

A Negative Nominal Interest Rate

application and implementation

October 2009

There is widespread agreement on negative real interest rates being a prerequisite for economic recovery when recessions are looming or already in the making. Nevertheless, when it comes to delivering negative real interest rates in a deflationary environment, considerations on turning negative in nominal terms are immobilised by technical objections. Indeed, as soon as the target nominal interest rate hits the zero bound, academic discussions on the necessity of negative real interest rates seem to make altogether way for the tacit acceptance of a policy dead end. Precisely because it does not suffer from wastage, money plays an essential role in this context. Introducing negative nominal interest rates then comes as a measure which removes from money its quality of being a stable store of value. This essay will look at feasible channels to introduce carrying costs for money balances and will dress the picture of negative nominal interest rates as a policy tool.

www.turningnegative.free.fr

Table of Contents

Introduction.....	3
<i>On the issue of implementing a negative nominal interest rate</i>	
Part I: Opening remarks.....	4
<i>A broad perspective on liquidity as a store of value</i>	
Part II: Application.....	13
<i>Considering negative interest rates as a policy instrument</i>	
I. The zero bound premise	
II. Liquidity trap	
III. Hoarding	
Part III: Implementation.....	24
<i>Tax on liquidity and negative nominal interest rate in practice</i>	
I. Overcoming the zero bound	
II. Objections to an implementation	
III. A negative interest rate policy in practice	
Conclusion.....	42
<i>Widening the operational scope for central banking</i>	
References.....	43

Introduction

A central bank's lower bound interest rate has traditionally been fixed at zero percent. Yet, unfamiliar though it may appear, the idea of implementing a negative nominal interest rate has of late and in the light of the current crisis gained some attention from economists, policy-makers and journalists.

Papers by Goodfriend (2000), Woodford (2003) and Buiter (2003), the first to envisage negative nominal interest rates, have recently gained some considerable momentum as the financial crisis of 2008 was unfolding, and which saw major central banks being pushed ever closer to the zero bound. However, opinions on the subject are still quite unsettled and emotions on the subject run high. To be sure, there is widespread agreement on negative real interest rates being a prerequisite for economic recovery when deflationary recessions are looming or already in the making. Yet, when it comes to delivering negative real interest rates in a deflationary environment, considerations on turning negative in nominal terms are immobilised by technical objections.

Recently, a FED analysis came up with an equilibrium interest rate of minus 5%. The Research Unit of Legal and General, a UK insurer, has, by the same token, calculated, under its forecasting model, that nominal interest rates should be slashed to minus 1.25 percent in order to lift the economy from recession. The Swedish Central bank, as of July 2nd 2009, has cut its deposit rate to minus 0.25%. Yet, the majority of policy makers, commentators and researchers remain persistently stubborn about turning to negative rates of interest. During uncertain times as these, however, one might for the sake of future economic and financial stability consider alternative policy tools thus far ignored or overlooked.

The dissertation will have a constructive view on the application and the implications of a negative interest rate and will, most importantly, consider the feasibility and effects of a short-term negative interest rate policy. The broad structure of the dissertation is as follows:

Part I invites the reader to gain a broad perspective on the characteristics of liquidity, money and interest. Part II goes on to ponder on the implications of hoarding and the short-term safeguard of liquidity. It further provides the rationale for Part III by raising the question whether negative nominal interest rates and liquidity taxing would prove a useful policy tool. With technical constraints and objections considered in Part III, this dissertation will conclude with an outlook on what a negative interest rate policy could look like in practice.

PART I

Opening remarks

For a majority of people within the academic, the financial and the policy-making community, the crisis that took off in 2008 must have come as a surprise. The preeminent economic doctrine which may be loosely described as comprising a “free market orthodoxy” and that not so long ago appeared to be virtually omnipotent has sustained a serious blow of confidence in light of the drastic economic developments, following the events of the summer of 2008. As of late 2009, much uncertainty remains as to whether we are in fact heading for a light recession only, or if a long lasting depression is yet to come. Disagreement lingers on about whether we are to expect double-digit inflation or a period of sustained deflation.

Recently the Financial Times newspaper (FT) published an article that raised the question of what the 'ideal interest rate for the US economy' would be in the context of the current distressed economic climate¹. It concluded that, according to an internal analysis of the Federal Reserves Bank, the adequate interest rate would be 'minus five per cent'.² It is an astonishing fact that the shortage of liquidity triggered such a drastic theoretical analysis amongst the world's leading central bankers.

The concept of a negative nominal interest rate, unfamiliar though it may appear, has, in fact, recently attracted some attention of economists, policy-makers and journals. The ensuing debates, in the meantime, are marked by a profound sense of disagreement.

A Central bank's lower bound for interest rates has traditionally been fixed at zero percent. In light of the recent academic and policy discourses, it is as remarkable as astonishing a fact that implementing negative interest rates has not been at the fore of policy-makers' decisions in reacting to the current economic crisis. Indeed, US repo rates, for instance, have happened to turn negative in August 2003³. Equally, the oldest central bank of the world, the Swedish Riksbank cut its deposit rate to minus 0.25 per cent as of July 2009⁴. Yet researchers and policy-makers seem to have remained stubborn about turning negative.

1 Fed study puts ideal interest rate at -5%
Financial Times – April 27th 2009

2 Ibid.

3 Repurchase Agreements with Negative Interest Rates

Michael J. Fleming and Kenneth D. Garbade - April 2004 (Federal Reserve of New York)

4 Press Release - July 2nd 2009 (Sveriges Riksbank)

Costless liquidity holding

Consider the following example as a way of illustrating the problem. There are two representative agents, agent A being in possession of a load of apples worth, say, \$10.000 and wishing to sell, and agent B, holding \$10.000 worth in cash, willing but in no need to buy. agent A does face some constraints: first, transporting and storing the merchandise comes along with considerable costs, and second, the merchandise proves to be perishable, thus incurring a time constraint upon him. Consequently, agent A requires a swift agreement is reached sooner rather than later. Agent B, in turn, when holding his cash, is neither confronted with considerable storing costs nor a time constraint. This disposition conveys to him a clear advantage in terms of the ensuing negotiation with agent A: being aware of agent A's time constraint, he may refuse to buy the merchandise unless agent A drops his price. In turn, agent A would be forced to follow suit, hence the price of his goods would be dropped and he would sell at a cheaper price than first envisioned. Agent A could simply not afford drawn-out negotiations, since he tries to sell perishable goods.

The example certainly overlooks some important elements: inflation proves to be a time constraint for the cash holder himself; not all the goods and commodities traded worldwide are as quickly perishable as fruits, and even so, a fruit market is the best illustration of how to avoid a monopsony. Nevertheless, this example, in all its simplicity, stresses an important point: that is, the power of holding and hoarding liquidity. The rationale for a negative nominal interest rate in this particular context is that money must only serve as a medium of exchange and circulate so as to maximise the trade volume. The negotiations between agent A and agent B may have looked quite differently, if, just as agent A is confronted with storing costs and time constraints, agent B is also subject to a constraint: running the risk of incurring a penalty for hoarding liquidity as a store of value rather than spending it, thus being subject to a tax on money holdings.

A tax on liquidity itself does not, however, correspond to a negative nominal interest rate. While the consequences may be the same for the former and the latter – a reduction in the total amount of disposable liquidity – a negative nominal interest rate implies a lender-borrower relationship while a tax on liquidity does not. Be this as it may, the interaction between the two concepts will become increasingly apparent throughout this dissertation.

Views on the charge of interest

In his book “The Theory of Interest”, Irving Fisher outlined what one could call the lower bound for the interest rate: if a commodity can be stored for free over time, then the interest rate in units of that commodity cannot fall below zero. In our monetary reasoning this would come to mean that a negative nominal interest rate is impossible to implement unless it is costly to carry money. A bank would refuse to lend at a negative nominal interest rate

as long as holding cash or building up excess reserves at the central bank yields 0%. Consequently, taxing liquidity clearly comes along as a *sine qua non* in order to pave the way for negative nominal interest rates.

A positive interest on borrowed funds is usually thought of as legitimate as the price of money for the following reasons:

- to give up the advantages of liquidity
- to renounce consumption today
- to take into account credit risk
- to protect oneself from inflation

When keeping liquidity rather than providing it as a lending facility, a positive interest rate can be understood to be a tax on these money holdings. That is, both in terms of seignorage (inflation) and in terms of an opportunity cost (no capital gain). This price can be seen as the value of cash to pay in order to avoid risky investment strategies.

To be sure, a negative nominal interest rate brings about quite an awkward situation: one may be willing to lend, but rather than obtaining some reasonable rate of return for postponing consumption or for giving up liquidity, the borrower pays back less than the principal sum that was lent in the first place. Such a deal would, of course, seem much more favourable for the borrower than for the creditor.

In a more philosophical penchant, do consider what Thomas Aquinas, Doctor of the Church, has to say about usury:

To take usury for money lent is unjust in itself, because this is to sell what does not exist [...]. In order to make this evident, we must observe that there are certain things the use of which consists in their consumption: thus we consume wine when we use it for drink and we consume wheat when we use it for food [...]. Accordingly if a man wanted to sell wine separately from the use of the wine, he would be selling the same thing twice, or he would be selling what does not exist [...].

On the other hand, there are things the use of which does not consist in their consumption: thus to use a house is to dwell in it, not to destroy it. Wherefore in such things both may be granted: for instance, one man may hand over to another the ownership of his house while reserving to himself the use of it for a time, or vice versa, he may grant the use of the house, while retaining the ownership.

Now money, according to the Philosopher (Ethic. v, 5; Polit. i, 3) was invented chiefly for the purpose of exchange: and consequently the

*proper and principal use of money is its consumption or alienation whereby it is sunk in exchange.*⁵

Thomas Aquinas distinguishes between consumption (process of consuming) and usage (action of using). According to him, money belongs to the first category, i.d. a credit consists in a transfer of ownership of a good that is to be consumed (invested). Unlike a house whose ownership can be dissociated from its usage, that is, paying a rent or acquiring the house itself, money cannot be separated into a distinct owner and user exactly because it is consumed rather than used. Therefore, charging interest on money, Thomas Aquinas concludes, means selling what does not exist: the usage of money.

Whatever the moral grounds of such logic, Thomas Aquinas as many others before and after him, advocates credit without the charge of any interest at all. So, clearly, the concept of a negative nominal interest rate goes beyond the moral philosophy of thirteenth century Dominican priests and philosophers.

Yet another approach, rather mathematical than philosophical, considers the exponential growth process of interest.

$$k_t = (1+i)^t k_0$$

k_0	capital at the outset
i	interest on capital
t	year
k_t	capital at time t

Unlike the natural growth pattern of a human body for instance, with rapid growth at the beginning, slowing down over time and halting at a certain point, exponential growth, instead, begins very slowly and accelerates over time. Besides capital accumulation, other processes do have an exponential growth pattern: viruses and cancers, and these, in turn, tend to kill off their host eventually. The exponential growth pattern of capital accumulation is considered by some schools of thought, in particular the *Freigeld* movement⁶, to be the root problem of our modern capitalist societies with their frequent economic and financial crises and its purported tendency towards wealth redistribution.

This line of reasoning highlights the confrontation between the working class that is engaged in an activity of production, and the capital holding class that extracts interest on its capital without actually contributing to economic development itself. An extreme example is frequently used to illustrate the

5 Thomas Aquinas - Summa Theologica: Second Part of Part II, Question 78

6 Margrit Kennedy: Geld ohne Zinsen und Inflation (2006)

doubtful utility of a person who lives on income from property and securities. If every member of society was to work until one's savings were sufficient so that yearly interest payments on that capital would allow to live decently without reducing that principal capital amount (cf. Friedman's permanent income), then society would eventually collapse as all production of goods and services would have come to a complete halt. That example, utterly unlikely as it is, may only be of theoretical interest, but conveys another dimension of the problem: it is risk-taking and entrepreneurship, production and trade that allow society to keep afloat and to advance, and it certainly isn't money whose "principal use of money is its consumption or alienation whereby it is sunk in exchange" to quote Thomas Aquinas.

The reader surely gathers that this logic targets to free money from interest which is exactly the stated objective of the *Freigeld* movement mentioned earlier. Its founder, Silvio Gesell, was among the first to envision a negative interest on capital.

Gesell separates the interest rate into three distinct elements:

- the risk premium to compensate for potential loss
- the inflation premium to compensate for the loss in value of money at maturity
- the tribute which is the price to be paid for the advantage of holding liquidity

The tribute occupies the focal point in Gesell's approach to money. Money holders wouldn't give up their liquidity unless the interest on a credit was above the tribute which consequently serves as a lower bound for the return on business investments. If the prevailing interest rate set by the central bank at a level that ushers new business projects into the profitability zone was below that tribute, money holders would necessarily refuse to lend their liquidity, rather hoard it, and thus withdraw money from circulation.

Modern economic theory insists on the importance of maturity when considering the impact of interest rates on the economy. Short term interest rates (one day to less than a year) are rather a concern for private banks and happen to influence their lending decisions while long term interest rates are closely linked to household consumption and investment behaviour.

Contrary to Gesell's findings, evidence⁷ suggests that low short term interest rates encourage risk taking with banks, who relax lending standards and grant new loans with higher credit risk, despite lower credit spreads. Credit risk does increase without a proportionate increase in the charge of interest. In other words, low interest rates do not necessarily imply a reduction in

7 The impact of short-term risk interest rates on bank credit risk-taking
Financial Stability Review - December 2007 (European Central Bank)

lending as Gesell suggests. While Gesell's analysis may not be completely true in detail, it remains interesting in so far as it pinpoints to crucial obstacle to a healthy economy: the supremacy of money holding, its decision power – investing when it suits well, withholding cash when it does not, that is, hoarding.

Far from being a theoretical construct, hoarding has been very present indeed during the depression era in the late 20s and early 30s as well as during the financial fallout of 2008-2009 when the interbank market completely dried up and private banks held colossal excess reserves at the central bank. The very implications of hoarding - among which the risk of deflation as well as the liquidity trap that frequently comes along with it - have been the leitmotiv of articles on negative nominal interest rates published recently by Professor Willem Buiter of the London School of Economics, Professor N. Gregory Mankiw of Harvard University, Martin Wolf of the Financial Times and others.

Zero bound and deflation

By late 2008, after a row of consecutive rate cuts, it became evident that the FED, the BoE and the ECB were about to reach the zero bound, with conventional monetary policy running out of ammunition, and no more rate cuts to go.

Generally speaking, a central bank's monetary policy is said to be accommodative when the target rate is below inflation⁸. Recall the following relation:

$$r_t = i_t - p_t$$

The real interest rate (r_t) corresponds to the nominal interest rate (i_t) minus the rate of inflation (p_t). Hence, an accommodative monetary policy is nothing else than a period during which debtors benefit from negative real interest rates.

An accommodative monetary policy is needed when an economy suffers from a recession that may, in particular, bring about deflation. Deflation is defined as a fall in the general level of prices over a period of at least one year and is usually thought of as a side effect of the collapse of aggregate demand when producers are forced to cut prices. With regard to the relation between deflation and output decline more specifically, a survey⁹ of the depression era during the late 1920s suggests, notably, that output fell by

8 Rising Relative Prices or Inflation: Why Knowing the Difference Matters
Owen F. Humpage - June 2008 (Federal Reserve Bank of Cleveland)

9 Perils of Price Deflations: An Analysis of the Great Depression
Charles Carlstrom, Timothy Fuerst - February 2001 (Federal Reserve Bank of Cleveland)

thirteen percent in 1929 while the price level remained, for the time being, stable. Hence the suggestion that output data tend to precede price data. However, deflation need not necessarily be of the malign kind. Short episodes of price deflation may be caused by increased supply potential (rising productivity, falling production costs) that is not met by an appropriate monetary expansion, and deflation is as such not a matter for concern. But if a fall in the general level of prices proves to be persistent, deflation poses a considerable threat. The most commonly discussed issues are:

- downward wage rigidity in the short run and the slow adjustment in the longer run all but keep up with the quick price adjustments of goods and services. Hence, corporate profits tend to contract, with the consequences that this bears for output, investment and employment.

- when households are aware of a sustained decrease in the general level of prices, they may for the sake of precaution and in the face of uncertainty¹⁰ shun from large expenditures and, more generally, postpone purchases waiting for prices to fall further. This consumption behaviour would indeed cause prices to decline yet more.

- As mentioned above, holding money is costly in an inflationary environment. When inflation turns negative, instead, that cost does naturally disappear, and what is more, simply holding money yields a certain real return¹¹. This happens to be a straightforward incentive to hoard money and withdraw liquidity from circulation, once more, with the same consequences for the price level.

- Deflationary episodes can paralyse monetary policy and deepen the recessionary spiral. Consider a situation whereby inflation turns negative. Idest, the evolution of prices becomes deflationary, and suppose the central bank has cut the interest rate all the way to zero to combat the decline in prices, albeit without great success:

$$r_t = i_t - p_t \quad \text{becomes} \quad r_t = 0 + \text{deflation}$$

Clearly, if deflation persists at the zero bound for the nominal interest rate, then the economy is trapped in a state of positive real interest rates although it would call for quite the opposite.

A few comments on inflation and central banking

Being distinctly aware of the dangers that deflation brings about, academics

¹⁰ The Economic Crisis: Causes, Policies, and Outlook

Christina D. Romer – April 2009 (Council of Economic Advisers)

¹¹ Deflation

Charlotta Groth, Peter Westaway - March 2009 (Bank of England)

have since long advocated positive inflation of around two percent¹² as a target for monetary policy in order to retain a security margin against a general fall in prices. Central banks usually base their analysis on some kind of core-inflation measure, that is, a consumer price index calculated from a basket of goods and services for a representative consumer and excluding food and energy.

Monetary policy is interested in the broad picture. As the target interest rate is too blunt an instrument, it is persistent price changes only that occupy central banks: volatility in the evolution of prices among certain components, especially food and energy, adds unwelcome noise, which according to predominant central banking doctrine, justifies its exclusion¹³.

The stated objective of pretty much every central bank in the world is to maintain price stability which has come to mean a sustained low rate of inflation. With inflation targeting implemented as the powerful doctrine of monetary policy, a central bank is set to follow the Taylor rule that stipulates how the target interest rate is to be varied in order to reduce divergences from the target inflation rate and from potential GDP. But what if a successful inflation targeting policy with stable low inflation allow absolutely no conclusion about whether monetary policy is actually appropriate in the long run¹⁴?

Inflation targeting is based on a measure of inflation that excludes not only food and energy, but more importantly, asset prices, be that stocks, bonds or real estate. Asset price booms have often ended in episodes of financial instability in the past.¹⁵ A central bank's target interest rate acts with a lag on inflation and output, and being too blunt an instrument, central bank's responsiveness to asset price movements is considered to “lead to large output losses that exceed by a wide margin those that would arrive from a possible bubble burst”.¹⁶ That statement seems, in the light of the recent crisis that was probably about to trigger considerable havoc in the real economy had the governments and central banks not intervened massively, rather questionable today.

Another matter of consideration happens to be world savings. A significant amount of new savings made an appearance with the entry of rapidly growing countries (and their ever-growing current account surpluses), especially

12 Some economists such as Summers and Fisher have advocated a target of three percent

13 An alternative measure of inflation

François R. Velde - February 2006 (Federal Reserve Bank of Cleveland)

14 Monetary and Financial Stability

Axel Leijonhufvud - October 2007 (Centre for Economic Policy Research)

15 Can monetary policy really be used to stabilise asset prices?

Katrin Assenmacher-Wesche, Stefan Gerlach - March 12th 2008 (VoxEU)

16 Ibid.

Asian, in the world economy. These savings made their way into the world financial markets and pushed down interest rates, which itself stirred up asset prices ever since the IT bubble had burst in 2001. Eventually, inflation targeting has come to be the right policy under the wrong circumstances.

What link may there be between central banking, inflation and nominal negative interest rates?

One answer may be found in the history of the reordering of the world financial and trade architecture at the end of the Second World War. At the Bretton Woods conference in 1944 that was to set the rules of the world financial system after the defeat of the Axis powers, John Maynard Keynes as the leader of the British delegation offered a suggestion as to how to regulate international payments and trade: by establishing an international currency, called "Bancor", the international clearing house for world trade - charged to promote a global trade balance - would be able to impose a negative interest rate on current account surpluses so as to penalise liquidity hoarding. Eventually, Keynes' proposal had not been implemented. With today's knowledge of the current financial and economic crisis and the global imbalances that helped to cause it, the proposal of taxing current account surpluses could, ex post, have proved an efficient measure to curb financial folly and to foster economic stability.

Negative nominal interest rates and liquidity taxing are not novel ideas, have come to light at several times in history, and still, have been largely overlooked or ignored by policy-makers and academics. Nowadays, one would rather associate this type of measure with anti-capitalistic schools of thought. And yet, this dissertation, by considering negative nominal interest rates as a policy instrument, will not pursue an anti-market agenda, but will simply contemplate a potential means to ease, if not cure, some of the woes of our economic system.

PART II

Application

"The monument to Soviet central planning was supposed to have been a heap of surplus left boots without any right ones to match them. The great bull market of the past quarter century is commemorated by millions of empty houses without anyone to buy them."

The Economist, January 22nd 2009

The measures taken to preserve a system that was supposed to work best without much state intervention have been, by its standards, rather impressive. The Federal Reserve, at the forefront of central bank intervention saw its balance sheet mushroom to \$2.174 billion in April 2009 from around \$800 billion before the crises started in 2008. One item, for instance, that helped accelerate this development was the credit of \$57 billion in September 2008 to insurance company AIG alone which was later in March 2009 to announce the largest quarterly loss in U.S. corporate history (\$61,7 billion). Furthermore, not only have the standards for accepted collateral been reduced - meaning that the central bank takes on progressively riskier assets - but it also has the Fed engage in direct lending which is clearly not its initial mandate:

A [...] set of programs initiated by the Federal Reserve - including the Commercial Paper Funding Facility (CPFF) and the Term Asset-Backed Securities Loan Facility (TALF) - aims to improve the functioning of key credit markets by lending directly to market participants, including ultimate borrowers and major investors. The lending associated with these facilities is currently about \$255 billion, corresponding to roughly one-eighth of the assets on the Fed's balance sheet. The sizes of these programs, notably the TALF, are expected to grow in the months ahead.¹⁷

Government intervention - mostly as underwritings of balance sheets of the banking sector - has taken the form of a huge surge of public debt among the ten leading rich countries, rising from 78% of GDP in 2007 to approximately 114% in 2014, as estimated by the IMF¹⁸. US public debt, in particular, at 41% of GDP at the end of 2008, is expected to reach 82% of GDP by 2019.

¹⁷ Ben S. Bernanke: The Federal Reserve's Balance Sheet, April 3rd 2009

¹⁸ Public debt - The biggest bill in history
Leaders - Jun 11th 2009 (The Economist)

At the fore of the public debate were the rescue of the state mortgage lenders Fannie Mae and Freddie Mac¹⁹. Their debt volume alone posed a systematic danger to the international financial system, if payments would have been defaulted on a large scale. In the end, Washington agreed to inject \$100 billion in the form of a conservatorship to both mortgage lenders, in order to avoid the catastrophic imaginary scenario of their bankruptcy. In turn, both Fannie Mae's and Freddie Mac's debt is now supervised by government authorities. Across the Atlantic, one shall single out the UK treasury's propping up of HBOS and the Royal Bank of Scotland at a volume of \$37 billion. The latter subsequently received another £13 billion and agreed to a 84% government ownership of the bank. Furthermore, the institution had to "sign a binding agreement with the Treasury on how much it will lend and on what terms"²⁰. The state of lender as last resort in times of liquidity shortages was by no means confined to the Anglo-Saxon sphere. Hence, similar schemes of government intervention are to be found elsewhere such as in Germany (Hypo Real Estate) or the Benelux states (Fortis).

Transferring private debt to the state treasury may be considered a somewhat unconventional approach to healthy public finances. Given that much of such private debt is in some way or the other linked to subprime credits and opaque CDO structures, private toxic credit has been turned into U.S. treasury debt which may raise a few questions on sovereign credit risk. Accordingly, the risk of sovereign default among countries in the northern Atlantic region may be much less utopian than it used to be a few years ago. Yields on 10 year US government bonds have effectively risen from 2% in December 2008 to nearly 4% in June 2009 (but have admittedly cooled down to 3,30% in October 2009).

Having slashed the target rate from 5,25% (August 2007) to 0,25% (December 2008), the Fed had not secured considerable success in cooling down the markets: interbank credit spreads had remained high, and financial markets still suffered from liquidity shortages. As a consequence, the banking sectors excess reserves with the central bank had instead reached \$800 billion in December 2008 which represents a profound increase from the usual level of just a few billion dollars.

Stuck at a zero interest cul-de-sac that stirred up an unbounded liquidity preference, the Fed has turned to quantitative easing, that is, using the monetary printing press to finance the Fed's purchase of private and US government securities. Deflation may have fortunately been avoided, but in the wake of the success of quantitative easing one might assume that inflation

19 Government-sponsored enterprises (GSE) active in mortgage securitisation, charged to guarantee that lending to home buyers keeps afloat

20 Bloomberg.com: RBS Will Be Guinea Pig for 'Creeping Nationalization', January 20th 2009

is going to be the most potent weapon left for governments to wipe out large debt burdens. and to drop their credibility with it.

Quantitative easing does certainly not provoke an inflationary spiral when it is deflation that it is fighting, but once the financial system and the real economy have returned to normal, central banks must proceed with the utmost prudence in the handling of the monetary expansion. Indeed, central banks walk a thin line between the dangers of deflation and those associated with rapid inflation.

The very necessity to use extraordinarily unconventional measures capable of jeopardising state solvency justifies by itself a thoughtful debate on alternatives that would either allow policy-makers to handle financial crises a little less fuzzily or that may even contribute to making unpleasant episodes as these a little less frequent. Which brings us back to the closing remarks of Part I, and introduces the principal theme of Part II of this dissertation: does a negative interest rate constitute a fundamental solution to the problems that governments and central banks have been so desperately fighting against these last eighteen months?

I. The zero bound premise

Policy-makers and researchers are aware that a sharp decline in output and spending does, at least in theory, call for a negative nominal interest rate in order to encourage swift recovery from deflation and recession by spurring demand²¹. Hence, to put it simply, negative nominal interest rates, if they could be implemented without difficulty, constitute a fundamental tool against a serious economic downturn.

The zero lower bound on nominal interest rates, however, poses a concrete obstacle to any attempt to make an efficient use of negative nominal interest rates. A central bank is free to set its target rate at a negative level, but that policy decision would have absolutely no impact at all on the interbank market rate.

The zero lower bound states that nobody would lend at a negative rate if one could just “stuck the cash in the mattress”. In fact, the rate of return on currency (banknotes and coins) is zero, and consequently, if the interest rate were to fall below zero, the public would rather hold its savings in the form of currency, and the financial institutions its liquidity as reserves. Accordingly, private banks will never lend their liquidity to each other at a negative

21 It May Be Time for the Fed to Go Negative
N. Gregory Mankiw - April 18, 2009 (New York Times)

nominal interest rate if reserve deposits are costless to store at central banks. Thus, the zero bound on the nominal interest rate is a consequence of the zero rate of return on currency for one, and the zero cost of storing bank reserves at the central bank for the other.

This aspect of a floor to nominal interest rates is well illustrated in a paper on the zero bound, published by the ECB²²:

Imagine instead that holding real balances does involve some cost: for example, that the only currency is gold, and storage space and security guards are costly. I would be willing to hold bonds instead of gold, even at a negative interest rate, since by doing so I could avoid paying for storage and security.

The floor to nominal interest rates is therefore given by the cost of holding currency.

The paper demonstrates under which circumstances negative nominal interest rates on bonds could be put into practice. Indeed, to spell out the logic of this argument, the price of storing currency is the key issue. If it is less lucrative to store money, lending it is the next best option, thus having the positive side-effect of stimulating the credit flow.

Unfortunately, a major flaw impairs the scope of that report's conclusion: according to the author (the report is admittedly from 2002) the risk of hitting the zero lower bound is very low. Yet, it is not because the possibility remains unlikely that it is not dangerous. A similar fallacy had been widespread during the lucky days of credit risk transfer debates when policy-makers, academics and the banking lobby were too quick to pour out accolades on the merits of risk dispersion while deeming a financial fallout triggered by that novel technique utterly unlikely.

Unlikely or not, the zero lower bound has become a matter of concern for the Fed since December 2008 when its target rate reached 0.25% as well as for the Bank of England since March 2009 with its target rate fixed at 0.5%. So, what would be the circumstances under which a zero bound situation manifests itself (and under which a negative nominal interest rate may be a viable policy alternative)?

The zero bound is inherent to the emergence of deflation risk and financial as well as economic instability that comes along with it. Preventing deflation must therefore be a crucial policy objective for central banks. To make sure it doesn't happen, Ben Bernanke suggested in a speech²³ held in 2002, before

22 Monetary policy and the zero bound to interest rates

Tony Yates – October 2002 (European Central Bank)

23 Deflation: Making Sure "It" Doesn't Happen Here

Ben Bernanke – November 2002 (Federal Reserve Board)

becoming chairman of the Fed, three measures of reference:

- Preserve a buffer zone.

As has been noted before in this dissertation, central banks in the years 2000 with inflation targeting as a policy in place and low inflation prevailing, were goofed into maintaining interest rates too low for too long²⁴ and thus presumably having but a little margin for combating deflation. One must remember at the same time that, in August 2007, the Fed target rate stood at 5.75%, and that a string of consecutive rate cuts down to 0.25% should have proved enough margin for accommodating monetary policy to take effect which, unfortunately, it did not.

- Maintain financial stability

While that may be more of an objective than a measure itself, financial stability is beyond any doubt paramount to preventing deflation. The underlying logic insists on the relation between financial crises, fire sales, falling asset prices with general declines in prices and aggregate demand. With retrospect, the central banks were unable to ward off the financial crisis of 2008 that was to trigger precisely what was to be avoided: fire sales and falling asset prices.

- Act preemptively, cutting interest rates aggressively when inflation is low

The Fed, the BoE and the ECB have not lacked boldness in their rate cut decisions. They have practically gone all the way down to zero (the Fed more than the ECB) and quickly so, thereby, slow responsiveness really has not been an obstacle to efficient central banking crisis management. And yet, even so, the financial crisis as of late 2008 could not be tamed, with the interbank credit market coming to a standstill.

As mentioned before, there is widespread agreement on negative real interest rates being a prerequisite for economic recovery when deflationary recessions are looming or already in the making. Nevertheless, that agreement surprisingly dissipates into technical caveats at the zero bound. After all, there is nothing new into the understanding that accommodative monetary policy conditions economic recovery.

Yet why would a certain scheme A ($i=2\%$; $\pi=4\%$; $r=-2\%$) be feasible while a certain scheme B ($i=-4\%$; $\pi=-2\%$; $r=-2\%$) would not, even if the final outcome, a negative real interest rate of -2% , was exactly the same in both cases? Notwithstanding the fact, generally agreed upon, that an ailing

²⁴ Keynes and the Crisis

Axel Leijonhufvud - May 2008 (Centre for Economic Policy Research)

economy calls for real interest rates turning negative, be that through the scheme A or B, considerations on the necessity of negative real interest rates seem to make altogether way for the tacit acceptance of a policy dead end as soon as the target nominal interest rate hits the zero bound.

To neglect nominal negative interest rates is to deprive oneself of the potential to galvanise impact of monetary policy in a deflationary situation in what would otherwise be the zero bound interest rate paralysation.

Consider Irving Fisher's debt-deflation theory in relation to the utility of a negative nominal interest rate. The US American economist's observation on the Great Depression in the early 1930s led him to suggest that deflation caused by debt reacts on debt. That is, distress selling of assets to service debt may reduce outstanding debt, but as a perverse side effect also provokes a general price decline, that in turn rises real interest rates and causes more distress selling. To put it in Fisher's words, "the very effort of individuals to lessen their burden of debt increases it [...]. In 1933, liquidation had reduced debt by 20%, but had increased the dollar by 75%"²⁵.

How did it come to distress selling in the first place? As a report²⁶ by the Bank of England has noted, evidence of the 80s and the 90s suggests that debt accumulation is an essential factor to crises such that the 'most severe recessions occurred in those countries which had previously experienced the largest increase in debt'.

Minsky's financial instability hypothesis tells the story of how an economy that depends on debt to function transits from a stable to an unstable trajectory - dubbed the Minsky moment - when market turmoil and distress selling emerge. A negative nominal interest rate may well be an answer to the Minsky moment, but in this part of the dissertation we are rather concerned with a means to curing deflation. Thus, whether or not negative nominal interest rates may aspire to turn into a powerful policy of controlling debt accumulation will be discussed later in this Part II.

For the time being, consider that market volatility and a deflationary recession are already in the making, possibly with a debt-deflation process at hand.

25 The Debt-Deflation Theory of Great Depressions
Irving Fisher - 1933 (Econometrica)

26 Deflation
Charlotta Groth, Peter Westaway - March 2009 (Bank of England)

II. Liquidity trap

This dissertation has at several points already implicitly pondered on the liquidity trap. To make clear what may seem obscure, some elements seen before - such as Gesell's tribute - will be reconsidered. The liquidity trap, as a technical term, is a crucial feature of serious recessions, especially in the context of deflation. It occurs when a central bank cannot stimulate aggregate demand by using its interest rate. More formally, through an IS/LM perspective, a liquidity trap appears when the natural rate of interest turns negative, that is, when the IS curve hits LM at a negative rate. Monetary policy ineffectiveness turns out to be most apparent at the zero bound to nominal interest rates. With the target interest rate reduced down to zero, its alleged limit, liquidity does abound but does not have any effect on the availability of funds and remains, therefore, without any influence on consumption and investment.

Why does it not? People absorb any amount of liquidity in what one could call an unbounded liquidity preference, as they “want to conserve their capital in nominal terms, and care little about the interest rate”²⁷. At a very low rate of interest (it need not be zero), the riskfree nominal rate on short-term government bonds, considered as the opportunity cost of holding currency, fails to incite private agents to engage in lending and asset purchases: treasury bills and money become nearly perfect substitutes. To sum up, the pivotal point of a liquidity trap is that private agents deem interest rates too low to take on credit risk or to hold less liquid assets. Instead, they prefer to hold liquidity rather than debt securities or money market fund shares. Recall our remarks on Gesell's view on the interest rate: the existence of a tribute sets a floor below which lenders refuse to give up their liquidity. An idea that we were quick to refute but which turns out to be a persistent description of what we call nowadays a liquidity trap.

According to conventional wisdom, in order to lift an economy from the liquidity trap, a central bank must create expectations that anticipate future monetary policy to be expansionary - and will stick to the commitment of maintaining it thus for a sufficient period of time. But as for maintaining financial stability in order to prevent deflation, the management of expansionary expectations seems to be more an objective than a measure itself. If anything, it is quantitative easing that may be considered a measure to influence expectations.

In the light of massive central bank intervention required to revive the interbank credit market and, more broadly, to create expansionary expectations, the potential usefulness of negative nominal interest becomes

27 It is time for the monetary authorities to jump into the liquidity trap
Willem Buiter - December 2, 2008 (Financial Times)

self-evident.

If it was possible to tax money holdings so as to make holding liquidity costly, government debt or any risky security at low rates of return - possibly even yielding a negative nominal interest rate but appealing as long as it is more expensive to keep money balances - would choke the unbounded liquidity preference at once. Money and treasury bills would cease to be perfect substitutes.

The proposition is straightforward, easy to grasp and is, most significantly, not conditional on the skillful discretion of an insightful central banker. Indeed, creating expansionary expectations sounds like a blurred objective. With regard to quantitative easing, one must “tread carefully”²⁸ when using it, considering its potential impact, but, while certainly efficacious, it is not necessarily efficiently used: it has been working well in 2009 in the US and the UK²⁹, it has not in Japan in the 1990s.

III. Hoarding

A liquidity trap is a symptom that indicates the presence of liquidity hoarding. Commercial banks tend to be very reluctant to lend in the interbank credit market, and households and firms being reluctant to spend and to invest. But what is more, the rationale for hoarding is not bound to the argument of treasury bills and money being perfect substitutes.

One may find it contradictory at first to see emerge a liquidity preference that usually provokes a non-negligible increase in the monetary base, and at the same time notice the drying up of the interbank market while these two processes are really complementary. Quite intuitively, the presumed contradiction between abundant liquidity and liquidity drying up ensues from confusing two notions of liquidity.

Recall that the term liquidity can come to mean both the ease with which one turns an asset into money, but also the holding of money itself, being the most liquid asset naturally. Commercial banks have access to liquidity through:

- (1) banks deposits by their customers
- (2) the interbank credit market
- (3) excess reserves and deposit facilities
- (4) the selling of assets on their balance sheet

²⁸ Speech held at a dinner of the Confederation of British Industry
Mervyn King - January 20th 2009 (Governor of the Bank of England)

²⁹ Keep the money flowing to stave off deflation
Tim Congdon - July 8th 2009 (Financial Times)

In the case of (1), a bank would face a liquidity shock when its customers decide to withdraw their deposits and prefer to retain their savings in cash - the classic bank run.

Then, (2) is more concerned with wholesale funding, where banks finance their liquidity needs on the interbank market by borrowing at very short-term maturities. When for one reason or another, as will be discussed later, credit spreads increase, and the volume of transactions plunges, liquidity on the interbank market dries up. The case of Northern Rock fits into this frame.

As for (3), excess reserves and the deposit facility tend to increase substantially when the interbank market dries up; or rather, the interbank market dries up precisely because banks prefer to store at the central bank the little liquidity they retain.

Finally, (4) is the result of any of the three elements above, or all of them together, in the making, which in turn threatens the general level of asset prices.

As will be discussed later, a negative nominal interest rate may be, in this setting, a suitable measure to combat bank runs, the drying up of liquidity on markets and the building up of excess reserves. Beforehand, we shall contemplate on the motives and techniques of liquidity hoarding.

Why do banks hoard liquidity, and are reluctant to lend even at very short-term maturities to other banks? Uncertainty about the future state of the economy and the financial system certainly appears to encourage liquidity hoarding. Unsure whether the interbank market will allow for borrowing at short notice if quick financing is needed, banks rather sit on their cash than lend it, even overnight. The episodes of the Bear Stearns collapse, the Lehman Brothers bankruptcy illustrate that point: excess reserves jumped at once and the interbank credit market dried up further when news of the problems emerged³⁰.

The increased credit risk has been put forward as the main explanation for the reduced lending volume in the interbank market. As the financial crisis evolved, commercial banks and other financial institutions grew increasingly suspicious about the financial health of their competitors: the surge in credit risk spreads, then, indicates the perception of a higher risk of default. There is doubtlessly a link between a credit risk spread and the perceived risk of default, but that leaves the question of causality largely unanswered.

Credit spreads of high quality corporate bonds have more than doubled between September 2008 and January 2009, as the Governor of the Bank of

30 Judit Montoriol-Garriga and Evan Sekeris
A question of liquidity - March 2009 (Federal Reserve Bank of Boston and Richmond)

England, Mervyn King, noted in a speech³¹, only to conclude that this was “the highest spread since the 70s [...] despite innovation in financial markets. Considered inherently healthy, confirmed by strong credit ratings, these corporations should be able to weather the storm if short-term liquidity was readily available at the usual cost. However, it appears that there must be some degree of self-fulfilling anticipation. It is for the very reason that credit spreads increase that corporations actually face the problem of servicing and rolling-over their debt. Northern Rock arguably failed not because it was insolvent but rather because it was unable to raise the short-term liquidities needed to meet its funding needs.

Hence, within the frame of the question why banks hoard, one may cautiously suggest that increasing credit spreads are not a reason for hoarding but rather an outcome of it, not part of the justification but part of the problem.

In an article entitled the “Liquidity risk premium in money market spreads”, the ECB Financial Stability Review³² draws the attention to the fact that higher credit risk alone can't explain the credit spreads during the worst months of the financial crisis. “In the absence of liquidity problems”, so the argument goes, “the CDS spread [for a particular entity] should be approximately equal to the difference between the yield of par bond issued by the reference entity [...] and the risk free rate”. It identifies three reasons capable of explaining why arbitrage opportunities, that exist when the bond spread goes beyond the CDS spread as was the case in late 2008, are unused:

- the probability of significant liquidity shocks is not negligible
- the probability of default of the lending bank is not negligible
- the probability of shortage of high quality collateral is not negligible

To sum up, the idiosyncratic liquidity considerations of a lending bank can increase credit spreads independently of a borrower's credit quality. This finding comes as a major result: First, it backs up our suspicion on the causality between credit spreads and credit risk. Second, and most importantly, it reinforces the assessment that hoarding, through its setting a liquidity bottleneck and cutting financial institutions and non-financial corporations short of essential funding means, is established as a root cause and amplifier of financial crises in general.

The examples of concrete forms of hoardings strengthen this observation. Within a few days in late September 2008, the daily volume of the overnight

31 Cited already as footnote (10)

32 Liquidity risk premium in money market spreads

Financial Stability Review - December 2008 (European Central Bank)

unsecured interbank market in the Euro zone dropped to half (a fall by €29.3 billion) while liquidity stored at the ECB increased by €152.9 billion³³. Abroad, the volume of bank deposits at the Fed, stable in nominal terms at a few dozen billion dollars for pretty much 60 years, reached more than \$800 billion in early 2009³⁴.

Between September and December 2008, the U.S. Monetary base jumped from \$890 billion to \$1740 billion, “doubling in a little more than three months”³⁵. There is a more formal approach to liquidity hoarding, termed the monetary base - GDP ratio. According to Mitsuhiro Fukao³⁶ who worked on data from Japan during its liquidity trap experience, the ratio oscillates within the range of 7% to 9% when the Bank of Japan sets the interest rate at a normal level between 1% to 12%. With Japan's zero interest rate policy in place, that ratio grew initially to 11% and finally to 21% when quantitative easing set in. Thus, any ratio above 10% could be interpreted as indicating a tendency towards hoarding. Applying that measure to the U.S., using 3Q US GDP for September and 4Q US GDP for December, the ratio soars from around 6.5% to 13.2% which suggests more formally that hoarding was indeed spreading in the US during the last quarter of 2008 when the Fed set its target rate to very low levels.

This section has attempted to lay down the harmful influence of hoarding. Fighting hoarding behaviour, therefore, appears to be paramount to keep the interbank market functioning properly and to keep credit floating. It is in this particular context, that a negative nominal interest rate may find its most far-reaching application if it proves to be a powerful means to foster financial stability. To be sure, Willem Buiter's and Gregor Mankiw's thrust, by publishing heatedly discussed articles on implementing a negative nominal interest rate, into conventional monetary policy doctrine addresses this very issue of hoarding at the zero bound.

The implementation of a negative nominal interest rate to that end will be, with its limits and diverse objections, one of the main themes of Part III. For the time being, recall the aforementioned elements of liquidity disposition: bank deposits by customers, the interbank market and excess reserves. If the public was to produce an unbounded liquidity preference, then envision raising a tax on banknotes and currency. If it was the interbank market that dried up, think of the possibility to lower the floor of holding liquidities (electronic and bank money) to negative levels such as to make storing it

33 Liquidity hoarding and interbank market spreads

Financial Stability Review - June 2009 (European Central Bank)

34 The Federal reserve system balance sheet: what happened and why it matters

Peter Stella - May 2009 (International Monetary Fund)

35 More money: understanding recent changes in the monetary base

William T. Gavin - April 2009 (Federal Reserve Bank of St. Louis)

36 The effects of ‘Gesell’ (currency) taxes in promoting Japan’s economic recovery

Mitsuhiro Fukao - June 2005 (Hitotsubashi University)

costly. If it was swelling reserves that caused concern, then give thought to enforce negative interest rates on excess reserves.

The point of such measures is to make debt securities, other financial assets and consumption more attractive than simply holding money. One could easily conceive the idea that in uncertain times of turmoil, access to liquidity and secure deposit thereof must be considered a service, and therefore, be paid for. As Willem Buiter puts it, “private agents may be willing to pay voluntary taxes in order to ensure [that] access [...]” to that cash.³⁷ Assuming that risk-free and low-risk securities pay slightly negative interest rates, while holding money produces an opportunity cost compared to these securities, the motif of what one could call the maximum loss avoidance may effectively allow to revive the interbank market. This seems a rather reasonable alternative to a liquidity trap with hoarding behaviour, a dying interbank market and growing excess reserves that sets a scene where each and every financial institution distrusts all others, keeps liquidity from circulating, and is satisfied with ensuring a “positive zero” yield.

37 See footnote (9)

PART III

Implementation

The analysis that precedes Part III has attempted to draw the reader's attention to the inherent characteristics of liquidity holdings. While liquidity is subject to an opportunity cost as it offers no capital gain, it does, in the words of Allan H. Meltzer yield a “nonpecuniary return in safety or confidence that the money holder receives”.³⁸ And thus, precisely because it does not suffer from wastage, money as the most liquid form of all assets, can serve as a secure store of value. The line of argument then continues to pinpoint this very quality of money balances as an essential root problem and amplifier of financial crises that see emerge liquidity traps and liquidity hoarding.

Hence the following proposal: remove from money its quality of being a stable store of value with its negligible carrying costs. This is not a mute point for money holding, because, as Keynes³⁹ already recognised, “if its carrying costs were material, they would offset the effect of expectations as to the prospective value of money at future dates”. In this context, the store of value as a function of money is considered as disruptive and should, through this proposal, make way for the foremost purpose of money: circulation as a medium of exchange.

Part III will look at the tax on liquidity and the negative nominal interest rate in practice. To that end, one must reconsider the zero bound premise first, and reflect on means to overcome it. Once a technically feasible channel has been set up to introduce carrying costs for money, negative nominal interest rates are ready to be implemented. At that point, we will weigh in to ponder on the objections against its enforcement. In a last section, finally, we will, with regard to the problems outlined in Part II and the objections made in Part III, dress the picture of the potential fields of action of negative nominal interest rates as a policy tool.

38 Keynes monetary theory: a different interpretation - Allan H. Meltzer (1989)

39 The general theory of employment, interest and money – John M. Keynes (1936)
Chapter 17: the essential properties of interest and money

I. Overcoming the zero bound

Recall that in order to allow for negative nominal interest rates as a viable policy instrument, one has to explore the means to surmount the zero bound. For as long as money pays a nominal interest rate of zero, nobody would lend at negative nominal interest rates: simply holding liquidity is more profitable than lending. The problem, in fact, resides in the nature of currency, that is, banknotes and coins. Suppose the monetary authority was to announce, in an effort to tax idle money balances, a negative nominal interest rate on currency. Why would holders of money balances voluntarily show up at all to pay that tax? Most certainly, they would not because currency is what one could call a bearer instrument, *id est*, the issuer (the central bank) does not know the identity of the owner, and under such circumstances is incapable of imposing any tax.

When the issuer does know the identity of the owner, referred to as registered securities, the money holder does not get away as easily. In order to illustrate the idea, consider a checking account at a commercial bank. User fees can be charged precisely because all transactions can be traced back to the identity of the user. Banks could, for this very reason, impose a negative nominal interest rate on their customers' deposits which, arguably, they already do if deposit fees are larger than interest paid on the deposit⁴⁰.

Excess reserves belong to the same category of security in that they establish a traceable link between a depositing commercial bank and the monetary authority that provides such a reserve facility. As such, central banks can decide to pay interest, positive⁴¹ or negative⁴², on reserves.

As it becomes evident at this point of the argument that the components of the money stock do not necessarily respond in the same manner to the implementation of a negative nominal interest rate, a monetary authority keen on increasing its impact must mind the distinct reaction patterns. Thus, within the most liquid monetary aggregate, the monetary base, a negative nominal interest rate would have uneven effects. When analysing the implementation of such a policy, one must distinguish between currency, that is, bearer instruments (banknotes and coins) and the rest of the monetary

40 Holding a checking account at a French bank which does not pay interest on his deposit, the author of this dissertation is subject to an automatically debited, monthly deposit fee. Whether these “frais de fonctionnement” may be considered as a negative nominal interest rate may be open to debate, but given that the checking account features a negative yield in the end of the day, this anecdote illustrates that paying negative nominal interest on registered securities is, at least technically, feasible.

41 The Federal Reserve decided in October 2008 to begin to pay interest on depository institutions' required and excess reserves. Positive interest on excess reserves may have, presumably, produced yet another motive for liquidity hoarding, though.

42 The Swedish Riksbank has begun, as of June 2009, to charge a negative deposit rate on reserves.

stock that happens to be registered securities (reserves, deposit money, etc.)

In order to overcome the zero bound altogether so that the effects of implementing a negative nominal interest rate are univocal, one must find a solution to the zero yield of currency. A handful of proposals do exist; two of them seem rather consistent, worth mentioning:

- Abolish currency

The proposal targets to replace banknotes and coins by electronic payments in order to unify the entire money stock under a system that allows to trace each unit of account to its owner. While the logic may appear unrealistic at first sight, one notes after a second thought that credit cards constitute precisely such an electronic, and registered, payment means. The idea of abolishing currency is obviously to evict bearer instruments from the money stock. Once all liquidity holdings are pooled together into the frame of registered securities, the conduct of negative interest rate policy would cover the entire money stock. As Willem Buiter⁴³ pointed out, one could keep a limited number of bills of low denomination in circulation so as to allow 'a concession to the poor. This would not undermine a negative interest policy as it seems rather unlikely that "banks and other big financial financial players would wish to store warehouses full of small bills"⁴⁴ just to evade lending at negative rates.

- Tax currency

This idea is to make money pay a negative interest rate so as to introduce carrying costs for liquidity. This is what, in the front matter to Part III, was meant with removing from money its quality of being a stable value with its negligible carrying costs. Keynes did envisage such a possibility:

Thus those reformers, who look for a remedy by creating artificial carrying-costs for money through the device of requiring legal-tender currency to be periodically stamped at a prescribed cost in order to retain its quality as money, or in analogous ways, have been on the right track; and the practical value of their proposals deserves consideration.⁴⁵

Keynes did in fact have knowledge, as the quote suggests, of an approach to taxing currency: Silvio Gesell's depreciating money, centerpiece of the *Freigeld* movement. When looking at the negligible costs of retaining liquidity, Gesell observed that the motive to hold money as a store of value prevents it from circulating as a medium of exchange which is its basic mission.

43 Negative interest rates: when are they coming to a central bank near you?
Willem Buiter - May 7th 2009 (Financial Times)

44 Ibid.

45 John Maynard Keynes - General Theory of Employment, Interest and Money (1936)
Chapter 17: The Essential Properties of Interest and Money

In order to ensure that money balances do not serve as an idle store of value, the concept of depreciating money works as follows: a banknote of a particular denomination retains its status as legal tender only if regularly stamped. That is, one is to pay a tax (in form of stamps) at a specified date in order to continue using the banknote at its nominal value. If that tax is not paid, the banknote not stamped, the currency loses its status as legal tender. To put it into Keynes' words, this process addresses the particularity of money, that unlike most assets, does not “suffer from wastage or involve some cost through the mere passage of time⁴⁶”. The proposal of periodically buying stamps for every banknote in possession in order to achieve the objective of introducing artificial carrying costs dates back to the 1920s, so may appear somewhat antiquated. Yet, the idea itself of a monthly charge of, say, half a percent of the nominal value of a banknote (adding up to six percent yearly) in order to retain its quality as a medium of exchange thus comes as a powerful deterrent to the withdrawal of liquidity from circulation.

To illustrate the consideration of artificial carrying costs to liquidity, imagine such a concept had been put into practice during the financial crisis of 2008-2009. Liquidity being subject to some natural rate of depreciation, say, minus six percent, the floor to lending is set at a negative level. Therefore, alternative investments such as risk-free short-term government debt yielding possibly slightly negative interest become attractive, which, at last, allows for negative real interest rates.

To sum up, two characteristics of the Gesell tax on money holdings are to be pointed out: first, Gesell's depreciating money reduces the floor, below which money holders refuse to lend, to negative levels. This particularity breaks the zero bound to the nominal interest rate and allows central banks to turn negative if need be. Second, the instauration of depreciating money as legal tender does, in Gesell's design, not only foil liquidity hoarding, but also generates an intended side-effect: people are rather unwilling to pay the tax on money at the end of a month which incites them to avoid massive retention of *freigeld* banknotes and, in order to get rid of them, use these sooner rather than later by turning to real assets and consumption. This very behaviour is expected to increase the circulation of money, and consequently, its velocity. This effect of depreciating money is inherently linked to the method that is used to levy the liquidity tax. If the tax is to be collected at prescribed dates – be that once a month or once a year – the money holders are free to use the banknote as often as pleases them while taxing banknotes every time they are used implied taxing money as a medium of exchange which is absolutely counter-productive. Thus, only if depreciating money is taxed on periodic basis, would it positively affect the velocity of money.

46 Ibid.

This section has intended to demonstrate the technical feasibility of overcoming the zero bound. One approach identifies the possibility of physically storing wealth at negligible costs in the form of currency as the explanation for a non-negative floor to lending. Accordingly, in order to unmake physical storage of value at no cost, one must have a cashless society. The other approach leaves bearer and registered instruments separated, but suggests to levy a tax on physical liquidity in order to discourage its being misused as a store of value. Finally, most reports which analyse the subject are quick to dismiss the proposals as ingenious in theory but cumbersome in practice, and if experiments had put these into practice, mention these in marginal note as anecdotes at best.

There had been, however, an experience of putting depreciating money into practice, that should have earned its way into the books of economic history and would have probably been forgotten, if it wasn't for Irving Fisher: the experiment of Wörgl⁴⁷. Wörgl is a small town of a few thousand habitants in western Austria that was, during the Great Depression, as much struck into a painful recession as any other community in Europe at the time.

In the light of rising unemployment, falling tax revenues and illiquid local savings banks, the city council decided to give depreciating money a try as local currency. Being aware that in an environment of falling prices Austria's legal tender, the Schilling, was apt to be hoarded and withdrawn from circulation, the city council instructed for the emission of depreciating money in the form *arbeitsbestägigungen* which had the same denominations with the same nominal value as the Schilling. *Arbeitsbestägigungen* were not fiat money, though, that is, the emission was completely backed up a Schilling deposit of the same amount. To assure their circulation, the city council convinced the local civil service to accept that their paycheck was to be made up of Schilling for one half, and of *arbeitsbestägigungen* for the other. Furthermore, merchants and workmen were encouraged to accept *arbeitsbestägigungen* as legal tender, while the city council itself approved their use as a means of payment for income tax and other charges. Finally, the new local legal tender was fixed to depreciate at a monthly rate of one percent.

The project initiated in 1932. Within a year of its implementation, the unemployment rate decreased substantially while it increased further in surrounding communities as well as on the national level. Income tax payments resumed, and were even paid in advance - incoming, funds that the city council used to invest in infrastructure, paid with *arbeitsbestägigungen*. The news soon spread to numerous communities across Austria that were planning to set up some local depreciating currency schemes of their own. It was at this point in 1933 that the National Bank of Austria stepped in to have

47 Irving Fisher - Stamp Scrip (1933)

local depreciating money prohibited by law on the grounds of seeing its monopoly of currency emission threatened. The fourteen-months experience ended abruptly. All that remains of the project today is the inscription on bridges and houses built at the time: *mit Freigeld erbaut*⁴⁸.

This experience in Wörgl serves as the flagship of the *Freigeld* movement. Given its small scale, however, it remains difficult to extrapolate such an application to national or even international levels. To be sure, the acceleration of money circulation has proven to be a powerful means to lift Wörgl, temporarily out of the crisis, and it is telling that the project was crushed by law rather than by failure. Within the frame of this dissertation, finally, the Wörgl experiment retains one's attention is so far as it supports the assumption that overcoming the zero bound by taxing liquidity does contribute to making hoarding unattractive.

II. Objections

The proposal of introducing a liquidity tax and imposing negative nominal interest rates does spark some considerable expression of disapproval. This section shall examine the consistency of the arguments presented in opposition to that proposal, with the question being whether a negative nominal interest rate is not only technically feasible but also socially desirable.

II.1: Considerations on the nature of interest

The justification of the charge of (positive) interest has made its way into the principles of economics, and its utility has been widely established as a precondition to a functioning market economy. It does not come as a surprise, then, to see emerge some firm opposition to the proposal of introducing negative interest that is linked to the fundamental convictions with regard to risk-taking, bank profitability and the optimal allocation of resources. This first subsection on the opposition to the proposed policy change does not have the intention to challenge the validity of the theory of interest, but shall rather examine whether the arguments employed rule out in principle the implementation of negative nominal interest rates.

(a) *Interest as compensation*

To engage in the activity of lending essentially implies voluntarily reducing one's disposal of liquidity, and in order to be incited to do so, the charge of interest seems justified. This line of argument relies in particular on the aftereffects of a lending decision, id est, that one is constrained to postpone consumption, to face inflation, and to bear the risk of losing the invested

⁴⁸ Constructed through the use of *freigeld*

funds. Therefore, it appears contrary to common sense to enforce negative nominal interest rates on lending.

The compensation in terms of purchasing power for having accepted the inconvenience of no longer disposing of liquidity seems to be, in principle, justified. But then again, one must verify whether these claims by capital-holders are consistent in any event or if they may serve as a pretext in some situation. With regard to the argument of consumption postponement, two observations arise.

First, consumption postponement is not necessarily a sacrifice. The very occurrence of spare liquidity is a sign that the capital-holder has no intention of consuming, a behaviour that has been conceptualised as the propensity to consume: it posits that the capital-rich class consumes a relatively smaller share of its income than the capital-poor. The risk-free rescue of wealth over time that allows to maintain a consumption level in the future may, then, well be considered a convenience that one has to pay for.

Second, consumption postponement is a concept narrowly linked to the scenario of individuals lending to individuals. However, nowadays, households place their liquidities on deposits which, from a banking institution's perspective, amount to short-term funding, and which in the same time allow to by-pass the postponement of consumption. Furthermore, today's credit volume transits through financial institutions which act as intermediaries and whose role is to transform maturity: borrow short-term and lend long-term. One must, therefore, call an answer upon the question whether the consumption postponement argument applies to financial intermediaries who function as agents between two persons, *id est*, the saver and the borrower. One may, in fact, cautiously affirm that financial institutions do not consume if one admits a narrow definition of consumption as an end in opposition to consumption as a means (IT installations, telecommunications, etc.). Consequently, the postponement of consumption appears to be a shaky fundament on which to base the justification of charging interest.

There is, nevertheless, a much more solid ground to legitimising interest: risk-taking, that is, rewarding the willingness to finance productive, but risky business opportunities with a return on investment in face of the possibility of loss. In such a context, one may, intelligibly, feel very strongly about negative nominal interest rates lacking any basis whatsoever for a formal and convincing justification. Oddly enough, the underlying reason for implementing negative nominal interest rates and a liquidity tax is, quite exactly, to encourage risk-taking and to increase the relative capital gain on risky investments. The primary predicate of the proposal, implicit throughout the dissertation, is to curtain risk-free safeguard of wealth and to penalise large-scale flight to quality both of which behaviours stay liquid and short-term and contribute to cut the economy short of long-term funding.

(b) Banks cannot operate in a negative nominal interest environment

If banks were to borrow and lend at negative interest rates, profit margins would turn negative at once, making the banking business a non-viable activity and leaving the economy in shatters.

Yet, in order to stay profitable, banks must only look to it that they borrow short-term at a low interest rate while lending long-term at a high rate. Maturity transformation is a viable business both when

$$i_{\text{short}} = 3\% < i_{\text{long}} = 5\% \quad \text{and} \quad i_{\text{short}} = -5\% < i_{\text{long}} = -3\% .$$

Negative nominal interest rates do not impair the capacity of the banking business to generate profits from maturity transformation, under the condition, of course, that the term structure of interest rates, that is, the yield curve, keeps a positive slope.

(c) Low interest rates brought about the financial mess in the first place

A Low interest rate policy that allowed real interest rates to turn negative were a major factor in keeping malinvestments in place, and in creating the market for toxic financial assets as investors were looking for high yield. Turning to negative levels of interest, therefore, would only make matters worse. Interest rates must rather go up. The 1970s prove a powerful example of how interest rate hikes allowed the economy to return to a stable path.

Low interest rate policy did certainly contribute to the outburst of the financial crisis. This is, however, not the whole picture. The late Greenspan years of low interest rates were motivated by the recession that followed the bust of the IT-bubble in 2001. Low interest rates were, in that context, justified, but what did turn out to be imprudent, was to keep the target rate, as the inflation targeting policy suggested, low for years to come, too low for too long. Finally, one may posit that it was not a low interest rate policy itself that provoked the crisis but rather an inappropriate central banking responsiveness to the evolution of asset markets.

The “too-low-for-too-long” view has become quite conventional wisdom, and conveniently establishes the responsibility of the central banks for the financial fallout. Whether or not it were teaser rates for subprime mortgage, high leverage ratios above twenty-five⁴⁹ and opaque credit risk transfer structures that have made the financial cocktail so explosive is another question, and goes beyond the scope of this dissertation, but one may prudently suggest that low interest rates alone do not make up for financial disaster of the kind we have witnessed in late 2008. As for rising interest rates during the 1970s, the policy choice was, at the time, appropriate, even if painful, in that it fought against an inflationary environment much unlike today's colossal price decreases in bond markets in

⁴⁹ Two systemic problems

Axel Leijonhufvud - January 2009 (Centre for Economic Policy Research)

particular.

(d) No incentives from negative nominal interest rates

Reducing interest rates to negative levels will not produce more consumption from households when unemployment is high and rising.

Such a statement overlooks the basic mechanism of accommodative monetary policy. It ignores the simple fact that cutting interest rates encourages, admittedly with a delay, investment which should slowly but progressively stir up demand and counter rising unemployment.

There is no reason to believe that nominal negative interest rates are incapable of stimulating an ailing economy. It may not affect unemployment at once, but should turn out as efficient and soothing as conventional accommodative monetary policy that delivers negative real interest rates.

This subsection on the nature of interest has tried to address major objections against the introduction of negative nominal interest rates. It appears that some of the feelings of disapproval, sincere as they may be, neglect the rationale of the proposal: incite long-term risk-taking by discouraging short-term liquidity hoarding for the purpose of preserving wealth.

II.2: Liquidity considerations

(a) Flight from Currency

Suppose it was possible to tax currency in the spirit of Gesell's depreciating money, that it was competently implemented such that it was neither incurring large costs nor time-consuming to levy the tax. Yet, even though the tax proves technically functional, it may remain inefficient on an aggregate level of deposits are an alternative costless store of value. That is, currency taxing would provoke a flight to deposits.

Currency does in fact only represent a small proportion in the money supply. In the case of the Euro zone, for instance, currency in circulation makes up, as of August 2009, roughly three percent of the total €23,936 billion money stock⁵⁰. Consequently, taxing liquidity only, without corresponding measures for deposits and reserves, would not be expected to have too large an effect overall. Its principal implication would most probably be a reduction in currency holdings.

To ensure a maximum impact of currency taxing, deposits and commercial banks' reserves with the central bank must also be subject to some cost, id est, a negative nominal interest rate. Under this scheme, monetary base liquidity could not serve as a costless store of value any longer.

(b) Free lunch borrowing

50 Consolidated balance sheet of euro area MFIs – August 2009 (European Central Bank)

As negative nominal interest rates on loans are very advantageous to the borrower by reducing the actual principal owed, risk-free capital gains would be made possible. One is to simply sit on the cash that was initially borrowed until maturity of the credit, repay with it the reduced principal and retain the negative interest as profits.

The logic is plausible *a priori*. The debtor does repay less than he borrowed, the difference thereof being the negative interest. However, in a currency-taxing environment, holding money balances is itself subject to costs. Thus, sitting on borrowed cash comes along with a depreciation of its nominal value.

The currency tax has to be designed such that a borrower must not make a profit out of a credit by simply hoarding the provided funds. Consequently, lending at negative interest rates is only realistic if cost of holding money through the tax rate on currency was superior to the negative interest rate on a credit. This is a restatement, from a lender's point of view, of the floor to lending: the cost of holding currency sets the lower bound for the interest rate.

(c) *Flight from liquidity*

Currency tax and negative nominal interest rates are schemes which incite to flee from liquidity. However, making liquidity unattractive would not necessarily assure that illiquid investments were available or useful.

The problem raised here is not concerned with money balances held at short notice for the purpose of consumption. It rather eyes institutional investors that seek benefit from capital gains on investment or to maintain wealth protection otherwise. The argument suggests that the flight from liquidity itself does not create any business opportunities. One may indeed cautiously affirm that there need not be a correlation between the two. However, one must not confuse cause and effect. Flight from liquidity is not a cause but itself an effect of liquidity taxing and negative nominal interest rates. These, in turn, allow to deliver negative real interest rates which, according to accepted conventional wisdom, serve as stimulus to economic activity. In order to avoid the liquidity tax, money holders must turn to more illiquid forms of assets. By doing so, liquidity stays in circulation which is also believed to encourage spending and activity. If money holders do not, however, feel any investment to be useful, wealth protection seems to be a more pressing motive than a reasonable rate of return on risk-taking.

Holding liquidity renders no utility to society. If a money holder deemed useful illiquid investments unavailable, he would seek wealth protection and in the same time the convenience of its rapid disposal. riskless government bonds respond most closely to that motive. Nevertheless, this quality of offering a certain wealth protection and the power of its disposal is a service that should be paid for, which means a negative yield on the bond. Finally, money holders should be exposed to a trade-off between the yield and the power of disposal of capital. The more one cherishes access to liquidity at short notice, the more one should pay for it.

(d) Rather than refusing to lend, banks are incapable of lending

With deleveraging in full process, the reduction of liabilities and simultaneous surge in equity results from the uncertainty with regard to the exposition of bank balance sheets to opaque assets. In such a context, commercial banks tend to substantially tighten credit standards. A negative nominal interest rate policy would, therefore, not boost confidence.

The deleveraging process is usually part of a business downturn and a major characteristic of financial crises. The question, at this point, boils down to whether it is deleveraging properly that accounts for a reduction in the credit volume or rather cold business climate that plunges investment expectations, and therefore, slows down bank lending.

As mentioned before, overnight interest rates have an essential impact on bank lending, and thus, on the supply of credit. Negative nominal interest rates allow cheap short-term funding which should, in theory, strengthen incentives for commercial banks to increase long-term bank lending to households and firms. These, in turn, predicate their decision taking on their own financial situation: future consumption and investment depend on the terms of household and non-financial corporate debt reduction. Economists at Goldman Sachs recently stated that a central bank “should keep monetary policy sufficiently accommodative to forestall a collapse in spending and a deflationary spiral”.⁵¹ Consequently, a negative interest rate policy as being particularly accommodative may contribute to strengthening business climate which may in turn boost confidence. Nevertheless, a negative interest rate certainly is not a panacea that may inverse a deleveraging tendency at once.

(e) Liquidity for the purpose of periodical payments at short notice

Negative nominal interest rates on short-term liquidity would prove particularly harmful for large corporations that employ a considerable workforce. In the face of a periodical need to meet the payroll, these corporations cannot afford to turn to more illiquid assets. Therefore, imposing a negative interest rate on short-term liquidity puts a serious disadvantage on firms that hold liquidity as a necessity rather than as a store of value.

It is true that short-term liquidity needs justify holding short-term liquid assets for the simple reason that periodical expenses, as the payroll or intermediate consumption, can only be met when liquidity is available at short notice. Nevertheless, while short-term liquidity needs may be the original motive of holding considerable shares in money market funds, corporations do benefit from the fact that short-term liquidity does yield a certain return on capital. Furthermore, retailers, that have the particularity of paying their suppliers with some delay dispose of money which they invest at

51 Goldman Says Deleveraging May Keep Fed Rate Low for ‘Years’
Simon Kennedy - September 10th 2009 (Bloomberg.com)

short-term to generate a capital gain on the amount owed to the supplier. That appears to be a non-justified risk-free income.

A negative nominal interest rate on liquidity eliminates the risk-free income on the shares of short-term money market funds, a capital gain which seems at odds with the basic motive of meeting liquidity needs. Admittedly, it does turn out costly to hold liquidity for other reasons than the store of value. On the other hand, large corporations that are active on the monetary market as institutional investors do also have the possibility to access the monetary market as borrowers and may refinance themselves with the emission of short-term debt at very favorable terms.

II.3: Household deposit considerations

Flight from deposits

The standing facilities of a central bank, that is, the marginal lending and the deposit facility, provide the ceiling and the floor to the overnight rate in the interbank money market. If a negative nominal interest rate was to be implemented on both elements of the standing facilities, the overnight interbank market would turn negative. Consequently, commercial banks would not allow their customers to store their liquidity costlessly on a checking account and will pass the prevailing negative interest rate on the money market to deposits. Finally, when confronted with negative interest on their deposits, people would hold cash instead.

Negative interest on deposits serving for both short-term liquidity needs (consumption) and for precautionary purposes (savings) would indeed incite depositors to withdraw their cash from their checking accounts and hold cash instead. Cash offers a certain yield of zero if no tax was levied upon it. Such a move would pose liquidity threat for banks, and provoke another, yet more substantial problem: deposits in nominal terms exceed tenfold total currency in circulation in the case of the Euro zone.

While the impact of taxing household savings is not yet the concern in this context, the consideration on cash withdrawals does include savings as well. In order to encourage households and firms to keep their liquidities in deposits rather than as cash, one could, as before, tax currency so as to make physically holding it more costly than keeping it at a negative interest rate on deposits. Or else, introduce, in the image of deposit ceiling rates of interest, floor rates of interest on household deposits such that they are not subject to negative interest, id est, guaranteeing a minimum yield of zero percent. There is no reason to believe that banking would cease to be a viable industry. Its crucial role in society is maturity transformation, borrowing short-term at lower rates than the what is charged on its long-term lending programs.

III.4: Savings considerations

The debate on the implementation of negative nominal interest rates has sparked, in particular, massive protest with regard to its impact on savings: How else can one describe a proposal that is to “tax [households] because [they] decide to be frugal”⁵², to cite US Republican Congressman for the state of Texas, Ron Paul, other than “preposterous” at best, not to say government looting otherwise.

Savings considerations do offer some consistent justification for categorically opposing the implementation of negative nominal interest rates. This line of reasoning pinpoints five elements in particular that must be addressed when contemplating the policy move in question.

First, household savings is the fruit of the careful management of earned income⁵³. Taxing such financial property amounts to plain theft. A policy that intentionally makes ordinary people's cash worth less has nothing of a measure to reduce liquidity hoarding but is restrained to wealth redistribution from households to government.

Second, negative interest rates are disincentives to place savings on deposits and would induce people to hold it in other forms, be that cash or gold, or any other asset, therefore reducing banks' disposal of liquidity through their customers' deposits.

Third, making savings costly, by taxing currency and, in synchronisation, charging negative interest on deposits would substantially shoot up prices for such assets as gold and silver since people would look for alternative stores of value.

Fourth, negative interest on the disposal of liquidity at short notice takes a major freedom from ordinary people, that is, the freedom of choice to refrain from consumption and investment.

At last, currency taxing and negative deposit rates force ordinary people into investment and consumption behaviour they may not want to pursue, a logic which enchains with the fourth point just mentioned above. Individuals may lack financial know-how to invest wisely and may not have the desire to increase their consumption so that such a policy would only provoke an increase in consumption that is of no utility to them.

The objections to the implementation of negative nominal interest rate reach a high degree of consistency with regard to the considerations on household savings. In this context, it is primordial to distinguish between households and institutional investors. Both groups are inclined to some kind of liquidity preference, albeit not with the same intentions. Liquidity hoarding and excess reserves have been examined at length throughout the dissertation, and it is

52 Cash and the 'Carry Tax'

Declan McCullagh – October 27th 1999 (Wired.com)

53 Which refers to income obtained through work in opposition to unearned income due to interest and dividends

in the light of substantial amounts of liquidity being concentrated on the hands of the few, *id est*, institutional investors, that the prerogative to tax liquidity meets its full purpose. In the same time, household savings are large in aggregate, but do not convey any particular political power to single households in shaping economic policy.

The unfortunate side-effect of these suggested measures to redress a situation in which “instead of being a servant, finance had become the economy's master”⁵⁴ to quote the Financial Times' columnist Martin Wolf, is to affect household financial assets: that is, the proposal to tax liquidity inflict costs on household money balance holdings that are maintained to facilitate life today and to ensure security tomorrow.

An effort that aims at introducing negative nominal interest rates into the range of monetary policy must thus take into particular account the objections made in connection with household savings. In order to catch some indications of how a negative interest rate policy must be shaped in practice such that it becomes socially acceptable, reconsider the five arguments:

Argument (1), while not highlighting the veritable rationale for imposing a liquidity tax, draws up a consistent diagnostic which allows to draft a first condition for a successful implementation of negative interest rates: household savings must remain untouched.

Arguments (2) and (3) hint to the importance of keeping the monetary base in deposits. Consequently, one must outline a means to prevent large-scale liquidity withdrawals. That being said, the preoccupation of many that a currency tax and a negative nominal interest rate would shoot up the price of precious metals seems, *a priori*, partially unwarranted. Gold may effectively serve as a store of value, but besides causing considerable storing costs, has absolutely no utility nor is it particularly liquid. A tendency towards gold as a store of value doubtlessly increases its price, but as gold is unessential to the functioning of an economy, its price increase should have a negligible impact. Either way, to conclude on the point, gold is preferable to liquidity as a store of value. Both lack positive yields, but only the latter also serves as medium of exchange: using gold as a store of value is inconsequential, using liquidity is not, as it reduces the availability of the monetary base.

Finally, arguments (4) and (5) remind us that households and firms require deposits for the purpose of liquidity disposal at short notice (routine purchases and periodical expenditures). Hence, in order to reduce undesirable social costs, the prerequisite to provide current accounts at the lowest possible cost.

54 Why dealing with the huge debt overhang is so hard
Martin Wolf - January 28th 2009 (Financial Times)

As a concluding remark on this section, one notes that if negative nominal interest rates are to have a realistic prospect of being implemented, one must design a scheme which, while curbing risk-free income, liquidity preference and flight to quality, does protect households from the negative side-effects of such measures.

III. A negative interest rate policy in practice

The inquiry into negative nominal interest rates has evolved through three distinct stages. Part I invited the reader to gain a broad perspective on the characteristics of liquidity, money and interest. Part II went on to ponder on the implications of hoarding and the short-term safeguard of liquidity. It further provided the rationale for Part III by raising the question whether negative nominal interest rates and liquidity taxing would prove a useful policy tool. With technical constraints and objections considered, one may now dare an outlook into what a negative interest rate policy could look like in practice.

When it comes to liquidity being used as store of value, be it as hoarding through the withdrawal of currency from the economic circuit or as risk-free short-term lending that keeps liquidity from being employed productively in long-term projects, negative nominal interest rates and liquidity taxing could effectively serve as policy tools at the disposal of central banks. Monetary policy has a conventional, unlimited means to curb inflation and to calm down a heating economy, that is, rising the interest rate as much as deemed needed. When things turn ugly such as in a deflationary spiral with output and spending decline, the central bank does not have a symmetrical, unlimited monetary policy response and must turn to uncertain, unconventional measures when the zero bound is reached. Without outlining once more what has been described in detail in Part II, this last section looks at an operational framework of implementing a proposal that makes monetary policy symmetrical in all states.

(I) The tax on currency

Given the advanced technological infrastructure in the western countries, it does not seem fanciful to imagine a currency that is subject to a periodical tax which is neither cumbersome nor time-consuming. Also, the currency tax could be, just as a central bank's target rate, varied according to needs which includes the possibility to charge a negative tax on currency, that is, paying people for holding money. Suppose further that the currency tax would become invalid once the currency has been deposited on checking accounts so that neither individuals nor banks would be charged the tax. For the sake

of facilitating the daily purchases in low denominations, consider introducing the tax for banknotes only, and to exempt coins.

Such a legal framework would probably induce people to abandon currency and use electronic, registered payment methods instead, which comes in practice close to the proposal of abolishing currency without actually doing it. Either way, with such a basic monetary structure in place, currency could no longer serve as a store of value.

(II) Management of deposits

One must then draw out a consistent policy for deposits. In order to avoid that households bear the costs of an otherwise useful measure, introduce floor and ceiling rates of interest on household overnight deposits. Overnight deposits are the store of liquidity needed for everyday expenditures, and therefore, households must not be penalised for it. When commercial banks are confronted with negative nominal interest rates as we will see in (c), they would tend to pass on the costs on their customers' deposits. This may be legally prevented by a floor rate of interest on overnight deposits of zero percent. In the same time, consider, equally, to introduce ceiling rates of interest - fixed below the rate of inflation - on overnight deposits, in order to make sure these are only used for regular routine liquidity needs. One may certainly store wealth on overnight deposits, but the price to pay for keeping one's entire wealth liquid is inflation, and as ceiling rates should remain below the rate of inflation, such wealth would be subject to a negative real interest rate.

If the easy access to one's wealth is not a concern, and if one is willing to part with liquidity without however feeling competent to invest, deposits with an agreed maturity, and redeemable at notice, could be offered as an interesting alternative: this facility responds to the concern that household precautionary savings must not be touched. Offered interest rates on these deposits should be allowed to rise with maturity so as to compensate the willingness to making one's savings increasingly illiquid. By making deposits redeemable at notice, furthermore, a penalty for early withdrawal would make sure this facility shall not be misused.

(III) The target rate and the interbank market

When a central bank wishes to reduce the overnight interbank rate to negative levels, its target rate must turn negative. That is, offering or absorbing base money transits at negative rates through the central bank's standing facilities. The deposit rate for reserves, as the floor to the interbank money market must be fixed at a lower negative interest rate than the marginal lending at which the central bank offers liquidity. As the central bank is not constrained to be profitable and retains the monopoly to issue base money, negative interest on its lending program is not a concern.

(IV) Reserves

The deposit rate for reserves, or more precisely, excess reserves, should effectively turn negative if the currency tax turns negative, but such a move should not be extended to required reserves. One could, in fact, even consider paying positive interest on these required reserves so as to reward commercial banks for their lending programs rather than imposing an opportunity cost when obliging banks to hold a substantial amount of reserves at a yield of zero percent.

To conclude, this framework paves the way for the use of negative nominal interest rates. At this point, it is up to the central bank's discretion to turn negative temporarily in anticipation of a looming crisis or to keep short-term interest rates permanently negative so as to penalise liquidity preference in all states of the economy.

CONCLUSION

Extreme government policy responses in face of the financial crisis of 2008 have helped undermine the widely-taught theory of efficient, rational and self-equilibrating free markets. Rather than questioning the utility of the market economy, however, the ambition of this dissertation was to explore an alternative potential means to strengthen its stability, both economic and financial. By considering negative nominal interest rates, it addresses the issue of influencing real interest rates in a deflationary environment through a perspective that parts with current central banking policy of massive money printing.

It has in particular looked into the riskless store of value, be that through currency hoarding or risk-free short-term lending and excess reserves. It then went on to identify the safeguard of liquidity as a potential major obstacle to functioning interbank money markets, and, therefore, to the availability of credit in the broader economy; a conviction amply confirmed by the financial crisis of 2008 as idiosyncratic liquidity considerations of lending banks have indeed increased credit spreads independently of borrowers' credit quality. Throughout this dissertation, liquidity has been considered financially useful as long as it does not remain sterile. It has been used to describe related, yet distinct notions. One must therefore bear in mind in this context that overall market liquidity and hoarded banking liquidity do not come to mean the same thing at all.

As a means to prevent liquidity from serving as a riskless store of value disposable at short notice, and in order to bring on liquidity as a medium of exchange in circulation, this dissertation has suggested the introduction of negative nominal interest rates and currency taxing into the operational scope of central banking. Negative nominal interest rates may, of course, not be the panacea to all problems, but would nevertheless allow monetary policy to become completely symmetric. Many practical considerations certainly remain unsettled – one may for instance think of the implications of negative nominal interest rates at an international level. However, while questions of the technical feasibility are important in practice, the far more interesting issue, and the motivating force for this dissertation, seems to be whether nominal negative interest rates are economically desirable. The underlying expectation of this dissertation, finally, is that this proposal may make the economic system as robust during episodes of financial tension as it is efficient in fighting inflation.

REFERENCES

The American Enterprise Institute

Why Not Negative Interest Rates?

Alex J. Pollock - May 21, 2009 (The Journal of the American Enterprise Institute)

Bank of Canada

The Zero Bound on Nominal Interest Rates: Implications for Monetary Policy

Claude Lavoie, Stephen Murchison - Winter 2007/2008

Bank of England

Deflation

Charlotta Groth, Peter Westaway - March 2009 (Bank of England)

Household debt and spending

Matt Waldron, Garry Young - December 2007 (Bank of England)

The economics and estimation of negative equity

Tomas Hellebrandt, Sandhya Kavar, Matt Waldron - June 2009 (Bank of England)

On the sources of macroeconomic stability

Garry Young - June 2008 (Bank of England)

Monetary policy and the zero bound to nominal interest rates

Tony Yates - March 2003

Speech to the CBI Dinner, Nottingham, at the East Midlands Conference Centre

Mervyn King - January 2009

Bank of Japan

Zero Bound on Nominal Interest Rates and Ex Ante Positive Inflation: A Cost Analysis

Yuki Teranishi - November 2003

Centre for Economic Policy Research

Keynes and the Crisis

Axel Leijonhufvud - May 2008 (Centre for Economic Policy Research)

Lessons from the 2007 Financial Crisis

Willem Buiter - December 2007 (Centre for Economic Policy Research)

Liquidity insurance for systemic crises

Enrico Perotti and Javier Suarez - February 2009 (Centre for Economic Policy Research)

Monetary and Financial Stability

Axel Leijonhufvud - October 2007 (Centre for Economic Policy Research)

The Icelandic banking crisis and what to do about it

Willem H. Buiter, Anne Sibert - October 2008 (Centre for Economic Policy Research)

Two systemic problems

Axel Leijonhufvud - January 2009 (Centre for Economic Policy Research)

Council of Economic Advisers

The Economic Crisis: Causes, Policies, and Outlook

Christina D. Romer - April 2009

The Economic Journal

*OVERCOMING THE ZERO BOUND ON NOMINAL INTEREST RATES WITH NEGATIVE INTEREST ON CURRENCY: GESELL'S SOLUTION**

Willem H. Buiter and Nikolaos Panigirtzoglou - October 2003

European Bank for Reconstruction and Development

Overcoming the Zero Bound: Gesell vs. Eisler

Willem H. Buiter - October 2004

European Central Bank

Credit and the natural rate of interest

Fiorella De Fiore, Oreste Tristani - April 2008 (European Central Bank)

Determinants of bank lending standards and the impact of the financial turmoil

Financial Stability Review - June 2009 (European Central Bank)

Do monetary indicators lead euro area inflation?

Boris Hofmann - February 2008 (European Central Bank)

Opting out of the great inflation

Andreas Beyer et al. - March 2009 (European Central Bank)

The Topology of The federal funds market
Morten L. Bech, Enghin Atalay - December 2008 (European Central Bank)

House prices, money, credit and the macroeconomy
Charles Goodhart, Boris Hofmann - April 2008 (European Central Bank)

Investigating inflation persistence across monetary regimes
Luca Benati - January 2008 (European Central Ban)

Liquidity hoarding and interbank market spreads
Financial Stability Review - June 2009 (European Central Bank)

Liquidity risk premia in money market spreads (p. 145)
Financial Stability Review - December 2008 (European Central Bank)

The impact of short-term risk interest rates on bank credit risk-taking (p. 169)
Financial Stability Review - December 2007 (European Central Bank)

Monetary Policy and the Zero Bound to Interest rates: a Review
Tony Yates – October 2002

The Economist

Irving Fisher - Out of Keynes's shadow
Buttonwood - Apr 2nd 2009

Minsky's moment
Buttonwood - Apr 2nd 2009

The new (improved) Gilded Age
Economics focus - Mar 19th 2008

A special report on the future of finance: Greed and fear
Edward Carr - Jan 22nd 2009

Public debt - The biggest bill in history
Leaders - Jun 11th 2009

Government debt - The big sweat
Leaders - Jun 11th 2009

Financial Times

Keep the money flowing to stave off deflation
Tim Congdon - July 8th 2009

'Helicopter Ben' confronts the challenge of a lifetime
Martin Wolf - December 16th 2008
Confessions of a crass Keynesian

Willem Buiter - December 13th 2008

Quantitative easing explained

Chris Giles, Cynthia O'Murchu, Steve Bernard and Jeremy Lemer - February 5th 2009

Central banks need a helicopter

Eric Lonergan - December 4th 2008

The case for negative interest rates now

Brendan Brown - November 20, 2008

It is time for the monetary authorities to jump into the liquidity trap

Willem Buiter - December 2, 2008

Fed study puts ideal interest rate at -5%

Krishna Guha - April 27, 2009

Negative interest rates: when are they coming to a central bank near you?

Willem Buiter - May 7, 2009

The Wonderful World of Negative Nominal Interest Rates, Again

Willem Buiter - May 19, 2009

Negative interest rates, Sharia law and tech stocks

Willem Buiter - May 20, 2009

The Federal Reserve System

Stamp Scrip: Money People Paid to Use

Bruce Champ - January 4th 2008 (Federal Reserve Bank of Cleveland)

The Yield Curve, June 2009

Joseph G. Haubrich, Kent Cherny - June 30th 2009 (Federal Reserve Bank of Cleveland)

Effective Practices in Crisis Resolution and the Case of Sweden

O. Emre Ergungor, Kent Cherny - February 12th 2009 (Federal Reserve Bank of Cleveland)

Rising Relative Prices or Inflation: Why Knowing the Difference Matters

Owen F. Humpage - June 1st 2008 (Federal Reserve Bank of Cleveland)

A Brief History of Central Banks

Michael D. Bordo - December 1st 2007 (Federal Reserve Bank of Cleveland)

Price Stability: Issues and Challenges

Sandra Pianalto - June 1st 2007 (Federal Reserve Bank of Cleveland)

Monetary Policy Alternatives at the Zero Bound: An Empirical Assessment

Ben S. Bernanke, Vincent R. Reinhart, and Brian P. Sack - September 2004

Repurchase Agreements with Negative Interest Rates

Michael J. Fleming and Kenneth D. Garbade - April 2004

Overcoming the Zero Bound on Interest Rate Policy

Marvin Goodfriend - August 2000

Private Money in Our Past, Present, and Future

Bruce Champ - January 1st 2007 (Federal Reserve Bank of Cleveland)

The Fed's Monetary Policy Response to the Current Crisis

Glenn D. Rudebusch - May 22nd 2009 (Federal Reserve Bank of San Francisco)

Minutes of the Federal Open Market Committee

April 28th-29th 2009 (Board of Governors of the Federal Reserve System)

Deflation: Making Sure "It" Doesn't Happen Here

Ben Bernanke - November 21st 2002 (Federal Reserve Board)

A question of liquidity: The great banking run of 2008?

Judit Montoriol-Garriga, Evan Sekeris - March 30th 2009 (Federal Reserve Bank of Boston)

A Monetary Approach to Asset Liquidity

Guillaume Rocheteau - January 2009 (Federal Reserve Bank of Cleveland)

Nominal Interest Rates: Less Than Zero?

Daniel L. Thornton - January 1999

A Tale of Two Crises

James B. Bullard, Geetanjali Pande - November 5th 2008 (Federal Reserve Bank of St. Louis)

Access to Credit

Luke Shimek and Rajdeep Sengupta - November 3rd (Federal Reserve Bank of St. Louis)

An alternative measure of inflation

François R. Velde - February 8th 2006 (Federal Reserve Bank of Cleveland)

Avoiding the Inflation Tax

Huberto M. Ennis - December 2007 (Federal Reserve Bank of Richmond)

Bagehot on the Financial Crises of 1825...and 2008

Richard G. Anderson - January 23rd 2009 (Federal Reserve Bank of St. Louis)

Bank Crises and Investor Confidence

Una Okonkwo Osili and Anna Paulson - November 28th 2008 (Federal Reserve Bank of Chicago)

Bank Liquidity, Interbank Markets, and Monetary Policy

Xavier Freixas, Antoine Martin, David Skeie - May 2009 (Federal Reserve Bank of New York)

Banking Crisis Solutions Old and New

Alistair Milne and Geoffrey Wood - October 2008 (Federal Reserve Bank of St. Louis)

Beyond Zero: Transparency in the Bank of Japan's Monetary Policy

Ed Stevens - March 15th 2001 (Federal Reserve Bank of Cleveland)

Chronicles of a Deflation Unforetold

François R. Velde - November 21st 2006 (Federal Reserve Bank of Chicago)

Does the Yield Curve Signal Recession?

Joseph G. Haubrich - April 15th 2006 (Federal Reserve Bank of Cleveland)

Electronic Money and the Future of Central Banks

Ed Stevens - March 1st 2002 (Federal Reserve Bank of Cleveland)

Friedman and Taylor on Monetary Policy Rules: A Comparison

Edward Nelson - April 2008 (Federal Reserve Bank of St. Louis)

Hard Core Inflation

Kristie M. Engemann and Michael T. Owyang - March 2005 (Federal Reserve Bank of St. Louis)

How do banks make money? The fallacies of fee income

Robert DeYoung and Tara Rice - November 2004 (Federal Reserve Bank of Chicago)

Interest Rates, Yield Curves, and the Monetary Regime

Joseph G. Haubrich - June 2004 (Federal Reserve Bank of Cleveland)

Interest rates and inflation

John H. Wood - 1971 (Federal Reserve Bank of Chicago)

Is It More Expensive, or Does It Just Cost More Money?

Michael F. Bryan - May 15th 2002 (Federal Reserve Bank of Cleveland)

Lessons from the history of money

François R. Velde - March 1998 (Federal Reserve Bank of Chicago)

Precautionary Reserves and the Interbank Market

Adam Ashcraft, James McAndrews, David Skeie - May 2009 (Federal Reserve Bank of New York)

A Conference on Liquidity in Frictional Markets

Joseph G. Haubrich - May 2009 (Federal Reserve Bank of Cleveland)

Measure for Measure: Headline versus Core Inflation

Daniel L. Thornton - July 2007 (Federal Reserve Bank of St. Louis)

Milton Friedman and U.S. Monetary History: 1961-2006

Edward Nelson - June 2007 (Federal Reserve Bank of St. Louis)

Monetary Policy's Third Interest Rate

Richard G. Anderson - October 2008 (Federal Reserve Bank of St. Louis)

More Money: Understanding Recent Changes in the Monetary Base

William T. Gavin - April 2009 (Federal Reserve Bank of St. Louis)

Negating the Inflation Potential of the Fed's Lending Programs

Daniel L. Thornton - July 1st 2009 (Federal Reserve Bank of St. Louis)

Interest on Reserves and Monetary Policy

Marvin Goodfriend - May 2002 (Federal Reserve Bank of New York)

Paying Interest on Deposits at Federal Reserve Banks

Richard G. Anderson - November 2009 (Federal Reserve Bank of St. Louis)

Per Capita Income Growth and Disparity in the United States, 1929-2003

Paul Gomme, Peter Rupert - August 15th 2004 (Federal Reserve Bank of Cleveland)

Perils of Price Deflations: An Analysis of the Great Depression

Charles T. Carlstrom, Timothy S. Fuerst - February 15th 2001 (Federal Reserve Bank of Cleveland)

Real Interest Rate Persistence: Evidence and Implications

Christopher J. Neely and David E. Rapach - December 2008 (Federal Reserve Bank of St. Louis)

Recession or Depression?

Kevin L. Kliesen - March 23rd 2009 (Federal Reserve Bank of St. Louis)

Recession or Depression? Part II

Kevin L. Kliesen - April 14th 2009 (Federal Reserve Bank of St. Louis)

Systemic Banking Crises

O. Emre Ergungor, James B. Thomson - February 2005 (Federal Reserve Bank of Cleveland)

Systemic Risk and Liquidity in Payment Systems

Gara M. Afonso, Hyun Song Shin - March 2009 (Federal Reserve Bank of New York)

The Effect of the Fed's Purchase of Long-Term Treasuries on the Yield Curve Daniel L. Thornton - May 18th 2009 (Federal Reserve Bank of St. Louis)

The Federal Funds and Long-Term Rates

Daniel L. Thornton - October 2007 (Federal Reserve Bank of)

The Power of Price Stability

Sandra Pianalto - May 1st 2005 (Federal Reserve Bank of Cleveland)

The Quantity Theory of Money

Yi Wen - 2006 (Federal Reserve Bank of St. Louis)

The Tale of Gresham's Law

Richard Dutu, Ed Nosal, and Guillaume Rocheteau - October 1st 2005 (Federal Reserve Bank of Cleveland)

The optimal price of money

Pedro Teles - May 2003 (Federal Reserve Bank of Chicago)

Thinking Like a Central Banker

William Poole - September 28th 2007 (Federal Reserve Bank of St. Louis)

Understanding the Term Structure of Interest Rates

William Poole - June 14th 2005 (Federal Reserve Bank of St. Louis)

What's a penny (or a nickel) really worth?

François R. Velde - February 2007 (Federal Reserve Bank of Chicago)

Why Haven't Long-Term Interest Rates Fallen?

David E. Altig and Ed Nosal - January 1st 2002 (Federal Reserve Bank of Cleveland)

Wicksell's Natural Rate

Richard G. Anderson - January 2005 (Federal Reserve Bank of St. Louis)

Yield Curve Inversions and Cyclical Peaks

Richard G. Anderson - 2006 (Federal Reserve Bank of St. Louis)

A Comparison of Measures of Core Inflation

Robert Rich, Charles Steindel - December 2007 (Federal Reserve Bank of)

Revisions to PCE inflation measures

Dean Croushore - May 2008 (Federal Reserve Bank of Philadelphia)

International Responses to the Crisis Timeline

William Ryan - October 2008 (Federal Reserve Bank of New York)

Preventing Deflation: Lessons from Japan's Experience in the 1990s

Alan Ahearn et al. - June 2002 (Board of Governors of the Federal Reserve System)

Milton Friedman, Teacher, 1912-2006

Charles T. Carlstrom, Timothy S. Fuerst - December 2006 (Federal Reserve Bank of Cleveland)

The growth of paperless money

Stuart Desch, Kiran Krishnamurthy - June 2009 (Federal Reserve Bank of Richmond)

The Yield Curve as a Leading Indicator: Some Practical Issues

Arturo Estrella, Mary R. Trubin - August 2006 (Federal Reserve Bank of New York)

Financial Services Authority

The financial crisis and the future of financial regulation

Adair Turner - January 21 2009(Financial Services Authority)

Bank for International Settlements

Another look at global disinflation

Toshitaka Sekine - May 2009 (Bank for International Settlements)

Deflation in a historical perspective

Michael Bordo, Andrew Filardo - November 2005 (Bank for International Settlements)

In search of monetary stability: the evolution of monetary policy

Otmar Issing - March 2009 (Bank for International Settlements)

International Monetary Fund

Global liquidity, risk premiums and growth opportunities

Gianni De Nicolò, Iryna Ivaschenko - March 2009 (International Monetary Fund)

The inflation-unemployment trade-off at low inflation

Pierpaolo Benigno, Luca Antonio Ricci - March 2009 (International Monetary Fund)

The crisis: basic mechanisms, and appropriate policies

Olivier Blanchard - April 2009 (International Monetary Fund)

The federal reserve system balance sheet: what happened and why it matters
Peter Stella - May 2009 (International Monetary Fund)

The Zero Bound on Interest Rates and Optimal Monetary Policy
Gauti Eggertsson, Michael Woodford - June 2003

Hitotsubashi University

The Effects of 'Gesell' (Currency) Taxes in Promoting Japan's Economic Recovery
Mitsuhiro Fukao - June 2005

The Jerome Levy Economics Institute of Bard College

The Financial Instability Hypothesis
Hyman Minsky - May 1992

National Bureau of Economic Research

Misconceptions Regarding the Zero Lower Bound on Interest Rates
Bennett T. McCallum - June 2006

The New York Times

It May Be Time for the Fed to Go Negative
N. Gregory Mankiw - April 18, 2009 (New York Times)

Credit Crisis - The Essentials
July 17, 2009 (New York Times)

New York University

Comments on: "The Zero Bound on Interest Rates and Optimal Monetary Policy"
Mark Gertler - June 2003

Princeton University

Escaping from a Liquidity Trap and Deflation: The Foolproof Way and Others
Lars E.O. Svensson - December 2003

Revue économique

« *Perpetuum mobile* » et *crédit gratuit*. Deux propositions oubliées pour améliorer le fonctionnement d'une économie monétaire
Michel Herland - 1977 (Volume 28, Numéro 6)

Sveriges Riksbank

Monetary policy with a zero interest rate
Deputy Governor Lars E.O. Svensson - September 17th

Université Lumière Lyon 2

Silvio Gesell's Theory And Accelerated Money Experiments
Jérôme Blanc - December 2006

VoxEU

The credit crunch of 1294: Causes, consequences and the aftermath
Adrian R. Bell, Chris Brooks, Tony Moore - May 13th 2009 (VoxEU)

Federal Reserve policy actions in August 2007: frequently asked questions
Stephen Cecchetti - August 15th 2007 (VoxEU)

Eight hundred years of financial folly
Carmen M. Reinhart - April 19th 2008 (VoxEU)

Deflation or disinflation?
Robert Ophèle - February 11th 2009 (VoxEU)

Back to the Thirties with a Twist
Barry Eichengreen - August 30th 2008 (VoxEU)

Can monetary policy really be used to stabilise asset prices?
Katrin Assenmacher-Wesche, Stefan Gerlach - March 12th 2008 (VoxEU)

Does a downward-sloping yield curve predict a recession?
Charles A.E. Goodhart - September 24th 2007 (VoxEU)

The First Global Financial Crisis of the 21st Century
Edited by Andrew Felton and Carmen M. Reinhart - 2008 (VoxEU)