What is the Relationship Between Complementary Currencies and Inflation?

Dan Hetherington

Submitted 22nd September, 2006

Abstract

There has been a rapid proliferation of complementary currencies since the 1980s. By and large, these initiatives have not been created by economists, nor has their design been drawn directly from economics textbooks. Indeed, as economic theory tends to make simplifying assumptions about the nature of money, it can be difficult for an economist to understand how such currencies differ from types of money familiar in economic theory. Nevertheless, complementary currencies present important policy questions to economists, the most urgent being, *do they present a danger to the existing economy?* There is a clear, *prima facie* case that, if complementary currencies behave as a form of liquidity indistinguishable from other fiat monies, they could cause inflation by expanding the money supply as predicted by the Quantity Theory of Money.

This paper examines that possibility in two ways. Firstly, a formal model is developed to draw out the key questions in determining whether or not a complementary currency acts as an increase in the money supply. This model illustrates that the design of the currency is important, but that an appropriate currency can increase trade without reducing the demand for existing fiat money. In the second part, complementary currencies are incorporated into an Optimal Currency Area framework, and their potential as an instrument of policy is examined. Under the management of a central authority, it is argued that complementary currencies could be used to target expansions in the money supply in those geographical regions that are most in need of them, whilst maintaining a tight monetary policy in other areas of the economy, thus providing a more adroit tool to control inflation than manipulation of traditional monetary aggregates.

Contents

Chapter 1

Introduction

Complementary currencies (CCs) are poorly understood by economists, and their economic features can be difficult to separate from their non-economic aspects. The recent explosion in the use of complementary currencies in many different countries in the world has not been lead by economic theory. Many of their architects and advocates justify their introduction not on economic grounds, but by questioning one of the implicit assumptions economists make about money: that it is value-neutral. They claim that far from being a pure medium of exchange, money's properties shape not only the pattern of trade but the nature of social relations between buyers and sellers. Such currencies are explicitly designed to encourage cooperative behaviour, but how much of this behaviour is programmed economically into these currency systems and how much is a conscious voluntary choice is not always easy to unravel.

Understandably, the economist's most urgent concern with complementary currencies is whether they present a danger to the traditional economy in which they are created. In an age in which monetary theory is so prevalent, and the money supply is actively managed in all industrialised countries by one means or another, there is a plausible *prima facie* concern that by uncontrolledly expanding the money supply, complementary currencies pose an inflationary threat. However, it is equally clear that the real question is substantially more complex than it appears on the surface. In order to determine whether complementary currencies are inflationary, it is necessary to understand exactly how they differ from the forms of money that are familiar in economic theory, and why they are so popular. It is necessary to review relevant areas of economic theory, but also to appraise how readily they can be applied to different currency environments, and to discuss whether they can be modified or extended to better describe these emerging conditions.

The subject of complementary currencies is broad, with a sparse existing literature. It is made complex by the variety of motivations claimed for the introduction of complementary currencies, ranging from reducing local unemployment to 'cultural revitalisation' (Lietaer, 2001a, Ch 5; DeMeulenaere, 2006). The types and properties of such currencies also vary widely. The next chapter summarises some key aspects of their variation and history.

Next, a simple model is presented in the context of the Quantity Theory of Money — Chapter 3 reviews and discusses the relevant theory, whilst a formal model is developed in Chapter 4. This model crystallises thinking, concentrating on a specific set of features and a well-defined economic role for the complementary currency. Within this framework, it is possible to discuss the likely impact of such a currency on money demand, and therefore on inflation. Although this approach examines a specific set of circumstances, it is possible to identify the key mechanisms by which complementary currencies may create inflationary pressure, and the appropriate questions on which an analysis of a specific situation should concentrate.

In Chapter 5, a second line of enquiry reviews Optimum Currency Area theory. As an established framework for analysing the costs and benefits of breaking economies into small regions governed by independent currencies, it appears an obvious perspective from which to investigate complementary currencies. The possibility of extending this framework to look not at geographically separate currencies, but overlapping or concentric currency areas is discussed. Chapter 6 concludes, summarising findings and suggesting

possible further lines of enquiry.

Chapter 2

Complementary Currencies

A complementary currency is a secondary medium of exchange that circulates alongside national money. It is not designed to compete with existing money systems: it will normally have design features which give it substantially different properties than national money, in the hope that it will support and augment rather than replace or undermine the existing money system. The convention adopted here is that the term 'money' refers specifically to the existing national (or supernational in the case of a currency such as the Euro) currency, whereas 'currency' is used variously to mean anything that is designed to be used as a medium of exchange.

2.1 Functions of Money

Economic theory traditionally stresses the functions of money as a medium of exchange, store of value and unit of account. Money has other uses, less often stressed in the literature, as a standard of deferred payment, a tool of empire and an instrument of speculation (Lietaer, 2001a, pp 332–333). Although these latter functions do not fit as easily into simple theoretical models, they are nevertheless significant: for instance, the US$ 1.9 tr traded each day in the foreign exchange markets is approximately 98 per cent speculative — internationally the speculative function outweighs the medium of exchange function by 50 to 1 in terms of transaction volumes (BIS, 2005, p 1; Lietaer, 2001a, pp 314–317).

Crucially, these functions continually interact with one another. The demand for money is a composite of a demand for each of these functions of money. When demand for one function of money rises, it may affect the amount of money available for use in its other roles.

Probably the most comprehensively explored interaction is that between the medium of exchange and the store of value. As a depression begins, when there is general pessimism about the prospect of a rapid economic recovery, credit-constrained people will rationally try to hoard whatever money they can in order to smooth their consumption through periods of low income. This hoarding reduces the velocity of money, effectively reducing the amount of money available for use as a medium of exchange. Even if much of it is saved, if short-term interest rates approach zero then willingness to lend will tend to disappear (the Keynesian 'liquidity trap', see for example Hicks, 1937) — in other words, banks may be motivated to hoard money as well. The use of a single money as both a medium of exchange and store of value allows the amount of money available for use as a medium of exchange to vary widely — and in the opposite direction to that which most economists would recommend. There may be superfluous medium of exchange whilst the economy is healthy and a sudden insufficiency as a depression begins.

Irving Fisher argued (1933) that this conflict between the store of value and medium of exchange functions was the primary obstacle preventing recovery from the Great Depression in the US by 1933. It has been argued that this trade-off has played some part in the extended Japanese stagnation (eg Krugman, 1998; Krugman *et al*, 1998; Motonishi and Yoshikawa, 1999). Similarly, Joseph Stiglitz's description of the East Asian financial crisis illustrates that the use of money as a speculative tool threatens its efficiency at meeting various other functions, particularly a standard of deferred payment. He claims that the rapid

increases in interest rates that were required to defend several East Asian currencies from speculative attack undermined the currencies' efficiency as a standard of deferred payment, causing a spate of bankruptcies that would not have occurred without the hikes (Stiglitz, 2002, Ch 4).

Although the use of a single money system to achieve all of these aims is most convenient, and minimises the various transaction costs that would arise from having complementary systems, it is clearly possible that in order to best serve one particular function of money, an asset should *not* also be able to function as another. This is probably most obvious in the medium of exchange case, as it is important that any medium of exchange is in roughly constant supply, and not subject to large shocks. Otherwise, according to the Quantity Theory of Money, its value will vary in proportion to the size of these supply shocks, undermining its usefulness as a medium of exchange, assuming that there is some real cost associated with price instability.

In the 1970s, Friedrich Hayek (1976a and 1976b) proposed a system of *competing* currencies as a means to combat inflation. By removing the state's monopoly on the issue of money, a 'free market' in monies would emerge which would finally control the profligacy of governments and central banks. The term *complementary* currency is important in distinguishing the present subject from such ideas as Hayek's. Complementary currencies are not designed to replace national money, nor are they designed to have identical properties. They are typically designed to have a more limited range of functions than money. Usually, they isolate the medium of exchange and unit of account properties and are designed not to be useable to fulfil other functions. They also tend to be local in scope, being accepted only within a small area, which limits the goods and services they tend to be accepted for. They may also have explicitly limited fungibility — that is, unlike money, there may be strict limits on which types of goods an alternative currency can buy: in the most extreme case, some currencies can only be spent in one particular market. These differences between complementary currencies and money create more complexity than is immediately obvious, but the scope for imaginative currency design implies a lot of potential for heterogeneous currency systems to be developed which have various beneficial effects for the economies which build on them.

2.2   Important Types and Features

2.2.1   Fiat Currencies

The exact definition of a fiat currency is difficult to pin down; or at any rate, the term is often used rather loosely. Strictly, it refers to a currency which derives its value from a declaratory fiat, or order of government, giving it the status of legal tender. However, in the literature, it is often described as "an unbacked, intrinsically useless asset" (Kiyotaki and Wright, 1991) although despite the literature explaining why such an asset might circulate (eg Kiyotaki and Wright, 1989) others argue that no such currency has ever existed, emphasising that the acceptance by government of fiat currency in payment of taxes is a form of backing (Goldberg, 2005).

In the context of complementary currencies, a fiat currency is created out of nothing by an authority (sometimes a local government, but not necessarily linked to government in any way). It is generally not legal tender, and only rarely acceptable in payment for taxes.

In cases in which fiat currencies are not convertible into another asset and not acceptable as payment for taxes, the source of their value is debatable. What does seem clear is that their value is linked to their *scarcity*: an excessive issue over and above the amount that individuals want to hold tends to reduce their value (in accordance with the Quantity Theory). The quantity of fiat complementary currencies in circulation therefore has to be actively managed by the issuing authority, who must try to match currency supply to fluctuating demand in much the same way that a central bank manages a national money supply.

2.2.2   Mutual Credit Currencies

In contrast, *mutual credit* (MC) currencies operate on a fundamentally different principle. Although there is a central clearing house, this body does nothing but record transactions. At the moment of a

transaction, the currency is *created* in the form of a simultaneous credit and debit, recorded by the clearing house (either by submitting some form of cheque, or via an electronic means of payment). In a mutual credit system, there is no direct analogue to the quantity of currency issued.

Mutual credit currencies are similar to fiat currencies in that the source of value of the unit of account is debatable. Some MC currencies such as Time Dollars attempt to set the unit of account at par with a fixed quantity of labour, others use a national currency as the unit of account (such as WIR, or the Local Exchange Trading System, LETSystem or LETS). In other cases, the unit of account does not even have a nominal value (such as with the Robust Complementary Community Currency System, ROCS). However, MC currencies are not vulnerable to over-issue and inflation in the same way that fiat currencies are. For this reason, they are often described as 'sufficiency' currencies (cf 'scarcity' currencies to describe fiat currencies), since a transaction can never be precluded by a lack of currency. MC currencies are generally not convertible into any other currency or asset.

In order to accept MC currency, each individual needs to become a member of the system, and hold an account with the clearing house. In contrast, with a fiat currency, an individual implicitly becomes a member of the system the first time he decides to accept payment in complementary currency — there is no formal membership.

Another important difference between the two is that MC currencies are usually transparent: each member's current balance is publicly visible and members are encouraged to prefer to buy from those with the most negative balances. This creates a 'soft' mechanism for balancing trade rather than a 'hard' credit limit, and also divides the responsibility for balancing trade between both the buyer and seller. This point is worth explaining in a little more detail. Consider an economy consisting of just three individuals, A and B who earn more than they spend and C, who spends more than he earns. If trade between the three were governed by an MC system, this would highlight C's deficit to both A and B, who would have the information they need to seek to buy from C wherever possible. In contrast, under a fiat system, the onus would fall entirely on C to either reduce his expenditure (which will have a contractionary effect on the aggregate economy) or find new means of earning money from A and B. Of course, there is no monetary incentive for A and B to seek to buy from C, but there are other reasons why they might choose to do so anyway. Firstly, if prices are fixed, then A might be indifferent between buying from B or C. She might therefore be willing to purchase from whoever is most in deficit, 'merely for the good of the system'. For example, imagine an MC system set up to manage a baby-sitting cooperative, with a fixed price for an hour of baby-sitting in some complementary MC currency. It is quite plausible that in such a system, anybody wanting to hire a baby-sitter would first contact the most highly indebted member. This would be individually rational, since every member gains some small benefit from the 'credibility' or 'health' of the system, which is promoted by avoiding disproportionately large negative balances (see Shraven, 2001a for a discussion of the threat of members leaving such a system whilst indebted; and Sweeney and Sweeney, 1977, for the problems associated with trying to manage a baby-sitting cooperative using fiat CC). Secondly, an economic incentive can be built in to avoid remaining in surplus, which would encourage surplus members to seek ways of spending their balances, knowing that their currency will be most readily accepted by deficit members, who are not similarly trying to spend their own surpluses. The standard way of doing this is to apply a 'demurrage' charge, which will be described in the next section. All in all, this creates an incentive for *both* buyer *and* seller to seek out transactions which will lead to overall system balance — in contrast to a fiat system, in which responsibility falls entirely to deficit members to achieve their own balance. As a consequence, users of these systems often report that they encourage more cooperative, rather than competitive, behaviour (Lietaer, 2001a).

John Maynard Keynes discusses this benefit in the context of world trade in order to justify his proposal of an international system that would incorporate MC elements, presented to the Bretton Woods Conference in 1944 (Keynes, 1980). He argues that (under fixed exchange rates) it is far easier for surplus nations to achieve trade balance than deficit nations — since governments traditionally do not find it difficult to spend more money (and the surplus accrues in the form of foreign exchange in government or central bank reserves). In contrast, the opposite may not be true, and even when a deficit country can achieve trade balance, if it does so by restricting imports then this will have a contractionary effect on world trade. A system for managing international trade should not rely on deficit countries to contract

trade — a balanced and cooperative system should also encourage surplus countries to expand trade with deficit countries. As with nations so, it is argued, with individuals.

As Schraven (2001a) discusses, MC currencies also create the interesting dilemma that whilst individuals are indebted to the MC community as a whole, this credit is agreed by a single individual at the point of a transaction. In contrast, under a fiat system, the full liability for all credit extended lies with the individual who agrees to offer a loan. This creates the potential for a variant of the open-access-resource problem, which may limit the conditions under which such systems are stable (Schraven, 2001a and 2001b).

2.2.3   Demurrage

A further concept relevant to both types of currency is *demurrage*. Demurrage is a charge levied on currency holdings. It was originally advocated by Silvio Gesell (1958) as a disincentive to hoard money. It provides a means of resolving the conflict between two functions of money: the medium of exchange function and the store of value function. By effectively taxing money holdings, demurrage dissuades the use of currency as a store of value — it must either be spent rapidly (before it loses too much of its value) or else banked (in which case banks must make it available for investment or consumption loans in order to avoid paying demurrage charges themselves). In this way, the amount of money circulating would not be prone to wide variation, because there would be a powerful incentive not to withdraw money from circulation.

In practice, demurrage used to mean that a stamp would have to be added to each bank note every week or month in order for it to remain an acceptable means of payment. These stamps could be bought from the post office, with either form of currency. One disadvantage of this approach is that it tends to lead to a surge in spending shortly before a new stamp had to be affixed in order to avoid this cost. However, modern demurrage currencies are entirely electronic, and the charge can either be applied very regularly or even continuously.

Gesell originally advocated the use of a demurrage charge on the national currency (Gesell, 1958). Keynes agreed that this would bring benefits in theory, but believed that some other asset (such as specie) would be preferred and therefore circulate in its place (Keynes, 1935, Ch 23). This may be an anachronistic argument with the advent of non-physical means of payment, which has made money an even more convenient medium of exchange than its closest rivals amongst commodity currencies. Despite his earlier concerns, Keynes later included demurrage on large positive accounts in his proposals for a post-war International Clearing Union, believing that the added convenience of belonging to such a system would so outweigh the cost of such charges that no major country would prefer bilateral arrangements (Keynes, 1980). Irving Fisher advocated the use of demurrage in complementary currencies for specific use in cases in which hoarding was an unusually grave problem, particularly during the Great Depression, and wrote a book partly to try to persuade those interested in setting up complementary currencies to correctly adopt Gesell's recommendation (Fisher, 1933, Ch 1).

Demurrage is a naturally attractive feature for a complementary currency because such currencies are generally designed to function as a medium of exchange, and *not* as a store of value. Experience with demurrage currencies (particularly in Wörgl, Switzerland: see Lietaer, 2001a; Schraven, 2001b) suggests that demurrage also provides an extra incentive for all users of a currency to become its advocates by creating an urgency in their need to find somebody that will accept their depreciating currency. This helps to overcome one practical problem of setting up a complementary currency: the amount of advocacy required by its issuers to increase its acceptance.

Demurrage has been described as being 'equivalent to a negative interest rate.' (Lietaer, 2001a, p 147). Although demurrage currencies can be loaned at any rate of interest (just as with non-demurrage currencies), the opportunity cost of lending is equal to the demurrage charge, whereas normal currencies have no opportunity cost of lending. This reduces the minimum interest rate that a lender will accept, making it viable for nominal interest rates to fall to zero or lower whilst lenders retain an incentive to lend.

Others have observed the similarity between demurrage and inflation — both result in cash balances continuously losing value over time. Whilst this is true, demurrage avoids the principal real costs of

inflation: the unit of account is preserved and the rate of demurrage is not subject to fluctuation (unlike rates of inflation, particularly when inflation is high). It is therefore often associated with the stimulating effects of inflation (by increasing the motivation to spend cash balances quickly) without the destabilising effects (because of the preservation and certainty of the unit of account).

2.3   History of Complementary Currency Systems

A comprehensive survey of historical examples of complementary currency systems is beyond the scope of this paper. Lietaer (2001a) provides such a survey. Here only the main trends will be described.

Demurrage charges have been known to exist in various currency systems for millennia, at least since Pharaonic Egypt. They have tended to emerge whenever a currency is backed by a commodity, especially commodities which are bulky or vulnerable to decay, such as grain. Then, if currency is issued against a commodity store, a demurrage charge must be built in to account for the costs of storage, shrinkage, insurance and so on. It has been claimed that, by establishing a negative interest rate, they have been associated with unusually long-term investments such as the cathedrals built in Western Europe in the Central Middle Ages (Lietaer, 2001a, pp 17–28).

Dual-currency systems have also been observed in indigenous cultures, such as Bali (Lietaer and DeMeulenaere, 2003).

Interest in both demurrage and in complementary currency systems increased rapidly during the Great Depression. Irving Fisher's book 'Stamp Scrip' (1933) catalogues local currencies in the US, and urges the adoption of demurrage charges to prevent hoarding (see also Mitchell and Shafer, 1984, for thousands more examples from North America during this period). Alternative currencies were also set up in Austria and Germany. Some of these experiments were very successful in reducing unemployment and revitalising the local economy — for example, the success of a CC in the Austrian town of Wögle in reducing unemployment by 25 per cent lead to a meeting of 200 mayors from other Austrian towns to vote unanimously to adopt Wörgl's system (Schraven, 2001b, pp 1–5; Lietaer, 2001a, pp 153–5). However, in all cases attempts to replicate these successes more widely were blocked by central authorities: by the German Ministry of Finance in 1931, the Austrian central bank in 1933 and by Franklin Roosevelt by executive decree in 1933, against the advice of Undersecretary of the Treasury Dean Acheson (Lietaer, 2001a, pp 156–7). The threat of inflation was cited by the Austrian central bank as its main reason for opposing these currencies. Each of these governments subsequently demonstrated its political commitment to centralised (as opposed to decentralised, popular or activist) solutions to its country's economic problems.

The only major survivor of this period is the *Wirtschaftsring-Genossenschaft* (or 'WIR') in Switzerland, a predominantly mutual credit system without demurrage which was founded in 1934 and has grown steadily in size over the last seventy years. It is used both by individuals and small businesses. Currently, over US\$ 2 bn[1] is transacted annually through this system by 80000 members.

There has been a dramatic explosion in the use of complementary currencies since the late 1980s, particularly in the UK, US, France, Germany, Australia, New Zealand, Argentina and Japan (Lietaer, 2001a, p 159 and 2004; Scott Cato, 2006). In Japan, for instance, the number of systems in operation has grown from around 50 in 1985 to over 600 in 2003 (Lietaer, 2004). Systems currently in operation are highly diverse, both in the underlying concepts they employ (such as fiat, MC, hybrid systems) and the physical form they take (including both paper and various forms of electronic architecture). Globally, there were 3000 complementary currency systems operational by 2001, according to the *Financial Times* (Lietaer, 2001b). LETS, a form of MC currency, is the most prevalant form.

Recently, governments have shown greater interest in the use of CCs as a means of achieving their wider economic objectives. In the UK, for example, Williams *et al* (2001) cite papers from the Department for Education and Skills, the Home Office, the Social Exclusion Unit and the Department for Environment, Transport and the Regions on the use of MC systems as a mechanism for assisting people back into employment. The central bank in New Zealand has recognised that they have a role in controlling inflation (Lietaer, 2001a, p 215).

---

[1]The WIR's unit of account is the Swiss franc: annual trade amounts to approximately 2.5 bn Swiss francs (Lietaer, 2001a, p 168)

Chapter 3

Theories of Inflation

3.1 Quantity Theory of Money

Economists' theoretical view of inflation has long been dominated by the Quantity Theory of Money (QTM), dating at least to the 16th Century when it successfully explained the impact of large silver inflows from the Americas on European prices (eg Galbraith, 1975). In the 20th Century, it was most closely associated with Irving Fisher and Milton Friedman. Little space will be devoted to it here, but its basic form needs to be outlined in order that its applicability to CCs can be examined.

The modern formulation of the QTM is based on Fisher's equation of exchange (Fisher, 1922):

$$MV = PT,$$

where M represents some measure of the money supply, V represents the velocity of this money (the average number of transactions made by each currency unit per unit time), P is the average price level and T is the number of transactions made in the particular type of money defined by M.

Much of the content of the QTM lies in the assumption that in the medium term, V and T are roughly constant — the implication being that the ratio P/M is also constant, so that any increase in the money supply will result in a one-for-one increase in the general price level.

The theory has had some considerable success in making verifiable predictions (eg Lucas, 1980), although over the longer term, it has failed to explain why the large post-war increases in money supply in most Western economies have not nearly been matched by a concomitant increase in the general price level (Begg *et al*, 1997, p 458). It seems that over the past few decades, the demand for money has risen substantially — a predictable consequence of financial deregulation, amongst other factors. Since QTM predictions are primarily medium-term, this should not be considered a fatal weakness of the model; however, it does illustrate the vulnerability of the theory to any violation of the twin assumptions that V and T do remain constant (Jucker-Fleetwood, 1958).

There are two obvious ways to introduce a second, complementary currency into this framework. One approach would be to alter the definition of M to include the CC, so that its introduction could be seen as an expansion in M, all else remaining constant. An alternative approach would be to exclude the CC from M, and instead to concentrate on T — if money transactions are displaced by those in CC, then T would be expected to fall — so if V remains constant and the monetary authority does not make any compensatory change to M, then any reduction in T would be reflected in a proportional rise in P, ie inflation.

The first approach models the introduction of a CC as an increase in the money supply; the second, as a potential reason that the demand for money might fall. Either formulation suggests the possibility that money supply might rise above money demand, leading to a fall in the price of money in terms of goods.

The choice between the two approaches is, mathematically, arbitrary — the equation of exchange is in fact an identity that holds merely due to the definition of the terms. However, for the purposes of the following analysis, the second approach will be adopted. This decision is explanatory rather than

mathematical. Firstly, lumping money and CC together in the single term M disguises their differing properties, which lie at the centre of this analysis. Secondly, the impact of the introduction of a CC on the number of transactions conducted in money (T) is crucial to the question of the inflationary impact of CCs.

Fisher's formulation of the QTM focuses exclusively on the transaction-motive for holding money. Keynes (1935, Ch 13) augments this view by arguing that money is demanded not only to bridge the time between receiving income and spending it, but also for two further and quite distinct motives: firstly for speculation, and secondly as a precaution, under the prediction that there is the possibility that holding money will enable an individual to profitably exploit a future situation that he would be unable to exploit without money holdings.

In general, complementary currencies cannot be used for speculation, as they are almost invariably inconvertible (and when convertible, for example those backed under certain conditions by money, their exchange rate is predictable). They are generally poorly suited to serving as a precautionary asset, since they are so much less liquid than money, able to purchase a much narrower range of items (this is usually a consequence of their local scope). It seems reasonable to neglect the possibility that they will displace money's role as a precautionary asset. Thus, only the transaction-motive remains in which money and complementary currency could potentially compete.

3.2 Keynesian Demand-Pull

Although less often used, the Keynesian concept of demand-pull inflation may also help to make a distinction between the traditional case involving a single money and the introduction of a CC. Demand-pull can be seen as a mechanism by which changes in the price level actually occur in the QTM. For example, Friedman (1969, Ch 1) explains that a doubling of all money holdings will induce all individuals to attempt to elevate their rate of spending, in order to try to reduce their money holdings to their chosen optimum, which they must have achieved prior to their increase in holdings, assuming initial equilibrium. People's attempts to purchase more than they earn will be frustrated by everybody else's attempts to do the same; inevitably prices will be bid up. This, essentially, is the demand-pull mechanism: too much money competing for too few goods.

However, there are two important assumptions implicit in this line of reasoning. The more important is that money is fully fungible: that is, money can be spent on any of the goods that are offered for sale within an economy. Within a single-money framework, this assumption is so obvious as to naturally go unstated; however, if people's additional currency holdings come in the form of a CC with restrictions on the way in which it can be spent, this assumption becomes crucial. The secondary assumption is that the economy is at 'full capacity'. This is a useful abstraction whose inherent implausibility is rarely important. In the model Friedman discusses, it is a reasonable simplification, but for the purposes of modelling the introduction of a CC, it is important to assume that an economy will always have some sort of 'spare capacity', even when booming — there will be some resources that are not utilised as fully as they could be.

One very specific example of this is modelled in the next section: transactions of luxury services with high search costs that are vulnerable to disturbances in economic conditions (a proper explanation of this will be given alongside the model). However, there many examples. A service-provider which has fixed capacity per unit time but is subject to time-varying demand, such as a restaurant, will almost invariably have excess capacity at some times of the day. Under a single money system, primitive means of varying prices with time (offering discounts for early diners, or 'happy hours' in public houses) may go some way to utilise this spare capacity, but it is never practically possible to contrive a constant level of demand, even approximately. However, suppose that instead of doubling money holdings as Friedman suggests, that instead each individual received extra currency holdings in a currency that could only be used to purchase goods and services that could be produced using spare capacity. This injection of liquidity is constrained by design from competing with money for existing transactions. It provides each consumer with the option of purchasing spare capacity without giving up any of his previous consumption.

Taken together, the alteration of these two assumptions (currency fungibility and full capacity) casts

doubt about the process Friedman describes. If an injection of currency was made which was restricted to be non-fungible, so that it could only be used to purchase goods and services created using spare economic capacity, then more economic resources would be activated and the real economy would grow without bidding up prices.

3.3   Possible Policy Responses

The difference between whether CCs *tend* to cause inflation and whether their introduction leads to higher inflation *in practice* is dependent upon any policy response. One potential response to the introduction of a CC which was known to reduce the demand for money would be a simultaneous contraction of the money supply — this could clearly prevent resulting inflation even if the new CC created additional inflationary pressure. Whether such a policy response would be appropriate depends on the relative costs and benefits of the two different money supplies — the single-money and dual money systems — and on whether it is realistic to expect that such money-supply management could be undertaken successfully. These different situations are now discussed:

3.3.1   *Ceteris Paribus* (No Policy Response)

The simplest situation to analyse is the case in which CCs are introduced without any policy response. Using the Quantity Theory, the introduction of a CC will raise prices above what they would otherwise have been if it reduces T. That is, if the number of transactions made in national money falls as a result.

Two features of a CC could potentially influence T. Firstly, existing transactions could be made in CC rather than money following its introduction. Secondly, the CC could enable new dual-currency transactions which would otherwise not have existed. A dual-currency transaction is simply a transaction in which the buyer pays partly in CC and partly in money — these are common in many CC systems (and discussed in greater depth in Section 4.3). The first will tend to decrease T and thus increase P; the second will tend to increase T, decreasing P — so if the former dominates the latter than the CC will tend to be inflationary, whereas if the latter dominates the former then the CC will tend to be deflationary.

3.3.2   Alongside Monetary Contraction by the Central Bank

Suppose that the introduction of a particular CC was found to reduce the number of transactions T in national money. In this case, the introduction of a CC will still not be inflationary if the central note-issuing authority compensates for this fall in T with a reduction in M. Whether or not this policy will be welfare-improving will depend on whether the newly introduced CC has a greater positive impact on welfare than the national money which must be withdrawn from circulation to compensate.

A truly complete answer to this question is beyond the scope of this text. However, one particular case can be analysed fairly straightforwardly. One possibility is that the introduction of a CC will displace money transactions in a small proportion of the cases in which it is used. Suppose that this proportion was 20 per cent — ie that four out of every five transactions in which CC is used would not otherwise have occurred in national money, but that the fifth transaction would have.[1] In this case, the CC creates inflationary pressure which could be offset by the central authority by reducing the money supply by one fifth of the quantity of new CC issued.

If it were to do this, there would be a gain and a loss. The gain would be that the new money-and-currency supply would be enabling more transactions than it had been before the CC was introduced — the real economy would have expanded, and *without* any inflationary effect. The loss would be that the central authority would have lost its seigniorage on the monetary contraction (or, if it had achieved this contraction buy buying cash with bonds, it would have increased the interest for which it would be liable).

---

[1] Assume, for simplicity, that in this case no dual-currency transactions take place.

3.3.3 The Loss of Centralised Control of the Money Supply

A further question is raised by this example, and that is whether it is reasonable to expect that the monetary authority is capable of accurately adjusting the money supply to take into account the introduction of other forms of currency, even if it has no control or knowledge of these other currencies. There is no easy way to answer this question without making further assumptions about the way in which CCs were issued. However, the information on which the central authority bases all of its decisions is similarly indirect: estimations of aggregates whose interacting effects on inflation are imprecisely understood. In contrast, CC transactions tend to be very well-documented: of the two largest contemporary CC systems, all transactions through the International Reciprocal Trade Association (IRTA) have to be reported to the US Internal Revenue Service, and all trade through the WIR is similarly meticulously documented (Stodder, 2000). This information could probably be processed by a central bank if this were deemed useful.

3.3.4 Money Demand Volatility

It may cogently be argued that the threat of *volatility* in the demand for money is a more serious danger to a central bank's management problem than a steady decrease in demand. This dimension of the problem cannot easily be discussed without an elaborated model, so discussion is postponed until Chapter 4.

Chapter 4

Currency Scarcity Model

The following model illustrates how a negative income shock can create a scarcity of currency within a community, leading to a breakdown of intracommunity trading. The model illustrates how this breakdown can be avoided using a community currency. The model incorporates money holdings motivated by the transaction-motive, and thus predicts the change in money demand generated by a community currency.

The model consists of a small community of N members, who consume two 'goods' (one good and one service), called oil and teaching. Oil is imported from outside the community (the community has no capacity to create oil, no matter what level of resources it devotes to this), and must be paid for in the national currency. Secondly, teaching is a service which members of the community provide to one another — every member of the community is both a consumer and producer of teaching. Individuals are assumed to be identical in their preferences, but each teaches and learns a different subject, such that each individual can only buy from one other individual in the community and sell to another. The interconnections are such that simple barter would be too complex for trade in teaching. Each individual also has wage employment with a single firm outside of the community.

In order to model the demand for money, it is assumed that income is received at the beginning of each period, whereas all expenditure occurs at the end of the period. There is no saving. Thus, all money is held for exactly one period before being spent. This setup embodies a traditional assumption of the Quantity Theory — that the velocity of money is more or less constant (here it is exactly constant at one transaction per period). Keynes (1935, Ch 13) divides the demand for money into three distinct motives: the speculative-motive, the precautionary-motive and the transaction-motive. Since the CC in question has no possible speculative role, it is assumed not to have any impact on speculative holdings. Further, since it cannot buy necessities, it is assumed to have no impact on the precautionary-motive for holding national money. It can only impact transaction-motive holdings, and this effect can be measured by determining how much money is being held by the community in the middle of each period.

Specific functional forms are assumed for the utility of consumption of oil, teaching, and the disutility of teaching provision, since the different properties of these goods are fundamental to the implications of the model. Oil is assumed to be a relative necessity. It is supposed to correspond to the category of spending which is necessary for 'decent living', but which involves products being bought in from outside the community: such as rent (or mortgage repayments), heating, electricity, water, tax, food and clothing. It is assumed to have a sharply diminishing marginal utility to reflect the 'necessity' nature of these goods (especially in the short-to-medium term). In contrast, teaching is assumed to be a luxury good — each individual can easily do without it at short notice if forced to cut his expenditure. This good is designed to represent any good or service that the community is more or less able to provide itself without outside help (ie to have a low content of materials or labour from outside the community). Examples might include child care, elderly care, private teaching (such as tutoring of schoolchildren or the teaching of vocational skills to adults), as well as goods which it is speculated might be traded more within communities if conditions for their trade were improved, such as community meals, car-sharing and locally grown food. To emphasise the non-necessity nature of this good, it is assumed to have constant marginal utility. So that consumption of teaching is finite, teaching provision carries a moderately escalating marginal

disutility. The model assumes that wage income is exogenously determined, reflecting the limited ability of individuals to alter their level of employment flexibly, particularly in the face of unfavourable economic conditions, which is the environment of most interest.
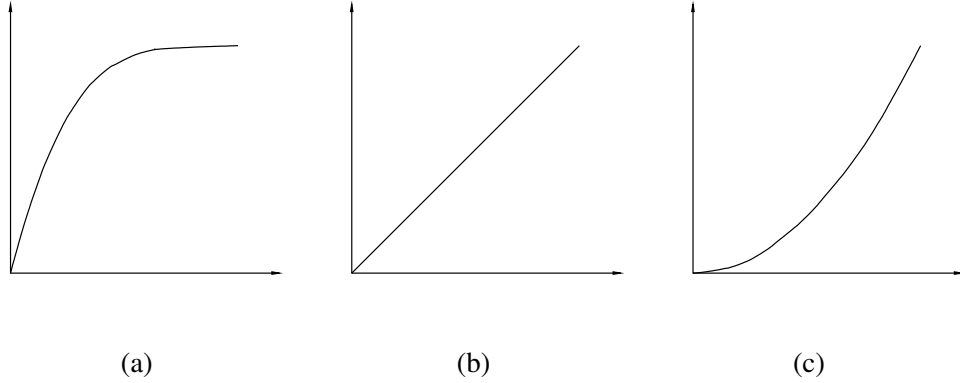

<div align="center">(a)   (b)   (c)</div>

Figure 4.1: (a) Oil has a sharply diminshing marginal utility; (b) learning has constant marginal utility; (c) teaching has moderately escalating marginal disutility

The following explicit functions are assumed for these (dis)utilities, each illustrated in Figure 4.1:

$$u_o = 1 - (q_o - 1)^4$$

$$u_l = q_l$$

$$u_t = -q_t{}^2$$

where u denotes utility, o denotes oil, l denotes learning (consuming teaching) and t denotes teaching (supplying teaching), and each function is valid in the range $q \in [0, 1]$. The final constraint is the budget, given by

$$I = p_o q_o + p_l q_l - p_t q_t$$

By assumption, all individuals have identical preferences and identical incomes, so in Nash equilibrium, $p_l = p_t$ and $q_l = q_t$ so that the local market for teaching clears. We now investigate the equilibrium state of the economy and its response to a worsening of the economic climate (modelled by a fall in the exogenous income, I).

Equilibrium is given by the equality of the marginal utility per dollar spent on oil and teaching, and the marginal disutility per dollar earned in teaching.

$$\frac{\mathrm{d}u_o}{\mathrm{d}q_o}\frac{1}{p_o} = \frac{\mathrm{d}u_t}{\mathrm{d}q_t}\frac{1}{p_t} = -\frac{\mathrm{d}u_l}{\mathrm{d}q_l}\frac{1}{p_l}$$

and

$$I = p_o q_o$$

since income from teaching equals expenditure on teaching by symmetry. Suppose that the economy settles at a long-term equilibrium in which $I = 1$ and $p_o = 2$ (these are both exogenous). The model can be solved to give the endogenous price of teaching as $p_t = 4$ and quantity of money holdings equal to the sum of all transactions in each period, $p_o q_o + p_t q_t = 9$ per person (8 of which is circulating only within the

community economy). Then suppose that there is an unanticipated exogenous shock to the individuals' incomes, and I falls to 0.8, with p_o remaining at 2 — perhaps a factory providing the main source of employment to the town is forced to stop offering overtime due to a fall in sales. If prices are assumed fully flexible, then the price of teaching falls much more than proportionately to 2.3 (a 42% fall in response to a 20% fall in wages) and the quantity of teaching consumed remains constant. On the other hand, if the price of teaching is assumed inflexible in the short run, *all teaching ceases*. The different nature of the goods — the necessity of goods 'imported' into the community next to the relative superfluity of goods bought in the community — means that, when faced with a reduction in income, individuals choose to cut back more on community goods; and money which was previously circulating within the community leaves. This equilibrium is inefficient, because expenditure on teaching does *not* reduce the amount that each household can spend on oil. There is merely a cooperation problem — it is in the community's interest to continue to use as much currency as before to purchase teaching, but it is in each individual's interest to divert all money previously spent on teaching to oil, regardless of the impact that this will have on his own income when this behaviour is mirrored by the rest of the community. In this sense, a community currency can be seen as a means of enforcing a *cooperative agreement* to maintain demand for local goods in the face of a community-wide negative income shock. Unless these transactions are denominated in a community currency, there is the opportunity to 'cheat' on such an agreement by using money received for a local good to purchase a scarce non-local good.

Why might prices in a local market be sticky? There are important differences between a community transaction and an average economic transaction — the buyer and seller are likely to know one another well, and the product or service is likely to be part of an ongoing relationship rather than a single-time transaction. This may make it more difficult for a customer to ask for a discount during periods in which money is scarce, perhaps preferring to purchase less for social reasons (not wishing to imply that the quality of the good or service has dropped, for example). Also, in repeat transactions between the same buyer and seller, it is less likely that the terms of the contract are renegotiated each time (unlike a situation in which each buyer is matched with a different seller each time). Again, it may be socially easier to terminate a contract than renegotiate the terms.

The model could even understate the losses from this breakdown in the community economy, since it is likely that when outside employment is exogenously cut that the disutility of working within the community (providing teaching) will fall because each individual has more free time. So, in this situation, the planner's optimum solution might actually be to *increase* the amount of trade in teaching in the face of a negative income shock.

Now consider an altered model in which there are two separate and inconvertible currencies, one national money in which the oil market deals, and another community currency which is only accepted within the local teaching market. The two markets are effectively decoupled, such that only the budget constraint

$$I = p_o q_o$$

and the equality between the utility per community-dollar of learning and the disutility per community-dollar of teaching

$$\frac{\mathrm{d}u_t}{\mathrm{d}q_t} \frac{1}{p_t} = -\frac{\mathrm{d}u_l}{\mathrm{d}q_l} \frac{1}{p_l}$$

remain. Now, a negative income shock reduces expenditure on oil by exactly the same amount as in the single-currency case, but the local market for teaching remains unaffected — prices and the quantities bought and sold remain the same.

4.1 Why might currency stability be particularly important to a community economy?

There are certain features of the community economy for goods and services provided and consumed locally which imply that it is in need of these extra forms of 'support': the stability of a currency unaffected by

Scenario	Money holdings per person
Before shock, without CC	9
After shock, flexible prices, without CC	5.43
After shock, inflexible prices, without CC	0.8
Before shock, with CC	1
After shock, with CC	0.8
Before shock, without CC, no community economy	1

Table 4.1: National money holdings under different circumstances

local money supply shocks, and by the extra infrastructure that is necessary for the implementation of a complementary currency.

Firstly, local transactions have high search and transaction costs. These are very different from commodity markets. For example, the main cost involved in car-sharing is likely to be finding a passenger that wants to travel to the same place at the same time as the driver. The only means of bringing such search costs down to acceptable levels is likely to be repeating the transaction (finding somebody to share a car to work every day may be feasible when finding somebody to share a car for a single journey is not). *Disruption* may therefore make some local transactions non-viable.

Secondly, local transactions may be personal: the utility of consumption and disutility of provision may well depend on who the buyer or seller is, rather than just the product as is normally assumed. For example, the disutility derived from providing childcare for a family member is likely to be smaller than that for a stranger.

For both of these reasons, community trade may therefore be self-reinforcing — the more local trade exists the more local trade is possible due to the externalities involved with knowing other community members better. The more intracommunity trade exists, the more people get to know one another, and the more the disutility of providing a service that involves a lot of personal interaction falls. Similarly, the more intracommunity trade exists, the more information is shared informally between community members, perhaps reducing search costs associated with many of these goods.

4.2 Consequences for Money Demand

The money demand in each of the four scenarios is summarised in Table 4.1.

The first observation is that, ignoring external shocks, there is a large difference between money demand with and without CCs — the introduction of a CC would reduce the demand for money by almost 90 per cent under these circumstances. This observation reflects the traditional argument that secondary currencies displace money transactions, potentially creating a surplus of money supply over demand, and therefore inflation.

The second observation is that, ignoring CCs, the external shock causes a large variation in the money demand, whether or not prices are assumed flexible. In the normal course of the business cycle, the money supply has to be managed by a central authority to match this variation in demand. Although the specific numbers in this example have been contrived to magnify the effects under examination, the variation in demand for money *during the normal course of a moderate business cycle* is either about half the size (if prices are flexible) or *as large* (if not) as that which could be expected with the introduction of a CC. This presents a difficult management problem for a central authority.

Thirdly, notice that the variation in money demand with a CC is small by comparison — it is identical to the variation in I. The use of a complementary currency to handle a community economy *reduces the variability in the demand for national money*.

Fourthly, the potential effect of the CC in reducing demand for money is dependent on the counterfactual to which it is to be compared. This model illustrates that the community economy may be vulnerable

to total breakdown in the face of external shocks. Many advocates of community currencies argue that there is far less intracommunity trading than would be optimal, and this model provides a potential explanation — that periodic money scarcity is capable of undermining the gradual establishment of such an economy. Therefore, if the counterfactual considered is that due to past negative shocks, the community economy has collapsed (or has never been able to develop), then the transactions enabled by CCs would *not* otherwise occur in national money, and therefore *cannot displace demand for national money*. This situation is illustrated by the final line in Table 4.1. Furthermore, currency designers have argued that CCs can be designed specifically to be only usable to purchase spare capacity, in other words to buy goods that would not otherwise be purchased in national money — so this condition that a CC is only used to build new economic activity rather than to displace money from existing activity *can be built into the new currency by design* (Lietaer, 2006). The most obvious and successful contemporary example of this is Frequent-Flier Miles — this currency has been designed specifically to be only usable to purchase spare capacity, and has been successful in doing so (Lietaer, 2001a).

4.3 Extensions

One aspect of CC introduction not modelled here is the idea of dual-currency transactions (DCTs). These are transactions in which a good is paid for in a mixture of CC and national money. They often arise in practice when a service involves components of both a scarce raw material that must be bought outside the community, and a community labour component. For example, an amateur dressmaker might ask that the cost of cloth be paid in national money, and the cost of labour paid in CC (eg Lietaer, 2001a, pp 206–9).

These transactions, just as with transactions paid entirely in CC, are likely to be new transactions that would not otherwise be possible without a CC, for reasons already described. The novel feature of DCTs, however, is that they tie up extra quantities of national money in transactions that are enabled by the introduction of a CC — in other words, they tend to *increase* demand for national money, having a deflationary effect.

4.4 Conclusions

This model shows that CCs can provide a valuable means of insulating a community economy from the effects of an external shock, if prices in the community economy are inflexible.

It shows that the introduction of a CC may or may not be inflationary, depending on whether the transactions which come to use CC were previously being made in national money. It suggests a mechanism by which the type of transactions typically made in CC are undermined and discouraged in a situation in which there is no CC and the community economy is subject to external shocks.

It therefore shows that if a CC is designed only to be usable to purchase spare capacity that would not otherwise be sold in national money, then its introduction will not reduce demand for national money. Other authors have proposed means of ensuring this (eg Lietaer, 2001a and 2006).

It also illustrates that the introduction of a CC reduces the volatility in money demand that results from a negative external shock, whether prices are flexible or not. It may be that volatility in money demand presents a far greater management problem to a central authority than a gradual decline in money demand stemming from the increasing use of community currencies — even if this were to be a consequence of their introduction.

Chapter 5

Optimum Currency Area Theory

Optimal Currency Area theory provides another perspective from which the possible interplay between complementary currencies and inflation can be examined. In some ways it is a particularly obvious choice: it is a theoretical framework specifically set up to evaluate the benefits of using different currencies to isolate different economic activities from one another — with a particular view to avoiding having to resort to inflationary increases in the money supply as a means of accommodating economic shocks.

The original Optimal Currency Area (OCA) theory was developed by Robert Mundell (1961). At a time at which many economists were speculating as to the consequences of leaving the Bretton Woods agreement in favour of floating exchange rates, it provided a framework for analysing the costs and benefits of designing a system which would maintain fixed rates throughout a particular region — either by hard peg, or through a single currency. He proposed the idea of an 'optimal currency region': a geographical area that should optimally have a single currency, fixed internally but floating against other world currencies. Such a 'region' may or may not be the same as a national territory. In principle, an optimal region could be either larger or smaller than a national economy, or completely independent of them. For instance, he suggested that an optimal means of dividing the US and Canada might be two currencies: an Eastern dollar and a Western dollar, reflecting the economic, rather than sovereign, variation across these countries.

5.1   Benefits of smaller currency areas

Mundell argued (1961) that regions which experience economic shocks differentially would benefit from having separate currencies. This argument operates firmly within the Keynesian economic framework that prevailed at the time at which this theory was first presented. Prices and wages are assumed sticky in nominal terms. For example, in a world consisting of two regions, A and B, suppose that preferences change, reducing demand for B's products compared to those from A. Adjustment to this shock requires that wages fall in B; stickiness prevents this, resulting in unemployment. However, if the two regions have separate currency systems, then B's currency can be allowed to depreciate relative to A, achieving the required erosion of B's real wage and preventing unemployment. The separation of the two economies involves a form of *insulation* of the one from the other.

Implicitly, this argument relies on a model of workers' expectations as being essentially stationary, so that they would fail to predict the longer-term reduction in their real wage. This seems less likely the smaller the region, because smaller regions are more economically open — that is, the cost of living is determined more by the price of goods in other regions, and so it seems less plausible that workers will accept a constant wage when prices in other regions are expected to rise.

5.2   Benefits of larger currency areas

In contrast, ideas about the benefits of larger currency areas have developed over time, Mundell himself (1973, cited McKinnon, 2000) adding significantly to the debate in later years.

The original suggested benefit of large currency areas is the reduction in transaction costs associated with inter-regional or -national trade. The larger the single currency area, the larger the area from which goods can be imported and to which goods can be exported without incurring costs in currency exchange. These costs may be greatly increased if the exchange rate is floating, forcing agents to find ways of managing the risks involved.

More recently, Mundell argued that a large currency area, comprising diverse sub-regions, would also have the effect of supporting those sub-regions which were experiencing negative shocks. The argument is that a currency that remains strong through the shock can be used to smooth the shock's effects — the weaker sub-region can be bolstered by the stronger. Firstly, currency reserves can be run down to spread the costs of the shock over a greater time period, both by government and the private sector. Secondly, within a single currency area, it should also be easier to hedge against this type of shock by diversifying asset ownership throughout the currency area — so that individuals from a flagging region will own assets within other parts of the currency area, lessening the economic independence of these regions. Thirdly, the risk of a negative shock leading to devaluation is likely to lead to a risk premium in lending — and there is evidence of this in Latin America, and in peripheral areas of Europe prior to the Euro (McKinnon, 2000). In contrast, a large currency area with a diversified economy will be much less prone to a significant devaluation — therefore purchasing bonds denominated in this currency will be far less risky. This lower risk will translate into a low risk premium and low interest rates.

In sum, determining the actual borders of real OCAs requires matching the marginal cost of increasing the size of an OCA with its marginal benefit. This much, and the theoretical costs and benefits of large OCAs, are relatively uncontroversial. However, quantifying these costs in any particular case has proven extremely difficult, and different analysts have come to wildly different conclusions as to whether a particular region does or does not constitute an OCA (the main recent debates centring on Western Europe and Asia).

An alternative way of analysing the question is to ask which aspects of a region tend to make it a better candidate for an OCA, and which make it less well suited. It will tend to be the case that larger regions have fewer of the favourable properties, and more of the unfavourable ones.

Good candidates for an OCA should have high labour mobility in legal and practical terms — workers need to be able and willing to move within the area to find work. Poor candidates will have legal restrictions on migration, linguistic diversity and cultural barriers to relocation. Good candidates will have high capital mobility, with little tax or extra risk involved in investment spanning the region. Good candidates will have high wage and price flexibility, so that wages can fall in nominal terms in sub-regions hit by negative shocks without the need for an exchange rate adjustment to achieve the necessary fall in real wages. A fiscal transfer mechanism which can skim money from temporarily prosperous regions and inject it into lagging regions also makes an OCA more realistic. This is one of the central reasons that national economies are often found to make good OCAs — the political problems of redistributing wealth between sovereign governments.

5.3   Large OCAs and Inflation

There is a simple link between large OCAs and inflation. When different sub-regions experience different economic conditions, each sub-region seeks a distinct monetary policy. Suppose again that a currency area consists of two sub-regions, A and B, and that from an initial equilibrium there is an exogenous shift in demand from B's products towards A's products. Ideally, A requires a tight monetary policy, as competition for resources in this area puts upward pressure on wages and prices. However, B would benefit from a somewhat looser monetary policy, to accommodate the shock and allow prices to rise in A, so that the inter-regional terms of trade move in A's favour, leading to inter-regional trade balance. The monetary authority is therefore in an impossible situation — it has too blunt an instrument to set monetary policy optimally for both regions.

Ultimately, the 'balance of payments' between the two sub-regions must be brought back into balance (otherwise money would be continually flowing from B to A, which is unsustainable in the long run). There are various ways in which this could happen:

1. the government could use **fiscal transfer** to balance the deficit,

2. unemployed workers could **migrate** from B to A,

3. if monetary policy accommodates the shock, **inflation in A** could make locally produced goods less attractive than goods imported from B, increasing A's imports and reducing its exports, balancing trade, or

4. if monetary policy remains tight, then an increase in **unemployment in B** would slowly reduce nominal (and real) wages in B, leading again to A increasing its imports from B and reducing its exports.

Some degree of fiscal transfer will occur even without policy intervention: tax revenue based on economic activity will fall and expenditure on benefits will rise in the lagging region. If both regions are taxed by a single authority this may be more pronounced, depending on how anxious each government is to balance its budget. However, using large-scale fiscal transfer to offset such shocks in the longer term is likely to be politically unfeasible. Even under the most favourable conditions, migration places a heavy burden on those required to migrate. It may also be a more feasible option for those who are also flexible in other ways — the subgroup of the population that is readily able to migrate may be the same subgroup that is most able to retrain in a different industry, particularly the young. A region that has suffered substantial outward migration may therefore be even more poorly suited to undergoing industrial adjustment (this is discussed briefly by Schraven, 2000).

The central authority is therefore likely to come under pressure to accommodate the shock in order to pursue a full-employment policy, which would have the effect of smoothing the shock but would ultimately result in higher overall inflation.

The purpose of this section is to ask whether there is a potential role for a secondary currency to reduce the pain involved in this adjustment process *without* requiring a persistent increase in the money supply, and also to discuss the ways in which OCA Theory might be adjusted to account for multiple overlapping or concentric currencies. In other words, to ask whether the systematic application of complementary currencies can make large currency areas more feasible by offering a mechanism for combating regional unemployment *without* an inflationary increase in the money supply. In this sense, the direct impact of the CC on inflation is not directly relevant — the important impact is in reducing inflation by enabling the central authority to pursue a tighter monetary policy in the currency area's primary money supply.

What form would a parallel currency take for this purpose? Clearly, it could take any of a number of forms. For the purpose of this discussion, the form of currency will be assumed similar to that described and advocated by Irving Fisher (1933), for the reasons that he outlines. It would therefore have the following attributes:

1. it would be **temporary**: a parallel currency would be introduced in a lagging region to aid in the adjustment to a shock, and would be gradually removed from circulation as adjustment is completed,

2. it would be **issued**, spent into circulation and backed **by a local authority**, either in coordination with the central issuing authority, or under rules laid down by the central issuing authority (such as linking the issue of currency to regional unemployment),

3. it would **trade** (roughly) **at par** with national money, but be **inconvertible**. This would be achieved by backing the currency in national money, but specifying restrictive conditions under which it can be redeemed. For example, it might be accepted at par as payment of local taxes, or be redeemable in national currency after a specified period — the difference in value between national money and temporary currency would therefore be limited, and

4. it would be subject to a **demurrage charge** or carrying cost.

Such a currency could be expected to have various consequences, if issued at the start of a regional depression.

Firstly, it would provide an additional form of stimulating fiscal policy. This currency would be spent into circulation in additional local government expenditures, creating employment where possible for those worst hit by the regional shock. This would be a form of deficit expenditure, since the tax revenue to pay for this expenditure would not be collected until later. This tax would come in the form of demurrage charges, and the ordinary local taxes paid for in CC. This would therefore increase the local government's ability to smooth the consequences of the shock into the future and give it the capacity to create new, targeted spending. This would come at a time during which its budgetary position would otherwise be worsening, as it comes under political pressure to provide additional support to the unemployed and faces reductions in a wide range of tax revenues that are linked to economic activity. The local authority would not have to pay interest on this deficit, and an arbitrarily large proportion of the new spending would be paid for through the new demurrage taxation (Fisher (1933) lists many cases in which in practice this spending was entirely financed by demurrage).

Secondly, such a CC would act to accelerate regional import substitution. This is one of the fundamental mechanisms by which the regional payments balance can be achieved — the lagging region finds means of replacing products previously bought in from another region with new local production. Under normal circumstances, this only begins to take effect after a slow and painful differential adjustment of wages has reduced the price of locally produced products. A CC would have the same effect, but without the slow and painful adjustment of wages. 'Painful', in this sense, means that wages are only bid down due to a rise in unemployment. Instead, there is a natural incentive for everybody that holds CC to find an alternative, local supplier for everything that she needs to buy, since local suppliers can be persuaded to accept CC as partial or full payment for goods, whereas the local nature of the currency means that goods imported from another region will have to be paid for entirely in money. The demurrage charge adds an extra incentive in the same direction — given the opportunity of making a purchase in either money or CC, the CC transaction will always be chosen as a means of avoiding paying the next demurrage charge on CC holdings.

Can this be a long-run solution? Is it possible that the balance of trade between two regions can be permanently changed by a temporary CC, even without a change in the relative real wage between the regions? Theory suggests not, that the inevitable real wage drop will have to occur during the period over which the CC is being phased out, otherwise local and inter-regional transactions would naturally return to their former pattern.

On the other hand, it is questionable to what extent 'long-run equilibrium' is relevant here. The CC can be phased out over an arbitrarily long period, slowing the necessary adjustment of real wages to any extent necessary — to a rate, hopefully, at which they *can* adjust. Migration as a mechanism for adjustment is more realistic in the longer term, and the smoothing of a shock creates a greater possibility that opportunistic migration can make the adjustment rather than forced migration (workers searching for and finding a better job in a different region rather than moving to another region as a 'last resort' after being made unemployed). Moreover, in an environment in which shocks are a normal part of the economic landscape, it may only be necessary to mitigate the effects of a negative shock until the next positive shock comes along.

Thirdly, Fisher argues (1933) that the increased multiplier effect of a demurrage currency prevents people's temptation to hoard money from exacerbating a negative shock. Friedman's permanent income hypothesis suggests that an unexpected temporary negative shock to a household's income should translate into only a small reduction in its consumption, since this loss in lifetime income should rationally be spread over the remainder of the household's lifetime. However, if the shock is perceived as permanent, then the immediate reduction in consumption will be equal to the reduction in income. Worse, if the household is (or perceives itself to be) credit-constrained, then the immediate reduction in consumption may be proportionately more than the drop in income, particularly if the household perceives that conditions are likely to deteriorate — which may be a self-fulfilling prophecy: if all households expect conditions to worsen and therefore radically reduce consumption, then the local economy will collapse to a much greater extent than that made necessary by the negative shock. Fisher saw demurrage as playing a crucial role in protecting the local economy from the sudden withdrawal of liquidity that hoarding could precipitate. CC becomes a very unattractive store of value due to the regular carrying charges, so it is rarely withdrawn

from circulation. Moreover, the incentive to avoid paying the carrying charge increases the velocity of this currency above that of national money — to an extent which can be 'designed in' by setting the rate of demurrage.

Under these circumstances, the question of whether CCs cause inflation is framed rather differently; particularly, any attempt to apply the usual *ceteris paribus* condition is clearly misplaced. The introduction of CCs as a systematic way of adding geographically targeted liquidity to a currency area experiencing differential economic shocks provides an *alternative* means of accommodating those shocks and therefore limiting unemployment which *avoids* a further expansion of the money supply. The direct effect of the introduction of a CC is not the issue — it is much more important that the CC is less inflationary than a liquidity expansion in national money.

Chapter 6

Conclusion

The preceding discussion has followed two distinct lines of enquiry, reflecting two important senses in which the policy question under consideration can be interpreted.

From a policy-maker's perspective, the question, 'What is the relationship between complementary currencies and inflation?' divides conveniently into two sub-questions. Firstly, 'Is it safe to allow complementary currencies to be set up, without an inflationary risk?', and secondly, 'Is there a way of incorporating complementary currencies into policy as a means of controlling inflation?'.

This discussion has pursued these two questions separately. Firstly, a model was set up to clarify thinking about a local currency such as a LETSystem, created to try and promote a new level of intra-community trade that was not previously taking place. This model suggested multiple possible benefits from such a currency: a CC might protect and promote intracommunity trade which could otherwise break down due to price inflexibility, and a CC might protect the national currency from fluctuations in demand for national money. In this model, the exact nature of the CC in question is not specified — it could have any properties that result in a functioning trade in community goods. The defining feature of the CC involved in this model is that it have limited fungibility, so that the majority of trade for which it can be used is intracommunal, not incorporating significant extracommunal inputs. In most existing CC systems, this is readily achieved by the local scope of the project, making it uneconomic to offer goods for sale in CC which require a money cash flow to purchase materials. However, it could also be applied to more geographically ambitious projects whose design explicitly imposes appropriate restrictions on fungibility to ensure that the new CC remains outside markets which should continue to be denominated in national money.

An example of such a system is the proposed *Saber* in Brazil (Lietaer, 2006). This is a voucher, issued against spare capacity in higher education in Brazilian universities. It is given by schools in less affluent areas to younger children who are believed by teachers to be underachieving. These students can then use this currency to purchase one-on-one tuition from older students who can, in turn, use the currency to pay for their own university fees. This provides a means of market differentiation, by which spare college capacity can be filled without lowering prices for those students that provide the universities' revenue base by paying in cash. The key to the success of such a project would be to maintain this lack of fungibility — particularly, to ensure that such vouchers are not purchased at a discount by students who would otherwise have paid their tuition in money. This presents only an administrative problem, to which various possible solutions present themselves. The nature of such organisational problems is not a concern here: only that *if* they can be overcome (which seems plausible), *then* such a situation would be broadly analogous to the model presented herein. Crucially, in both cases the new currency is designed to be exchanged only in new business dealings, leaving existing transactions (and the demand for money associated with them) intact.

The second section of this discussion approaches the question from the perspective of a policy-maker in the central issuing authority of a large currency area (perhaps a multi-region country), using the existing Optimal Currency Area framework as a starting point. It discusses the potential role for complementary currencies in providing geographically targeted support to regions experiencing negative economic shocks.

In some ways, this can be thought of as being similar to a strictly localised monetary expansion, although the true situation and mechanisms involved are more complex. Such currencies were originally proposed by Irving Fisher (1933) as a means of stimulating economic activity — which, on the surface, appears to be a poor strategy for controlling inflation. However, when viewed as an alternative to a policy of monetary expansion designed to relieve the pain of adjustment in lagging regions, such a policy's benefits become clearer. Unlike the community system discussed earlier, such a currency would be temporary, and gradually work its way out of circulation through a carrying charge and perhaps redemption against local taxes — leaving the money supply unchanged in the long run. Although not actively involved in implementing this policy, the New Zealand central bank recognises the important role of complementary currencies in controlling inflation by providing alternative means for the most economically distressed areas to fight unemployment without resort to an expansion of the money supply (Lietaer, 2001a, p 215).

When dealing with a currency with such fungibility — a CC which is acceptable in payment for some kinds of tax is clearly in partial competition with national money — the issue of monopoly control over the money supply becomes a more pertinent question. Clearly, any currency that is acceptable in payment of tax must come with some form of government sanction, but as many developed economies move further away from permitting even central government to control the money supply, there is scope for real debate as to whether local government can safely be given freedom to exercise a similar — albeit much weaker — right. This risk could be eliminated if such currencies were under the loose coordination of the central issuing authority, or at least subject to a set of regulations linking the issue of CCs to regional economic conditions.

As an entirely theoretical discussion, it would be unwise to make confident claims about the inflationary consequences of actual complementary currency systems purely on the basis of the models developed herein. However, the preceding arguments ought to highlight the obvious problems with the *prima facie* argument that, as 'simply another form of liquidity', complementary currencies are 'equivalent to an expansion in the money supply'. The wide variation in the possible properties of complementary currencies, as well as the wide variation in the possible ways and situations in which they can be used, ensure that the real situation must surely be more complex than that.

There are considerable difficulties in designing empirical tests of the questions discussed here. Although substantial data could be sourced from existing complementary currency systems, particularly mutual credit systems in which all transactions must be cleared through a central authority, there are much greater problems involved in assessing their direct effect on the general price level within an economy. Williams *et al* (2001b) estimate that the total value of all exchanges made through LETS in the UK sum to only £1.4 m — even if this amount of currency created much more inflationary pressure than an equivalent expansion of the money supply, its effect on price indices would be econometrically undetectable.

An alternative approach would be to focus on the impact of a non-fungible complementary currency on prices within a single market. For example, substantial time-series data exists on the volume of Frequent-Flier Miles issued and spent, and air ticket prices. It would be feasible to empirically assess whether their introduction has increased the price of air fares. The main obstacle in completing such work lies in the commercially confidential nature of this data. This currency is designed to have limited fungibility: not only can it be used to buy products only in a single industry, but there are various restrictions on specifically which tickets can be purchased with this currency — it therefore fits the description of a 'service-provider with fixed capacity per unit time [that] is subject to time-varying demand', as discussed in Chapter 3. On the basis of this analysis, then, it would be expected that Frequent-Flier Miles, assuming they have been competently issued by airlines, will not have increased the price of air travel.

Chapter 7

Bibliography

BANK FOR INTERNATIONAL SETTLEMENTS (BIS), 2005, 'Triennial Central Bank Survey: Foreign Exchange and Derivatives Market Activity in 2004', Basel, Switzerland: Bank for International Settlements

BEGG, DAVID, STANLEY FISCHER AND RUDIGER DORNBUSCH, 1997, 'Economics', Maidenhead: McGraw-Hill (5th edition)

CAHN, EDGAR, 2001, 'On LETS and Time Dollars', *International Journal of Community Currency Research*, Vol 5

DEMEULENAERE, STEPHEN, 2006, Appropriate Economics Website, <http://www.appropriate-economics .org/>, accessed 18/8/2006

FISHER, IRVING (assisted by Harry G Brown), 1922, 'The Purchasing Power of Money, its Determination and Relation to Credit, Interest and Crises', New York: Macmillan (revised edition)

FISHER, IRVING, 1933, 'Stamp Scrip', New York: Adelphi Company

FISHER, IRVING (assisted by Herbert W Fisher), 1934, 'Mastering the crisis: with additional chapters on stamp scrip', London: G Allen & Unwin

FRIEDMAN, MILTON, 1969, 'The Optimum Quantity of Money: And Other Essays', Chicago: Aldine Publishing

GALBRAITH, JOHN KENNETH, 1975, 'Money: Whence It Came, Where It Went', Boston: Houghton Mifflin Company

GERLACH, STEPHEN, 1995, 'Testing the Quantity Theory using long-run averaged cross-country data', BIS Working Paper No 31

GESELL, SILVIO, 1958, 'The Natural Economic Order', translated by Philip Pye, London: Peter Owen Ltd

GOLDBERG, DROR, 2004, 'On the Implicit Convertibility of Fiat Money', Working Paper, Texas A & M University

GOLDBERG, DROR, 2005, 'Famous Myths of "Fiat Money"', *Journal of Money, Credit and Banking*, 37, 957–967

HAYEK, FRIEDRICH, 1976a, 'Choice in Currency: A Way to Stop Inflation', London: Institute of Economic Affairs, Occasional Paper 48

HAYEK, FRIEDRICH, 1976b, 'Denationalisation of Money An Analysis of the Theory and Practice of Concurrent Currencies', London: Institute of Economic Affairs

HICKS, JOHN, 1937, 'Mr Keynes and the "Classics": a Suggested Interpretation', *Econometrica*, Vol 5, 147–159

INTERNATIONAL RECIPROCAL TRADE ASSOCIATION (IRTA), 2006, <http://www.irta.com/>, accessed 14/7/2006

JACKSON, MARK, 1997, 'The Problem Of Over-Accumulation: Examining And Theorising The Structural Form Of LETS', *International Journal of Community Currency Research*, Vol 1

JUCKER-FLEETWOOD, ERIN, 1958, 'The Key Role of the Velocity of Circulation of Money and Credit', *Oxford Economic Papers*, New Series, Vol 10, No 3, 290–315

KEYNES, JOHN MAYNARD, 1935, 'The General Theory of Employment, Interest and Money', London: Macmillan & Co Ltd

KEYNES, JOHN MAYNARD, 1980, 'Activities 1940–1944, Shaping the Post-war World: the Clearing Union'. In: Donald Moggridge (ed), 'The Collected Writings of John Maynard Keynes', Vol XXV, London: MacMillan, 42–66

KIYOTAKI, NOBUHIRO AND RANDALL WRIGHT, 1989, 'On Money as a Medium of Exchange', *Journal of Political Economy*, Vol 97 No 4, pp927–954

KIYOTAKI, NOBUHIRO AND RANDALL WRIGHT, 1991, 'A Contribution to the Pure Theory of Money', *Journal of Economic Theory*, 53, pp 215–235

KRUGMAN, PAUL, 1998, 'Japan's Trap', <http://web.mit.edu.krugman/www/japtrap.html>, MIT, May 1998

KRUGMAN, PAUL, KATHRYN DOMINQUEZ AND KENNETH ROGOFF, 1998, 'It's Baaack: Japan's Slump and the Return of the Liquidity Trap', Brookings Papers on Economic Activity, Vol 1998, No 2, 137–205

LIETAER, BERNARD, 2001a, 'The Future of Money: Creating New Wealth, Work and a Wiser World', London: Century

LIETAER, BERNARD, 2001b, 'Off Centre: Communities cash in on making currencies: Thousands of new independent monetary systems are helping to improve and enhance lives', London *Financial Times*, 24th February

LIETAER, BERNARD, 2004, 'Complementary Currencies in Japan Today: History, Originality and Relevance', *International Journal of Community Currency Research*, Vol 8, 1–23

LIETAER, BERNARD, 2006, 'Proposal for a Brazilian Education Complementary Currency', *International Journal of Community Currency Research*, Vol 10, pp 18–23

LIETAER, BERNARD AND STEPHEN DE MEULENAERE, 2003, 'Sustaining Cultural Vitality in a Globalizing World: the Balinese Example', *International Journal of Social Economics*, Vol 30, Issue 9, 967–984

LUCAS, ROBERT, 1980, 'Two Illustrations of the Quantity Theory of Money', *The American Economic Review*, Vol 70(5), 1005–14

MCKINNON, RONALD, 2000, 'Mundell, the Euro, and Optimum Currency Areas', Working Papers 00009, Stanford University, Department of Economics

MCKINNON, RONALD, 2004, 'Optimum Currency Areas and Key Currencies: Mundell I versus Mundell II', *Journal of Common Market Studies*, Vol 42, No 4, 689–715

MITCHELL, RALPH AND EIL SHAFER, 1984, 'Standard Catalog of Depression Scrip of the United States in the 1930s including Canada and Mexico', Iola, Wisconsin 54990: Krause Publications

MOTONISHI, TAIZO AND HIROSHI YOSHIKAWA, 1999, 'Causes Of The Long Stagnation Of Japan During The 1990s: Financial Or Real?', *Journal of the Japanese and International Economies*, Vol 13, 181–200

MUNDELL, ROBERT, 1961, 'A Theory of Optimum Currency Areas', *American Economic Review*, Vol 51, Nov 1961, 509–17

ONKEN, WERNER, 2000, 'The Political Economy of Silvio Gesell', *American Journal of Economics and Sociology*, Vol 59, No 4, 609–622

Schraven, Jorim, 2000, 'The Economics of Local Exchange and Trading Systems: a Theoretical Perspective', *International Journal of Community Currency Research*, Vol 4

Schraven, Jorim, 2001a, 'Mutual Credit Systems and the Commons Problem: Why Community Currency Systems such as LETS Need Not Collapse Under Opportunistic Behaviour', *International Journal of Community Currency Research*, Vol 5

Schraven, Jorim, 2001b, 'The Economics of Community Currencies: a Theoretical Perspective', Unpublished Honours Thesis, Oxford University, <http://www.jorim.nl/thesis.htm>, accessed 8/8/2006

Scott Cato, Molly, 2006, 'Argentina in the Red: What can the UK's Regional Economies Learn from the Argentinian Banking Crisis?', *International Journal of Community Currency Research*, Vol 10, 43–55

Stiglitz, Joseph, 2002, 'Globalization and its Discontents', London: Penguin

Stodder, James, 2000, 'Reciprocal Exchange Networks: Implications for Macroeconomic Stability', Working Paper, Rensselaer at Hartford

Sweeney, Joan and Richard James Sweeney, 1977, 'Monetary Theory and the Great Capitol Hill Baby Sitting Co-op Crisis: Comment', *Journal of Money, Credit and Banking*, Vol 9, No 1, Part 1, 86–89

Williams, Colin C, Theresa Aldridge, Roger Lee, Andrew Leyshon, Nigel Thrift and Jane Tooke, 2001a, 'Bridges into Work? An Evaluation of Local Exchange and Trading Schemes (LETS)', Policy Studies, Vol 22, No 2, 119–132

Williams, Colin C, Theresa Aldridge, Roger Lee, Andrew Leyshon, Nigel Thrift and Jane Tooke, 2001b, 'The Role of the Thrid Sector in Paving a 'Third Way': Some Lessons From Local Exchange and Trading Systems (LETS) in the United Kingdom', *International Journal of Community Currency Research*, Vol 5