The Case for a Basket

A New Way of Showing the True Value of Money

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Policy Exchange

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1 Shiller Robert J ``Indexed Units of Account: Theory and Assessment of Historical Experience,'' in Lefort F and Schmidt-Hebbel K, *Indexation, Inflation, and Monetary Policy*, Central Bank of Chile, 2003. Also appeared as National Bureau of Economic Research Working Paper no 6356, 1998

Executive summary

The pound in your pocket is only ever worth what you can buy with it. If you can purchase a bag of potatoes with it one year, but only one potato with it the next, then the value of the pound has fallen and so has your wealth. We all know this to some extent because we remember how much, say, a bar of chocolate was twenty years ago and are astonished that the same amount of money could not now get us anything more than a few sweets. If I had given you £100 ten years ago, and you had only recently found it again after putting it under your mattress in expectation of a rainy day, it would now be worth a lot less than it was when you first had it.

Economists call this phenomenon – the ability of an amount of money to be worth something in exchange for other things – the "purchasing power of money", i.e. the power a given pile of cash gives you to demand goods in return for what you have. When you can no longer buy a computer for the amount of money you had a few years ago, the value of your wealth has changed as a result of the shifts in the prices of goods. When the price of a Ferrari or a bag of onions rises, and the amount of money you have remains the same, your wealth declines. This increase in the price of goods is called inflation. The converse scenario, of falling prices, is deflation.

Unfortunately, you can lose wealth as a result of changes in the prices of goods but not realise it. If you have been mugged, you would immediately know how much cash you have lost – someone has demanded money from you, you have given it up, and you can now see them running away with it down the street. When prices change it is often much harder to see your wealth doing the same thing. The price of a pair of trainers may rise by a little one year, and by a bit more the next, but over several years it is difficult to keep

track of the total change. Because there are so many products that can be bought, some of which rise in price over time, others that fall, it is tough to follow such alterations even over one year. Most of us only ever have a general feeling that it has become easier or harder to buy things than it was before.

Even though many of us also know that the value of money is likely to change over time, only a few of us do anything about making sure that the wealth we have is protected. When we put cash in to a savings account, for example, we trust that the interest rate on it will maintain the value of what we have put away. When it does not do so our savings gradually lose their purchasing power – we become poorer. Any time that we enter into a contract that does not take account of changes in prices, as in a mortgage or promise to pay somebody something in a few years, we put our wealth at risk.

At the moment, these risks are higher in the United Kingdom than they have been for many years. Over the past 18 months the rate of inflation as measured by the Consumer Price Index has jumped from a normal level of around 2% change per year to 5%, and then back to 3%. The Retail Price Index has only fallen to a zero rate of annual change three times, in 1959, 1960 and in February this year. These shifts reflect the unstable financial situation that the country has been going through. Now, however, instability in prices is likely to get worse over the coming years as the results of the Bank of England's decision to print money (to start quantitative easing) begin to take effect.

Fortunately, however, there is a way to make avoidance of this risk easier. Money has long been known to have three functions: as a means to exchanging things (your sheep in return for my cash), as a store of value (you can keep your money without having to purchase anything, in the hope that its value will remain stable) and as a "unit of account", (you can express the value of any one thing relative to any other by quoting just the numbers, the prices, of

both). This third function is particularly affected by price changes. Knowing how much one product is worth relative to another can be very difficult if prices are changing and we do not know all the prices at once. By having a mechanism that allows us to easily link values of things to something stable in value, we can protect ourselves from such mistakes.

The UK already has two reliable and well-known ways of measuring price changes: the Consumer Price Index (CPI) and the Retail Price Index (RPI). Both indices tell us the differences in given prices over the past month, year, etc. Given that they exist, why do most of us not protect ourselves from inflation or deflation by linking our wealth to changes in either index? Because doing so is too difficult. Many of us are at risk from price changes but do not understand the danger that this poses to our wealth. Making it easier for us to appreciate the impact of inflation should make many of us wiser to the threats of price volatility.

The most straightforward way of doing this is through what I call "baskets". By attributing a monetary value to the CPI and then changing it as the CPI records shifts in prices, we would have a unit of account that was linked to price changes. So, from January next year the government would decide that the CPI was equal to one basket that was worth £1. The CPI would always be worth only one basket but the price of the basket would change as the CPI changed. So, over the years that £1 would become, say, £1.12, £1.26, £1.40 etc. These changes in the price level of the basket would mean that it would keep track of inflation (or deflation), *but its value would remain constant*. The basket would not lose value as the prices of goods changed *because it is always linked to a set of goods through the CPI*.

All prices could then be quoted in "baskets". Any financial contract that involves the movement of money over long periods could be transacted in "baskets" which are linked to changes in prices. If, for example, I agree to supply you with one hundred t-shirts in a year's time in return for £100 I could, rather than ask you

for £100 in a year's time, just say that I want 100 baskets. At the beginning of the contract, a basket would be priced at, say, £1, but as it tracks the CPI, it would come to be priced at £1.05 in twelve months. So, my wealth would then have remained constant (because my purchasing power would not have shifted over the year), rather than declined a little.

I am not proposing that baskets would replace money. Because a basket would always have a price that is linked to the CPI, it would always be worth something in cash terms. So, in our contract for t-shirts you would actually pay me £105 at the end of the year, because our agreement to use baskets as a defence against erosion of my wealth meant that the contract tracked changes in prices. Furthermore, the reverse could happen as well. You could say to me that the car you want to sell is worth 1,000 baskets, simply by taking the price you have attached to it and dividing it by the price of the basket at a given time. The price of a basket would thus mean that there is always a way of translating financial decisions between their basic monetary price and their price in baskets.

Because so many financial contracts are agreed to without reference to changes in prices, the introduction of baskets would make responsiveness to them much easier to achieve. They would help us all to see how everyday prices and agreements that involve money are linked to what they are worth in terms of what they can buy. This is what has happened in Chile since it introduced a highly successful basket scheme in 1967.

The introduction of baskets would have to be led by the government through publication of the price of a basket and popularisation of its use. As people got used to what a basket represented, we could then use it for many different means. The most prominent use would be in financial contracts that are at risk from changes in prices, but it could also be used for everyday prices in the shops. So, a kitchen could be quoted both as "£2,000" and "2,000 baskets". If this were to happen, and the manufacturer were

only to change the price of the kitchen by inflation each year, then the customer would see the increase in the money price (from, say £2,000 to £2,500 over several years) but that the number of baskets needed to purchase it would not have changed, i.e. that the value of the kitchen had not shifted. Such widespread adoption of baskets could help us all to see the importance of inflation or deflation every day.

Ultimately, though, the purpose of baskets would be to help us all to take account of changes in prices much more easily, and understand what impact they are having on our wealth. It would not be a change that costs dramatic amounts of money, but a significant shift in mindset and understanding which could become an integral part of the way in which we react to the financial crisis. Helping everyone to look after their finances is important in principle, but has become practically much more pressing as the likelihood of inflation being volatile over the next few years has increased substantially. This change puts us all at risk. Baskets would help us to ameliorate it.

Introduction

The financial crisis should be viewed as an opportunity for all of us, for it creates a mandate to make fundamental changes to the economic system that would be resisted in more normal times. Such an opportunity should not be wasted. We should not confine our crisis-induced measures to short-run patches that will be dismantled as soon as the crisis is over. We should take the opportunity to make fundamental, and permanent, changes in the economy.

The United Kingdom should introduce a new indexed unit of account for business use, a unit of account that is tied to inflation as measured by a consumer price index, such as the Consumer Price Index (CPI) already in use. Like other developed countries, it already has a variety of consumer price indices, so this is not a matter of inventing a new index. It already has inflation-indexed contracts and inflation-indexed bonds. The fundamental change that would be wrought by introducing such a unit of account would instead be in the realm of framing. It would be about establishing a conventional way of indexing to inflation that is more congenial and to create the institutions that make public use of the unit extremely easy.

To encourage the broadest public acceptance, the indexed units of account would be called baskets since naming prices in terms of these units is akin to basing trade on the broad market baskets of real goods and services used to compute consumer price indices, rather than on some currency measure whose real value in terms of the market baskets may be unstable. Such a name would help people realize that, in effect, when they are basing trade on such units, they are measuring things in terms of these market baskets

composed of everything that a typical person buys, units which are more meaningful to them economically than currency.

If an indexed unit of account were adopted, and the public began to frame its thinking in terms of this unit, it would eliminate many of the ill effects of inflation or deflation, and reduce the resultant destabilizing forces on the economy. It would better allow people to make rational calculations unclouded by changes in the measuring rod, and would reduce the incidence of economic errors, some of which are partly responsible for the current financial crisis and other financial crises in history.

Avoidance of these errors has become particularly important with recent changes in the most common price indices (the CPI has hit rates of annual change of 4% and 5% in the last year, while the rate of annual change in the RPI has fallen from 3.8% in March 2008 to -0.4% in March this year) and the Bank of England's decision to start quantitative easing. The financial crisis and the responses to it have made it very difficult for people to judge future prices and thus protect themselves from the damaging effects of inflation. An indexed unit of account would make the removal of this uncertainty much easier for many people.

1. What is an indexed unit of account, or basket?

An indexed unit of account is a money analogue that can be used to price items for sale or to specify amounts to be repaid in the future. While it is in a sense a sort of money, it is not true money since it is not a medium of exchange, and has no physical embodiment like coins, notes, or reserve balances. An exchange rate between the unit and the true money or legal tender is defined, and then priced regularly over time, using an index number (such as the Consumer Price Index), and payments are executed in money. Thus, the indexed units of account facilitate payments that are tied to the index number, without being a means of payment.

As a medium of exchange, money is a physical object or account balance that passes from person to person when items are bought and sold. The medium of exchange role of money is very important, since it prevents the need for ordinary barter, which is an inefficient means of effecting trade since bartering requires a double coincidence of wants – if you want five sheep and can only get them from me, you have to hope that I also want two of your cows at the same time. The store of value function of money allows people to keep purchasing power between transactions, which is important too since it allows them to transact more efficiently, even though money is not the primary medium for long-term storage of value. The third function, the unit of account, is that prices are quoted in money units.

When there is an indexed unit of account, we may then make a distinction between the "unit of account" and the "currency", or between the "money of account" and the "money".[2] Where the

2 Keynes JM, *A Treatise on Money*, 1930

medium of exchange and the store of value is the currency, there is another unit of account, the indexed unit of account, which is fixed in real terms.

2. Why should the UK adopt the basket?

Modern behavioural economics has borrowed from psychology the important concept of psychological framing. Psychologists have shown in repeated studies that behaviour is strongly affected by the framing of a question, a problem, or a situation.[3] Adopting a new unit of account, the basket, would be a gentle way of "nudging" people to undertake more rational behaviour, without coercing them, in line with a new view of the role of government inspired by behavioural economics.[4] This could have widespread effects.

Real prices vs money illusion

In simple terms, the introduction of such a unit of account would mean the creation of a new system of economic measurement, which would make real quantities, rather than arbitrary nominal quantities, the centre of our attention. Such an innovation would be radically different from other measures taken to deal with the current financial crisis – there is virtually no taxpayers' money being used, no changes of the rules of the game in the middle of the game, no coercion, no risk of resentment at inequities, because use of the units of account by the public would be entirely voluntary.

Simon Newcomb[5] (an astronomer renowned for establishing a world-wide unified system of astronomical constants long ago), criticized economists who argued that rational people ought to be able to make proper allowances for inflation in their contracts without any special institutions, and argued that money occupies a

3 See Kahneman, Daniel, and Amos Tversky, *Choices, Values and Frames*, Cambridge: Cambridge University Press, 2000

4 Thaler, Richard H., and Cass R. Sunstein, *Nudge: Improving Decisions about Health, Wealth, and Happiness*, Princeton: Princeton University Press, 2008

5 Newcomb, S "The Standard of Value," *North American Review*, pp 223–37, 1879

special niche in people's thinking. In a very early, nineteenth century, anticipation of the importance of framing he wrote:

> *"So far as the investigations of (Francis Amasa) Walker and other economists extend, their reasoning appears to be perfectly sound. We consider, however, that their results are to a certain extent ill founded from the circumstance of their leaving out of sight one of the most important factors of the problem, namely the effect of changes of the standard of living producing a universal deception among the community in respect to the increase or diminution of wealth. This factor is so important as to need very close consideration."*

Because of this universal deception, Newcomb argued, people will always be deceived if their contracts are made in terms of currencies:

> *"All men in this and other countries are accustomed from youth to measure the increase or diminution of wealth by dollars or other denominations supposed to be units of value.... Even when the facts are understood, the idea that the change is in the value of the commodities measured, and not in that of the dollar itself, is so natural that a long and severe course of mental discipline is necessary to get rid of it. Indeed, we question whether the most profound economist can be entirely successful in this respect."*[6]

Newcomb proposed what he called a "dollar of uniform value, as measured by the average of commodities." He called his proposal a "multiple standard of value" since it is based on a weighted average price of multiple commodities. He argued, therefore, that the conventional unit of account must be replaced by a unit which is tied to an average of prices of commodities.

Irving Fisher, the most prominent advocate of indexation in the United States, wrote a book entitled The Money Illusion[7] about just this inability for people to appreciate the subtleties of price level move-

6 Newcomb, S "The Standard of Value," *North American Review*, pp 230, 1879

7 Fisher I, *The Money Illusion*, 1928

ments. The term "money illusion" has been part of economists' vocabulary ever since. He, like Newcomb, also advocated[8] a "compensated dollar," the purchasing power of which would be absolutely constant, so that people would not be hampered by money illusion.

That people do indeed have powerful tendencies to make errors in dealing with inflation, and that people tend to want to anchor their decisions in terms of currency units, has been carefully documented with experimental research by three behavioural economists, Eldar Shafir, Peter Diamond and Amos Tversky.[9] They have found that people not only make simple mistakes, failing to take account of inflation in decision making, but also that people seem to behave as if they really have their preferences in terms of currency units rather than money. They discovered, for example, that people report feeling better off when their wages are increased (in terms of currency) even if they fully understand that prices have increased by just as much.

An important recent example of such mistakes is the widespread misperception that homes have always been a terrific investment. People get that impression partly because they remember the purchase price of a home even if it was purchased many years or decades ago, and compare that with the market value today without correcting for inflation. If homes were routinely priced in indexed units of account then that error would not have been made. That error is part of the causes of the housing bubble that got us into this financial crisis.

Similar errors caused by inflation have distorted the stock market. People tend to undervalue stocks during periods of high inflation because they have a habit of discounting them (along with all other goods that move with consumer prices) by a nominal interest rate, and by failing to take account of inflation-induced distortions in reported earnings.[10] The very low level of stock markets in the early 1980s appears to have been due to these errors. The rebound from this level when inflation abated after the early 1980s was part of the

8 Fisher I, *The Purchasing Power of Money: Its Determination and Relation to Credit, Interest, and Crises*, 1911

9 Shafir E, Diamond P and Tversky A, "Money Illusion," *The Quarterly Journal of Economics*, vol 112, pp 341-374, 1997

10 Modigliani F and Cohn R, "Inflation, rational valuation, and the market," *Financial Analysts' Journal*, 1979, vol 35, March-April, pp 24-44

reason that the feedback that produced the stock market bubble which peaked in 2000 got started. The use of indexed units of account in corporate borrowing and in corporate accounting would have prevented this problem.

Another example of such mistakes has been the general disinterest in inflation-linked bonds as investments, the relative stability and source of risk management of which is not apparent to people who think in nominal terms. If an alternative unit of measurement were adopted that was fixed in real terms, the advantages of bonds would be more apparent. The public would likely demand such instruments.

It would also help to stimulate the public's interest in price-level adjusted mortgages. The failure to see the importance of such mortgages caused large redistributions from non-homeowners to homeowners as inflation gradually built up leading to the high inflation of the 1970s. Mortgages that demand steady nominal amortization (such as repayment mortgages in the UK even though their interest rate may be floating) impose very high real initial payments on homeowners. The effect of these distortions also helps explain the worldwide economic crisis of 1980-2, when inflation (along with tightening monetary policy) pushed nominal interest rates to such high levels that relatively few people could afford to buy a house with a mortgage, and the construction industry collapsed, helping to bring down the world economy.

Inflation uncertainty

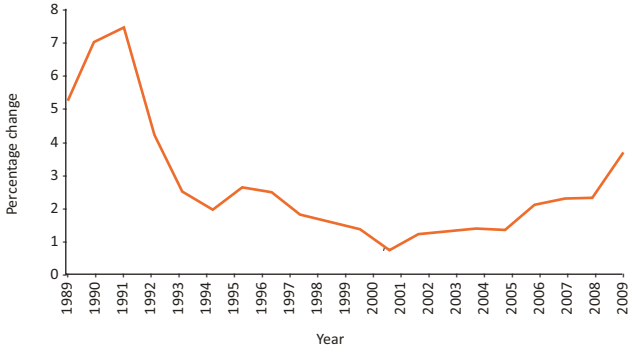
The present financial crisis is a time of considerable uncertainty about a number of economic variables, notably that of inflation. The beginning of the crisis brought expectations of deflation even while the rate of change in the CPI was rising from 2.2% in January last year to a high of 5.2% in October.[11] Now, with the large increase in the Bank of England's balance sheet and its decision to

11 Office for National Statistics

increase the supply of money through quantitative easing, high inflation has become a serious possibility. These changes make financial decision-making much harder. They are exacerbating the common problems we have with making choices that rationally account for inflation.

While many believe that central banks will successfully control the rate of inflation, we just do not know for sure how successful they will be. In a sense, they have recently failed to control it. For example, the Bank of England has failed to keep the annual rate of change in CPI within one percentage point of its 2% target twice in the past two years.[12] The cumulative effect of unanticipated swings over a number of years can have a substantial impact on real values and on the lives of people subject to un-indexed contracts.

Figure 1: Annual percentage change in CPI[13]

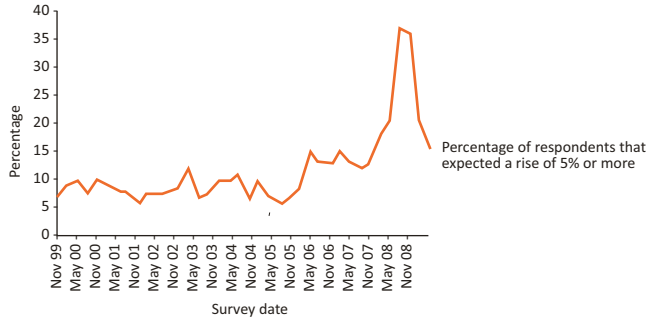


Unsurprisingly, the financial crisis and the most recent changes in the CPI have affected expectations of inflation. Every quarter the Bank of England conducts a survey of such expectations in the population. Since it started conducting it in 1999, the responses to its questions have been fairly stable. Not any longer.

12 Office for National Statistics

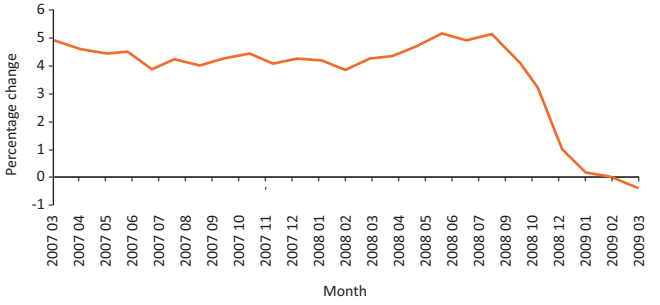
13 Office for National Statistics

Figure 2: "How much would you expect prices in the shops generally to change over the next 12 months"[14]



These changes in expectations are, for the data range of this survey, extraordinary. In fact, if we look at changes in the RPI rather than the CPI, inflation, rather than just the expectations of it, has also shown extraordinary change recently. Only twice, in 1959 and then 1960, has the change in RPI over a 12-month period fallen to zero or below it. In February of this year it did it for the third time.

Figure 3: percentage change in RPI over 12 months[15]



Quantitative easing, which was started in March, is thus a response with highly unpredictable consequences to changes in inflation that

14 Bank of England/NOP, *Inflation Attitudes Survey*

15 All items index, see Office for National Statistics

have themselves been highly volatile. Nudging people to make financial decisions with a proper tool to manage these risks would help them to protect the value of the contracts they enter in to.

Wealth effects and growth

Given the widespread use of nominally-denominated investments and nominally-denominated personal debt contracts, any major changes in the price level can cause large interpersonal redistribution of wealth. It is remarkable that some have proposed that just such an inflation-induced redistribution should be adopted as a deliberate policy to deal with the current world financial crisis, as a way of disguising bailouts of debtors, in complete disregard of the arbitrary redistribution such a policy would create.[16] Indeed, in 1933, in the middle of the Great Depression Irving Fisher argued that the effects of deflation on the distribution of wealth via its effects on un-indexed contracts was an important reason for the severity and longevity of that crisis.

Adoption of indexed units of account is an extremely important policy option to consider for any country with unstable price levels. It should be given serious consideration in countries which have recent histories of rapid price change: Indonesia, Russia and Turkey are obvious examples. These countries have recently seen extreme economic dislocations that are related to their price level uncertainty, and one cannot rule out that it will happen again. Prices set in terms of indexed units of account will have more stable real value in these countries than prices in foreign currencies such as the dollar or euro, because of fluctuations in real exchange rates, as well as potential future fluctuations in the real value of these currencies.

In places where prices have been more historically stable, such as in the UK or US, the purpose of adopting indexed units of account would be twofold: 1) to ameliorate the damage of any unstable policies, such as quantitative easing, in the future, not least as a means to protecting the value of long-term contracts which, when

16 Makin J, "The Inflation Solution to the Housing Mess," *Wall Street Journal*, April 14, 2008

eroded in value by inflation, destroy wealth for the people holding them; 2) to inculcate an awareness in the public of the importance of real prices and value, and therefore, hopefully, to induce a habit that includes this knowledge in the common financial calculations that many people make. Erratic or unsuccessful monetary and fiscal policies like the ones the UK is experiencing right now, or changes in economic or political factors that constrain monetary policy or interact with monetary policy to change the price level, are very common occurrences historically, hence the importance of indexation. These things would be much easier to achieve in the current crisis than during the next one.

This unfortunate vulnerability to the effects of changes in the rate of inflation is the result of failure to index to inflation. Most people find indexation difficult to understand, and do not demand it. In years past, economists mostly could not see the importance of introducing a new unit of account when we already have the inflation measures. If everyone were perfectly rational and thoroughly calculating, as recent mainstream economic theory typically assumes, then they would choose the right indexation scheme for every contract without regard to units of account. However, the advent of behavioural economics has made us recognize fundamental problems that people have with implementing indexation. Moreover, physical scientists have long appreciated the importance of designing a system of units of measurement, a problem that is singularly important for science and conceptually separate from the problem of measurement itself.

In simple terms, it is far easier and more direct for most people to say "I will lend you 500 baskets at 3% interest" than to say "I will lend you £500 at an interest rate equal to 3% plus the percentage change each month of the CPI." The former sounds just like lending real goods (the components of the market basket for the CPI) while the latter sounds like a complex mathematical procedure. People just won't do the latter, in most cases. With baskets, even

children can quickly learn to do indexed contracts; it is just a matter of substituting the word baskets for dollars or pounds. And this difference means that the economy will really become indexed; contracts will really be made in terms that are meaningful to people instead of in terms of some unstable currency unit.

The new unit could replace money in many sectors of the economy for the setting of prices. Creating the indexed unit of account would, if it was widely adopted by businesses and the public, remove one of these three functions from money, that of the unit of account. This would be a fundamentally positive change in the functioning of the economy.

The basket would make things easier

The essence of the idea behind the indexed units of account might be described as that of changing our units of measurement into indexed units that facilitate the specification of prices and contracts in terms of something broadly meaningful to people, a broad market basket rather than in terms of conventional money whose real value may be highly unstable. Since we cannot carry a broad market basket around with us to spend directly, there must then be a separation of the unit of account from the medium of exchange.

People have serious problems in learning to adopt more conventional indexation schemes. For example, efforts to start indexed government debt in moderate inflation countries (the UK, Sweden, Canada, Australia and the United States) have met with very lukewarm initial public response.[17] As of 2008, indexed federal debt is still only 10% of the U.S. national debt. In the UK, which started indexed national debt in the early 1980s, indexed debt is now up to 30% of the national debt. But a significant fraction of this debt is still held by institutions, not the broad public.

Even in some high inflation countries there is little public use of indexation. In Turkey, where inflation rates were running in the

17 Campbell JY and Shiller RJ, "A scorecard for indexed government debt," *NBER Working Papers*, 5587, 1996

vicinity of 100% a year for years, and where inflation has not been below 20% a year since the late 1970s, there is still very little indexation. In Turkey, government indexed debt was not introduced successfully until 1996, and even then the amounts were very small. Private debt is unindexed, except for some indexed savings accounts created by banks at the urging of the government. Remarkably, even alimony and child support payments are usually denominated in the currency, Turkish Lira, even though the payments are part of schedules that may last a lifetime. Obviously, the real value of the payments will be reduced to nearly zero in only a few years (recipients of these payments regularly apply to the courts for a modification of the payments, a costly and difficult procedure that raises many painful issues). Why don't they just index the payment scheme?

Back in 1997 I conducted a study[18] using interviews and questionnaires to try to learn why people in both the United States and Turkey were so little interested in indexation. The results were complex and hard to describe in a short space, in part because it is not easy to characterize people's misunderstanding of economic principles. But money illusion appears to be an important factor in reducing interest in indexation. Many people, rejecting indexation, will say "I just want to know how much money I will be getting," as if they regarded money as an end in itself. This appears to be pure money illusion, a la Newcomb and Fisher. Many people will openly admit, if asked, that they feel better about a pay increase in money terms even if they fully understand that prices have risen just as much.

My study concluded, however, that more is at work in inhibiting public interest in indexation than just pure money illusion. One factor identified in my study of the US and Turkey is that people have incorrect theories about the correlation of inflation with real incomes. There is a widespread belief that inflation coincides with stunning reversals in real incomes of ordinary people. The "wage

18 Shiller RJ, "Indexed units of account: theory and assessment of historical experience," paper presented at the International Conference of the Central Bank of Chile, 1997

lag hypothesis", which has long been discredited by economists and states that changes in wage rates lag alterations in price levels, is alive and well in the public imagination.[19] This is one reason why alimony and child support payments are usually not indexed in the United States and Turkey: people think that if there is a lot of inflation, then an indexed alimony and child support payer would not be able to keep up with the increased payments. People also largely believe that inflation hurts firms' profits as well. The idea that the effects of unforecastable inflation are primarily redistribution between debtors and creditors is not prominent in their minds. Inflation is viewed as hurting everybody.[20]

Another important reason why people resist indexation that I uncovered in my study is that they do not appreciate the uncertainty that inflation generates in price levels at distant dates.[21] Even in Turkey, where the price level has drifted over orders of magnitude, people seem not to appreciate the uncertainty about future price levels. When I asked Turkish respondents, on the questionnaire, to give a range in which the Turkish price level would probably fall in ten years, the median ratio between the high and low limits of the range was 1.5 to 1. This must be a grotesque understatement of the uncertainty about future price levels. In part, the judgment error probably arises because the media do not seem to give much attention to the true uncertainty that price levels have over long time intervals. This problem probably arises because of a difficulty that the public apparently has in understanding the power of compounding. Even in low inflation countries, people just haven't thought about how much difference it makes over long time spans if, for example, we have 2% inflation every year or have 6% inflation every year. These differences do not sound like very much, but in fact the difference in real values of fixed cash payments between these two inflation rates is in the ratio of 1.47 to 1 in ten years and 2.16 to 1 in twenty years.

We see, then, that the indexed units of account, by becoming in a sense an analogue of money, would solve deep and ingrained prob-

19 See Kessel RA and Alchian AA, "The meaning and validity of the inflation-induced lag of wages behind prices," *American Economic Review*, vol 50, no 1, March 1960, pp 43-66

20 Shiller RJ, "Why do people dislike inflation?", in Romer CD and Romer DH, *Reducing Inflation: Motivation and Strategy*, 1997

21 Shiller RJ, "Indexed units of account: theory and assessment of historical experience," paper presented at the International Conference of the Central Bank of Chile, 1997

lems that people have in taking account of the effects of inflation. These units help promote indexation where it would not otherwise occur, or where it would occur only haphazardly or incompletely.

Creating such units at this time of financial crisis could also be linked to other plans to redesign the banking sector. Banks are in the process of being nationalized, or at least substantially government owned. It is time that they got a new substance and structure. Telling the new banks to offer accounts denominated in indexed units of account, in baskets, would not only help the public to understand better the units themselves, but also would make more credible that we are launching out on an improved financial system.

Creating the units at this time of financial crisis could also be linked to other plans to redesign the tax system, which has a relation to plans to alleviate the crisis through the stimulus packages and through changes in progressivity. Failure to index properly creates a multitude of problems. If, as a radical modernization step, people were presented with new tax forms that clearly translated currency quantities first into baskets, and then all calculations were completely defined in terms of baskets, they would know that they were facing a thoroughly redesigned tax system, and one that has no anomalies due to failure to index.

The basket would solve a coordination problem

The creation by some authority like the government of an indexed unit of account may also solve a coordination problem that otherwise would inhibit indexation. A coordination problem appears when there is some advantage to everyone taking some action together (like adopting some form of indexation together) but, when taken individually, the actions are not as beneficial. If no steps are taken to help people coordinate, then the actions may never be taken. Coordination problems are central to monetary theory, indeed, the medium of exchange function of money itself may be regarded as helping to deal with the

coordination problems that would arise when, in a barter economy, people have difficulty locating a double coincidence of wants.

Coordination problems can be solved by social conventions. We all drive on the left side of the road, for example (in the UK at least). It wouldn't matter if we all drove on the other side of the road, but it would be a disaster if half of us chose one side and half the other. Once a social convention is established, the coordination problem is solved and people have little or no incentive to change it.

Why don't people in the UK quote prices in terms of the CPI in the absence of any government initiative to create indexed units of account? People could name the price of a product as, say, 10 CPIs, meaning that they will charge in pounds ten times the latest CPI. The reason people do not may have to do in part with a coordination problem, of deciding together that they will do this. Until such a decision is made, individuals will not find it in their interest to try to convince people to take the other side of indexed contracts.

Until there is a social convention on how and when to index, people will find it costly to try to come to an agreement on indexation. There are many questions. On what date does the price change? Which CPI should be used? (There are many definitions available.) What do economists where the CPI is computed think about which unit should be used? At present, in countries where no indexed unit of account exists, each person must answer these questions alone. It is thus not surprising that there is no tendency to quote prices in "CPIs."

Another coordination problem is that we must decide, and agree, on a way to smooth the CPI. We should not define prices just in terms of the latest CPI because the CPI is vulnerable to sudden jumps from month to month. This is particularly true when we are talking about indexing financial contracts to the CPI. A unit of account would smooth out the CPI movements (because it would be interpolated between the release dates of the CPI counts). Otherwise there would be important jumps in deposit balances on

the dates of new announcements of the CPI. Thus, the smoothing of the CPI in producing the indexed units of account would be a fundamental part of the functioning of it as an analogue of money.

To summarize briefly, one might say that the creation of indexed units of account may be considered as similar in a sense to the creation of daylight savings time (although the units of account are likely to be much more important in economic significance). Technically speaking, if everyone were perfectly "rational," there would be no need to set our clocks back forward one hour in the summer; we could all just decide to get up an hour earlier. But we know that will never happen. One reason it will never happen is that there is a coordination problem in getting people to start their business an hour earlier. Coordination problems appear if people in some workplaces arrive at work earlier and the people in other workplaces with which they deal do not. By analogy, people could just decide to raise all deferred payments in keeping with inflation, just as they could decide all to get out of bed an hour earlier, but if some do this and some do not, or if some use one price index formula and some use another, then there will be a coordination problem here too.

There is also another advantage of daylight savings time that goes beyond the coordination problem. There is the problem of human habit, of looking at the clock and unthinkingly deciding that it is time to do this or that. The advantage to daylight savings time, rather than making a collective decision to do everything an hour earlier in the summer, very plainly has something to do with the persistence of such habits. The same advantage is created by indexed units of account. Just as there was apparently no collective decision to change times of most daily activities seasonally in the years before daylight savings time, the alternative to the indexed units of account is really lack of consistent indexation.

3. The history of the basket

The Unidad de Fomento (UF) was introduced in Chile in January 1967 by the Suprintendencia de Bancos e Instituciones Financieras, a government regulatory agency. The UF is probably the world's first successful indexed unit of account. It is the first instance of indexation being achieved by quoting prices in a money-like unit, rather than relying on an indexation formula – the difference between nudging people to use indexation in their calculations through a basket, and leaving them to use the already published consumer price index.

Chile had issued an earlier unit of account in 1960, the Unidad Reajustable or UR, which was based both on price and wage indices, but it was not very successful. The UF was and is an amount of currency related to the Indice de Precios al Consumidor (IPC), the consumer price index for Chile. Originally, the UF was calculated three times a year, and was calculated monthly between 1975 and 1977, but daily adjustments in the UF have been made since 1977. The UF is now a lagged daily interpolation of the monthly consumer price index.[22] The use of the UFs by the public did not become habitual until the early 1980s, about fifteen years after their introduction, though only a few years after the values were produced on a daily basis.[23] Now, the UF is widely used in Chile.

Most bank deposits in Chile are 30-day non-indexed deposits or 90-day indexed deposits whose rates are expressed in terms of the UFs. Interest rates on the indexed deposits are expressed as a premium over the UFs. On maturity, the deposits are converted back to pesos at the current UF rate. Because indexed and unindexed bank deposits coexist, one might say that the Chilean

22 The formula for computation of the UF on day t is UFt = UFt-1 ´ (1+π)1/d, where π is the inflation rate for the calendar month preceding the calendar month in which t falls if t is between day ten and the last day of the month (and d is the number of days in the calendar month in which t falls), and π is the inflation rate for the second calendar month before the calendar month in which t falls if t is between day one and day nine of the month (and d is the number of days in the calendar month before the calendar month in which t falls). Since the inflation rate for a calendar month is computed using the consumer price index for that month and for the preceding month, the UFs within a given calendar month will depend on the consumer price index for each of the three preceding months (e.g. the April UFs will depend before April tenth on the consumer price index for January and February, and starting with April tenth on the consumer price index for February and March)

23 Levin BF, "Working through the Web with UDIs," American Chamber of Commerce of Mexico, June, 1995

banking system is partially indexed using the UFs. The UF is used in Chile for nearly all mortgages, car loans, and long-term government securities. All taxes are expressed in UFs. Pension payments are automatically tied to the UF. Executive stock options sometimes have strike prices denominated in UFs. The UF is widely used for rent payments. Alimony and child support payments are often denominated in UFs. Office properties for sale are usually quoted in UFs. Houses for sale are often quoted in UFs, though pesos are also used. However, the UF is not so commonly used for selling prices of automobiles, nor is it used commonly directly as way of setting salaries. Wages and salaries are denominated in pesos and only indirectly influenced by the UF, in that the change in the peso value of the UF is taken into account in wage and salary deliberations.

While the UF is apparently the first successful unit of account indexed to a true price index, the use of units of account separate from money has been known for millennia. Of course, historically, units of account precede money altogether, at least precede money as we know it. Trade in terms of precious metals themselves, rather than any money, actually preceded the invention of coinage in the seventh century B.C. Units of weight, such as the talent or the shekel, evolved into units of money when coins were minted that had specified relations to the weight. But, since governments could not be trusted to maintain the weight of the coinage, a tradition developed to write contracts in units that did not correspond to any current coins. Luigi Einaudi, an Italian economist, wrote in 1953 that

> *"Today each country has only one monetary unit: the lira, the franc, mark, pound sterling, or dollar. This is the system established by the French assemblies at the end of the eighteenth century.... Prior to the French Revolution, the monetary system of most European countries was based on altogether different principles. Contemporary authors could take*

> *these principles for granted and did not have to explain them to others. Their strange terminology causes us, who live in another world, to wander for a while in a dark forest. By and by, we finally understand the tacit assumptions of their discourses. The key, needed to interpret the apparent confusion of the monetary treatises written prior to the eighteenth century, is the disjunction between a monetary unit and a standard of value and of deferred payment and another monetary unit used as a medium of exchange."*[24]

In medieval and renaissance times, even contracts that were explicitly written in terms of units of currency that were currently circulating as coins sometimes were understood to be executed in terms of some other measure. For example, in Milan in 1445, a debt of one florin would not be paid with one of the gold florin coins, but rather in an amount computed under the assumption that the florin was still worth 384 silver deniers (and not the 768 deniers that the florin coin was then technically worth).[25]

Since there were often no coins currently circulating corresponding to these units, the actual units of account were often called "imaginary money." They were also called "moneta numeraria," "money of account," "ideal money," "political money," or "ghost money." From the time of Charlemagne, trade and contracts in Europe were substantially based on the moneta numeraria called the pound, (or equivalently, "livre" or "lira"), which was always worth 20 sous (shillings) and each sou worth 12 deniers (pence).[26] Ultimately, the standard of value represented by this system was the silver denarius issued by Charlemagne in the late eighth century and early ninth centuries, coins that were no longer circulating, or even seen, later in the middle ages and renaissance.

Charlemagne's denarius weighed one 240th of a troy pound, while the earlier Roman denarius had gone through repeated debasements, and was not a unit of account in medieval or renaissance times. Because they are even fractions, the sou (at twelve deniers) and pound

24 Einaudi Luigi,"TheTheory of Imaginary Money from Charlemagne to the French Revolution," in Lane FC and Riemersma J, eds, *Enterprise and Secular Change*, 1953, pp. 234–235

25 Cipolla CM, Money, *Prices and Civilization in the Mediterranean World: Fifth to Seventeenth Century*, 1956

26 Einaudi Luigi,"TheTheory of Imaginary Money from Charlemagne to the French Revolution," in Lane FC and Riemersma J, eds, *Enterprise and Secular Change*, 1953

were natural units of account, but Charlemagne never issued coins representing these values. Actual exchange was executed in terms of current coinage, which had many names from the realms that issued them, names such as angels, blanks, crowns, crazies, doblons, dollars, douzains, ducats, ducatoons, écus, farthings, florins, guilders, louis, moutons, nobles, obols, phillipi, reals, sovereigns, stivers, and testoons. Many of each of these would circulate simultaneously in each country, a situation that would create tremendous confusion if there were not a standard unit of account.

Aspects of this ancient system did of course continue into the nineteenth century as a result of efforts of governments to maintain bimetallic standards with fixed exchange rates between the coins of different metals. Sometimes this practice would cause the disappearance from circulation of the coin of lower value, a tendency that is predicted in Gresham's Law.[27] At other times, people began to adopt the convention that only one of the coins would be the money of account, the other's price allowed to float against it despite government proclamations to the contrary.[28]

The only aspect of the UF that was really new when it was introduced in Chile in 1967, therefore, was that it was based not on a single commodity but a representative consumer basket. This innovation was indeed very significant, since the management of risks is much better handled in terms of such an index rather than a single good. It is perhaps not surprising that the innovation represented by the UF was not adopted in ancient or medieval times, despite the apparent simplicity of the idea of index numbers. There was no published theory of index numbers, and there was no governmental authority that would plausibly have attempted to start a new social convention of denominating contracts in terms of such indexed units. The advantage of defining contracts in terms of the single commodity, the precious metal, rather than the currency, was obvious enough to ensure that the practice would continue over the centuries, but the next step, the indexed unit of account, was not at all obvious or easy.

27 Gresham's Law, named after Tudor financier Thomas Gresham (1519 – 1579), states that when two commodity-based currencies denominated as having the same value are in circulation, the one with the biggest difference between its face and commodity values will be used ahead of a rival with values that are closer together. This is because people will prefer to use the coin that is worth least in terms of a material resource but still worth as much during trading. In other words, the more debased currency pushes out the less debased one – "bad money pushes out good"

28 Rolnick AJ and Weber WE, "Gresham's Law or Gresham's fallacy?", *The Journal of Political Economy*, vol 94, no 1, February 1986, pp 185-199

The European Currency Unit (called ecu) might be regarded as a UF analogue, in that it is based on a sort of index, an index of currencies. The ecu, created in 1979, was defined as a basket of European currencies. The ecu was regarded as less vulnerable to runaway inflation than were the individual currencies, since it was in effect a diversified portfolio of currencies, and partly for this reason a substantial amount of European private long-term debt was ultimately denominated in ecus.[29] (A more important reason for the private use of the ecu may have been circumventing exchange and capital controls). Since the ecu is not based on a broad index of prices, wages or incomes I would not call it a true indexed unit of account.

There are, however, a number of examples of true indexed units of account outside of Chile. While these are not yet as ingrained in their countries' economies as the UF has been in Chile, they do represent important beginnings.

Ecuador

In 1993 Ecuador created a unit of account modelled after the UF. It was called the Unidad de Valor Constante (UVC).[30]

Mexico

Mexico has also copied the Chilean UF, creating in 1995 a unit of value called the Unidad de Inversion (UDI). The UDIs began at a par of one to one with the peso on April 4, 1995, and the peso value of the UDI increases one to one with consumer inflation. The Bank of Mexico publishes the value of the UDI on the 10th and 26th of every month based on the national consumer price index. Mexican banks offer UDI-denominated instruments, and use the interpolated published values of the UDI to make daily advances.

Uruguay

Uruguay also has a unit of account, the Unidad Reajustable (UR), which is used to index government pension payments and, since

29 See Bordo M D and Schwartz AJ,"Transmission of Real and Monetary Disturbances under Fixed and Floating Rates," In Dorn JA and Niskanen WA (eds), *Dollars, Deficits and Trade*, 1989

30 See Polit L, "Ecuador's Stock Market: Latin Equities Directory", *Latin Finance*, April, 1994

1996, to index government bonds. The UR is based on a wage index, rather than a consumer price index; there are possible advantages of such a variation on the UF in addition to the inflation-indexed form.[31]

Ukraine

In Ukraine, starting in 1995, a unit of account called uslovnaya edinitsa (условная единица conventional unit) or y.e has been used. Prices in stores and houses, cars, and other items advertised for sale in newspapers have been often denominated in these units. The units came into use after the government, during a period of high inflation in 1995, prohibited pricing in foreign currencies. Despite their superficial similarity to the indexed units of Latin America, these units, however, are not true indexed units of account. In fact, the government does not even decree the definition of the units. When the unit is used in ordinary advertisements, as in an advertisement for a home for sale, it is understood to be just a disguised price for the US dollar. Other definitions of the unit are, however, also used. In stores the conversion rate from y.e's to the currency is posted in the store, and it often deviates substantially from the dollar exchange rate.

31 See Shiller RJ, *The New Financial Order: Risk in the 21st Century*, 2003'

4. Arguments against adopting the basket

The essential idea behind the basket is simple and obvious, but there remains a fundamental question about the functioning of the medium of exchange, the money, in a system involving systematic use of the indexed units of account, and it is these concerns that have been the serious obstacle to the adoption of the basket.

Inflation bias

The principal argument for the elimination of indexed units of account in Chile (and Brazil where they actually were eliminated), has been that they impose an inflationary bias, and it is for this reason that their use has always been restrained by governments.[32]

While the Unidad de Fomento has been copied by several countries, at the same time there has been a move at times in some Latin American countries to deindex the economy, to reduce or even eliminate the reliance on indexation schemes. Once the inflation rate came down through most of Latin America, many felt that it was time to return to economic institutions that were more akin to those in the rest of the world.

Deindexation proposals are not new in Chile. In 1986, the Pinochet government, reacting to complaints of debtors such as farmers, aired a proposal to freeze the UF and at the same time to extend the repayment of debts. Fortunately, the UF was not frozen, and such a freezing would have damaged confidence in any future effort to revive the UF.

32 See Shiller RJ, "Human behavior and the efficiency of the financial system," Cowles Foundation Paper no 1025 and Shiller

In the Fall of 1996 Nicolas Eyzaguirre, the director of the Chilean central bank's research department, gave a speech in which he questioned whether the widespread use of the UF indexation system should be reconsidered, as a possible obstacle to low inflation in the future. According to Eyzaguirre "It is a unique paradox, unlike any other in the world: an extremely low inflation rate with all business and financial contracts protected against inflation." In an editorial in 1996, the Chilean newspaper La Nacion said that:

> *"Indexation emerged in Chile at a time when high inflation rates compelled the government to adopt precautions in order to strengthen the financial market. The situation has changed as all the indicators prove; but the indexation mechanism still persists and has now become an obstacle to the actual anti-inflationary aims rather than a palliative. At any rate, putting an end to indexation is not easy because it has become indispensable to the way our economy functions. The economy's differing actors have already made contracts based on the system of indexation, contracts which cannot be modified from one day to the other. We need to discover ways of gradually removing the system from our economy.... If we really want to reach inflation rates of two or three percent, an aim fixed by the Central Bank as ideal, we are going to have to do away with indexation."*[33]

Bankers Trust issued a report in 1993 asserting that:

> *"Tight monetary policies won't be enough to cut inflation significantly. The government could instead abolish the Unidad de Fomento (UF) the unit of measure that sets worker salary expectations and also is applied as a variable index to virtually all mortgages, car loans, and government debt securities."*

On August 14, 1997, Carlos Massad, president of the Banco Central de Chile, in a speech at the Latin American meeting of the Econo-

33 La Nacion, "The counterweight of an indexed economy," November 1, 1996

metric Society in Santiago, expressed the opinion that the UF should be phased out in a matter of some years. The Mexican UDIs have already been criticized as being inflationary by spokesmen for the Mexican Businessmen's Council (Coparmex) and by the newsletter El Inversionista Mexicano (EIM).[34]

Fortunately, de-indexation does not seem likely to involve scrapping the indexed units of account any time soon. In Chile, for example, de-indexation in the short run may mean little more than lengthening the maturities of non-indexed debt from very short maturities today to something intermediate.

Chile has experienced one major episode of high inflation since 1960, the years 1972 through 1977, when CPI inflation peaked at over 500% a year. This period came five years after the date 1967, when the Unidad de Fomento was first introduced, but before it became widely used. This burst of inflation ended well before 1982, when (roughly speaking) the Unidad de Fomento first became commonplace. One sees no evidence that the introduction of the UF has been inflationary.

Still, the concern is legitimate that there may be an inflationary bias in any indexation scheme for wages and salaries. When one indexes wages and salaries, one immediately sets expectations. In contrast, when wages or salaries are set in currency units, inflation naturally erodes real buying power. Thus, the natural base of comparison for wage and salary changes is one of declining real value. If indexation causes one to define wages and salaries in such terms that the base of comparison is constant or growing in real terms, then worker expectations will tend to be higher. There may be a vicious cycle, where inflation expectations yield higher prices and then even higher expectations. This vicious cycle is part of the "neo-structuralist"[35] model of inflation in Latin America.

Felipe Morandé and Klaus Schmidt–Hebbel, two economists, conclude that "There is significant evidence for explicit indexation

34 See Levin BF, "Working through the Web with UDIs," American Chamber of Commerce of Mexico, June, 1995

35 The "neo-structruralist" model sees price rises as being strongly associated with the inertia effects of indexing wages and prices, plus shocks generated by the world economy

mechanisms in the behaviour of exchange rate depreciation and wage growth, contributing to large observed inflation inertia."[36] Esteban Jadresic, also an economist, concludes that "unless the policymaker is firmly committed to maintain low inflation, wage indexation is likely to increase average inflation."[37] However, the inflationary impact of wage indexation cannot be summarized so simply, since we must ask what is the alternative to indexation of wages? Jadresic concludes that "wage indexation can reduce the cost of disinflation if the alternative to indexed wage contracts are contracts that specify preset time-varying wages."[38]

A basic fact about human behaviour that is relevant to understanding the impact of indexation is that people appear very reluctant to accept a nominal wage cut.[39] No one wants to have to admit to his or her family that one's wage or salary has been cut. But, economic conditions may necessitate wage or salary cuts in certain circumstances. People seem much more willing to accept real wage cuts that are caused by consumer price inflation that is greater than their wage increase. When we introduce indexed units of account for wage and salary contracts we need some kind of humane face-saving mechanism to allow people to better deal with the truth about their incomes.

While the Chilean example illustrates the use of only a single indexed unit of account in a country, there may be reasons to adopt not just one unit of account, but rather multiple units of account. I have here in mind especially creating an additional unit of account, beyond just the CPI-based unit of account, that is related to a measure of national economic prosperity, such as personal income.

When indexed units of account were first developed in Chile, it was to solve a pressing problem of high inflation. At that time, it would not have mattered very much, compared to the magnitude of the problem of existing nominal contracts, whether the units were denominated in terms of a consumer price index or in terms of nominal income. It was probably natural to create them in the simplest,

36 Morande F and Schmidt-Hebbel K, "Inflation targets and indexation in Chile," *Mimeo*, Central Bank of Chile, 1997

37 Jadresic E, "The macroeconomic consequences of wage indexation revisited," International Monetary Fund, unpublished paper presented at the Conferencia Internacional del Banco de Chile, 1997, pp 31

38 Jadresic E, "The macroeconomic consequences of wage indexation revisited," International Monetary Fund, unpublished paper presented at the Conferencia Internacional del Banco de Chile, 1997, pp 31

39 See Akerlof GA, Dickens WT and Perry GL, "The macroeconomics of low inflation," BPEA, no 1, pp 1-76, 1996; Card D and Hyslop D, "Does inflation 'grease the wheels of the labour market?'", in Romer CD and Romer DH, *Reducing Inflation: Motivation and Strategy*, 1997; Akerlof G and Shiller RJ, *Animal Spirits: How Human Psychology Drives the Economy and why it Matters for Global Capitalism,* 2009

most direct way possible, so as to facilitate public acceptance. Public acceptance of these UFs was not assured (and did not come immediately). The concept of the UFs could be explained more easily in terms of a price index than in terms of nominal income indexes.

But the problems caused by tying the UF to the consumer price index in Chile have not gone unnoticed. For example, critics of the UF in Chile have said that the UF causes problems for mortgage lenders in periods of high inflation, since the UF-denominated mortgages are adjusted daily, but salaries are denominated in pesos, and are adjusted only annually.[40]

While some appear to think that this problem should be solved by deindexing, this is not at all a reason to eliminate the indexed units of account. It is rather a reason to define additional new ones, that are related to income measures. This has been recognized by some policymakers. In fact, in 1960 the Chilean government created an indexed unit of account, called the Unidad Reajustable (UR) that depended both on wage and price indices, and although it was apparently not very successful, after 1967 when the UF was created there were really two indexed units of account simultaneously in use in Chile, both the CPI-based UF and the wage-CPI based UR. The Chilean government, moreover, in 1991, drafted a bill "that would establish a new, optional mechanism for adjusting mortgages by linking them to wages rather than the inflation rate." While a wage-indexed unit of account never got far in Chile, a wage-based indexed unit of account, the Unidad Reajustable (UR) was established in Uruguay and is in use there today.

When we consider indexed units of account in times and places where inflation is moderate, then the relative importance of getting the index right becomes central. By moderate inflation I mean the 1% to 5% inflation that is common in many countries of the world today, small on a year-to-year basis, but large and variable enough that there remains substantial uncertainty over longer time intervals.

40 See Bernardez C, "Chile's Unidad de Fomento," *Derivatives Week*, vol V, no 29, 1996

In an extreme case where the problem of inflation is utterly solved, so that there is never any inflation at all, we would have no need of indexed units of account tied to inflation itself. In this extreme case, however, there may still be a need for indexed units of account tied to income measures.

The importance of creating an "optional mechanism" for indexing to some income measure such as wages goes far beyond the issue of mortgage loans. In fact, creating units of account tied to some such measures is central to the fundamental problem of individuals' optimal risk management.

While it is also possible that erratic government policy could frustrate the purpose of indexed units of account, by retroactively ruling indexed contracts invalid, rulings of this kind are much less common historically than are major changes in the price level. Governments' honouring of past contracts is widely recognized as a fundamental component of an orderly and just society. In contrast, governments make no explicit promise to restrain inflation, and usually have only limited credibility when they do make such promises.

Why separate the unit of account from the currency?

What is the point of separating the medium and exchange and store of value functions that currency has from the unit of account function that we have in the Unidad de Fomento and other examples? Many argue that the reliance on indexed units of account like the UF is nothing more than a sign of failure to maintain the currency unit in constant buying power, and that what we really should do is just stop inflation dead.

Irving Fisher thought that keeping an indexed unit of account separate from the medium of exchange would not be sensible partly because of "laborious calculations in translations from the medium of exchange into the standard of deferred payments and

back again."[41] This argument is reminiscent of the arguments made today for the common currency in Europe, by people who are tired of the currency exchanges that they must make whenever they cross a border. Making these exchanges, as also making calculations between the indexed unit of account and the currency, may seem unnecessarily complicating for our lives. It is perhaps for this reason that the UF is not used to quote everyday prices in Chile.

The inconveniences generated by keeping a separate unit of account are not really large. In this age of computers, the complications created by the need to calculate how many pesos corresponds to a UF, or the calculations necessary for currency exchanges, can hardly matter. Indeed, there will inevitably be a blurring of the distinction between the currency and the separate unit of account once credit card companies allow charges to be made directly in the units of account, and banks allow writing of cheques in terms of the units of account (this has not happened yet, as far as I have been able to determine).

Still, there are some slight inconveniences to keeping the indexed unit of account separate from the currency, and so one naturally asks, why not merge the two? Why not just keep the price level steady? The problem with this solution is that the history of inflation around the world does not create any optimism that we could, at least without some kind of fundamental structural institutional change, really stop inflation dead. There have been many times in history when inflation was temporarily stopped, but producing lasting price stability, over many decades, has proved elusive. While there have been other schemes proposed to achieve price stability automatically there is no guarantee that such schemes will really succeed fully in their objective. If these alternative schemes are not sure to succeed, it may be better for all longer term contracts to be defined in terms of a unit of account, which is itself a proxy for a price index, so that the indexation cannot fail.

Simon Newcomb and Irving Fisher thought that they had a mechanism whereby an indexed unit of account could also be a

41 Fisher I, *The Purchasing Power of Money*, 1913

medium of exchange and store of value.[42] They thought that by defining the currency itself as an indexed unit of account, they could achieve just this. In effect, they wanted to print pieces of paper called UF, and use these as money.

They were writing at the time of the international gold standard. Any government could merely promise, they argued, to adjust the quantity of gold in its currency at regular intervals so that the real buying power of the gold that these currencies represent is kept constant. This proposal became known, after it was published by Irving Fisher, as the compensated dollar plan.[43]

It is apparent, however, that there is a potential difficulty in the government's efforts to maintain a compensated dollar. In order to guarantee that the real buying power of the compensated dollar is really constant, the government must promise to make the currency freely convertible into gold and back at all times. The problem then is, as recognized by Irving Fisher, that speculators might "embarrass" the government by making large trading profits at the government's expense. As Fisher pointed out, if the mint price were $18 per ounce and if it were known that the mint price would shortly be $18.50 per ounce, then speculators could redeem their dollars into gold and buy back their dollars at $18.50.[44] If the buying power of the currency is indeed to be kept steady, then the price index on which it is based must include the prices of many things that are not traded on speculative markets. Notably, it must include the prices of services. Any price index that includes these will almost surely be serially correlated, forecastable into the future. The government might possibly, if the buying power of gold falls far enough, find itself obligated to pay out more gold than it has. Given this possibility, public fears that the compensated dollar plan may have to be abandoned could force abandonment of it.

Fisher's proposed solution to this problem is that the government would impose a 1% bid-asked spread (the amount by which a bid exceeds the price asked for it, i.e. the difference between the

42 Fisher I, *Elementary Principles of Economics*, 1911; Newcomb S, Popular Astronomy, 1878

43 Fisher I, *The Purchasing Power of Money*, 1913

44 Fisher I, *The Purchasing Power of Money*, 1913

figure at which the bidder is willing to purchase the item and the seller to let him have it) when exchanging gold for compensated dollars, and that the maximum movement of the gold content of the dollar would be 4% per annum. This would help prevent speculation, he said. It would also make the buying power of the dollar unresponsive to large changes in the price of gold.

Fisher wrote an article presenting simulations with actual historical data between 1896 and 1911 indicating that speculation and the limit on the change in the gold content would not have been an important problem.[45] He points out that so long as the bid-asked spread and the brassage charge (the cost of coining bullion), exceeds the maximum allowed monthly change in the gold content of the dollar, there is no riskless arbitrage profit to be obtained by buying and redeeming dollars over a zero time interval (i.e. a space of time short enough to mean that no profit can be made from it, actually overnight) at month end. Any attempt to profit from the predictable changes in the gold content would then involve some risk, and so presumably such attempts would be limited in importance. Still, despite the success of his simulations for that period, the potential fluctuations in the buying power of gold could be large enough to cause the formula value of the dollar to fluctuate beyond 4% in a year, and this possibility suggests serious problems with the compensated dollar plan. Note, for example, that the buying power of gold doubled between 1979 and 1980 and then fell nearly back to its 1979 level by 1982. Fisher's simulations do not address the full complexity of the problem of speculation with the compensated dollar, a problem that involves such things as the simultaneous determination of the real price of gold and the money supply with public expectations both of future changes in the gold content of the dollar and of the probability of the event that the compensated dollar plan will be suspended.

Fisher's proposals generated much discussion, both among academics and the general public. Fisher reports a list of 344 arti-

45 Fisher I, "A compensated Dollar," *Quarterly Journal of Economics*, 27, 1913, pp 385-397

cles about his idea, many of them critical of it. [46] The story of the campaign for the compensated dollar, or "Fisher plan," is recounted in Fisher.[47] He found much opposition to his proposal, apparently mostly misinformed, but nonetheless effective in preventing serious consideration of his proposal. He later abandoned the proposal without disavowing it:

> *"I had never believed that the compensated dollar plan was the only possible plan, nor even ideally the best.... I am therefore still in favor of it for America, as part of a general plan, although, for simplicity, the method recently adopted in Sweden (a managed currency independent of gold) seems better."*[48]

He seems to have grown tired of his campaign for a compensated dollar, with the difficulty of convincing the public of its merits, and his attention was distracted by other plans. The significant risks of inflation with the new managed currency independent of gold were not so apparent at the time as they are now, and so the relative attractiveness of the compensated dollar plan was not so prominent.

Fisher's original plan for a compensated dollar defined in terms of gold might possibly be workable today, but it seems to involve more uncertainties as to its ultimate success than there are with the use of indexed units of account. There is, of course, at this stage in history, no reason to return now to a monetary system that creates any special function for gold. The problems potentially caused by speculation in the currency-gold ratio that Fisher alluded to are shortcomings of the compensated dollar plan. In the age of computers, there is not such a problem with keeping the unit of account separate from the medium of exchange as there was in Fisher's day. Given the apparent difficulty of guaranteeing the real value of currency, contracts can instead be written in terms of price indices themselves, i.e. in terms of units of account, leaving the medium of exchange function for conventional money.

46 Fisher I, "Objections to a compensated dollar answered," *American Economic Review*, 1914

47 Fisher I, *Stable Money*, 1934, appendix I, pp 374–389

48 Fisher I, *Stable Money*, 1934, pp 382

5. How a basket system would work

Which prices should be quoted in the indexed units of account? William Stanley Jevons, a 19th century economist, gave one possible answer: without mentioning the possibility of indexed units of account, he advocated automatic indexation of all contracts over three months' duration. On the assumption that inflation uncertainty over future time intervals of less than three months is likely to be inconsequential, one might defend this simple rule for its simplicity. A conservative principle of tinkering with the economy as little as possible might also lead us to something like Jevon's prescription.

In a sense Chile has adopted approximately Jevons' prescription, since UFs are used primarily for longer-term commitments. Most bank deposits in Chile have been 30-day peso deposits and 90-day UF deposits. But Chile has not adopted Jevons' advice with respect to wages or retail prices, which are still denominated in pesos.

As an alternative to such a conservative policy on dealing with indexation, it is important to recognize that there are arguments leading us the other way, towards tying all prices, wages, and payments to indexed units of account. One may argue that there is no clear advantage to tying any payments to money, with its inherent uncertainty. There is a cost of complicating the decisions that the public has to make by keeping alive both the tradition of prices quoted in money and the option of prices quoted in terms of indexed units of account.

Even in the pricing of everyday items, there would appear to be some, albeit usually small, advantage to defining payments in

indexed units of account. If, for example, one buys a television and returns it for a refund in two months, receiving the initial money value back, one may suffer a loss of a percent or more in situations with moderate inflation, and this would not happen if the price were set in indexed units of account. While, in examples like this one, the advantage to setting prices in terms of indexed units of account may be small, there seems to be no offsetting advantage to using money sometimes as that would justify making the public have to deal with two kinds of prices, money prices for everyday items and indexed unit of account prices for deferred payments. Using the indexed units of account for all prices, wages, and payments establishes the presumption and habit that indexing will always be used, just as stopping at a red light even when there is no traffic coming down the street preserves the proper habit.

What would happen if the basket were used for all prices?

We could drive a system of indexed units of account to its extreme in which the indexed unit completely replaces money for prices, wages, and other payments. It is important to consider this extreme at least as an exercise, so that we will better understand the functioning of an economy using indexed units of account. But this extreme is not only an idle exercise, it could be implemented. People could use their credit cards, debit cards, and smartcards that allow access to their accounts which are defined in terms of money. The individual need have no direct encounters with money. When a purchase is made, the price can be rung up in terms of these units, and the computer can automatically translate the unit price into a money price and debit that person's account. Then it is possible that money itself might eventually virtually disappear as a unit of account. Even the last strongholds of coin usage, the vending machines and newspaper stands, could be incorporated into an indexed unit of account debit card system with today's technology.

The idea of indexing all prices seems circular to some people. If all prices, other than the money price of the indexed unit of account itself, are indexed, they ask, then how can the government find out what is the money price of the indexed unit of account? What determines the change in value of the unit of account from month to month? The answer to this question has to do with a lag in the definition of the unit, so that the system is not simultaneous. The lag, given that some rigidity in prices defined in terms of the units is to be expected, also introduces potentially complicated dynamics to prices.

But, consideration of a simple model of inflation in an indexed world has not revealed that this lag should create problematic price dynamics.[49] With money still the medium of exchange, the supply and demand for money would still be fundamental to interest rates, and with the baskets price today known to price setters, they would still be in effect setting their current prices in terms of the medium of exchange, conventional money. Even if retailers routinely quoted prices in terms of baskets, they would be collecting money not baskets at time of sale, and they would change the price in terms of baskets whenever they perceived an imbalance in their cash flow, just as they do now.

In practice, this point is probably moot since it is unlikely that, for the foreseeable future, anything close to all items would be priced in terms of the indexed units of account. It is likely that most use of them would be, as Jevons originally advised, for significant items like houses or cars and for longer-term contracts.

Monetary policy with the basket

While the indexed units of account are proposed to deal with the problem that monetary policy may be erratic or have unforeseen consequences, be incapable of responding appropriately to exogenous shocks, or destabilizing of the price level, it is still important to

49 Shiller RJ, "Tools for financial innovations: neoclassical versus behavioral finance," *The Financial Review* vol 41, pp 1-8, 2006

ask how monetary policy should ideally be conducted once such units are in place. From the standpoint of the above model with all prices expressed in the units, monetary policy has little effect on real quantities unless the money stock is changed rapidly relative to the interval between computations of the price index. The monetary authority would have reason to keep the growth of money prices fairly low and stable, so that society does not need to incur the cost of more frequent computations of the price index.

The use of monetary policy for conventional countercyclical stabilization policy would have to be rethought after use of indexed units of account became widespread. The monetary authority would appear to have a diminished ability to exert influence over real interest rates, given the reduced role of sticky nominal prices. There may, however, be less need for countercyclical monetary policy, since the aggregate effects of sticky prices on business fluctuations will also be reduced. If indeed the amplitude of the business cycle is reduced by the adoption of indexed units of account, then monetary authorities would be able to focus their attention more on stabilization of the price level.

6. How the UK could adopt the basket

At this time of crisis, Britain, like all the nations of the world, should create a basket based on the consumer price index for its citizens, establish its legal status for commerce, provide assurances that it will continue to have this status for the indefinite future and make some commitment that the index will continue to be calculated on a consistent basis, i.e. without future freezes or other interference, and publish it on a daily basis on the Web. These are very easy first steps to take, so easy in fact that it may also be advisable to create not just a basket based on consumer prices but also some other units, such as a unit based on per capita income or a unit based on wages, for possible uses in other contracts, and thereby create a new system of economic units of measurement. But, creating the basket is the most essential thing to do. Here are the steps that the British government would need to take in order to create it.

The first step: the creation of the basket

Britain's inflation measures mean that the government already has access to all the data that it needs in order to regularly calculate the basket. It would need to decide, though, whether the CPI or the RPI was more appropriate for use. The two indices are quite similar, but they differ in one important respect: housing costs are included in the latter but not the former. CPI, unlike RPI, does not take into account changes in council tax, mortgage interest payments, house depreciation, ground rent and other such property costs borne by many people.[50] These things have been a very impor-

50 Office for National Statistics, *Consumer Price Indices: Technical Manual*, Office for National Statistics, 2007, pp 81

tant part of inflation over the past ten years or so, but because the Bank of England's inflation target is determined by CPI, it might be better to be consistent and publish the basket in it too. On the other hand, the RPI might be a better index for use in both measures.

Once it has decided which index to use, the government would need to establish an exchange rate between the index and the basket. This would be an important decision because it would be both integral to the scheme and help to determine how widely the baskets could be used. Both CPI and RPI are made up of over 100,000 price quotations.[51] To *index* such a magnitude into an inflation measurement, the Office for National Statistics attributes a base figure to the value of these goods and then expresses the average change in them through the percentage alteration in the index itself. For baskets to be calculated, a monetary value (£1, say) would need to be attached to that base figure and then changed as the inflation index changes. The smaller the value, the more easily the basket could be used with small prices.

Because it would be too expensive to calculate the base inflation index every day, the value of the basket would be interpolated to provide the daily price that would be needed. This would keep the price up-to-date and give the system more stability than it would have if the value of the basket was only published once a month, i.e. at the time of the latest CPI or RPI figures. This would allow the government to publish the value of a single basket (the rate at which it can be exchanged for normal currency) on the web, on a daily basis. In doing so it would need to make commitments to maintaining the method of calculation and the legal basis for the use of baskets.

The second step: government finances

In Chile, UFs, or baskets, did not attain wide currency among the population until the government started publishing debt in UFs. Only then did the people familiarize themselves with the notion and

51 Office for National Statistics, *Consumer Price Indices: Technical Manual*, Office for National Statistics, 2007, pp 23

begin to use UFs. After launching the basket, the next step for the government would thus be to redesign its debt and the banks it controls to reflect them. The existing indexed debt would be defined in terms of baskets. As new indexed bonds are issued, the asymmetries that are the result of not being thoroughgoing in indexation would naturally be eliminated. Government-controlled banks would be asked to issue accounts denominated in the units.

The government could also restate the entire system of taxes in terms of these units, thereby forcing the total indexation of the tax system to inflation and further encouraging people to learn how to use the new units of account. Taken together, these steps would pave the way for people to start using the new units for setting prices and for defining a wide array of contracts.

Further steps:

Baskets have the potential to be used far beyond the realm of government debt and large financial contracts. Ultimately, expressing everyday prices in such terms would inculcate a familiarity with inflation indexing across the population. To do this, the government would need to adopt policies that encourage the creation of institutions, such as debit cards, credit cards and checking accounts that are designed to facilitate quoting everyday prices in terms of baskets.

Conclusion

Taking these steps may not seem to be one of the most urgent things to do for the current crisis, but they are some of the most *important* things to do if we consider subsequent years, considering the impact such a step might have on confidence if inflation or deflation surprises us, and considering that the current economic crisis could indeed last for some years.

Even though some may fail to see an urgent connection between the creation of the basket and the immediate hazards of the crisis, it will be seen as a step forward to a more rational economic system. It is virtually costless for governments to take the first step, and indeed all of the steps pale in cost with the stimulus packages that are being adopted around the world. Moreover, the steps should be taken *before* there is any possible crisis-induced instability in the price level, after which the damage from that instability would be difficult to undo.

Money is only ever worth what it can purchase. If you have £10 and can buy twenty loaves of bread with it, then you are richer than if you can only buy ten. This is what economists call the "purchasing power of money". It is eroded by fluctuations in prices, particularly for contracts that are not indexed to inflation.

Unfortunately, many of us do not protect ourselves from these changes in prices when we enter into contracts or save money. Even though we should do, many of us do not link such things to a price index in order to preserve our wealth. Now, in a period when inflation has been unstable and many economists have warned of the prospect of deflation, and the Bank of England has started to print money, the potential for erosion of unindexed wealth has become serious. Professor Robert Shiller has a proposal for how we could start to protect ourselves from such a prospect. He has designed a way for the government to start publishing the price of a shadow currency that is linked to the price of a basket of goods. As the basket price changed, so would the currency price, thus meaning that we could easily link our contracts and investments to changes in the prices of goods. This would help us all to protect our wealth.

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