

UK or the Eurozone: Which Common Currency Area Can Work for Northern Ireland After Brexit?

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Abstract

Brexit and the controversy concerning an Irish border makes the issue of whether Northern Ireland is a common currency area with the rest of UK or the Eurozone topical. We test the microeconomic foundations of a common currency area for Northern Ireland, UK, Great Britain and Northern Ireland in the Eurozone. We provide evidence that all areas meet the microeconomic criteria for a common currency area. Banking data suggest that lending in Northern Ireland is different from lending in the rest of the UK, raising doubt on whether or not the UK forms a common currency area including Northern Ireland.

Keywords: Common Currency Areas, Microeconomic Foundations, Northern Ireland, Brexit

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1. Introduction

Brexit and the controversy concerning an Irish border makes the issue of whether Northern Ireland is a common currency area with the rest of UK or the Eurozone topical. The Brexit referendum, in which voters responded to with either "Remain" or "Leave", was "Should the United Kingdom remain in or leave the European Union?" The referendum took place in the United Kingdom and Gibraltar on 23 June 2016 and the summary of results are presented in Table 1 and Figure 1. The Northern Ireland referendum results were Leave: 349,442 (44.2%) and Remain: 470,707 (55.8%).¹

[TABLE 1 AND FIGURE 1 ABOUT HERE]

Leaving the EU creates only one potential land border, that between Northern Ireland and the Republic of Ireland. Solving the issue of this border has proved intractable in the Brexit process. Detailed commentaries on the economic, cultural and political aspects of this challenging border issue are provided in Mair et al (2019). From the EU perspective, since 2018, the EU has supported the *b-solutions* initiative. This has specifically focused on tackling legal and administrative border obstacles, aiming to highlight replicable solutions, which can contribute to reducing these obstacles.^{2,3}

¹ Details of the “vision for the UK’s future relationship with the EU and of a relationship based on friendly cooperation between sovereign equals” may be found in the UK government’s policy framework document at, HM Government, (2020).

² See the policy debate and assessment of *b-solutions* provided in Medeiros et al (2021).

³ The Protocol on Ireland/Northern Ireland, commonly abbreviated to the Northern Ireland Protocol, is a protocol to the Brexit withdrawal agreement that governs the unique customs and immigration issues at the border on the island of Ireland between the United Kingdom of Great Britain and Northern Ireland and the European Union, and on some aspects of trade in goods between Northern Ireland and the rest of the United Kingdom. Article 16 is a safeguarding mechanism within the Ireland/Northern Ireland Protocol, the arrangements agreed as part of the

This paper contributes to the literature by providing the first evidence that data on gross value added per capita, leisure per capita and notes and coins per capita show the UK, Northern Ireland, Great Britain and Northern Ireland in the Eurozone meet the microeconomic conditions for a common currency area. Specifically, this paper addresses the issue of whether or not Northern Ireland forms a common currency area with the UK or the Republic of Ireland and the rest of Europe. Following Swofford (2000), we define a common currency area as any geographic area in which the economic agents treat the same asset or group of assets as providing monetary services. This follows the methodology employed in Binner et al (2011) for the ASEAN countries and Taiwan, and Binner et al (2018) for Scotland, the UK and the UK without Scotland respectively.

Banknotes have been issued for use specifically in Northern Ireland since 1929 and are denominated in pounds sterling. They are legal currency, but technically not legal tender anywhere, including Northern Ireland itself.⁴ Four banks are authorised to issue banknotes in Northern Ireland: the Bank of Ireland (UK) plc, the AIB Group (UK) plc (trades as First Trust Bank in Northern Ireland), the Northern Bank Limited (trades as Danske Bank) and the Ulster Bank Limited. Issuing banks have been granted legal rights to issue currency and back the notes with deposits at the Bank of England.

UK–EU Withdrawal Agreement to avoid a hard border on the island of Ireland. Article 16 allows either party to undertake unilateral safeguarding measures if the protocol leads to “serious economic, societal or environmental difficulties that are liable to persist, or to diversion of trade”. Article 16 sets the protocol on how the newly negotiated agreement can be made to work and is now part of international law. After four years, the UK is required to give Northern Ireland a vote on whether to or not continue with the new trade arrangements in place which allow lorries to deliver goods without having paperwork and goods checked when they cross the border from Northern Ireland into the Republic of Ireland.

⁴ "Bank of England | Banknotes | More About Banknotes | Banknote FAQs". web.archive.org. 3 December 2011.

We take advantage of the fact that Northern Ireland's pound notes are not legal tender in the rest of the UK to investigate these issues.⁵ This oddity in UK financial law allows us to test the issue of whether the UK, Northern Ireland, Great Britain and Northern Ireland in the Eurozone are optimal currency areas.

The economic costs and benefits of having one currency are widely known; see e.g. De Grauwe (2016). In brief, 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 risk associated with currency fluctuations. A further benefit to the formation of a common currency area is the 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 are 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. The Rose and Wincoop (2001) finding would mean that the gains from reduced transactions costs would be

⁵ First and foremost, Northern Ireland banknotes are legal currency. Legal tender, however, is the only type of payment a creditor must accept if it is offered in return for a debt. The legal tender issue is fairly complex in the UK as the Northern Ireland banknotes are not "legal tender" anywhere (including Northern Ireland itself). Furthermore, Bank of England banknotes are only legal tender in England and Wales. In detail, Northern Ireland bank notes are not legal tender; only Bank of England notes are legal tender but only in England and Wales.

The term legal tender does not in itself govern the acceptability of banknotes in transactions. Whether or not notes have legal tender status, their acceptability as a means of payment is essentially a matter for agreement between the parties involved. Legal tender has a very narrow technical meaning in relation to the settlement of debt. If a debtor pays in legal tender the exact amount s/he owes under the terms of a contract, he has good defence in law if s/he is subsequently sued for non-payment of the debt. Please see the Bank of England fact sheet on "More about bank notes" available this link for further information; <https://web.archive.org/web/20111203051814/http://www.bankofengland.co.uk/banknotes/about/faqs.htm#16>.

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 were split up.

The costs of a common currency in an area include the loss of domestic monetary control and seigniorage for each country.⁶ The loss of a common currency area also can reduce seigniorage and harm the stability of the financial system. 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) whilst Henkel and Siedel (2019) examine the implications of economic integration across 1,280 European regions using a general equilibrium model featuring trade and labour mobility to capture welfare loss and net migration following Brexit.

Mundell (1961) and McKinnon (1963) developed the idea of the existence of an optimal or common currency areas and concentrate heavily on the macroeconomic criteria 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 latter line of thought, Swofford (2000) proposed microeconomic foundations for the existence of a common currency area, and subsequently used

⁶ 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.

the tests for the existence of a common of a common currency area in North America in his later work, Swofford (2005).

The basis for these microeconomic foundations is that for a common currency area to exist, the people included in the area must treat money differently than other goods. These microeconomic foundations and revealed preference tests for the existence of a common currency area are reviewed in the following section of this paper.

2. Existence of and Testing for a Common Currency Area

If money is an elementary good, then economic agents may treat other goods differently than they treat money. For example, if the people of Northern Ireland 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 areas can form a common currency area.

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 modelled in the consumer's utility function:

$$(1) \quad U = U(\mathbf{x}, m)$$

where U is a well-behaved utility function, \mathbf{x} is a vector of nonmonetary goods and assets, and m is cash that is the good that provides liquidity services.⁷

⁷ Feenstra (1986) shows that the liquidity costs and the utility of money approaches to modelling money demand are functionally equivalent.

For currency to be money, and to be consistent with economic theory including neutrality, other goods and assets held by the representative agent must be treated differently.⁸ This criterion means that the other goods and assets are at least weakly separable from all other goods in the agent's preferences. Thus, if cash is an elementary good and to be the common money in an area, then the people in that area must treat other goods and assets differently. This restricts $U(\cdot)$ to be at least weakly separable in all other goods and assets:

$$(2) \quad U = U(V(\mathbf{x}), m)^9$$

When there is a weakly separable sub utility function like $V(\mathbf{x})$, then the marginal rate of substitution between any two goods in $V(\mathbf{x})$ is independent of the level of money holding, m .¹⁰ Less formally, these weak separability criteria for aggregation are a way to identify money as whatever people in the hypothesized common currency area use differently than all other goods. 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.

If more than one person is in a hypothesized common 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.¹¹ These very stringent

⁸ Barnett (1980) originated the concept of an economic monetary aggregate.

⁹ This is a slightly different structure than that suggested in Swofford (2000) since if money is a single good rather than an aggregate, then the only way to see if money is treated differently is to see if all other goods are weakly separable from money. Data limitation makes us maintain money as a single elementary good in this case.

¹⁰ See Deaton and Muellbauer (1980) concerning aggregation over goods.

¹¹ 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 $U(\cdot)$ and $V(\cdot)$ are required for aggregation over agents. Quasi-homothetic preferences imply

restrictions are usually finessed by assuming a representative agent, as will be done in this study.¹²

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 can be viewed as a sufficient condition for the existence of a common money within an area. Even if the people of Northern Ireland can form a common currency area or could join another currency area, by choosing to change currency or going it alone they will be increasing transactions costs for all commercial interaction with the rest of the UK. For these and other reasons, the necessary political consensus to form a common currency area may not develop.

In this paper, revealed preference tests are used to test for the existence of UK, Northern Ireland, Great Britain and Ireland in the Eurozone as 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 Northern Irish pound sterling notes. However, revealed preference tests do not allow for random behaviour.¹³ To add a stochastic element to our research we also test for equality in medians of bank lending in Northern Ireland and Great Britain.

Following Varian (1983) let $p^i = (p^i_1, p^i_k)$ be the i^{th} observations for the prices of some k goods and assets and $x^i = (x^i_1, \dots, x^i_k)$ 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:

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.

¹² The assumption of a representative agent is necessary unless micro or panel data exist.

¹³ A detailed discussion of these nonparametric tests is presented in Varian (1982 and 1983).

If $x^i R x^j$ then $p^j x^j \leq p^i x^i$ for all $i, j = 1, \dots, n$.

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

Varian's (1985) implementation of his (1983) revealed preference test for weak separability is a three-part test.

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

Part 2: Test whether the data in the hypothesized sub utility 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 sub utility function replaced by an aggregate good calculated using the Afriat inequalities, (Afriat, 1967), are consistent with GARP.

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

Figure 2 shows examples of violations and consistency with GARP. In Figure 2 the consumer (or representative consumer) faces two budget constraints, JK and LM, between two goods x^1 and x^2 . If when faced with these two budgets the consumer were to select bundles A and B, then the consumer's choices would violate GARP and could not have been generated by a well behaved utility function. Bundles A and B are inconsistent with rational choice because when the consumer chooses bundle A, bundle B was available and when the consumer chooses bundle B, bundle A was available.¹⁴

¹⁴ Thus, in a multi-good situation a violation of GARP happens when for some $x^i R x^j$, the condition $x^j S x^i$ is true or a violation of GARP happens if x^i is shown to be revealed preferred to x^j but x^j is directly revealed preferred to x^i .

All other bundle pairs, E and F, A and E and B and F in Figure 2 are each consistent with GARP. If the consumer chooses bundles E and F, when bundle E is chosen, bundle F is not available and vice-versa. If the consumer chooses bundles A and E, when bundle A is chosen, bundle E is not available and bundle E is chosen when it becomes available because bundle E is strictly greater than bundle A. Similarly, if the consumer chooses bundles F and B, when bundle B is chosen F is not available and bundle F is chosen when it becomes available because bundle F is strictly greater than bundle B.

[FIGURE 2 ABOUT HERE]

Consistency with GARP and the Afriat sufficient condition are a sufficient condition for the existence of a common money. If these conditions hold, then a common money exists in an area whether or not the people in the area politically decide to use a common currency.

We now move to our choice of data. The data used in the revealed preference test are outlined in the next section. The sources of these data are also detailed.

3. Data

We use data for the UK and Northern Ireland from the Office of National Statistics, the NOMIS – Official UK Labour Market Statistics and the Bank of England Interactive Database. These data are quarterly observations on consumption and monetary asset from 2009Q4 through 2018Q4 except Gross Value Added (GVA) for which quarterly data are not available. We extrapolate quarterly GVA observations from annual GVA data. We start our sample from 2009Q4 because the data on ‘Notes and Coins’ for Northern Ireland from the Bank of England statistical interactive database are only available from 2009Q4, leaving us only with 37 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 when compared to their historical preferences.

We obtain all the non-monetary data, (Gross Value Added (GVA), consumer price index (CPIH) and population) for the UK and for Northern Ireland from the Office of National Statistics, labour hours worked for Northern Ireland, wage rate for the UK and Northern Ireland, 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 Northern Ireland from the Bank of England statistical interactive database.¹⁵ We use real GVA for the UK, for Northern Ireland and for the UK without Northern Ireland as our real goods sector data.

We assume CPIH¹⁶ for Northern Ireland is the same as that in the UK because Northern Ireland is part of the UK and no separate price index is computed for Northern Ireland. To check this assumption, we gather housing price indexes for both the UK and Northern Ireland and then multiply CPIH times the ratio of Northern Ireland housing prices to UK housing prices in order to construct an index for prices in Northern Ireland.

We use the price indices to convert the consumption and money series into real terms. We use the working population having an age of 16 plus to convert the consumption, leisure and money series into real per capita terms.

Following Barnett (1980) whereby 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

¹⁵ available at <http://www.bankofengland.co.uk/boeapps/iadb/>

¹⁶ CPIH is a new measure of consumer price inflation including a measure of owner-occupiers' housing costs (OOH).

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, (Fisher et al, 1993).

Finally, in order to check business sector behaviour is the same as that of the overall consumer behaviour in Northern Ireland and Great Britain, we collect quarterly data on value of Small and Medium Enterprises (SMEs) loans outstanding advanced to the businesses from the UK Finance Statistics. These data are quarterly observation from 2013Q2 to 2019Q2 for Great Britain and from 2014Q4 to 2019Q2 for Northern Ireland. Furthermore, we also check consumer borrowing behaviour and collect data on value of mortgage and personal loans outstanding advanced to the households from the UK Finance Statistics. The data are the most recently available quarterly observations from 2013Q2 to 2019Q2 for Great Britain and from 2014Q4 to 2019Q2 for Northern Ireland. We specify in detail the source and time frame of each data series we use for this paper in Table 2¹⁷.

[TABLE 2 ABOUT HERE]

4. Results

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

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

¹⁷ We retrieved house price indices for the UK and Northern Ireland from HM Land Registry at this site

<https://www.gov.uk/government/statistical-data-sets/uk-house-price-index-data-downloads-october-2022>

The data includes administrative and country level house price indices. We use the house price indices obtained for the UK and Northern Ireland for this analysis.

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, Northern Ireland, Great Britain and the Northern Ireland in the Eurozone, were checked for consistency with the microeconomic foundations of an optimum currency area.

The results are presented in Table 3. Each actual and hypothesized area individually meets the necessary and sufficient microeconomic conditions for the existence of a common currency area.¹⁸ That is, each of these areas meet the necessary conditions and the Afriat sufficient condition outlined above.

[TABLE 3 ABOUT HERE]

These results offer a bit of something for every side of this debate. The result on the UK means it does meet the microeconomic conditions for a common currency area and the status quo would present no economic problems associated with the common currency. The results on Great Britain means this area meets the microeconomic conditions for a common currency area and the rest of the UK would not encounter instability as a common currency area were Northern Ireland to join the Eurozone. The results on Northern Ireland mean it could form its own common currency area or, more likely, join the Eurozone, if the people of Northern Ireland are willing to pay the transition costs and operational costs associated with changing their currency.

¹⁸ As discussed in our data section above, we assume CPIH for Northern Ireland is the same as that in the UK because Northern Ireland is part of the UK and no separate price index is computed for Northern Ireland. To check this assumption, we gathered housing price indices for both the UK and Northern Ireland and then multiply CPIH times the ratio of Northern Ireland housing prices to UK housing prices. Our new revealed preference results remain the same with this alternative measure of Northern Ireland prices.

For example, academic salaries in Irish universities (currently denominated in Euros) are higher than those in NI (sterling based), by bringing NI public sector workers into the Eurozone, there might be pressure to increase salaries regardless of the taxation differences, thereby creating upward pressure on public spending. Furthermore, NI trades far more with GB than the Republic of Ireland so the distortions of bringing exchange rate variability into trade between NI and GB would be a further source of uncertainty. Experiences from similar countries suggest that if Northern Ireland leaves the pound, it could either have no central bank, (e.g. like Panama) or have a non-currency issuing central bank with limited powers and responsibilities (e.g. like Montenegro). Either choice could potentially conflict with the institutional requirements for EU membership.

A weakness of our approach is that we are not able to get separate data on various possible near monies for Northern Ireland and Great Britain. To remedy this weakness and add a stochastic element to our testing, we looked at quarterly data on bank lending to SMEs and to Households for Northern Ireland and Great Britain and tested whether lending in Northern Ireland and Great Britain are statistically different from each other. The descriptive statistics for this data are given in Table 4. Panel A shows the SME lending in Great Britain and in Northern Ireland from 2013Q2 to 2019Q2. The mean SME lending in Great Britain is £94,289.46 million and in Northern Ireland it is £6,215.08 million. Thus 93.8% of the total SME lending is in Great Britain and 6.2% is in Northern Ireland, as shown in the pie chart on the left-hand side of Figure 3. The median lending is very close to the mean lending showing there is no extraordinary lending in any period. Panel B shows household lending in Great Britain and in Northern Ireland also from 2013Q2 to 2019Q2. The mean household lending in Great Britain is £967,571.63 million or 97.8% of the total and in Northern Ireland it is £21,689.61 million or 2.2% of the total. These percentages are illustrated in the pie chart on the right-hand side of Figure 3. Similar to

SME lending, the median household lending is very close to the mean lending showing there is no extraordinary lending in any period.

[FIGURE 3 AND TABLE 4 ABOUT HERE]

To test whether lending in Northern Ireland and Great Britain are statistically different from each other, we ran various Wilcoxon/Mann-Whitney and similar tests. These tests have the null hypothesis of the equality of medians. These tests are non-parametric test and robust for small sample sizes. These tests compare two populations to see if they are significantly different from each other. The tests strongly reject the null hypothesis that the samples have the same median and we conclude that both business (Table 5) and household loans (Table 6) are different in Northern Ireland compared to the rest of the UK. These results, suggesting differences in the economies, imply that the UK including Northern Ireland may not form a common currency area.

[TABLE 5 AND 6 ABOUT HERE]

Overall, the data on value added, leisure and money indicates that the UK, Northern Ireland, Great Britain and Northern Ireland in the Eurozone form common currency areas. That the data are consistent with Northern Ireland and the UK minus Northern Ireland as common currency areas does not overcome various macroeconomic and political issues that might arise within the individual areas. In addition to the added transactions costs a Northern Ireland move to the euro would impose on the people of Northern Ireland and the rest of the UK, the people of Northern Ireland would face new costs including, as above, the possibility of setting up a central bank and other Northern Ireland governmental agencies. Still, the will of the people of Northern Ireland remains a necessary condition for Northern Ireland adopting another non-UK common currency.

Finally, it is worthwhile mentioning that there is a distinction between a monetary union and the fiscal policies that are subsequently required within a monetary union. Currently, the measures put in place to try to stop the spread of coronavirus has placed the economy on a wartime footing in terms of its fiscal policy in order to support businesses and people affected by coronavirus. State-backed loans of at least £330bn have been issued and tax breaks announced to protect companies and households suffering amid the economic collapse triggered by the virus.¹⁹ The question of whether or not the fiscal powers in Northern Ireland should be enhanced has been addressed in Birnie and Brownlow (2017) whilst the regions chronic competitiveness shortfall is identified alongside a review of future needs regarding enhancement of measures of competitiveness are identified in Birnie et al (2019). Gerald (2001) focuses on the economic issues arising from Irish fiscal policy in an evolving euro area, including lessons learned from German reunification in the 1990s, whilst a policy report on the citizens' rights and constitutional affairs regarding the UK withdrawal ('Brexit') and the Good Friday Agreement has been provided by Phinnemore and Hayward (2017). More recently, despite inherent structural, political and policy weaknesses (Brownlow, 2020; Jordan, 2022), post-Brexit output growth in Northern Ireland (NI) presents an enigma. Specifically, output in Northern Ireland has evidenced one of the strongest recoveries from the pandemic post-Brexit (Bhattacharjee et al.,(2022)). Against this backdrop, while the Northern Irish economy has regained its pre-pandemic level, there is a question as to how much of NI's economic performance can be attributed to the NI Protocol. Bhattacharjee et al. (2022) reported counterfactual GVA trends for NI, relative to the UK as a whole, as projected before the Brexit deal and under the NI Protocol.

¹⁹ A detailed discussion of the role of fiscal policies within a monetary union; a discussion on how independent national fiscal policies can be; and a detailed debate on whether or not a monetary union increases or reduces fiscal discipline, including any rules that may be used to restrict national fiscal policies, may be found in De Grauwe (2016, chapter 10).

This represented a robust outlook post-Brexit relative to the UK as a whole, but much weaker than London.

5. Conclusions

The people of Northern Ireland voted to remain in the EU whilst the UK collectively voted to leave EU membership. If this leads to Northern Ireland leaving the pound, that decision would impose added transactions costs on both the people of Northern Ireland the people of Great Britain. Such a common currency area would create a currency difference between Northern Ireland and Great Britain that, as Rose and Wincoop (2001) showed, might act as an implicit additional barrier to trade.

We provide the first evidence that data on gross value added per capita, leisure per capita and notes and coins per capita show that the UK, Northern Ireland, Great Britain and Northern Ireland in the Eurozone meet the microeconomic conditions for a common currency area. However, banking data suggests that lending in Northern Ireland is different from lending in the rest of the UK, adding some doubt to the issue of whether or not Northern Ireland is a common currency area with the UK.

As the United Kingdom is now legally outside of the European Union, we are naturally looking at the past, and past behaviour may not necessarily hold for changing conditions in the future. The people in any area could decide to form a common currency area and adjust their future behaviour accordingly, or they could independently change how they treat the assets examined here. The argument for a unified Ireland is closely tied to strong economic underpinnings. For example, Northern Ireland has received more than 600 million pounds (\$780 million) a year in funding from the EU aimed at supporting agricultural projects, economic growth, cultural development, and peace initiatives. The open border with the Republic of

Ireland in the south facilitates annual exports worth 3.4 billion pounds (\$4.4 billion) and almost a century after partition carved two separate political entities out of Ireland, Brexit has revived the prospect of Irish unification in a serious way (Haverty, 2020). Northern Ireland enjoys huge benefits from membership of the United Kingdom and the United Kingdom is stronger and richer for Northern Ireland being part of it, according to the Constitution Unit Interim Report (2020), contrary to the evidence presented by McGuinness and Bergin (2020) which suggests that Northern Ireland may be more adversely affected by any form of Brexit than either the Republic of Ireland and most UK regions. As such, Brexit is likely to generate a further widening of the gap between NI and both GB regions and the Republic of Ireland. In terms of the new “levelling up” agenda prioritized by the UK government, perspectives of expert analysts and policymakers on the implications of Brexit for different regions of the UK economy is provided in Billing et al (2021). In addition, the first systematic study of the impact of Brexit on the political and economic future of Northern Ireland and Ireland is detailed in Teague (2021). An assessment of the consequences of the Belfast Agreement is provided, and the advances that have been made since its signing in 1998 are highlighted, along with a discussion of how these advances may be jeopardized because of Brexit. It assesses the changes that may be necessary to create a stronger Northern Ireland economy. According to Teague, the demands for the immediate unification of Ireland that are now being made loudly and persistently by nationalists and republicans are considered too precipitous; the two economies on the island are not yet ready for Irish unity. Furthermore, the case for a radical reorientation of the Northern Ireland economy through the incremental creation of an all-Ireland economy is made, and an appraisal of not only its structure and performance, but also the economic feasibility of Irish unity is provided. (Teague, 2021).

The future of Northern Ireland has recently been rewritten to try to resolve the practical problems for the people and businesses of Northern Ireland and protect Northern Ireland’s place

within the United Kingdom, and to restore the balance of the Belfast (Good Friday) Agreement in all its dimensions. The Windsor Framework, agreed in February 2023, now replaces the former Northern Ireland Protocol and hence, the hard border between Northern Ireland and Ireland has been avoided. A new legal and UK constitutional framework is provided which is set to deliver free-flowing trade in goods between Great Britain and Northern Ireland by removing any sense of the border in the Irish Sea for goods staying within the UK. These goods will travel as normal through a new green lane without red tape or unnecessary checks, with the only checks remaining designed to prevent smuggling or crime. Furthermore, Northern Ireland's place the United Kingdom is protected, whilst the people of Northern Ireland can benefit from the same tax policies, food and drink, medicines, and parcels as the rest of the UK.

Finally, the UK Government recognises that these changes do create a different legal and practical context on the island of Ireland, with substantial and likely increasing divergence between Northern Ireland and Ireland over time - building, of course on the in-built capacity for divergence in the vast majority of areas outside the Protocol including environmental law, professional qualifications, employment law, procurement, immigration, banking, data, and a wide range of services and other rules. As such, the UK Government and the European Commission have agreed that the nature of these new arrangements requires enhanced market surveillance North-South, with a declaration from the Government committing to deepen on-the-market monitoring and enforcement in Northern Ireland, as well as to strengthen cooperation with the Irish Government to avoid any risks to the Single Market. The approach will be to

manage this sensitively with sensible practical arrangements, focused on maintaining market access for Northern Ireland while protecting the UK and EU internal markets.²⁰

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²⁰ The full Windsor Framework Agreement is available at <https://www.gov.uk/official-documents> The Windsor Framework, A New Way Forward CP806 ISBN 978-1-5286-3937-8 E02869175 02/23

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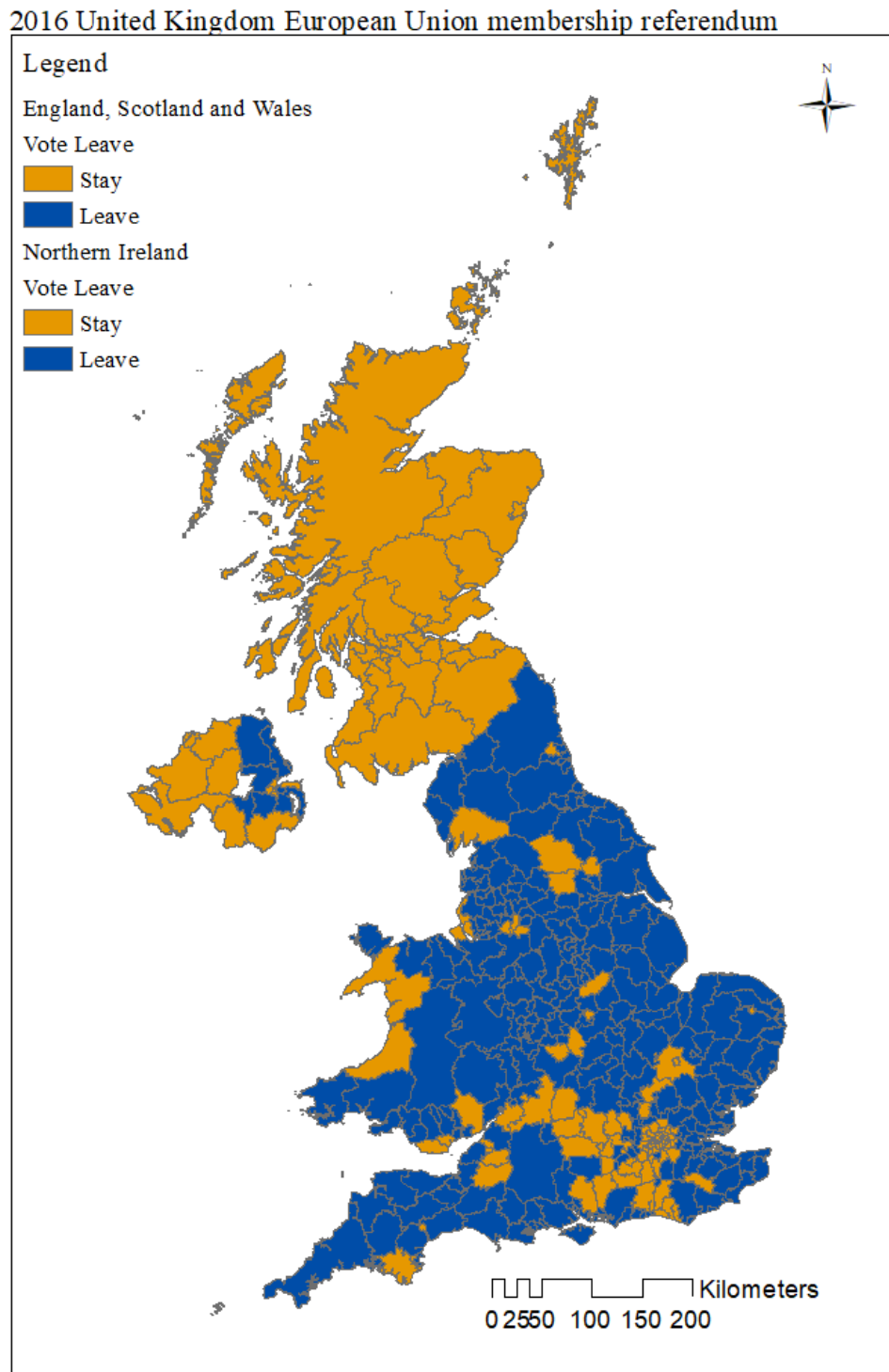
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Figure 1: Results of the 2016 United Kingdom European Union Referendum



Source: EU referendum: The result in maps and charts

Source: <https://www.bbc.co.uk/news/uk-politics-36616028>

Of the 381 voting areas in Great Britain and Gibraltar and the 18 Northern Ireland parliamentary constituencies, a total of 270 returned majority votes in favour of "Leave the European Union", while 129 returned majority votes in favour of "Remain a member of the European Union", including all 32 voting areas in Scotland.

 Leave
 Remain

Figure 2: Violations and Consistency of a Representative Consumer with GARP

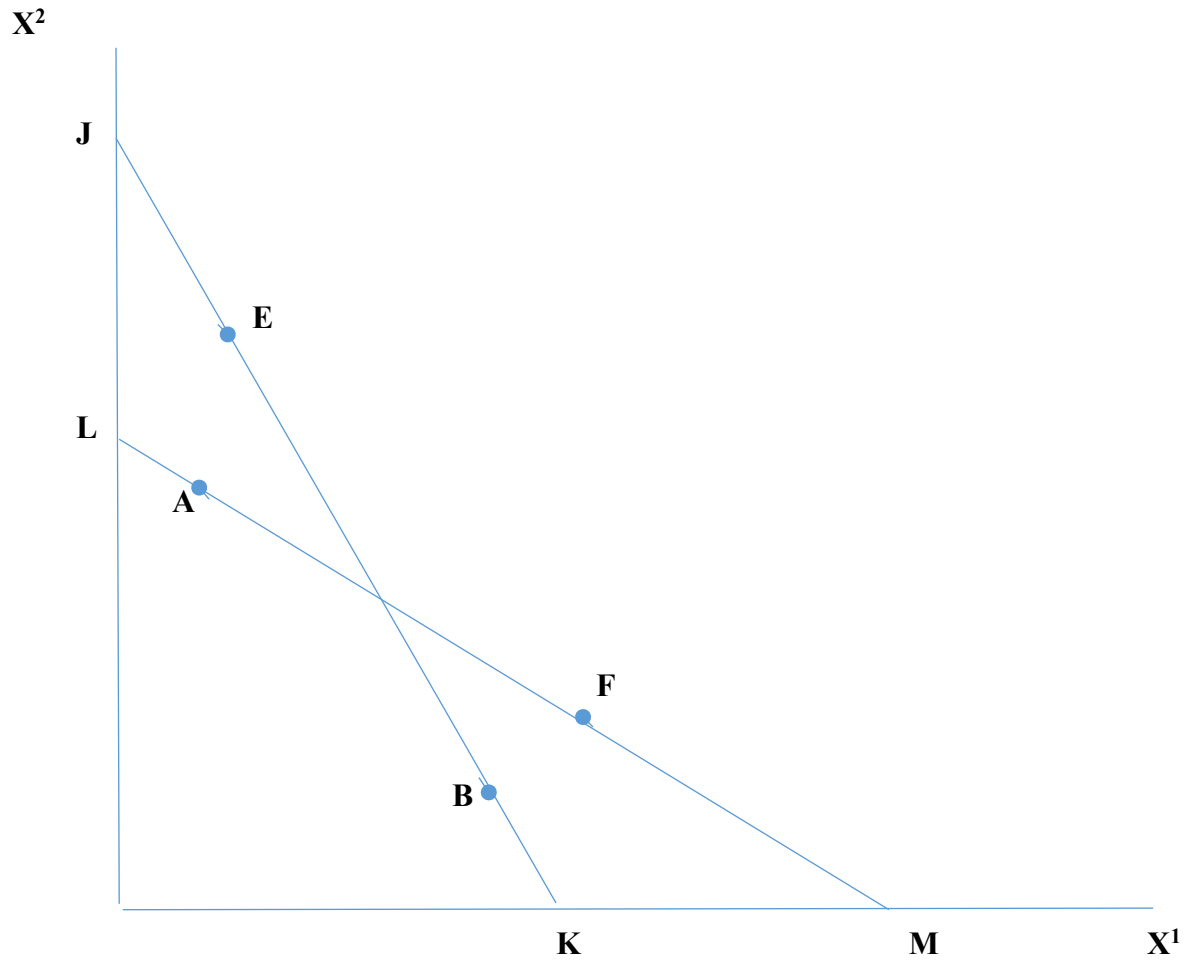


Figure 3: Mean Shares of Great Britain and Northern Ireland SME and Household Lending

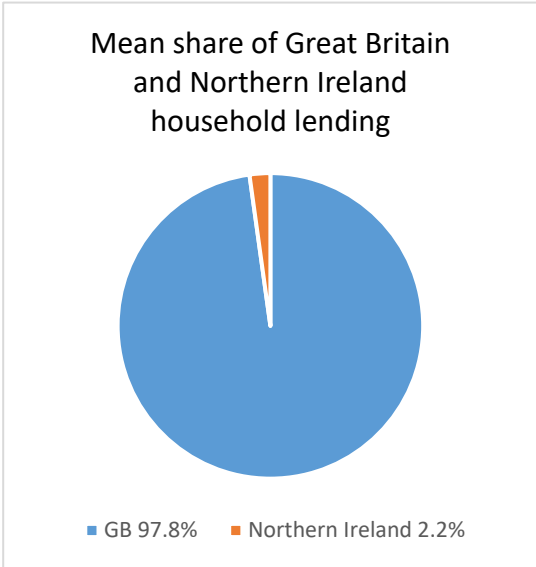
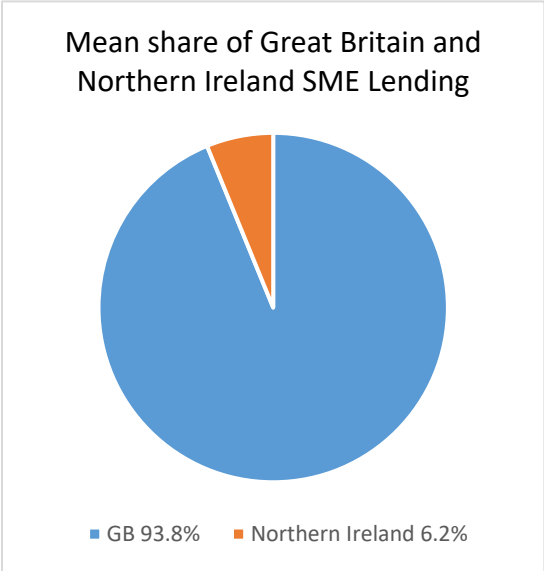


Table 1

Results of the European Union Membership Referendum 2016

Results		
United Kingdom European Union membership referendum		
“ Should the United Kingdom remain a member of the European Union or leave the European Union? ”		
Location	United Kingdom (population. 65.65m[1]) and Gibraltar (pop. 34,000)	
Date	23 June 2016	
	Votes	%
Leave	17,410,742	51.89%
Remain	16,141,241	48.11%
Valid votes	33,551,983	99.92%
Invalid or blank votes	25,359	0.08%
Total votes	33,577,342	100.00%
Registered voters/turnout	46,500,001	72.21%

Table 2
Data Table with Definition and Data source

Data	Data frequency	Data period	Definition	Data source
GVA	Quarterly	2009Q4-2018Q4	Gross value added	Office of National Statistics
CPIH	Quarterly	2009Q4-2018Q4	The Consumer Prices Index including owner occupiers' housing costs	Office of National Statistics
Population	Quarterly	2009Q4-2018Q4	Working population having an age of 16 plus	Office of National Statistics
Notes and coins	Quarterly	2009Q4-2018Q4	Quarterly amounts outstanding holdings of notes and coin	Bank of England statistical interactive database
Benchmark interest rate	Quarterly	2009Q4-2018Q4	Quarterly interest rate of monetary financial institutions' sterling time deposits	Bank of England statistical interactive database
Labour hours worked	Quarterly	2009Q4-2018Q4	Total actual hours worked	NOMIS – Official UK Labour Market Statistics
Wage rate	Quarterly	2009Q4-2018Q4	Gross hourly pay	NOMIS – Official UK Labour Market Statistics
SME loans for Great Britain	Quarterly	2013Q2-2019Q2	Small and Medium Enterprises (SMEs) loans outstanding advanced to the businesses for Great Britain	UK Finance Statistics
SME loans for Northern Ireland	Quarterly	2014Q4-2019Q2	Small and Medium Enterprises (SMEs) loans outstanding advanced to the businesses for Northern Ireland	UK Finance Statistics
Mortgage and Personal	Quarterly	2013Q2-2019Q2	Mortgage and personal loans outstanding advanced to the households for Great Britain	UK Finance Statistics

loans for Great Britain				
Mortgage and Personal loans for Northern Ireland	Quarterly	2014Q4-2019Q2	Mortgage and personal loans outstanding advanced to the households for Northern Ireland	UK Finance Statistics

Table 3

Revealed Preference Test Results

<i>Area</i>	<i>Utility Function</i>		<i>Subutility Function</i>	
	<i>GARP(Number of Violations)</i>		<i>Necessary</i>	<i>Afriat Sufficient</i>
UK	Y		Y	Y
Northern Ireland	Y		Y	Y
Great Britain	Y		Y	Y
Northern Ireland in the Eurozone	Y		Y	Y

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. The sample is from 2009Q4 to 2018Q4 or 37 observations.

Table 4
Descriptive Statistics

Panel A: SME Lending (Amount in million £)

	Mean	Median	Maximum	Minimum	Std. Dev.
Great Britain	94,289.46	93,878.30	101,747.00	87,159.07	4,039.42
Northern Ireland	6,215.08	5,890.76	7,581.75	5,415.36	769.23

Note the sample is from 2013Q2 to 2019Q2 or 25 observations.

Panel B: Household Lending (Amount in million £)

	Mean	Median	Maximum	Minimum	Std. Dev.
Great Britain	967,571.63	971,643.87	1,029,921.53	918,458.73	32,852.89
Northern Ireland	21,689.61	21,874.09	22,297.58	19,464.98	738.36

Note the sample is from 2014Q4 to 2019Q2 or 19 observations.

Table 5**Test for Equality of Medians Between Small and Medium Enterprises Lending Series in Northern Ireland and Great Britain**

<i>Method</i>	<i>df</i>	<i>Value</i>	<i>Probability</i>
Wilcoxon/Mann Whitney		5.62	0.00
Wilcoxon/Man Whitney (tie adjusted)		5.62	0.00
Median Chi-square	1	33.44	0.00
Adjusted Median Chi-square	1	30.13	0.00
Kruskel-Wallis	1	31.67	0.00
Kruskel-Wallis (tie-adjusted)	1	31.67	0.00
van der Waerden	1	28.25	0.00

Note the sample is from 2013Q2 to 2019Q2 or 25 observations.

Table 6**Test for Equality of Medians Between Household Lending Series
in Northern Ireland and Great Britain**

<i>Method</i>	<i>df</i>	<i>Value</i>	<i>Probability</i>
Wilcox/Mann Whitney		5.70	0.00
Wilcox/Man Whitney (tie adjusted)		5.70	0.00
Median Chi-square	1	34.43	0.00
Adjusted Median Chi-square	1	31.00	0.00
Kruskel-Wallis	1	32.61	0.00
Kruskel-Wallis (tie-adjusted)	1	32.61	0.00
van der Waerden	1	29.00	0.00

Note the sample is from 2014Q4 to 2019Q2 or 19 observations.