Scotland as an Optimal Currency Area

July 2014

Jane Binner
Department of Accounting and Finance
University of Birmingham
Birmingham
UK
Email j.m.binner@bham.ac.uk

Sajid Chaudhry
Department of Accounting and Finance
University of Birmingham
Birmingham
UK

Andrew Mullineux,
Department of Accounting, Finance and Economics
Bournemouth University,
89 Holdenhurst Road,
Bournemouth, BH8 8EB
UK

James L. Swofford
Department of Economics and Finance
University of South Alabama
Mobile, AL 36688
USA

Abstract

Since the Scottish independence movement has reached the point that there will be a referendum on Scottish independence this September, the issue of whether Scotland is optimal currency areas is very topical. In this paper we review the microeconomic foundations of an optimal currency area. We test these microeconomic foundations. We find that the UK, Scotland and the UK without Scotland meet the microeconomic criteria for a common currency area. While adopting a common currency is ultimately a political decision, these results imply that the broadest of these areas, the UK, is the optimal currency area in the sense of minimizing transactions costs. We do find differences in the UK less Scotland and Scotland economies in loan data. We further find that neither the euro bloc nor the euro bloc including Scotland meet the microeconomic criteria for a common currency area. In the event of a "yes" vote for Scottish independence, the immediate problem facing the Scottish government is to decide on an exchange rate regime that is seen as credible by the financial markets to avoid a flight of capital. How

policymakers chooses between alternative exchange rate regimes is currently a topic for hot debate in central banking circles and the process of a monetary union breaking up is a fascinating area worthy of future research.

1. Introduction

The question of whether Scotland should become independent of the UK is based upon the economic argument that more can be gained for the people who live in Scotland in terms of wealth, talent and resources through a stronger economy. Scottish Independence to some promises more jobs and people getting a more equitable return for their hard work and efforts. It is widely believed that tackling the inequalities will enhance the competitive position by increasing opportunity and participation.

A Scottish government would be empowered to have discretion over fiscal policy to allow greater independence. Ultimately, Scottish independence is about improving the quality of life for all people across Scotland to design the economy for their own particular needs and priorities.

The Prime Minister, David Cameron, has said,

"Supporters of independence will always be able to cite examples of small, independent and thriving economies across Europe such as Finland, Switzerland and Norway. It would be wrong to suggest that Scotland could not be another such successful, independent country."

Thus similar countries to Scotland have seen higher levels of economic growth over the past generation because they have the bonus of being independent, and are able to make the right choices for their nation and economy. In our earlier work, Binner et al (2011), we emphasised that the decision governing monetary independence or monetary union is wider than can be debated within the economic discipline – cultural, political and sociological research is also necessary.

In this paper we review the microeconomic foundations of an optimal currency area. We test these microeconomic foundations to determine whether Scotland should become independent from the rest of the United Kingdom. This issue is topical because the Scottish independence movement has reached the point that there will be a referendum on Scottish independence 18 September 2014 and the interest of some groups in the UK in joining the euro bloc. Since a separate government might well lead to each government adopting a separate currency and the current British government has already raised the possibility that an independent Scotland may not use the pound.

Scottish pound notes are not legal tender in England. [1] Not with standing this oddity of UK financial law, the issue of whether the UK or Scotland or the UK without Scotland are optimal currency areas is very topical.

A common currency area provides several benefits to the people in the countries in the area. One benefit is the complete elimination of transaction costs, because with a single currency

there are no exchange rate conversions. Having a single currency also removes the risk of economic exposure because there are no currency fluctuations. Another benefit to the formation of a common currency area is the characteristic of price transparency associated with having a single currency. With price transparency consumers will be able to comparison shop easily because all goods in both countries will be priced in the single currency. In addition, based on gravitational model results, Rose and Wincoop (2001) argue that national money seems empirically to act as a significant barrier to international trade. This would mean that the gains from reduced transactions costs would be greater than those implied from merely looking at the current size of international trade among the members of a common currency area. Naturally this similarly implies the costs would be greater than those implied by current trade level if a common currency area was split up.

The costs of a common currency in an area include the loss of domestic monetary control and seigniorage for each country.[2] The loss of a common currency area is the deepest question the government needs to address with respect to the stability of the financial system and levels of government debt, plus the loss of revenues from North Sea Oil for example. A monetary union presents huge constraints for an economy in terms of borrowing constraints, however, those in favour of independence might well feel independence is incomplete without domestic monetary independence. Trade-offs between exchange rate flexibility and monetary policy autonomy are the examined in detail in Fratzscher (2002).

Mundell (1963) and McKinnon (1963) developed the idea of the existence of an optimal or common currency areas and concentrate heavily on the macroeconomic foundations that affect the formation of such areas. More specifically, they consider mostly the political criteria that influence monetary policy. The direction of this thinking runs opposite to the idea that the determination of what actually constitutes money depends on the decisions of the people of a particular nation or nations. True to this line of thought, Swofford (2000) proposed microeconomic foundations for the existence of a common currency area and tested the Euro area for consistency.

We find that each of the UK, Scotland and the UK without Scotland meet the microeconomic criteria for a common currency area. These results imply that the broadest of these areas, the UK, is the optimal currency area in the sense of minimizing transactions costs. We do find differences in the UK less Scotland and Scotland economies in loan data. We further find that neither the euro bloc nor the euro bloc including Scotland meet the microeconomic criteria for a common currency area.

The basis for these microeconomic foundations is that for a common currency area to exist, the people included in the area must use the same asset or assets as money. These microeconomic foundations and revealed preference testing are reviewed in the following section of this paper.

2. Existence of and Testing for an Optimal Currency Area

As Binner (2011) discusses, a test of weak separability is that the entire data set and any hypothesized weakly separable subgroup must satisfy GARP. Consistency with GARP is a necessary condition for weak separability. The sufficient conditions checked for in this paper are that the data satisfy GARP when the subutility function is calculated using the Afriat inequalities, see Afriat (1967). This aggregate good based on the subutility function is then included in the hypothesized overall utility function which is tested for consistency with GARP. If the data set including the aggregate good for the subutility function is consistent with GARP, then the original data are consistent with a well-behaved utility function weakly separable in the assets in the

hypothesized subutility function. Since they include an aggregate good constructed using the Afriat inequalities, we call this sufficient conditions the Afriat sufficient conditions.

As Varian (1985) points out, if the Afriat sufficient condition checked for this paper does not obtain, some other sufficient condition might still obtain. Thus if only the Afriat sufficient condition is not met, we cannot reject the hypothesized structure of preference or the proposed common currency area. Thus if money is an elementary good, this means that economic agents treat other goods differently than they treat money. For example, if the people of Scotland treat other goods differently than notes and coins and the people of the rest of the UK do not treat other goods differently than notes and coins, then the two areas do not form a common currency area. However, if the people of the two areas treat notes and coins and other goods in a similar manner, then the two countries can form a common currency area.

Even if the people of Scotland can form a common currency, by choosing to go alone as a common currency they will be increasing transactions costs for all commercial interaction with the rest of the UK. Thus the necessary political consensus to form a common currency area may not develop.[3]

The microeconomic content of this definition of a common currency area requires that the common currency be an asset or assets in economic agents' optimizing function. If this common money is held by consumers for the liquidity services it provides, then it can be modeled in the consumer's utility function:

(1) $$U = U(x, m)$$

where U is a well-behaved utility function, x is a vector of nonmonetary goods and assets, and m is cash that is the good that provides liquidity services.[4]

For currency to be money that is consistent with economic theory including neutrality, the other goods and assets held by the representative agent must be at treated differently.[5] This criteria means the other goods and assets are at least weakly separable from all other goods in the agent's preferences. Thus, if an elementary good like cash is to be the common money in an area, then the people in that area must treat all other goods and assets differently. This restricts U( ) to be at least weakly separable in all other goods and assets:

(2) $$U = U(V(x), m).$$

When a weakly separable subutility function such as V(x) exists, then the marginal rate of substitution between any two goods in V(x) is independent of the level of money holding, m.[6] Less formally, the weak separability criteria for aggregation is a way to identify money as whatever people in the hypothesized common currency area treat as money. V(x) will contain all other goods and assets the agent treats differently than money. If the common currency of an optimum currency area is thought of as using cash as money, then the weak separability restrictions in equation (2) must obtain. If this criterion is not met, then monetary policy in the hypothesized common currency area may be unstable due to the lack of a reliable relationship between money and other goods.

From a set of areas that meet the microeconomic conditions for a common currency, the optimal currency area is the one that is the broadest. The broadest of the areas that meet the conditions is optimal in the sense that it eliminates the most transactions costs.

If more than one person is in a hypothesized optimum currency area, then (1) or (2) is restricted further by the conditions for aggregating over agents. The restrictions for aggregation over agents are more stringent than those for aggregation over goods. As Deaton and Muellbauer (1980) point out, aggregation over agents requires that the preferences of each agent be at least

quasi-homothetic. Thus, quasi-homothetic representations of U( ) and V( ) are required for aggregation over agents.[7] Still the quasi-homothetic restrictions are very stringent and often are finessed by assuming a representative agent as will be done in this study.[8]

A common currency area still requires a political decision by the people within the hypothesized area. Thus the existence of a well-behaved utility function with an at least weakly separable sub-utility function containing money and other monetary assets can be viewed as a sufficient condition for the existence of a common money within an area. Approaches for testing for the existence of such a common currency area are discussed next.

Revealed preference tests are used to test for the existence of a UK, Scottish, UK without Scotland and euro bloc with Scotland common currency areas. The advantages of revealed preference tests are that they do not require the assumption of a particular functional form, and they can be used with limited data observations as is the case with the separate series on Scottish pound sterling notes. However, revealed preference tests do not include random behavior. A detailed discussion of these nonparametric tests is presented in Varian (1982 and 1983).

Let $p^i = (p^i_1, p^i_k)$ be the ith observations for the prices of some k goods and assets and $x^i = (x^i_1, \ldots, x^i_k)$ denotes the corresponding quantities of the k goods and assets. Varian (1982) developed the generalized axiom of revealed preference, henceforth GARP. GARP can be stated:

If xiRxj then pjxj ? pjxi for all i, j = 1,…, n.

If the data satisfy GARP there exists a nonsatiated, continuous, monotonic, concave utility function that rationalizes the data.[9]

Varian's (1985) implementation of reveal preference tests becomes a three part test.

Part 1: Test if the goods in the hypothesized utility function are consistent with with GARP.

Part 2: Test whether the data in the hypothesized subutility function are consistent with GARP.

Part 3: Test a sufficient, but not necessary, condition for weak separability that is whether the data with the goods in the hypothesized subutility function replaced by an aggregate good calculated using the Afriat inequalities are consistent with GARP.

Hereafter, the sufficient condition for weakly separable utility, Part 3, will be referred to as the Afriat sufficient condition.

Consistency with GARP, and the Afriat sufficient test for a well-behaved utility function at least weakly separable in all other goods from money collectively are a sufficient condition for the existence of a common monetary aggregate. If these conditions hold, then a common monetary aggregate exists in an area whether or not the people in the area politically decide to use a common currency. The data set used for these revealed preference tests is discussed in the next section.

3. Data

The data used in this paper for the UK and Scotland are from the Office of National Statistics, the NOMIS – Official UK Labour Market Statistics and the Bank of England

Interactive Database. The data for the euro bloc[10] are used from the European Central Bank's Statistical Data Warehouse, the Eurostat, the Organization for Economic Co-operation and Development (OECD) Statistics and the US Bureau of Labor Statistics. These data are quarterly observations on consumption and monetary asset from 2009Q4 to 2013Q3. The starting point of our sample is the 2009Q4 because the data on 'Notes and Coins' for Scotland are available from 2009Q4, leaving us only with 16 data points. As discussed above an advantage of revealed preference tests is that they can be used with limited data observations. Also perhaps, the recent period preferences of agents are more representative of their choices now as compared to their historical preferences.

We obtain all the non-monetary data (Gross Value Added (GVA), Consumer Price Index (CPI), Labor Hours Worked and Population) for the UK and for Scotland from the Office of National Statistics except GVA for Scotland that we obtain from the Scottish National Accounts Project (SNAP) and Labor Hours Worked for Scotland, Wage Rate for the UK and Scotland, which we gather from NOMIS – Official UK Labour Market Statistics. We obtain the monetary data, which are Notes and Coins and the benchmark interest rate, for the UK and for Scotland from the Bank of England Interactive Database. For the euro bloc, all the data are obtained from the European Central Bank's Statistical Data Warehouse except population data that are obtained from the Eurostat and Wage Rate data that are obtained from the OECD Statistics and the US Bureau of Labor Statistics. The Data Appendix contains a complete list of the data discussed in this section together with relevant sources.

We use real GVA for the UK, for Scotland and for the euro bloc. We assume CPI for Scotland is the same as that in the UK because no separate price index is computed for Scotland. The price index used for the euro bloc is Harmonized Index of Consumer Prices (HICP). The base year for the CPI/HICP is 2005. We use the CPI to convert the consumption and money series into real terms. We use the working population having age of 16 plus to convert the consumption, leisure and money series into real per capita terms. Since we could not find a wage series for the euro bloc, we use Hourly Earnings Index (HEI), manufacturing sector wage for the year 2012 and the population for the year 2012 to calculate a weighted average euro bloc wage rate because no single wage rate is available for the whole euro bloc.[11]
Following Barnett (1980) that the appropriate price for each financial asset is its user cost, we define the nominal user cost of the monetary assets as a discounted interest rate differential, (R-r)/(1+R), where R is the benchmark rate and r is the rate of return on the monetary asset. Since the monetary asset used in our study is only Notes and Coins, r is equal to zero. Following the Bank of England's 'Envelope Approach', we use the rate of M4 component that pays the highest interest rate as our benchmark rate (Hancock, 2005).

Finally, in order to check business sector behavior is the same as that of the overall consumer behavior in Scotland and the rest of Great Britain, we collect data on value of loan balances advanced to the Small and Medium Enterprises (SMEs) from the British Bankers Association.[12] These data are quarterly observation from 2011Q3 to 2014Q4.

4. Results

The data described above on per capita value added, leisure and cash were checked for consistency with the microeconomic criteria for the existence of common currency using Varian's (1985) three-step revealed preference test for weak separability that was discussed previously.

Consistent with the modeling above, the specification check was:

(3) $$U = U(V(C,L)\ M)).$$

where C is real gross value added per capita, L is hours of leisure per capita and M is real cash or notes and coins per capita. That is the data for a representative agent in the UK, Scotland, the UK without Scotland, the euro bloc and the euro bloc including Scotland were checked for consistency with the microeconomic foundations of an optimum currency area with an elementary good as money.

As presented in first three rows of Table 1, for the UK, Scotland and the UK without Scotland data sets both the necessary and the Afriat sufficient conditions obtain. These results imply that the current UK is a common currency area. These results also imply that Scotland going it alone and the rest of the UK are also common currency areas.

Since the optimal currency area can be defined as the broadest possible common currency area, the UK would be the optimal currency area. Thus by going it alone, the people of Scotland would be imposing unnecessary transactions costs on themselves and the people of the rest of the UK.

[TABLE 1 ABOUT HERE]

As presented in the fourth and fifth rows of Table 1, neither the current euro bloc nor the current euro bloc with Scotland added meet the microeconomic conditions for forming a common currency area. This well could be why the euro bloc has had so much trouble recently. The result on the euro bloc may be due to the expansion of the bloc, as Swofford (2000) found some support for the bloc existing at the time. However, Swofford (2000) did find evidence of some potential for problems with some of the members in the southern tier of the euro bloc.[13]

A weakness of our approach is that we are not able to get separate data on various possible near monies for Scotland and the rest of the UK without Scotland. So we looked at some bank lending data for Scotland and the UK without Scotland to test whether lending in Scotland and the rest of the UK are statistically different from each other. To test this we ran Wilcoxon/Mann-Whitney test. These tests have null hypothesis of the equality of medians. Wilcoxon/Mann-Whitney test is a non-parametric test and robust for small sample sizes and compares two populations to see if they are significantly different from each other. The test strongly rejects the null hypothesis that the samples have the same median and we conclude that loans are different in Scotland and the rest of the UK. This result suggests differences in the economies that might cause a Scottish voter to favor adopting their own common currency.

[TABLE 2 ABOUT HERE]

Thus, overall, the data on value added, leisure and money indicate that the UK, Scotland and the UK without Scotland form a common currency area while the data on bank loans show differences in the economies of Scotland and the UK without Scotland. That the data are consistent with various common currency area does not overcomes various macroeconomic and political issues that might arise within the individual countries. In addition to the added transactions costs a Scottish currency would impose on the people of Scotland and the rest of the UK, the people of Scotland would face transactions costs including setting up a central bank and other Scottish governmental agencies. Still the will of the Scottish people remains a necessary condition for Scotland adopting its own currency.

5. Conclusions

A Scottish national currency that might result, if the Scottish people vote for independence, would impose added transactions costs on people on both side of the border with England. Such a common currency area would add an additional national currency that as Rose

and Wincoop (2001) showed might act as an implicit barrier to trade.

Still there is something for everyone in our results. We also have found that data on gross value added per capita, leisure per capital and notes and coins per capita show that UK, Scotland and the UK without Scotland all have the same structure of preferences while the data for the euro bloc nor the euro bloc including Scotland meet these criteria. This means that while Scotland meets the microeconomic criteria to form a common currency area, it would not be an optimal currency area in terms of minimizing transactions costs.

The euro bloc does not appear as a good option for the Scottish people. Neither the current euro bloc nor the euro bloc including Scotland meet the microeconomic foundations for a common money.

Finally, banking data suggest that lending in Scotland is different from lending in rest of the UK. That may be viewed as some evidence supporting a Scottish money and should form the focus of future research. A more immediate problem facing the new Scottish government should a "yes" vote occur is to decide on an exchange rate regime that is seen as credible by the financial markets to avoid a flight of capital. As in any asset market, future expectations are clearly important and linking future movements of the exchange rate to current market movements will be crucial for financial stability. How policymakers choose between alternative exchange rate regimes is currently a topic for hot debate in central banking circles and the process of a monetary union breaking up is a fascinating area so we await the future development in this literature with eager anticipation.

Table 1

Reveal Preference Test Results

	Utility Function	Subutility Function	
Area	GARP	Necessary	Afriat Sufficient
UK	Y	Y	Y
Scotland	Y	Y	Y
UK without Scotland	Y	Y	Y
Euro Bloc	N(8)	-	-
Euro Bloc with Scotland	N(5)		

Note Y implies the condition is met and N means a condition is not met. The reader is reminded that the Afriat sufficient condition is not necessary and that other sufficient conditions might hold.

Table 2

Test for Equality of Medians Between Series

Method	df	Value	Probability
Wilcox/Mann Whitney		3.74	0.0002
Wilcox/Man Whitney (tie adjusted)		3.74	0.0002
Median Chi-square	1	20.00	0.0000
Adjusted Median Chi-square	1	16.20	0.0001
Kruskel-Wallis	1	14.29	0.0002
Kruskel-Wallis (tie-adjusted)	1	14.29	0.0002
van der Waerden	1	12.96	0.0003

Note the sample is from 2011:3 to 2013:4 or 10 observations.

References

Afriat, Sydney N. (1967). "The Construction of Utility Functions from Expenditure Data." International Economic Review 8, 66-77.

Barnett, William, A. (1980). "Economic Monetary Aggregate: An Applications of Index Number and Aggregation Theory," Journal of Econometrics 14, 11-48. Reprinted in: Barnett, W.A., Serletis, A., 2000. (Eds.), The Theory of Monetary Aggregation. North Holland, Amsterdam, pp. 11-48.

Binner, JM., Chen, SH., Mullineux AW., and Swofford, J. (2011) Do the ASEAN countries form a common currency area? Journal of International Money and Finance, 30, 1429-1435

Deaton, Angus and John Muellbauer, (1980). Economics of Consumer Behavior, Cambridge:

Cambridge University Press.
Feenstra, Robert C., (1986). “Functional Equivalence between Liquidity Costs and the Utility of Money,” Journal of Monetary Economics, 17:2, 271-91.
Fratzscher M., (2002), “The Euro bloc, the Dollar bloc and the Yen Bloc: How much monetary Policy Independence can Exchange Rate Flexibility Buy in an Interdependent World” European Central Bank Working Paper Series No 14, June 2002.
Hancock, M., (2005). “Divisia Money”. Bank of England Quarterly Bulletin, 45:1, 39-46.
McKinnon, Ronald I., (1963). Optimum Currency Areas”, American Economic Review, Vol 53, pp. 717-724.
Mundell, Robert A., (1961). “A Theory of Optimum Currency Areas,” American Economic Review, 51, 657-665.
Patterson, K. D., (1991). “A Non-parametric Analysis of Personal Sector Decisions on Consumption, Liquid Assets and Leisure,” The Economic Journal, 101:408, 1103-1116.
Rose, Andrew K. and Eric van Wincoop, (2001). “National Money as a Barrier to International Trade: The Real Case for Currency Union,” American Economic Review, 91:2, 386-390.
_____. (2000). “Microeconomic Foundations of an Optimal Currency Area,” Review of Financial Economics, 9, 121-128.
Swofford, James L. and Gerald A. Whitney. (1988). “Comparisons of Nonparametric Tests of Weak Separability for Annual and Quarterly Data on Consumption, Leisure and Money,” Journal of Business and Economic Statistics, 6, 241-246.
_____. (1986). “Flexible Functional Forms an the Utility Approach to the Demand for Money: A Nonparametric Analysis,” Journal of Money, Credit, and Banking, 18:3, 383-389.
Varian, Hal R. (1982). “The Nonparametric Approach to Demand Analysis,” Econometrica, 50, 945-973
____, (1983). “Nonparametric Tests of Consumer Behavior,” Review of Economic Studies, 50, 99-110.
____, (1985). “Nonparametric Demand Analysis,” software program.

Data Appendix Table

Variable Description and Sources

Variables	Description	Sources
Gross Value Added (GVA)		
UK	UK GVA at base price of 2010	Office of National Statistics, UK
Scotland	Scottish GVA at base price of 2010	Scottish National Accounts Project
Euro bloc	Euro bloc (18) GVA at base price of 2005	European Central Bank's Statistical Data Warehouse
Consumer Price Index (CPI)		
UK	CPI, 2005=100	Office of National Statistics, UK
Scotland	Separate Price Index is not available for Scotland. We assume the CPI in Scotland is the same as that in the UK	-
Euro bloc	Harmonised Index of Consumer Prices (HICP) in the euro bloc (18), 2005=100	European Central Bank's Statistical Data Warehouse
Population		
UK	Population having age 16 and above in the UK	Office of National Statistics, UK
Scotland	Population having age 16 and above in Scotland	-ditto-
Euro bloc	Population having age 16 and above in the euro bloc (18)	Eurostat

Variables	Description	Sources
Labour Hourse Worked		
UK	Total Actual Weekly Hourse Worked in the UK	Office

of National Statistics, UK		
Scotland	Total Actual Weekly Hourse Worked in the UK	NOMIS – Official UK Labour Market Statistics
Euro bloc	Total Actual Quarterly Hours Worked in the euro Bloc (18)	European Central Bank's Statistical Data Warehouse
Wage Rate		
UK	Gross Hourly Pay in the UK at Current Prices	NOMIS – Official UK Labour Market Statistics
Scotland	Gross Hourly Pay in the UK at Current Prices	-ditto-
Euro bloc	Hourly Earnings Index in the euro bloc (18), 2010=100 and Manufacturing Sector Wage Rate in Local Currency for the year 20102	OECD Statistics and US Bureau of Labor Statistics
Notes and Coins		
UK	Notes and Coins issued in the UK	Bank of England Interactive Database, UK
Scotland	Notes and Coins issued in Scotland	-ditto-
Euro bloc	Notes and Coins issued in the euro bloc (18)	European Central Bank's Statistical Data Warehouse

Variables	Description	Sources
Benchmark Rate		
UK	Rate of the UK M4 component that pays the highest interest rate	Bank of England Interactive Database, UK
Scotland	-ditto-	-ditto-
Euro bloc	10-year Government Benchmark bond yield, euro bloc (18)	European Central Bank's Statistical Data

	Warehouse	
Benchmark Rate		
Great Britain	Value of loan balances advanced to the Small and Medium Enterprises (SME)	Bristish Bankers Association
Scotland	-ditto-	-ditto-

Note the euro bloc contains the following countries: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia and Spain. The British Bankers Association does not report data on loan outstanding to SMEs in the Northern Ireland.

---

[1] The legal tender issue is fairly complex in the UK and the Scottish pound sterling notes are not legal tender anywhere even in Scotland. Both Scottish and Northern Ireland banknotes are not "legal tender". Furthermore, Bank of England banknotes are only legal tender in England and Wales. Legal tender has, however, a very narrow technical meaning in relation to the settlement of debt. If a debtor pays in legal tender the exact amount he/she owes under the terms of a contract (and in accordance with its terms), or pays this amount into court, he/she has good defense in law if he/she is sued for non-payment of the debt.

In ordinary everyday transactions, the term "legal tender" in its purest sense need not govern a banknote's acceptability in transactions. The acceptability of a Scottish or Northern Ireland banknote as a means of payment is essentially a matter for agreement between the parties involved. If both parties are in agreement, Scottish and Northern Ireland banknotes can be used in England and Wales. Holders of genuine Scottish and Northern Ireland banknotes are provided with a level of protection similar to that provided to holders of Bank of England banknotes. This is because the issuing banks must back their banknote issue using a combination of Bank of England banknotes, UK coin and funds in an interest bearing bank account at the Bank of England.

[2] Seigniorage will of course exist for the region as a whole. The cost is in deciding how much seigniorage to seek and how to divide it up among the countries.
[3] Of course as discussed above, Rose and Wincoop (2001) have found national currencies act as significant barriers to trade and the gains from forming a common currency area are greater than that indicated from the current level of trade between countries.
[4] Feenstra (1986) shows that the liquidity costs and the utility of money approaches to modeling money demand are functionally equivalent.
[5] Barnett (1980) originated the concept of an economic monetary aggregate.

[6] See Deaton and Muellbauer (1980) concerning aggregation over goods.
[7] Quasi-homothetic preferences imply that each agent's Engle curves are linear. While quasi-homothetic Engle curves are linear, they need not pass through the origin as is the case for homothetic preferences.
[8] The assumption of a representative agent is necessary unless micro or panel data exist.
[9] Thus, a violation of GARP happens when for some xiRxj, the condition xjSxi is true or a violation of GARP happens if xi is shown to be revealed preferred to xj but xj is directly revealed preferred to xi.

[10] We use 18 euro bloc countries in our study, which include Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia and Spain.

[11] The wage rate includes all the countries except for Cyprus, Latvia, Luxembourg, Malta and Slovenia, so all we miss is small countries and our wage rate may be slightly biased upward.

[12] The British Bankers Association does not report data on loan outstanding to Small and Medium Enterprises in the Northern Ireland.

[13] The 1 May 2004 enlargement of the European Union was the largest single expansion of the European Union (EU), in terms of territory, number of states, and population. The simultaneous accessions concerned the following countries: Cyprus, Czech Republic, Estonia, Hungary, Latvia Lithuania, Malta, Poland, Slovakia, and Slovenia. Seven of these were part of the former Eastern Bloc, one of the former Yugoslavia, and the remaining two were Mediterranean islands. Part of the same wave of enlargement was the accession of Bulgaria and Romania in 2007, who were unable to join in 2004, but, according to the European Commission, constitute part of the fifth enlargement.