misconstructions continue to grip new Keynesian thinking.²¹

Lastly, Figure 9 highlights the potentially important role of inflation in securing full employment owing to inflation's positive impact on investment spending. However, the argument in favor of higher inflation is different from that of new Keynesians (Blanchard et al., 2010). New Keynesians argue higher inflation is desirable as a buffer against hitting the ZLB. Their logic is that higher inflation in normal times implies a higher normal nominal interest rate, which provides more room for the monetary authority to lower the nominal interest rate in the event of a large negative economic shock. In contrast, the argument in Figure 9 focuses on the aggregate demand benefits of higher inflation which increases the absolute and relative return to investment in an environment of fixed nominal interest rates.²²

7. Conclusion

Pre-Keynesian classical macroeconomics was guilty of a double failure. First, it assumed interest rates were determined by the loanable funds market which served to coordinate and equilibrate full employment saving and investment. This assumption was criticized by Keynes (1936) who claimed no such coordination mechanism existed and interest rates were determined via money market liquidity preference.²³ Second, classical loanable funds macroeconomics assumed there

²¹ The insensitivity of investment to the interest rate (the cost of capital) provides a supplementary justification for the socialization of investment. Keynes (1936, p.378) thought socialization was a long-run future possibility that might be permanently needed if a falling rate of profit, due to capital abundance, meant private investment was insufficient for full employment. In the short-run, temporary socialization of investment (i.e. large scale public investment) may also be occasionally needed in deep recession and periods of stagnation if private investment spending is unresponsive to lower interest rates.

²² In Figure 9, there may be many nominal interest rate – inflation combinations at which AD is equal to full employment output. In this case, there is a natural rate of interest but it is non-unique. However, aggregate supply may also be impacted by inflation, in which case the very concept of the natural rate of interest is brought into question.

²³ Unfortunately, Keynes never explicitly called the loanable funds market a fiction. Instead, in his *General Theory* he was more opaque and his most insightful observations were also given in the relatively obscure Chapter 16, Sundry Observations On The Nature Of Capital: “An act of individual saving means – so to speak – a decision not to have dinner to-day. But it does not necessitate a decision to have dinner or to buy a pair of boots a week hence or a year hence or to consume any specified thing at any specified date. Thus it depresses the business of preparing to-day's

exists a “natural” full employment rate of interest that is stable. The combination of these two assumptions -- existence of a loanable funds market and existence of a stable natural rate of interest -- means the economy possesses a mechanism (the real interest rate) for coordinating full employment saving and investment.

New Keynesian ZLB economics semi-retreats from the classical position that there exists a loanable funds market. In its place, it substitutes the central bank which acts as a “pseudo-loanable funds market” by targeting the natural full employment rate of interest. However, it persists with the second fallacy that there exists a natural rate of interest. Given that belief, New Keynesian macroeconomics asserts the ZLB explains stagnation as it renders central banks unable to restore full employment.

This paper has clearly distinguished Keynesian economics from classical and new Keynesian economics. For Keynesians, not only does a *laissez-faire* monetary economy lack a mechanism for delivering the natural rate of interest because there is no such thing as the loanable funds market, a *laissez-faire* monetary economy may also lack such an interest rate because the IS and AD schedules are vertical or backward bending before full employment. Moreover, contrary to New Keynesian claims, the ZLB may be a stabilizing device that prevents negative nominal interest rates that could exacerbate excess supply conditions. In this regard, the ZLB may have parallels with downward price and nominal wage rigidity that block deflation and adverse Fisher debt effects (Palley, 2008).

dinner without stimulating the business of making ready for some future act of consumption....The trouble arises, therefore, because an act of saving implies, not a substitution The absurd, though almost universal, idea that an act of individual saving is just as good for effective demand as an act of individual consumption, has been fostered by the fallacy, much more specious than the conclusion derived from it, that an increased desire to hold wealth, being much the same thing as an increased desire to hold investments, must, by increasing the demand for investments provide a stimulus to their production; so that current investment is promoted by individual saving to the same extent as present consumption is diminished (Keynes, 1936, p.210-11).”

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