Tax on Capital Markets and Welfare Loss

If the government and its central bank view a banking crisis led recession as causing deflation that is excessive and that they want to avoid, then the government may focus on the easy path of just printing central bank money rapidly rather than focusing on the more difficult task of reforming the financial sector. Efficiently reforming the financial sector can quickly bring it out of crisis and "reflate" the economy, as happened immediately following the US 1933 Banking Act, and its establishment of the FDIC. Inflation went from a negative 10% to a positive 5% is less than a year.

The 1930's banking legislation amounted to a *"normalization" of the banking sector* and the economy that effectively ended the Great Depression. And it was done without dramatically increasing the government money supply of currency. Instead the "reflation" was done by private banks intermediating savings to investment, causing demand deposits and loans to grow.

During the 1960's similarly there was a bevy of banking regulations and legislation to regulate the tremendous growth in US banking both within the US and in the international capital markets. Again, here during the 1960's inflation, the use of the government to decrease the inflation rate by reducing the government supply of money was not resorted to. Rather the regulation of the growing bank sector was the policy focus.

During the Great Recession, seemingly inefficient banking reform and bank sector subsidization has occurred while also dramatically increasing the government money supply (in terms of the monetary base of "reserves plus currency"). This is a jumble of policy action that may not have been well-designed.

For example, by continuously flooding the capital markets with newly printed money, the Fed has managed to keep the Federal Funds interest rate (FFR) on overnight loans between banks near zero. This has occurred by a continual flood of money into capital markets. This flood has not only lowered the nominal, market, FFR, but also has continually pushed down the real interest rate. The flood has created low real interest rate "swamp", where return on savings is so low as to be not worth offering much savings for intermediation.

Wicksell in his (1898 p.4) *Interest & Prices: A Study of the Causes Regulating the Value of Money* describes how real interest rates can be driven down both temporarily and permanently. The accelerated rate of growth of the US Monetary Base since 2008 allows according to Wicksell for the real

rate to be driven down in a "permanent" way because of the Fed providing persistent liquidity to capital markets. But Wicksell's prediction of higher inflation has not yet occurred. Instead reserves are earning interest from the Fed and not being lent out. This defers the normal money creation process whereby excess reserves are completely lent out, demand deposits are created, and the money supply accelerates in a money multiplier fashion.

The Fed-created capital market "swamp" from persistent liquidity is a distortion that implies a certain tax and subsidization scheme is in effect. In particular, a continual use of the Fed to distort capital markets by providing unending liquidity acts as a subsidy to investment but a tax to savers. Investors are happy to get money for a near zero real interest rate but savers are not willing to supply much at a near zero interest rate.

Enforcing a near zero or negative real interest rate, not just a near zero nominal interest rate, acts as the imposition of an effective ceiling on real interest rates that distorts capital markets away from their *natural "Wicksellian" real interest rate equilibrium* (which would likely be in the range of 2 to 4+%, given US history). Consider Figure 1 as a representation of the capital market supply and demand for capital, which are savings and investment respectively. The relative price of capital is $(1+r)/1$, or simply $1+r$. This $1+r$ is called the "gross" real interest rate (the net interest rate r could instead be used).

Figure 1 includes an real interest ceiling at around 0.5%. Post-2008 the actual real interest rate has actually been lower and in fact at negative rates almost the entire period, so the graph abstracts from the exact level of the real interest rate. It also abstracts from the fact that the real interest rate fluctuated at mostly negative levels as the inflation rate fluctuated around positive levels almost the entire post-2008 period.

In Figure 1 the example equilibrium rate is at a level somewhat above 4%. The real interest rate ceiling at 0.5% causes the quantity supplied (the savings) to be less than the quantity demanded (the investment). This causes an excess demand for capital at the enforced ceiling.

Figure 2 shows how the ceiling is effectively imposed. There is a large additional supply of capital, as given by the red supply line in the graph. This is due to the central bank increase of the monetary base. In particular, since interest is paid on reserves in the US since 2008 at a rate higher than the Federal Funds rate, the excess supply of capital is exactly analogous to the US banking system's excess reserves.

The excess reserves, which were effectively zero throughout US history

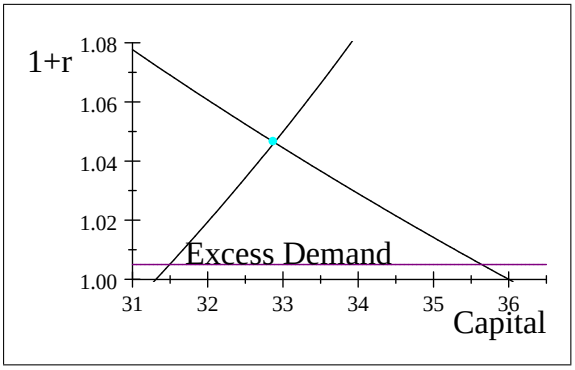

Figure 1: Savings and Investment: Aggregate Supply and Demand for Capital k With Real Interest Rate Ceiling

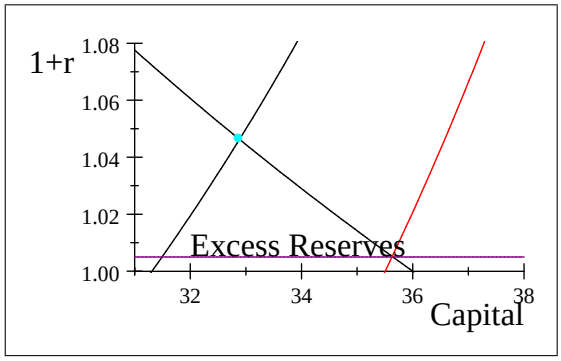

Figure 2: Fed's Shift out of Supply of Capital through the Open Market Purchases of US Treasury or Treasury backed Securities: Creating the Bank System's Excess Reserves.

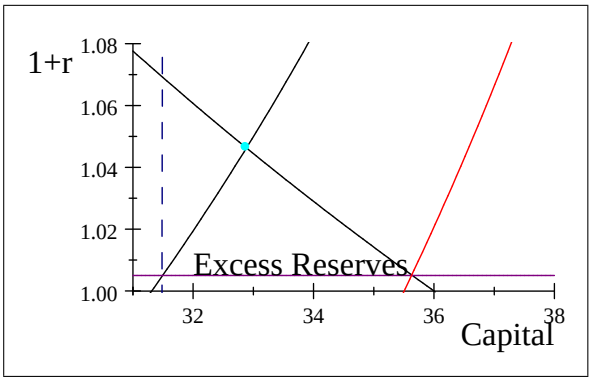

Figure 3: High r for Private Investors, Low r for Private Savers, and the "Deadweight Loss Triangle"

before 2008, have been caused by the Fed's massive open market purchases of US Treasury debt since 2008, as well as purchases of mortgage backed securities (MBS). The MBS consist of loans guaranteed by the US Treasury, so these MBS are effectively US Treasury liabilities, or debt, as well. This means that the black supply and demand lines in Figure 2 are the private sector supply and demand for capital while the excess reserves are the US governments excess supply of capital that enforces the real interest rate ceiling.

Figure 3 shows the implicit tax that is imposed by an effective real interest rate ceiling. The dotted vertical line shows the quantity of capital that is saved and invested by the private economy. The Savers receive a very low real interest rate, at the 0.5% level of the ceiling. And because of an artificially, Fed policy-induced, low supply of capital for the private sector, the real interest rate for the private investment is effectively very high, near 7% in the graph. The "triangle" in Figure 3, marked by the dotted vertical line and the supply and demand curves, is what microeconomics calls the "deadweight loss" of "lost consumer and producer surplus". This surplus is welfare that would not be lost if instead the natural Wicksellian real interest rate prevailed, where the black supply and demand curves intersect. Economists sometimes call this the Harberger triangle, because of his study of welfare loss from tax and subsidization.[1]

[1]The Harberger triangle work is brought together in Harberger's 1974 book, Taxation and Welfare, published by Little, Brown.

As George Selgin of the Cato Institute put it in a Wall Street Journal editorial called "A Legal Barrier to Higher Interest Rates", [2]

> "To set a floor on how far the rate could go, the Fed started paying interest on banks' reserve balances with the Fed, taking advantage of the 2006 Financial Services Regulatory Relief Act giving it permission to do so. Alas, it did not work. Government sponsored enterprises...which...weren't eligible for interest on reserves (IOR), started making overnight loans to banks at rates below the IOR rate. In effect, this turned what the Fed hoped would be a floor on the fed-funds rate into a ceiling. To raise rates now the Fed increases the rate on reserves.

Selgin's quote is about the nominal interest rate, which has been kept almost exactly constant. But since the inflation rate has been above the nominal interest rate on excess reserves for almost the entire post-2008 period, the ceiling on nominal interest rates translates into a ceiling on real interest rates that is at a mostly negative level that fluctuates somewhat with the inflation rate (rather than staying exactly constant as in the above figures).

Financial "Repression"

The forcing down of real interest rates has been called a part of the US government's "financial repression" of the financial intermediary sector. It is part of distorting the flow of savings towards the government sector's spending and away from the private sector's investment.[3] As the Wall Street Journal (WSJ) puts it:

> "This time, though, the signs of stress are a result of something else: The campaign by governments to direct financing to themselves, limiting access by the private sector. In the U.S., there are legal changes under way in the money markets, which is prompting money to shift from 'prime' funds, which buy short-term debts issued by companies, to instead buy short-term debt issued by the

[2] George Selgin, "A Legal Barrier to Higher Interest Rates", the Wall Street Journal, September 27, 2016; Op-Ed page.

[3] See also V. V. Chari, Alessandro Dovis and Patrick J. Kehoe, 2016, "On the Optimality of Financial Repression", Federal Reserve Bank of Minneapolis Research Department Staff Report XXX, January.

> U.S. Treasury. This is merely the latest example of what academics call financial repression, a broad category of government policy adopted to require savings to be lent cheaply to the government. Repressive policies were the norm in Western markets for decades following World War II. That was until the financial liberalization was begun by Margaret Thatcher in the U.K. and then-President Ronald Reagan in the U.S. New rules since the Lehman Brothers failure [in 2008] have again tightened the screws on lending to the private sector, while favoring government financing in multiple ways, most obviously through exempting banks from holding capital against government debt".[4]

Banks typically have to hold reserves against loans they make, but apparently not for government debt. This increases the distortion towards savings going into "risk-free" government debt rather than into risky private sector investment.

"Seeking Yield": Capital Market Distortion

Figure 3 shows how an effective real interest rate ceiling distorts capital markets, causing a higher real interest rate in effect for investors in the private sector. How has this played out in the facts of the Great Recession? Many economists have described the post-2008 period right up to the present as one in which investors have been forced to "seek yield". This means that the traditional *portfolio balance* between holding a certain amount of low yield government debt and higher yielding private sector investments has been distorted towards holding more government debt.[5]

The pushing down of the real interest return on government debt has forced the private sector to find higher yielding private investment in order to try to balance out the return on the whole portfolio with the desired amount of overall riskiness. With banks forced to hold so much government debt, this means the rest of private savings deposits get directed more towards higher yielding private sector investment. This is the "seeking yield" part of the consequences of the Great Recession government flooding of capital markets

[4] James Mackintosh, Streetwise (column), WSJ, August 2, 2016; p. C1-C2.

[5] See Parantap Basu and William T. Gavin (2010), What Explains the Growth in Commodity Derivatives? Federal Reserve Bank of St. Louis Review, January/February 2011, 93(1), pp. 37-48.

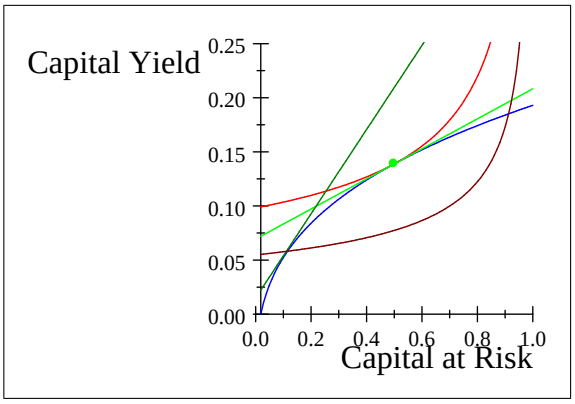

Figure 4: Optimal Portfolio Diversification between Market Portfolio (Tangency) and "Risk-free" Government Debt.

with money (held as reserves). But it is accepted in finance theory, in terms of what is called the capital asset pricing model of optimal market portfolio holdings, that higher yield in private investment comes with higher risk. This higher risk in the private investment, during this seeking-yield post-2008 period, is balanced by large holdings of low risk, low yield government debt.

The high interest rate in Figure 3 in this way represents the high yield, but also higher risk, that occurs in a capital market that is induced into "seeking yield" in order to compensate for the low return and large holdings of government debt. Put differently, the private sector investment as a whole is riskier than it would be otherwise. Figure 4 captures this "tilting" of the average portfolio's holding of risky private sector investment.

Figure 4 graphs the portfolio yield on the vertical axis and the share of the portfolio invested in risky private capital on the horizontal axis, as is done in the capital asset pricing model graphs. The blue production possibility curve is the "efficiency frontier" of the total risk and yield of investment in the private sector economy. This frontier was developed by Sharpe (1964) and Lintner (1965), and allows for the individual "idiosyncratic risk" of each firm to be pooled together (and so eliminated) so that only "systemic risk" remains and is graphed on the horizontal axis.[6]

[6]Lintner, John, 1965, "The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets," *Review of Economics and Statistics*, 47 (1): 13–

The indifference curves in the graph, the red and brown (convex) curves are typically attributed to Tobin (1958).[7] They show the representative household-saver preference for diversifying between the risky portfolio of private sector investment and the so-called *"riskless" portfolio of government debt*. In Figure 4 the natural tangency between the production possibility curve of the "efficiency frontier" of private investment and the red indifference curve of the representative saver is the undistorted equilibrium amount of the share of capital that is invested privately, with the rest invested in "risk-free" government debt.

When the real return on the private sector is pushed up by policy distortions that cause the "seeking of yield", the investors see a higher price of risk relative to yield while the savers face a lower price of risk relative to yield. Figure 4 represents this policy induced new equilibrium by the intersection of the brown indifference curve with the blue production possibility curve. This shows a "wedge" between the interest cost of investment in the private sector and interest return to savers in households. This intersection thereby corresponds to the ceiling induced wedge between the return to savers and to private investors in Figure 3.

The distorted equilibrium is seen with a steeper slope along the blue production possibility curve at the point of the intersection relative to the tangency point as in the natural equilibrium. This indicates a higher price of risk relative to yield. For the saver, the intersection of the utility curve with the production possibility curve indicates a lower price of risk per yield, as seen by the flatter slope of the indifference curve upon which the saver equilibrium resides.

Figure 4 exaggerates possibly the degree to which the equilibrium has changed during the Great Recession, using this standard risk-yield diagram of the capital asset pricing model. But it maintains the two different equilibrium in such a way that they are consistent with the same preferences of the representative agent, who is both investor and saver in the aggregate economy. To see this, note that the degree of diversification between the risk free government bonds and the risky private capital increases as the share in risky capital falls from 50% to 10% of total capital investment, as given by the vertical axis of Figure 4. This is certainly an exaggeration of the

37; Sharpe, William F. ,1964,. "Capital asset prices: A theory of market equilibrium under conditions of risk," *Journal of Finance*, 19 (3): 425–442.

[7] Tobin, James, 1958, "Liquidity Preference as Behavior Towards Risk," *Review of Economic Studies* 25.1: 65–86.

decreased share of the portfolio in private capital.

The preferences still can remain constant as given by a set preference map of utility curves. The two equilibria have the same share of the risk-premium in the total interest yield of the portfolio. The total yield is the government risk-free rate plus the risk-premium from private sector investment. The ratio of the risk-premium to the total yield in the Figure 4 example starts at the original tangency equilibrium of a risk-premium to yield ratio of a total yield around 13.5% minus a risk-free rate of around 7.5%, for a risk-premium of 6%. Relative to the total interest yield, 6% is 58% of 13.5%.

In the new distorted equilibrium, the total yield changes to around 6% minus a risk-free yield of 2.5%, or a 3.5% risk-premium, relative to a total yield of 6%. This gives a risk premium (3.5) that is an identical 58% of the total yield (6.0). So the preference for a certain percent of risk relative to yield is maintained in the new equilibrium, despite the degree of diversification changing from 50% in private investment to 10%.

The purpose of Figure 4 is to illustrate the theory of how the real interest rate ceiling distorts capital markets in terms of not just a lower quantity of private sector investment than in the natural undistorted equilibrium, but also a riskier overall portfolio for investors but a less risky one for savers. Many have explained the Great Recession in these terms of seeking risk. Here the concept is related to the finance theory standard of the "capital asset price model" and its yield-risk graphical presentation. It shows that not only are quantities distorted but so is the quality of private sector investment distorted, towards riskier investment.

The manifestation of a riskier private sector portfolio can be a so-called "bubble" in asset prices, such as in the Dow Jones Industrial Average, the Standard and Poor 500, or the Russell 3000. Given the policy distortion, such a bubble is fully rational, many would argue. But if the policy distortion is eliminated, it may well be that the fundamentals of the return on the investments end up yielding less than is promised by current asset stock prices. This means the stock market might "crash" if the policy distortion of the interest ceiling on real interest rates is eliminated, and so prices return to "fundamental values". If so, in retrospect we would call current stock price levels a bubble. But at the current time of the high prices in stock markets, such as in 2016 when the Dow once again rose above 2007 levels to record highs, it is never clear that there exists a bubble that must pop. Or put differently, it is unclear that the price of overall portfolio risk to yield (the slope in Figure 4) is being pushed higher only by government policy that is

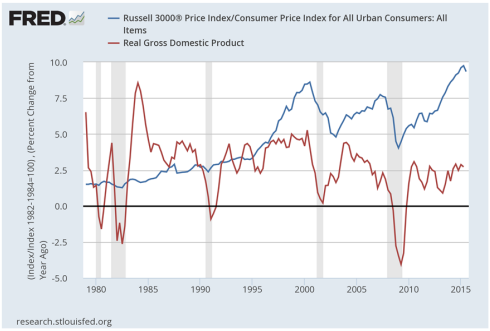

Figure 5: Real Capital Asset Prices (Russell 300/CPI) relative to Real GDP Growth

unsustainable in the long term.

Figure 5 shows that real asset prices, here seen as the Russell 3000 stock index divided by the CPI price index, have trended significantly upwards since 2010 without real GDP trending upwards. This also happened in the 1996 to 2000 period. It simply indicates that there may be a significant asset price reversal if real interest rates start moving back to "historically normal" levels. If there is risk seeking because of too low real interest rates, then allowing higher, more normal, or "natural", rates of interest can cause a short term reversal in asset price levels.

Government Capital Flooding

Consider that in Figure 4 when the private sector "capital at risk" becomes less, this means that the fraction of the portfolio invested in the private sector falls relative to that invested in risk-free government debt. So even as the risky interest rate on private investment rises, the decrease in the government risk-free rate, and the increase in the fraction of the portfolio held in risk-free debt, means that the average overall return on capital may actually be falling, including both risky and risk-free capital investment.

Meanwhile a smaller fraction of capital investment going into private sector investment means that the real wage gets pushed upwards. Indeed, the real wage markedly rose during 2008 to 2009, as well as during 2001-2003, in opposite movement relative to detrended real GDP growth, as shown in

Figure **??**, when real interest rates were unusually low or negative during these periods. Overall this can induce a rise in the price of human capital relative to physical capital.

The result would be seen as an increase in the wage to real interest rate ratio, or w/r. In the economic theory of firm production, such a rise in relative factor prices induces substitution from labor (human capital) to capital. This would be consistent with a falling labor force participation rate, a falling employment rate, and lower growth due to less human capital investment. All of these phenomena have been a feature of the Great Recession and the almost "lost decade" of 2007 to 2016.

Figure 6 shows the blue isoquant which is a constant level of output for different combination of human and physical capital inputs. The light green isocost line shows the natural equilibrium tangency point that determines the Human to Physical capital ratio in an undistorted market. The slope of the isocost line is the wage rate w divided by the real interest rate r, or w/r. When w is pushed up while r is pushed down by policy, then for the same level of production (same isoquant) the equilibrium would move to the left where the dark green isocost is tangent to the blue isoquant. The human capital to physical capital ratio become lower as w/r becomes higher. Of course the isoquant could be shifted in as well to a lower level of output as representative of the Great Recession (when the output growth rate was negative). Relatively less human capital is consistent with a lower economic growth rate; this can be seen when the Ramsey model is extended to explain growth endogenously through addition of a human capital investment sector (as in Chapter 9 Appendix).

A way that this theoretical relative price change of inputs can be seen in the data of output prices is through the CPI for services, which are human capital intensive, versus the CPI for non-durables goods, which are more physical capital intensive. Figure 7 shows that in the percentage change in a CPI price index for Non-Durables relative to Services fell in 2009 and continually after 2012 to the present, as the gap between the Blue and the Red data series is positive. Relatively cheaper capital prices make the cost of more capital-intensive non-durable goods less expensive relative to the cost of more labor- (or human capital) intensive Services. Post 2012, this difference in the CPI components has been large in historical (post-1987) terms.

The second related effect is that government investment has pushed out private investment. This is seen by the low loan to deposit ratios. And it is seen by the massive holdings of government investment in Mortgage Backed

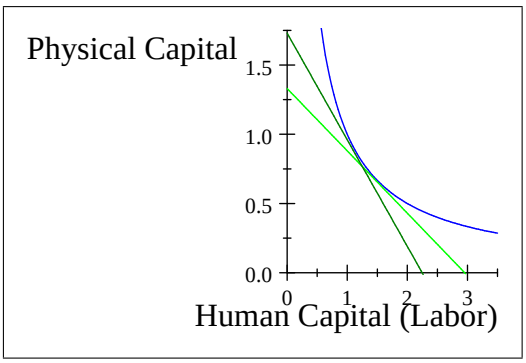

Figure 6: Policy Induced Substitution from Human Capital to Physical Capital, from Light Green Tangency to Dark Green Tangency.

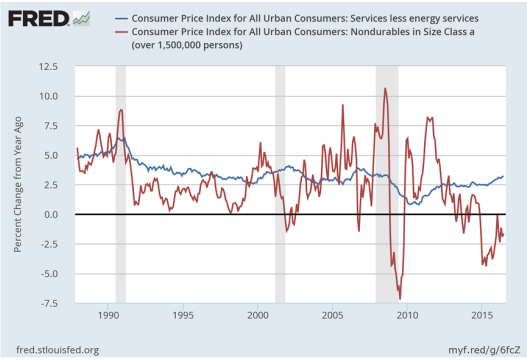

Figure 7: Large Decline in the Percentage Change in the CPI price index for Non-Durables (Red) relative to Services (Blue), in 2009 and since 2012.

Securities and in Treasury debt. This is manifestly enforced by the massive quantities of excess reserves held by Fed for private banks. The total capital input may rise, as in Figure 6, even as private investment falls, given the US government's massive increase in debt during the Great Recession.

Private banks get paid interest on the excess reserves above the Federal Funds rate, and so give the reserves back to the Fed. Without the interest paid on excess reserves, the interest ceiling on the real interest rate would collapse as the excess reserves would gradually be lent out. With the interest paid on excess reserves capital markets remain distorted here and internationally.

Internationally Inefficient Bank Subsidization

The globalization of financial intermediation that developed significantly starting in the 1960's meant that capital funds could move across country to take advantage of differentials in real interest rates found internationally. If the US real rate is relatively low, US funds can move to another country, buy up that other country's currency, and receive a higher return on capital.

The buying up of another country's currency, say using US dollars, leads to an appreciation of that country's exchange rate relative to the US dollar. The demand for the foreign currency increases its price relative to US dollars, and this price is the exchange rate. The rise in the exchange rate in turn makes exports of that foreign country more expensive relative to US demand for their products as imports. This is the way that international exchange rates move, reflecting the supply and demand of a country's currency relative to another country's currency.

Artificially low real interest rates in the US, in the sense that they are being forced down by US government policy, can induce in effect similarly artificially low real interest rates in other nations that trade with the US. The reason is that governments of other countries may not wish to see their exchange rates appreciate relative to the US dollar as this would increase the price of exports in terms of US dollars. Therefore they increase their money supply enough to push down their own real interest rate through repeated, accelerated, rates of money supply growth.

Worldwide the Great Recession has seen the term *"quantitative easing"* applied post -2008 to US money supply accelerated growth policy, to the United Kingdom's money supply accelerated growth policy and to the European Central Bank's money supply accelerated growth policy. This has led

to low real interest rates in the US, UK and Eurozone (including 19 of the 28 EU economies). Other international governments have also followed suit in order to avoid appreciation against the currencies of such a large trading block as the US, UK and Eurozone represent.

For example, Switzerland for several years post -2008 refused to follow this accelerated money supply growth policy and the result was an historic appreciation of its currency relative to the US dollar, UK pound, and EU's Euro. One Swiss franc went from being worth $0.78 US in October 2006 to $1.30 in August 2011, a two-thirds increase in value. Finally Switzerland began to supply more money and steadily drove the US $ value of one Swiss franc back down to $1.02 in July 2012, and was near this $1.02 level four years in July 2016. Interestingly, the Swiss National Bank had no large Swiss government debt increases to buy, so the began buying a portfolio of the Swiss private business sector. This could be said to be in effect a partial nationalization of Swiss private industry as an consequence of their keeping level with the US real interest rate.

Should the US real interest rate should really be around zero, or is it policy induced? And then the question is should the international exchange rates of some of the most developed countries be such as to imply near zero real interest rates internationally or is this phenomena policy induced? There are different points of view on this and it is a lively debate.

Some believe that world economic growth is permanently low for now and will stay low and that the near zero real interest rates reflect this correctly. Others argue that the internationally near zero real interest rates are a result of US monetary policy designed to bail out the financial sector in an inefficient fashion, thereby forcing other nations to follow suit or else see their exchange rates appreciate. The argument has been put forth in this chapter that these low real interest rates are not endemic of long term low international real GDP growth rates but rather a result of misguided monetary and banking prudential policy that taxes international capital markets. Thus the question is whether the "lost decade" of post -2007 has been policy induced or some sort of difficult-to-explain sudden drop in real developed world economic growth as in a permanent "secular stagnation".[8]

Application: Normalizing Policy

[8] Lawrence Summers takes the "secular stagnation" view in several often referenced blogs; see http://larrysummers.com/category/secular-stagnation/

The policy take-away during the period after the Great Recession of 2008 to 2010, during what might well be called a lost decade of low growth, is that belief in the 3-equation New Keynesian model means that the US is in a new era of low growth, given the long run linkage of the first, IS, equation of the model. Belief in the 3-equation model makes this a natural conclusion. And then the result is that there is nothing that government policy can do to reverse this. Negative or low real interest rates are simply the fundamental "secular" trend now facing the US for the indefinite future, and near zero nominal interest rates are therefore justified.[9]

Alternatively, consider the results of the analysis presented in this chapter. The Phillips curve trade-off was temporary and held only during the crash in bank intermediation and in asset prices. Once banking was stabilized, since 2010, there is little discernible Phillips curve behavior in the data. Economic growth resumed, with no Phillips curve relation, but nominal interest rates were still forced to near zero. The second equation of the 3 equation model, the Phillips curve, does not hold now and has not held apparently since a brief 2008-2009 appearance during the simultaneous bank crisis and asset market crash.

Second, the money supply has dramatically been increased by the Fed, but inflation has not occurred as Fisher's quantity theory model suggests. But that is because the money is in the form of reserves that as of 2008 receive interest above the market rate of the Federal Funds rate, thereby encouraging keeping the reserves while discouraging using the reserves to instead make loans. Turning all of the current excess reserves into loans would dramatically increase private bank demand deposits and the money supply in turn. Inflation would then rise undoubtedly.

Paying interest on excess reserves is an example of what economists term Moral Hazard. The government policy is paying banks not to lend out reserves and create new investment, thereby increasing the probability of the "bad state" of insufficient private investment. Increasing the probability of the bad state is the very essence of a policy-induced increase in Moral Hazard. It may have been deemed to be a good idea to give banks emergency revenue during the crisis, with the clearly stated intent in Fed minutes of ending this interest payment. This then is a limited duration ad hoc form of providing deposit insurance coverage to the banks. But the indefinite continuation of the interest payments simply has induced banks to lend out less reserves and

[9] As in Lawrence Summer's "stagnation" blogs.

so has created the moral hazard of a "lost decade" state of affairs with less investment relative to savers deposited funds.

Were interest payment on excess reserves ended, and the reserves were lent out, then as inflation rises, the Fed would see increasing pressure to raise nominal interest rates. This is exactly what occurred in 2005 after holding the FFR below the inflation rate for nearly three years: high inflation induced the Fed to end its fixing of the FFR interest rate below the inflation rate. Currently, negative or zero, or very low, real interest rates cause less savings to intermediated to private investment, as in an implicit tax on savings caused by an effective ceiling on real interest rates. If the Fed is creating an effective ceiling on real interest rates, this makes it seem that "stagnation" is endemic to the economy when instead it is an outcome of the paying of interest on bank reserves at a fixed interest rate above the FFR while keeping the FFR near zero. The FFR market has become dominated by paying a higher interest rate on reserves. This gives banks a "risk-free" bonanza of interest on reserves that they normally would only receive once they lent out the reserves for investment.[10]

Of the New Keynesian three equation model, the Taylor equation has been deemed irrelevant to actual interest rates. The IS equation indicates stagnation. And the Phillips curve no longer holds or is relevant post- bank crisis. So the only take-away is the IS equation indicating stagnation. Does the conclusion that the economy is in a fundamentally long term stagnation follow when the rest of the model is apparently invalid during the Great Recession's lost decade?[11]

Excess reserves are not being fully lent out as loans, as in all previous pre-2008 history, and the stagnating growth does indeed continue. The proper policy path that leads to a normalization of the economy is to stop paying interest on excess reserves and raise the FFR so that the real interest rate is positive. There would be a resulting bump up in the inflation rate, perhaps over 5 to 10 years, but more likely over just a few years, as the excess reserves are lent out and the money supply expands. The nominal interest rate would

[10] The original idea of paying interest on bank reserves goes back historically and in recent literature but there it was apparently never linked to the idea of paying interest at a rate permanently above the Federal Funds Rate. See Guzman, Mark G., 2008, "The Impact Of Paying Interest On Reserves In The Presence Of Government Deficit Financing," Economic Inquiry, 46(October, 4): 624-642.

[11] As Summers argues in his blog: http://larrysummers.com/category/secular-stagnation/

be allowed to rise with the inflation rate and the real interest rate would be kept positive and procyclic as reflecting supply and demand in the capital market over the normal business cycle. That normalization would take care of the purely monetary policy part of the government policy path to full policy normalization.

The answer to full normalization is not heavily regulating banks through higher reserve requirements. The answer is a Bagehot goal of minimal reserves and the most efficient intermediation as is possible. This is done by having all financial intermediaries join the FDIC and pay premiums that insure their depositor funds. The premium rate paid would depend on the riskiness of the intermediary's portfolio, as with current FDIC policy. And if an intermediary chooses to have relative large reserve levels, that intermediary would tend to pay a lower risk premium, depending on the riskiness of the rest of the intermediary's asset portfolio. That would take care of the so-called "macro-prudential" side of regulating the financial intermediary sector. Spreading this risk-based deposit insurance premium system to the international finance sector would stabilize global financial markets.

Finally, the fiscal aspect is that the US federal government has to respect its budget constraint in the sense of moving from a continuing, unending bank sector bailout, and wartime economy, to a more normal federal government role of financing normal social insurance systems. This need include the cost of international military activity; but this is a small fraction of the federal budget relative to past military activity during major wars. Normalizing the federal budget expenditures, which in all fairness could have happened once the financial sector collapse was over, is imperative in keeping the Fed from printing money at the historically accelerated rate it chose since 2008. The Fed would not have to buy so much Treasury debt if the Treasury did not have to borrow so much to cover its deficit.

The Ramsey World as extended to including money may well explain the current economy, once all of the implicit taxes and subsidizations taking place in the capital market are included. This can be from the New Monetarist perspective of Williamson (http://newmonetarism.blogspot.com/), that views money as the most liquid asset, or from the neoclassical models that includes money simply as a means of exchange.

The neoclassical approach emphasizes liquidity only in terms of the classic Wicksellian liquidity effect of driving down the real interest rate by accelerating the rate of growth of the money supply. This liquidity effect can explain the long stream of low real interest rates through a repeated application of

Figure 8: US Economy's Python Digestion of Prickly Porkupine- Inflation

accelerated money supply growth: This money growth is apparent in the Fed's near continuous huge asset build-up since 2008, which in turn reflect the path of excess reserves. Once these reserves get loaned back out, the neoclassical Ramsey world with money would predict Figure 8: a lump of inflation over time to be gradually digested by the US economy.

Being Earnest on Banking

Why was interest paid on reserves in 2008? The Fed says it was just to stop penalizing banks from having to hold required reserves, an old concept dating back to economists such as Milton Friedman. Banks need to hold reserves in the normal course of business. The Fed requires this to be about 10%. To the extent that this amount of reserves is more than what banks would normally hold, the Fed is "taxing" banks by requiring more non-interest bearing reserves than banks would have chosen on their own. So the idea was to pay interest on all of the required reserves: this would actually subsidize banks by paying interest not only on the additional reserves required by the Fed compared to what they would normally hold, but also on the usual reserves the banks would normally hold.

Then the idea of paying interest was allowed to morph unexpectedly in terms of economic theory behind the idea. Instead of paying interest only on required reserves, in 2008 the Fed allowed interest to be paid on all reserves held at the Fed including excess reserves. Now, historically before 2008 in the US, excess reserves were zero, always. Now suddenly with interest paid on excess reserves as well as required reserves, excess reserves began piling

up as the Treasury issued debt and sold it to banks, the Fed bought the debt from the banks, and the banks kept the proceeds as excess reserves at the Fed. This enabled risk-free income at a rate above the Federal Funds Rate (FFR), since the FFR was one-quarter of a percent less than the rate paid on excess reserves. This essentially eliminated the Federal Funds market and replaced the setting of FFR interest rates by the Fed to the setting of the interest rate on excess reserves.

The truth is that discussion at the Fed explicitly emphasized the amount of money this would send to the main, small, group of US banks that accounted for most of the reserve holdings. This money would shore up their balance sheets. And so it did. The average amount of excess reserves on which interest was paid since from 2014 to 2016 is about $2.4 trillion. At an interest rate currently of 0.25% on excess reserves, as from 2008 until November of 2015, these reserves were paying $\$(2,400,000,000,000)(0.0025) = \$6,000,000,000$. This is $6 billion a year being paid to the 10 "systematically important" banks that hold the bulk of the excess reserves. For each of the 10 banks on average this is a guaranteed source of $600 million a year, a sizeable part of any corporation's annual revenue.[12] Figure 9 shows the FRED graph for the required reserves interest rate (Blue) interest on excess reserves (Purple and Green) and Federal Funds rate (Red) from 2009-2015.[13]

In December 2015, the interest rate on excess reserves was raised by a quarter of a percent to 0.5%. This means that for the year of 2016, double the amount will have gone to the 10 banks, or $12 billion. This is an average of $1.2 billion per bank for the year, a huge source of revenue.

Excess reserves finally showed signs of starting to decline during 2016. So the average interest paid to each of these private banks may continue to decline: but even $1 billion is a lot of risk-free revenue for a bank to receive from the Fed each year. Normally, as in historically in the US, any such direct subsidy to private sector banks would need to be authorized by Congress according to the budget reconciliation laws of the federal budget process. The Fed has essentially skirted the US Congressional budget process by directly paying banks money for any given level of reserves.

The Fed also broke its own "law", of not specifically benefiting any one

[12] Thornton, D. "Another Unintended Consequence of QE", Common Sense Economics Perspective, No. 13.

[13] See same graph in Timothy S. Fuerst, 2015, Comment on: "Speculative runs on interest rate pegs" by Marco Bassetto and Christopher Phelan, Journal of Monetary Economics, 73(July): 115–118.

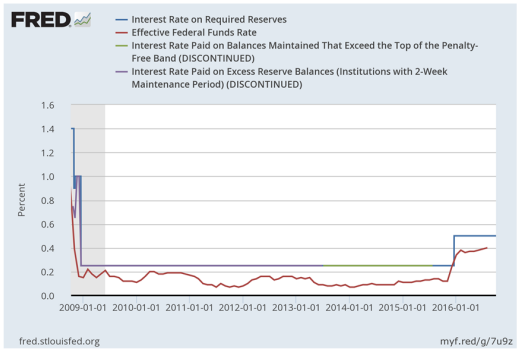

Figure 9: Interest on Excess Reserves vs.Federal Funds Rate, 2009-2015.

sector by its purchases of assets when it bought up the mass of mortgage-backed securities (MBS). So they abruptly changed their policy to explicitly drop the language of not supporting any one sector. This support of a sector through asset purchases normally is done through the Treasury, as it was under President Bush in 2008. Then the Treasury purchases of MBS had to be budgeted through the Congressional budget process according to the expected loss incurred from buying risky debt. In particular, the expected loss on mortgage purchases, via MBS holdings, would have to have been approved by the Congressional budget for the fiscal year.[14]

So the Fed skirted the US Congress budget process a second time with MBS purchases, along with the excess reserve interest payments, leading various members of US Congress to call on re-writing the statue governing the Fed. Of course the Fed Presidents oppose that; for example Jeffrey Lacker testified to the US Congress Subcommittee on Monetary Policy and Trade, of the House Financial Services Committee, arguing delicately for no changes to the Fed, as in his conclusion:[15]

[14] Passed into law in 1974, The Congressional Budget and Impoundment Control Act requires Congress to make a budget each year and enact laws required to attain the budget that they agree upon; sometimes this takes the form of a Budget Reconciliation Act that adjusts programs so as to meet the Congressional budget target. Such an Act then must be signed into law by the President or vetoed.

[15] See https://www.richmondfed.org/press_room/speeches/president_jeff_lacker/2016/lacker_testimony_20160907

> "Many aspects of the Fed and our financial system have changed since the Fed's founding, and some claim that the Federal Reserve's governance structure is a historical anachronism. Nevertheless, our core function – providing stable monetary conditions to facilitate economic activity – remains unchanged. And the continued relevance of the trade-offs taken into account by the authors of the Federal Reserve Act argues for the continued utility of the finely balanced arrangements they crafted."

Meanwhile regulations, through "stress tests" that the Fed has imposed, require higher reserve requirements on what the Fed has deemed as "systematically important" banks. So the Fed pays interest on these reserves at the same time that it demands more reserves. This skews the bank portfolio towards holding more excess reserves and making less loans. In itself it would be expected to cause a decrease in lending activity.

What bank policy was the real smoking gun of the 2008 bank panic? Can there be any regulatory cause of the bank panic as a result of distortions in the capital market induced by the regulation itself? It might be said that there are five main sets of regulation, policy changes and legal aspects that contribution to the 2008 bank panic. And these five all involve the indirect subsidization of mortgage loans.

The first is the Fed purchase of a large portfolio of MBS. The second is the federal tax-based subsidization of house mortgages, from a long-standing policy of allowing the income tax deduction of interest paid on housing loans. Third, housing loans have been federally guaranteed for high-risk, low-income, mortgage loans since the 1930's, but these guaranteed loans accelerating since 1999 when the Federal National Mortgage Association (Fannie Mae) began easing requirements for loans.

Fannie Mae is an acronym for a strange subsidization entity for mortgage loans, which has switched ownership between the government and the private sector over time, depending on whether it ran losses or profits on its loan portfolio. The US federal government had privatized Fannie Mae in stages through 1954 and 1968 legislation that made its operations no longer appear within the US federal budget process. After 1970, it acted as a private corporation that was "government sponsored", or a "government sponsored entity" (GSE).

The government sponsorship was the federal guarantee of the repayment of the mortgage loans made by Fannie Mae. It became listed and traded

publicly on the New York stock exchange in 1970. The first mortgage backed securities trading also began in 1970, according to Jaffee and Quigley[16]

From $3 billion in 2003, Fannie Mae's purchases of new mortgage loans rose steadily to $20 billion in 2006. This is the period that overlaps with the Fed's strict control of the FFR interest rate, between 1% and 2 %, that created negative real interest rates that are good for borrowers. Fannie Mae was found by the Office of Federal Housing Enterprise Oversight (OFHEO) in May of 2006 to have reported profits that were overstated by $11 billion, hiding the extent to which the "sub-prime" loans were under-performing, with a $350 million penalty imposed on Fannie Mae by the Security and Exchange Commission. Fannie Mae became bankrupt in September 2008 after the Fed suddenly raised interest rates in 2005-2006. This agency was then "de-chartered", or placed into federal "conservatorship", and so taken over by the Federal government.

The fourth factor is that the US Commodity Futures Modernization Act of 2000 (CFMA) allowed over-the-counter trading of derivatives to not be classified as futures or securities, and thus Credit Default Swaps based on mortgages were able to avoid regulation. According to Matthew Sherman (2009), "The bill prevented the Commodity Futures Trading Commission from regulating most over-the-counter derivative contracts, including credit default swaps." As a result, "derivatives trading expanded quickly, increasing from a total outstanding nominal value of $106 trillion in 2001, to a value of $531 trillion in 2008."[17]

The trading of MBS became more unregulated. The FDIC had been in the practice of giving first precedence to Credit Default Swaps (CDS) when winding up a defaulted bank. In this way, the liquid assets associated with CDS could be resolved quickly rather than waiting months for their resolution in courts. And the FDIC could then reorganize and sell the bank's assets and keep it an ongoing concern under different ownership so that the bank system was not disrupted.

The 2000 CFMA allowed the same first-claim-on-assets prioritization of CDS traded, on the over-the-counter market by private financial intermedi-

[16] "The Future of the Government Sponsored Enterprises: The Role for the Government in the US Mortgage Market", by Dwight Jaffee and John M. Quigley, Working Paper 17685. http://www.nber.org/papers/w17685

[17] Pages 2, 11, respectively; Matthew Sherman, 2009, "A Short History of Financial Deregulation in the United States", July, Center for Economic and Policy Research, Washington, D.C.

aries, that the FDIC was using when a bank became insolvent. The prioritization of CDS that were based on MBS meant that these CDS's became guarantees that mortgage loan losses would be repaid first out of assets by any financial institution that went into default. This gave a subsidy to the value of MBS-based CDS that made them more profitable for financial intermediaries to hold relative to other assets. This prioritization of MBS-based CDS occurred at the same time as when the mortgage market subprime loans were encouraged by federal government policy. And many of these loans could not be repaid once the Fed stopped fixing interest rates in 2005 and instead raised interest rates dramatically.[18]

When the MBS went into default and the CDS insurance went to be cashed in at a host of insolvent investment banks, there were insufficient liquid assets that could be used to pay off the insurance against mortgage risk paid for by the CDS's. This caused a flood of CDS's that could not be paid back, as in a default on the contract's ensuing payment, and this amplified the bank crisis among investment banks. It resulted in a run on the deposits, or money market funds, of the investment banks leading to several bankruptcies.[19]

"Un-prudential" federal subsidization of housing loans through government sponsored enterprises, and imprudent financial regulation that allowed CDS's of private investment banks the same prioritization that the federal government FDIC used in the special case of banks becoming bankrupt, plus the statutory income tax deduction allowed for interest on mortgage loans, led to a triple subsidization of the use of financial instruments that drained the liquid assets of the financial system once the housing prices collapsed starting in 2007. This occurred only starting in 2007 because the drop in housing prices then meant that the collateral value of the mortgage loans became less than what was owed. The loans then had negative value, so the investment demand for mortgage backed securities began to tumult.

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[18] See William T. Gavin, 2015, "Bankruptcy Rules for Derivatives: How Have They Changed and Why Do They Matter?", manuscript, December.

[19] "The CMFA made a change in bankruptcy law for derivatives that contributed to crises at Enron and WorldCom. It made it profitable for banks to create and trade the collateralized debt obligations (CDO) and the credit default swaps (CDS) that exploded in use between 2004 and 2008. These instruments, which derived their value from subprime mortgages, fell sharply in price during 2008 and were the immediate cause of the insolvencies at Bear Stearns and Lehman Brothers." W. T. Gavin, ibid, above footnote, p. 1.

The fifth factor is the Fed fixing of nominal interest rates. Had the Fed not fixed nominal interest rates for nearly three years from 2002 to 2005, at levels below the inflation rate, thereby subsidizing borrowing with negative real interest rates, and then dramatically raised them from 2005 to 2007, the mortgage crisis would have likely not have occurred. For example, if the market interest rates fell to 1% in 2001, and then were allowed to rise back up so as to keep the real interest rate positive and at levels of the real interest rate consistent with an expansion in the economy, then the Fed's role in subsidizing borrowing would not have occurred. As it happened, the Fed contributed the fifth subsidy to mortgage borrowing by creating negative real interest rates that significantly lowered the interest rates on mortgage loans for a sustained multi-year period by its fixing of the FFR below the CPI inflation rate.

Summing Up

The Federal Reserve Bank System's (the Fed's) response to the terrorist attacks on the US on September 11, 2001, began a era of highly unusual control of capital markets by the Fed. Interest rates in terms of the Federal Funds Rate (FFR) were held fixed for years at a time, unlike any previous period in US history since the Fed was established in 1914.

Fixed interest rates occurred in three steps from 2002 to 2005, and at a single fixed rate from 2008 until the end of 2015. This capital market control, through maintaining a fixed FFR for a year or more at a time, accounts for about 11 of the last 14 years. During this time the real interest rate was forced into negative ranges for much of the time as the CPI inflation rate fluctuated at rates above the FFR.

The US Treasury ran continual high deficits ever since fiscal year 2002. They borrowed by issuing new Treasury debt, which private markets bought. The Fed bought back a large fraction of the total new Treasury debt borrowing since 2002. This typically is called monetizing the debt by printing money to buy it up with the result of higher inflation.

That the higher inflation did not result left markets to ponder when the inflation rate would rise or if the dramatic increase in the monetary base would ever even translate into higher inflation. The inflation did not result since much of the Fed's purchase of Treasury debt from private banks ended up back in the Fed as excess reserves held by the private banks at the Fed.

Before the Fed began paying interest on excess reserves in 2008, essentially

zero excess reserves had always previously been held at the Fed. Indeed the Federal Funds market was just a market through which banks borrowed from each other in order to meet the weekly required reserve level that they were obligated to meet under Fed regulations. Once the Fed paid interest on excess reserves, those reserves grew to about $2.5 trillion, today now somewhat.

The interest paid of reserves was a quarter of one percent from 2008 until December 2015, at which time it rose to a half of a percentage point. This generated interest paid by the Fed to private banks of some $6 billion a year in 2015 and double that, to $12 billion, in 2016. Moreover, Fed minutes show that almost all of this interest on excess reserves has been going to a group of only 10 banks. This amounts to $1.2 billion in 2016 on average being paid to each of the banks, completely "off-budget" and skirting the US Congressional budget process.

The Fed also directly aided the bank industry during the Great Recession and afterwards by buying and holding a large portfolio of mortgage backed securities (MBS). Historically Fed regulation prohibited the Fed from buying assets that favored any one industry; this language was dropped from Fed rules during the Great Recession. Again, if the US Treasury had bought these MBS as they did at the end of President George W. Bush's second term as President, then any expected losses on the purchases would have to have gone through the Congressional budget process. The Fed purchases of MBS, for the first time in US history, again allowed the propping up of the bank industry, while evading the approval of the required appropriations that normally would have to be approved through the US Congressional budget reconciliation acts that are signed into law by the President.

The effect of the setting of the FFR below the inflation rate for so many years since 2001 forced negative real interest rates onto capital markets while the Fed flooded capital markets with purchases of US Treasury debt. This in effect put a "ceiling" on the real rate of interest at a level below the "natural" real rate of interest that would exist were the Fed not intervening persistently in capital markets.

Wicksell and Friedman had long discussed how any such long-term, persistent, or semi-permanent, lowering of the real interest rate by increasing the rate of growth of the money supply would lead to sustained higher inflation. This higher inflation did not result yet because the huge amounts of the reserves have not been lent out and have been kept instead as "excess" reserves back at the Fed, as a result of the Fed paying interest on the reserves.

The distortions to capital markets have resulted because at low real in-

terest rates a lower private savings rate results. In essence Fed policy has forced up the risky private investment real interest rate while lowering the "risk-free" government interest rate paid on US Treasury debt. A lower loan to deposit rate has resulted because this investment gauge, by various measures, tends to follow the real interest rate. A low real interest rate leads to less loans and private investment relative to total bank deposits.

Policy debates center around what the Fed should do henceforth. One proposal is to continue to keep the FFR low since the low GDP growth rate of the "lost decade" following the Great Recession has been just the bad luck of a long-stagnating world economy. In contrast is the option to raise the FFR, and eliminate the interest on excess reserves, so as to end a bad policy regime of implicitly taxing capital markets by imposing a low real interest rate ceiling on them through persistent liquidity injections. If the latter international capital market tax effect of Fed policy is a valid hypothesis, and if the interest payment on reserves is ended, it is very likely the US and possibly world economy will experience a burst of sustained inflation well above the Fed target of 2% a year. Risky capital market returns in terms of "high" stock market valuations would also be expected to fall, just as the risk-free real interest rate would be expected to rise.

The good part of a complete capital market deregulation in terms of ending the Fed's "price-of-capital controls" is that capital markets would likely become reinvigorated towards "fundamentals" and normal real GDP growth would likely be able to resume worldwide. Higher inflation for a time would simply be part of the tax imposed to pay for the decade-long spree of a sustained high level of deficit spending. That is how Ricardian equivalence works: everything spent by the government eventually has to be paid for through taxes.