Is the UK Sterling-Zone an Optimal Currency Area?

Comparisons with the Euro Area and the Rest of Europe Using City and Regional Investment Data

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Abstract

In this paper we use detailed data on the capital risk-pricing of large-scale UK and European real estate investments to capture the extent to which the UK Sterling-area, the Eurozone, and the non-Euro parts of the EU, correspond to Mundell's (1961) original notion of an optimal currency area (OCA). Financial capital is the most geographically mobile factor, and the factor input which can respond most rapidly, and move most quickly, towards equilibrating adjustments in response economic shocks. As such, observations of how capital prices adapt to shocks across different city, regional, national, and pan-national geographies provide a powerful test of the OCA logic in a manner which is consistent with Mundell's (1961) original arguments. In particular, our analysis spans the shocks associated with the 2008 global financial crisis. Our results suggest that in the post-crisis era, the Sterling-area is less of an optimal currency area than either the Eurozone or the non-Euro parts of the EU. This also helps to explain why in the post-crisis era, UK monetary policy, and in particular quantitative easing (QE), appears to have had no real beneficial traction outside of the London area.

Is the UK Sterling-Zone an Optimal Currency Area? Comparisons with the Euro Area and the Rest of Europe Using City and Regional Investment Data[1]

Michiel N. Daams, Philip McCann, Paolo Veneri and Richard Barkham

Introduction

The aim of this paper is to present new evidence and a new test of the optimal currency area (OCA) logic using the UK and the rest of Europe as exemplars. The approach which we explain here provides two major advantages over previous approaches to discussing these issues empirically. Firstly, our approach treats inter-country and intra-country shocks in a consistent manner, something which has not previously been achieved, and as such is fully consistent with Mundell's (1961) original logic. Second, our approach uses data on the capital market's risk-pricing of places both within and between countries, allowing us to observe factor adjustments to external shocks and thereby explicitly linking the geographical dimensions of the OCA logic to questions of monetary policy.

Following the broad literatures based on the initial arguments of Mundell (1961) and Fleming (1962), academic and political interest in the optimal currency area argument in both the UK and the European Union was spurred in the years spanning the turn of the century by debates regarding the introduction of the Euro and OCA arguments were employed in discussions as to whether the UK should (Layard et al. 2002) or should not (Minford 2002; King 2016) join the Euro. Interest in the OCA logic was further reignited by the Eurocrisis in the wake of the 2008 global financial crisis (Marsh 2009, 2011; Krugman 2013; Stiglitz 2016; Arestis and Sawyer 2012) and the need for Euro area institutional reforms to limit the damage associated with capital market shocks. In addition, in the case of the UK, interest in the optimal currency area argument also resurfaced in the context of the 2014 Scottish independence referendum, with the UK government explicitly asserting that the Sterling-zone as currently constituted displayed "*all of the characteristics of an optimal currency area*" (HM Government 2014 p.6), with the corollary that included the assumed neutrality of monetary policy across all regions of the UK (Bunn et al. 2018). However, the correlation of London's business cycles with respect to the rest of the UK regions has been falling for almost fifty years and is nowadays lower than the business cycle correlation between most of the Euro area countries (Harvey 2013). This observation appears to be at odds with the official UK government position (HM Government 2014) that the Sterling-zone displays all (HM Government 2014 p.6), or strong (HM Government 2014 p.22), characteristics of an optimal currency area. Since then, interest in the OCA arguments has broadly faded as both the Euro crisis and the political pressure for Scottish independence have both somewhat waned. However, understanding the extent to which the Sterling-zone and the Euro area (Eurozone) are optimal currency areas is important for understanding the traction and efficacy that monetary policy has in their respective Sterling-zone and Euro area domains.

This paper will present a new test of the optimal currency area (OCA) logic on the basis of uniquely-detailed dataset on individual very large and location-specific real estate investments. Financial capital is the most geographically mobile factor, and the factor input which can respond most rapidly, and move most quickly, towards equilibrating adjustments in response economic shocks. As such, observations of how capital prices adapt to shocks across different city, regional, national, and pan-national geographies

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provide a powerful test of the OCA logic in a manner which is consistent with Mundell's (1961) original arguments. Building on previous work (Daams et al. 2024a,b,c) we will demonstrate that these data provide a new test of the OCA which is more detailed and nuanced than previous approaches, and much closer to the original insights of Mundell (1961) than other prior approaches. In marked contrast to previous papers, our analysis here will demonstrate that in terms of the perceptions of capital market investors, in the post-2008 crisis era, the Sterling zone displays none of the features of an optimal currency area, and indeed appears to be less of an OCA than either the Euro area or the non-Euro parts of the EU+EFTA. During this period, as we will demonstrate below, the dispersion of risk-pricing between regions within the UK is greater than between regions within the whole of the Euro area. Not surprisingly, the effects of monetary policy and quantitative easing in particular, also therefore appear to be highly asymmetric between UK regions, with monetary policy having genuine traction in the London regions and no real traction whatsoever in most other UK regions. Within the UK, the insights afforded by these findings provide serious food for thought regarding the nature and effectiveness of both UK monetary policy and also the UK 'internal market'.

The rest of the paper is organised as follows. The next section provides a brief overview of the optimal currency area argument, logic and empirics. The third section briefly explains our empirical approach to determining the risk-pricing of regions based on large real estate investments. The fourth section then uses this approach to present the evidence regarding the extent to which the Sterling-zone is even approximately optimal, in the light of evidence from across the EU. The fifth section provides some brief conclusions.

The Optimal Currency Area Argument

The logic of Mundell's (1961) seminal paper on the optimal currency area (OCA) distinguished between what he termed 'regions' and 'nations'. In Mundell's (1961) optimal currency area framing, the key feature of a 'region' is that the nature and scale of any economic shock is similar within the region, and with efficient markets, any internal differences can be quickly and effectively corrected for by intra-regional factor mobility on the part of either capital or labour. In contrast, in terms of the optimal currency area logic, for Mundell (1961), the differences between 'nations' and 'regions' are twofold, namely that economic shocks are largely asymmetric between nations whereas they are largely symmetric or homogenous within regions, and factor adjustment processes are effective within regions but not between countries. In contexts where factor mobility is high, then in response to external shocks, equilibria will be restored quickly in a fixed exchange rate setting, whereas if factors are immobile, then flexible exchange rates will need to play this role. The former context corresponds to Mundell's (1961) notion of a 'region', whereas the latter context corresponds to Mundell's (1961) notion of a 'nation'. This analysis along with related papers (Fleming 1962) gave rise to a large optimal currency area (OCA) literature on the potential links between domestic economic adjustment and currency regimes (Ricci 1997; Buiter 2000; Obstfeld 2001).

The subsequent literature has adopted the convention that a group of countries will more closely approximate a (pan-national) optimal currency area the greater is the respective correlation of their national business cycles (Kunovac et al. 2022; 2023), or their inflationary pressures, or their fiscal and monetary policies (Ricci 1997) and announcements (Nanovsky 2022), and the more mutually open they are to factor flows. Moreover, the movement towards a common currency system, as was the case with

the Euro, potentially can also foster a greater correlation in these features, so there may be some elements of endogeneity in these relationships (Frankel and Rose 1998; De Grauwe and Mongelli 2005).

For many years, various commentators (King 2016; HM Government 2014) in the UK and elsewhere (Krugman 2013) have argued that the Euro area can never approximate an optimal currency area due to the fact that the different parts of Europe function so differently in economic terms. Indeed, this was one of the key arguments as to why the UK should not adopt the Euro and instead should maintain Sterling. In terms of macroeconomic management, from the perspective of a member country, the main argument against currency unions is the loss of the independent ability to tailor monetary policy to 'local' needs (Santos Silva and Tenreyro 2010, 2013). 'Local' in this sense refers to national needs, because by definition, in a national setting with an independent national currency, monetary policy cannot be tailored to the individual needs of local regions.

A difficulty with OCA literature, however, is that it does not point theoretically to any specific empirical test of an optimal currency area, so testing is somewhat indirect. In the case of the Euro, the conventional approach of examining cross-country business cycle correlations finds that the prevailing OCA conditions vary over time (Kunovac et al. 2022). In the Euro area, the OCA conditions declined in the aftermath of the 2008 global financial crisis, and then in the recovery period since 2014 the OCA indicators broadly picked up, to be again disrupted by the Covid-19 shocks (Kunovac et al. 2023). In terms of effective macroeconomic policy, as OCA conditions improve, then monetary policy is likely to be more effective whereas when the OCA values are low, the stabilising role of monetary policy is likely to be more constrained (Kunovac et al. 2023). However, for the conduct of monetary policy, inflation is at least as important as the output gap, so rather than business cycle correlations, the synchronization of monetary policy recommendations and announcements may provide an alternative indirect test of the OCA (Nanovsky, 2022).

A second difficulty with the OCA literature, is that the empirical analyses have always only ever considered the bottom-up OCA arguments regarding the pooling of sovereignty between countries[2], rather than the top-down argument of Mundell (1961) as to whether a nationally sovereign currency itself is an optimal currency area, or whether parts of one country along with parts of another country comprise an optimal currency area, exactly as Mundell (1961) had originally posited. Where empirical tests of OCA theory do exist, they are almost entirely based on national and cross-country data, thereby excluding the internal (region) versus the external (nation) aspects of the optimal currency area framing. This is important because, going back to the logic of Mundell's (1961) original argument, the optimal currency area argument depends on the balance between what he calls a 'region' versus what he calls 'nation', and tests based only on existing national data, whether of business cycles or monetary policy announcements, only capture the external part of this story, because they are constrained by the sovereign definition of what is a nation, rather than the OCA logic as to what is a 'region' and what is a 'nation'. Moreover, these indirect approaches also fail to directly capture the shocks to factors at the 'regional' or 'national' levels in Mundell's framing.

[2] Using an OCA-type of logic, Alesina et al. (2003) examine the relationships between the number of countries and the number of currencies or currency unions, and they argued that around the time of the introduction of the Euro, while there were indeed well-defined dollar and euro areas, no clear yen area was apparent. Even today, apart from the Eurozone, there are only a handful of currency unions such as in West Africa and the Eastern Caribbean, all involving small countries (Frankel 2024).

In the following sections we will present the empirics of a novel series of tests of the optimal currency area logic to both UK and European regions and nations which is consistent with Mundell's (1961) 'regions' and 'nations' logic while also allowing for differences based on sovereignty in a manner which previous indirect tests have failed to achieve. The data we have at our disposal is comprised of thousands of individual transactions involving very large-scale commercial real estate investments – each of over $10m - into offices, retail and industrials in different cities and regions. We know the exact timing and the location of the investment and the respective investment yield. Therefore, and as we explain below, by different aggregation techniques these data allow us to calculate both the investment yield and the investment risk-premium for each UK and European city, region and nation for each year 2003-2023. Economic shocks to the price of capital in different places and at different times are revealed in terms of changing investment yields and investment risk-premia in different places and at different times. As such, these data allow us to observe annual pricing shocks on capital, however large or small, across different geographies and levels of spatial aggregation. By varying the geographical units, we are able to identify which geographical aggregation most closely corresponds to Mundell's (1961) original OCA definition of a 'region'. Therefore, an advantage that this approach has over previous analyses is that our analysis is not constrained to examining just the behaviour of countries, as is the case of OCA tests based on national business cycle correlations, but rather it allows us to consider different geographies in a manner which is consistent with Mundell's (1961) original distinction between a 'region' and a 'nation'. This approach allows us to identify directly from the data what actually comprises a 'region' or a 'nation' in Mundell's (1961) logic.

Within OECD and European countries, investment capital is freely mobile across regions within the same country, and also highly mobile between regions across European countries, and in terms of factor mobility, is the best factor indicator of currency areas (Buiter 2000). This means that national or currency-wide capital pricing shocks can be rapidly transmitted between the different regions of the UK and between the regions of the rest of Europe. Therefore, in response to economic shocks, we can also observe how the price of capital adjusts across UK and European cities, regions and countries in a manner which is consistent with Mundell's (1961) logic, even allowing for national border effects which may somewhat weaken the speed of factor responses (Engel and Rogers 1996). Importantly for our analysis, our data also allows us to observe the effects of the largest economic shock in the last eighty years, namely the 2008 global financial crisis. As we will see, examining capital price-shocks for all UK and European cities and regions for 2003-2023, the years spanning the pre-crisis and post-crisis periods, provides deep insights into precisely under what conditions and over what geographies an Optimal Currency Area (OCA) may be evident.

Taken together the different aspects of our approach therefore provide much more direct tests of the Optimal Currency Area (OCA) logic than any previous methods and produce OCA temporal and geographical insights which no previous tests have ever allowed for. In particular, in terms of temporal relationships, we will see that the UK Sterling-area, the Eurozone and the rest of non-Euro Europe (EU+EFTA) correspond less to an OCA type of set-up in the post-crisis era than in the pre-crisis era. At the same time, we will also demonstrate that different combinations of geographies more or less closely correspond to an OCA to a different extent at different times. In general we find that in the pre-crisis period the Sterling-area was closer to being an OCA than either the Eurozone or the non-Euro parts of Europe, whereas in the post-crisis period, in general the Sterling-area is less of an OCA than either the Eurozone or the non-Euro parts of Europe. These observations are new.

Regional Risk-Premia, Investment Yields and UK Cities

Before we proceed with the OCA tests, we will present a brief background to the datasets and the empirics that these tests are based on. We have at our disposal uniquely-detailed data on thousands[3] of very large-scale commercial real estate investments in the office, industrial and retail sectors, which include detailed investment yield values for each transaction. We follow the methodology of Daams et al. (2023, 2024a,b) who have applied the Capital Asset Pricing Model (CAPM) to these data in order to develop a methodology for calculating the year-by-year investment risk premia and investment yields for all UK, US and European cities and regions over the last couple of decades. In other words, this allows us to calculate the risk premium priced into the *i*th individual investment in national, regional, or urban market *m* (*m* = 1, …, *M*) at time *t*. Both the investment yield data and the calculated risk-premia values provide us with indicators as to the cost of capital in each place at each time. As such, this approach also determines the detailed city and regional 'external finance premia' (Bernanke 2002), which represents the difference between the official discount rates and the rates at which private investors discount investments in particular places and at particular times based on perceived risks (Daams et al. 2024a,b). The way that the risk-premia for the UK are calculated follows (Daams et al. 2024a,b).

The simple CAPM can be written as (Armitage 2005):

(1) $$E(R_i) - R_f = \beta_i[E(R_m) - R_f]$$

or:

(2) $$E(R_i) - R_f = \rho_{im}\frac{\sigma_i}{\sigma_m}[E(R_m) - R_f]$$

where:

$E(R_i)$ = Expected return on investment *i*;
$E(R_m)$ = Expected return on market *m*;
R_f = Expected return on risk-free investment *f* (government bonds);
σ_i = Standard deviation of returns on investment *i*;
σ_m = Standard deviation of returns on market *i*;
ρ_{im} = Correlation between returns on investment *i* and market *m*;

and where the investment beta can be written as:

(3) $$\beta_i = \rho_{im}\frac{\sigma_i}{\sigma_m}$$

If we treat each cluster, respectively, as *i*, and we can calculate all of the UK-wide market *m* values in the real estate investment sector as the average values across all cities, then the average yield in each cluster *i*, as observed by year, is denoted as r_i and the average year-specific yield across the whole UK market is denoted as r_m. Given that the yields reflect the expected return on each investment, across the whole system of UK clusters we can now write a CAPM equation of:

(4) $$-r_f = \rho_{im}\frac{\sigma_i}{\sigma_m}[r_m - r_f].$$

[3] For 2003-2023 we have 12,681 UK investments and 5,428 investments in continental Europe with complete yield data.

For each cluster *i* and also for the UK real estate market as a whole *m*, from our dataset we know the values for r_i, r_m, r_f, σ_i and σ_m , and we can also calculate the value of ρ_{im}. This allows us to calculate the relationships between the observed risk premium $(r_i - r_f)$ for the *i*th cluster and its risk premium predicted by the CAPM $(\rho_{im} \frac{\sigma_i}{\sigma_m} [r_m - r_f])$, and also to examine the beta values $\rho_{im} \frac{\sigma_i}{\sigma_m}$ for individual clusters. The expected return on a risk-free investment at time *t*, is approximated by the yield on 10-year UK government bonds, which are long-dated akin to the typical horizon of real estate investments. The equivalent calculations for the rest of Europe follow the same approach as for the UK, with each country's 10-year sovereign bond values for the respective year used as the risk-free benchmark. These individual risk premia values can then be aggregated to the market-level to measure $Risk\ Premium_{m,t}$ at the various relevant urban, regional or national scales of analysis[4].

Using our dataset we can also directly observe the individual investment yields inherent in any transaction. Givn that we know the timing and detailed location of each investment, again, we can aggregate these individual transactions at the city, regional and national levels on a yearly basis in order to generate the location-specific and time-specific investment yield values to accompany the calculated location-specific and time-specific investment risk-premia values. As we see below, these two measures of capital-pricing values follow each other very closely.

What is important for our purposes is that, as we see in Figure 1, in the case of the UK, in the wake of the 2007-08 global financial crisis, the capital and investment markets in effect partitioned the UK economy into two separate economies, namely London and its immediate hinterland versus the rest of the UK outside of London and its immediate hinterland (Daams et al. 2023, 2024a).

In Figure 1a we see that risk premia today are still above pre-crisis levels for all parts of the UK, except London. Meanwhile in Figure 1b we see that monetary policy, and in particular the yield compression effects of quantitative easing (QE), gained real beneficial traction in the London economy. In particular, investment yields in London closely track the downward path in 10-year sovereign yields from 2009 through to 2016, the year of the Brexit referendum, after which investors appear to have placed a floor below which London pricing does not fall. In contrast, quantitative easing (QE) appears to have had no beneficial effects outside of London, with the rest of the UK regions stuck in junk-bond pricing territory, some 400-500 basis points above the sovereign rates.

[4] Further technical aspects of the basis on which these city-specific and region-specific annual risk-premia are calculated are discussed in detail in Daams et al. (2023, 2024a,b) and also in the respective accompanying online supplementary material associated with each of these papers.

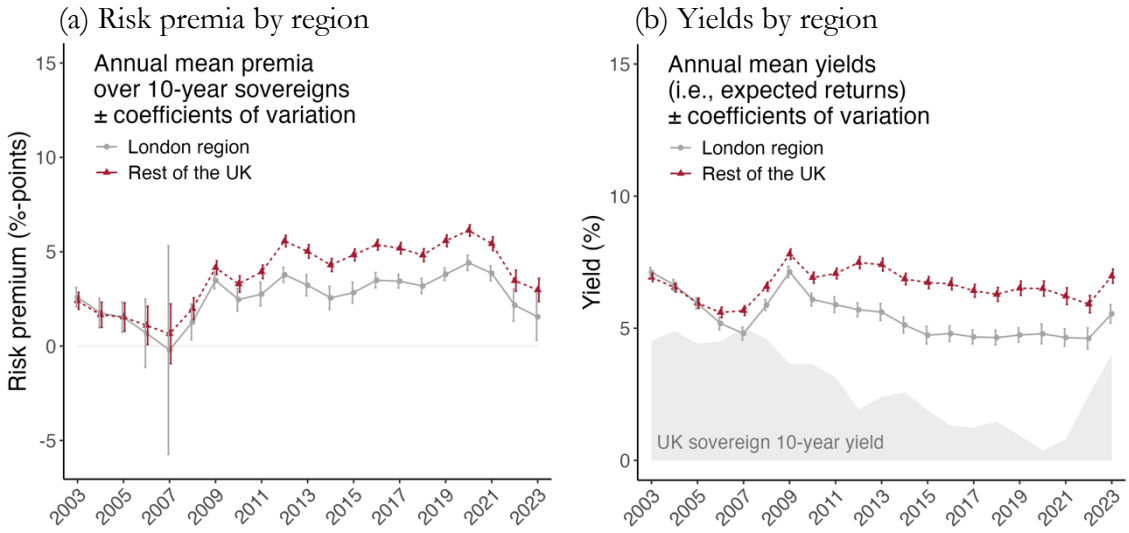


Figure 1. Regional external finance premia on investments into London and the Rest of the UK

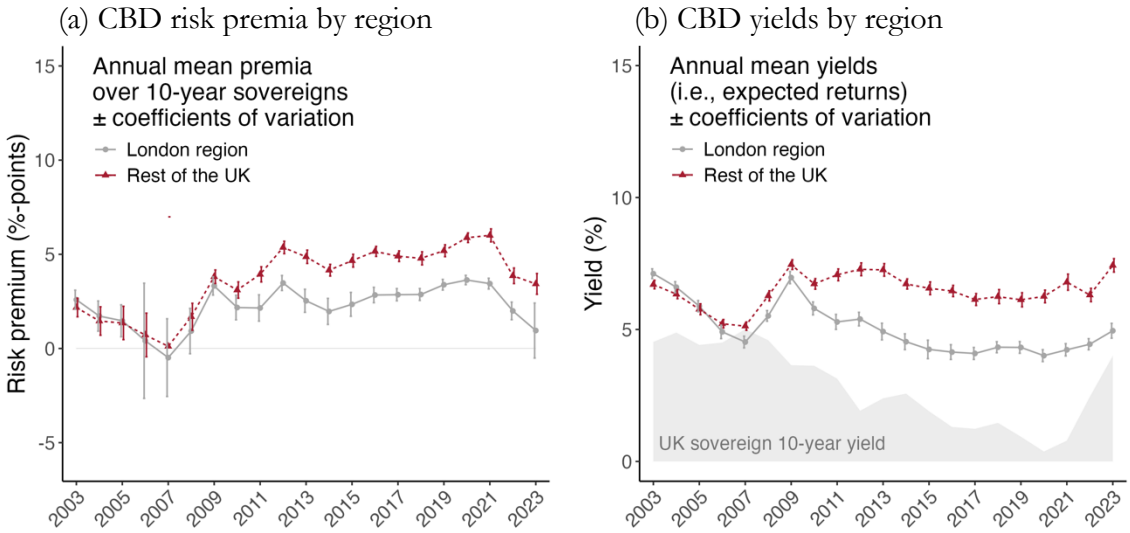


Figure 2. Central business district (CBD) external finance premia in London and the Rest of the UK

In Figure 2 we plot these same risk pricing trends as in Figure 1, but now this is done for the central business districts (CBDs) of UK cities. The spreads in the investment risk premia and yields between London and the rest of the commercial centres of UK cities are of the order 250-300 basis points, akin to the current sovereign spreads between the UK and Romania or Chile. As such, it appears that in terms of UK cities, the capital markets currently price much of the UK urban economy in a manner which is similar to newly developing countries.

Prima facie, in terms of risk premia and investment yields, these continental-wide levels (Daams et al. 2023a,b,c) for the spreads in risk premia and investment yields between UK cities and regions imply that, in investment terms, the UK no longer looks anything like an optimal currency area. Not surprisingly, and as we have seen in Figures 1b and 2b, a direct corollary of this is that the effects of monetary policy also appear to have been highly asymmetric between regions. Interestingly, this had already been the case

for more than half a decade before the time at which the UK institutions (HM Government 2014, Bunn et al. 2018) and their former heads (King 2016) were arguing that the UK Sterling-zone displayed the hallmarks of an optimal currency area (HM Government 2014) including monetary neutrality between regions (Bunn et al. 2018), whereas the Euro area displayed few such features (King 2016). Yet, although the UK also has its own 'internal market' and fiscal transfer system, neither appears to have any effect on this deeply problematic situation.

Although this prima facie regional and urban risk pricing evidence suggests that the Sterling-zone is currently a long way from being an optimal currency area, official defences of the Sterling-as-optimal-currency-area position (HM Government 2014, Bunn et al. 2018) may argue that the shocks associated with the 2008 global financial crisis are likely to have impacted on the optimality of all national currencies or cross-country currency unions. According to this defence whereby the Sterling-zone is assumed to be close to an optimal currency area, the post crisis responses of the Sterling-zone would be expected to have been closer to what we might anticipate theoretically from OCA theory than would have been the case in other less OCA-optimal currencies or currency unions. We test this argument by comparing the UK Sterling-zone area with both the Euro area and non-Euro parts of Europe.

The UK and European Capital Pricing Empirics of the Optimal Currency Area

In this section we will set out to test these arguments empirically, using the data described above. However, in order to best capture empirically Mundell's (1961) OCA notion of a 'region' and a 'nation', in the following empirical sections, in the case of the UK we use the term 'region' in the standard sense as being a geographical sub-component of the UK sovereign state defined as the Sterling-zone, while in the case of the EU, we use the term 'region' to define a geographical sub-components of the various national sovereign member states of the European Union. In each case our definitions of 'regions' follow standard UK ITL/OECD-TL definitions of regions and metropolitan areas, and these allow us to consider what combinations of UK ITL/OECD-TL regions might most closely correspond to Mundell's (1961) original OCA notion of a 'region' and a 'nation'.

Our data allows us to ask questions regarding the extent to which particular combinations of UK and EU regions closely approximate an optimal currency area (OCA) from two different perspectives.

(*i*) First, we can examine the contribution to the national variance in location-specific risk premia which is accounted for by intra-regional variance as against the inter-regional variance in risk premia.
(*ii*) Second, we can consider the absolute levels of variance in investment yields and risk premia displayed by regions, countries or combinations of regions and countries.

From the first perspective, it is well known that the prices, returns and risks associated with real estate investments vary by street, by block and by building, and within the real estate industry this is succinctly captured by aphorism 'location, location, location'. As such, in terms of national variance decompositions of risk premia calculated on the basis of individual investments broken down by their intra-regional and inter-regional contributions, we would expect that typically the intra-regional variance entirely dominates the inter-regional variance. More specifically, following the OCA-logic, if a country is an optimal currency area (OCA), we would expect that intra-regional variance in risk premia is equal for all regions within the country while the inter-regional variance would be zero. From the second perspective, in response to major international economic shocks, we would also expect that the inter-regional variance exhibited

within a single nation would be less than what is observed across a group of nations. We can therefore consider these issues by calculating both the relative shares of risk premia variance due to inter-regional versus intra-regional variance as well as differences in their absolute between regions, countries or groups of regions or countries.

Our first perspective for discussing the optimal currency area argument comes from the examination of the relative shares of risk-premia variance which are counted for by intra-regional variance versus inter-regional variance. In terms of variance decompositions, here we present estimates from pure linear mixed effects models without any controls of UK risk premia. These models allow for regional intercepts to vary randomly and based on this, unlike a fixed effects model, they estimate the intra-regional and inter-regional variance in risk premia explicitly. The models are estimated year-by-year, such that the variance decompositions are thus obtained by year separately. In each case, the risk-premia are calculated as the risk premia mark-up for each individual investment above the official discount rate of the respective country at that moment[5].

In 2003, as we saw in the previous section's Figures 1 and 2, both the average risk-premia and investment yields were equal across all UK (ITL1/OECD-TL2) regions, such that any variance in risk-premia which was observed was solely due to intra-regional local variations. Indeed, as we see in Figure 3a and 3b, in 2003 all of the UK national variance is accounted for by intra-regional variance, with the inter-regional variance accounting for zero of the national variance in risk-premia. This state of affairs is entirely consistent with the argument that the Sterling-zone was an OCA optimal currency area at that time. Yet, these conditions started to change slightly in the following years. In particular, as we see in Figure 3a, from 2005 onwards, we start to see that inter-regional variance becomes increasingly evident while intra-regional variance falls, although intra-regional variance still dominates inter-regional variance. From 2009 onwards, the inter-regional component of the national variance in risk premia now looks to be rather different from what one might expect if the Sterling-zone were an optimal currency area.

This becomes clearer if we separate London from all other UK regions. When we compare London with respect to all other UK regions, as we see in Figure 3b, the onset of the global financial crisis 2007-2008 led to rapidly growing inter-regional variance in risk premia, such that by 2015-2017, the inter-regional variance in risk premia was actually higher than the intra-regional variance in risk-premia. At this point, the Sterling-zone features appear to be entirely the opposite of an optimal currency area set-up. Although this has since attenuated somewhat, the interregional dispersions in risk premia evident in both Figures 3a and 3b still appear to be quite different far from what might be expected if the Sterling-zone was an optimal currency area set-up.

[5] In Figure 3, all definitions of a region are based on ITL1/OECD-TL2 regions while in Figure 4 all definitions of a region follow the OECD (2012) definition of Metropolitan Urban Areas.

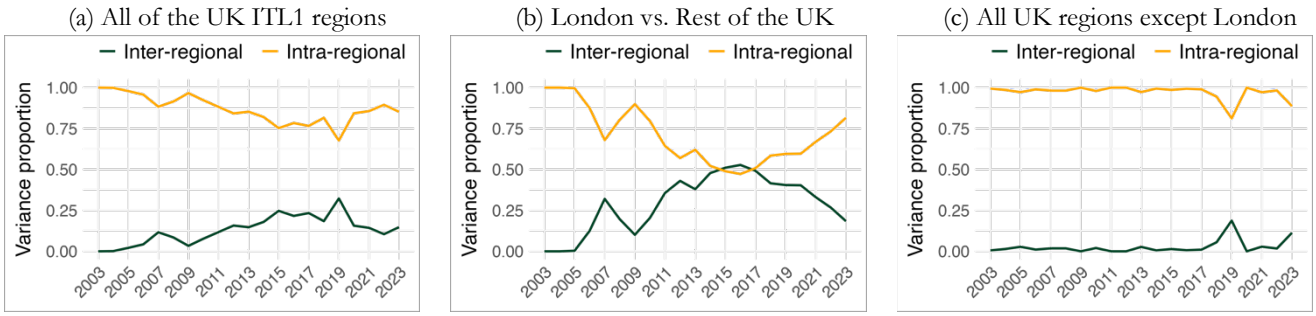


Figure 3. Inter- and Intra-Regional Variance Decomposition of UK Risk Premia by Regional Grouping

Figure 4. Inter- and Intra-Regional Variance Decomposition of UK Risk Premia by Urban Grouping

Interestingly, as we see in Figure 3c, if we exclude London and then just consider the risk dispersion features of all other UK regions, we see that intra-regional dispersion not only accounts for almost all of the UK-wide variance, but that the decomposition patterns of intra-regional and inter-regional variance have barely changed at all over the two decades since 2003. In other words, once London is removed, the rest of the UK regions display features of risk premia which are consistent with an optimal currency area set-up.

If we now use the OECD definition of Metropolitan Areas as our definition of a region, then we see in Figure 4a that inter-urban differences have been climbing steadily since 2003, now accounting for a quarter of the national variance in risk premia, although intra-urban differences still dominate accounting for three-quarters of the variance. If we consider investments in the central business districts (CBDs) of the cities versus those investments in non-CBD locations within these urban regions, as we see in Figure 4b, while the inter-urban variance rose from 2003 to 2020, it has since largely disappeared and reverted to the 2003 levels, with zero inter-urban differences in risk premia variance. In terms of city centres versus rest-of-city locations, the UK once again looks like an optimal currency area. However, if once again we compare only CBD investments, now between London versus all other UK cities, we see in Figure 4g that the inter-urban variance grew markedly from the 2008 crisis right up to 2016, at which the levels of inter-urban variance were almost equal to the intra-urban variance levels. Similar patterns are also evident in Figure 4c when we treat each individual central business district (CBD) individually. Although this has since somewhat attenuated, such that the inter-urban variance now accounts for roughly a quarter of all national variance in risk premia (Figure 4a,c,d,f,g), these comparisons still look to be far away from optimal currency area features.

We now undertake similar exercises to the case of the UK, but here we examine regions and urban areas within the EU, and within the Euro area. In Figure 5a the inter-regional versus intra-regional variance decomposition is undertaken for Euro area versus non-Euro area EU and EFTA countries; in Figure 5b,c,d the inter- versus intra-regional variance decomposition is undertaken for Euro area, or non-Euro area, countries; and in Figure 5e,f,g, the inter-regional versus intra-regional variance decomposition is undertaken for all OECD-TL2 regions within and across the Euro area and non-Euro areas.

As we see in Figure 5a, when we split the definitions of regions within the EU according to Euro area versus non-Euro area EU and EFTA countries, apart from a rise to around one quarter in 2016-2019, inter-regional variance typically accounts for only a tiny fraction of the EU-wide variance of risk premia. This displays features which are consistent with an optimal currency area. However, when we consider all of the countries within the Euro area as separate regions, as we see in Figure 5b, there are three periods (mid-2003 to mid-2004; mid-2010 to mid-2012; and 2016) during which inter-regional variance is greater than intra-regional variance. During these periods the EU looks to be far from an optimal currency area, although it has now again settled down to something akin to an OCA. Finally, in Figures 5e, 5f, and 5g, when we take account of all Euro area, non-Euro area, or all European Union OECD-TL2 regions, respectively, we see that for much of the last two decades, the inter-regional variance in risk premia has accounted for roughly a quarter of the total Euro area and EU-wide risk premia variance. During 2011-2012, the inter-regional variance in risk premia was actually greater than the intra-regional variance, whereas today inter-regional variance in risk premia is zero and all variance is intra-regional in nature.

As with the case of the UK, as well as formal regional definitions, we can now again consider these issues from the perspective of regions being the metropolitan urban areas, using the OECD (2012) definition of urban areas.

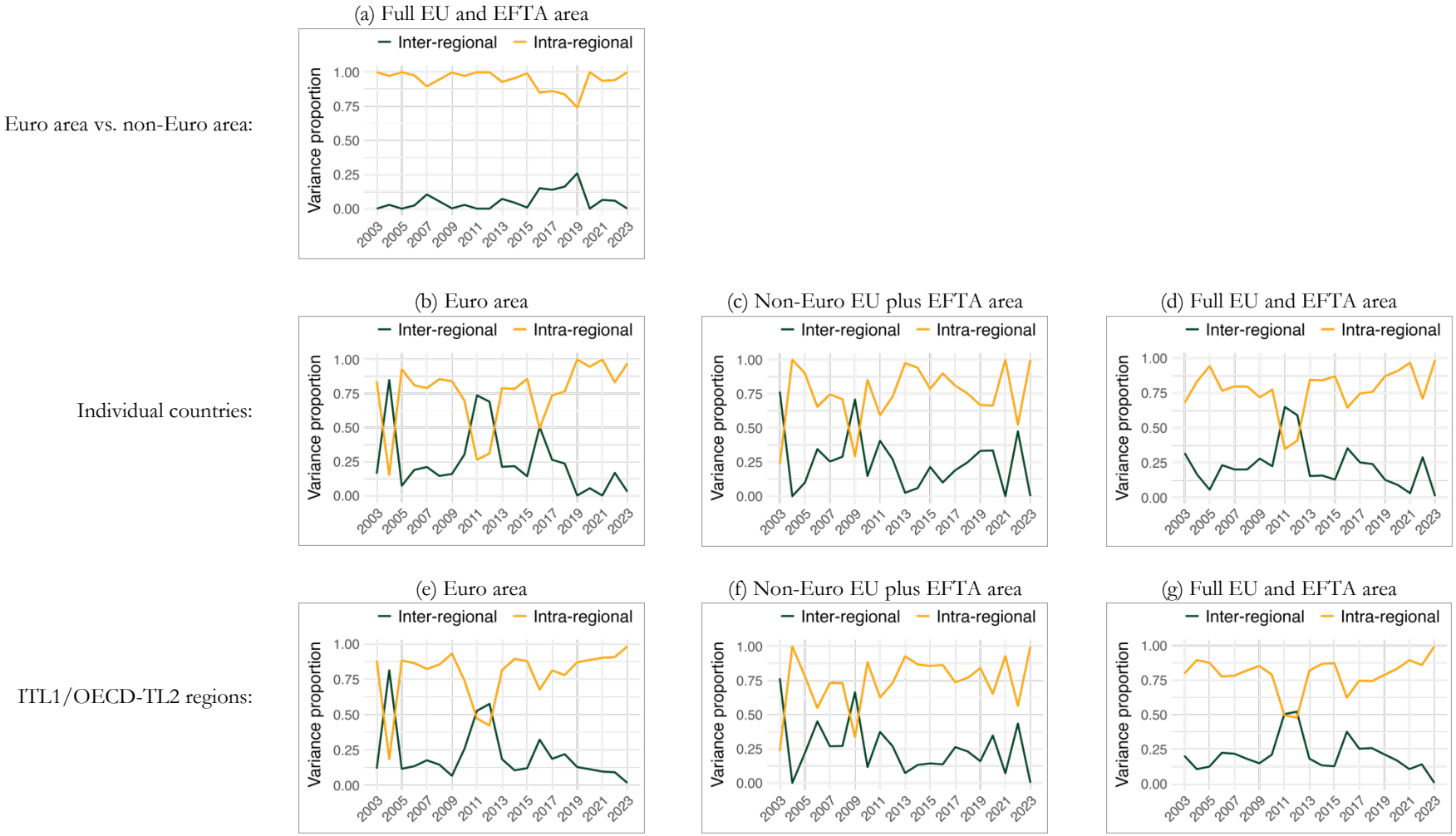


Figure 5. Inter-Regional and Intra-Regional Variance Decomposition of Risk Premia by Continental European Regional Grouping

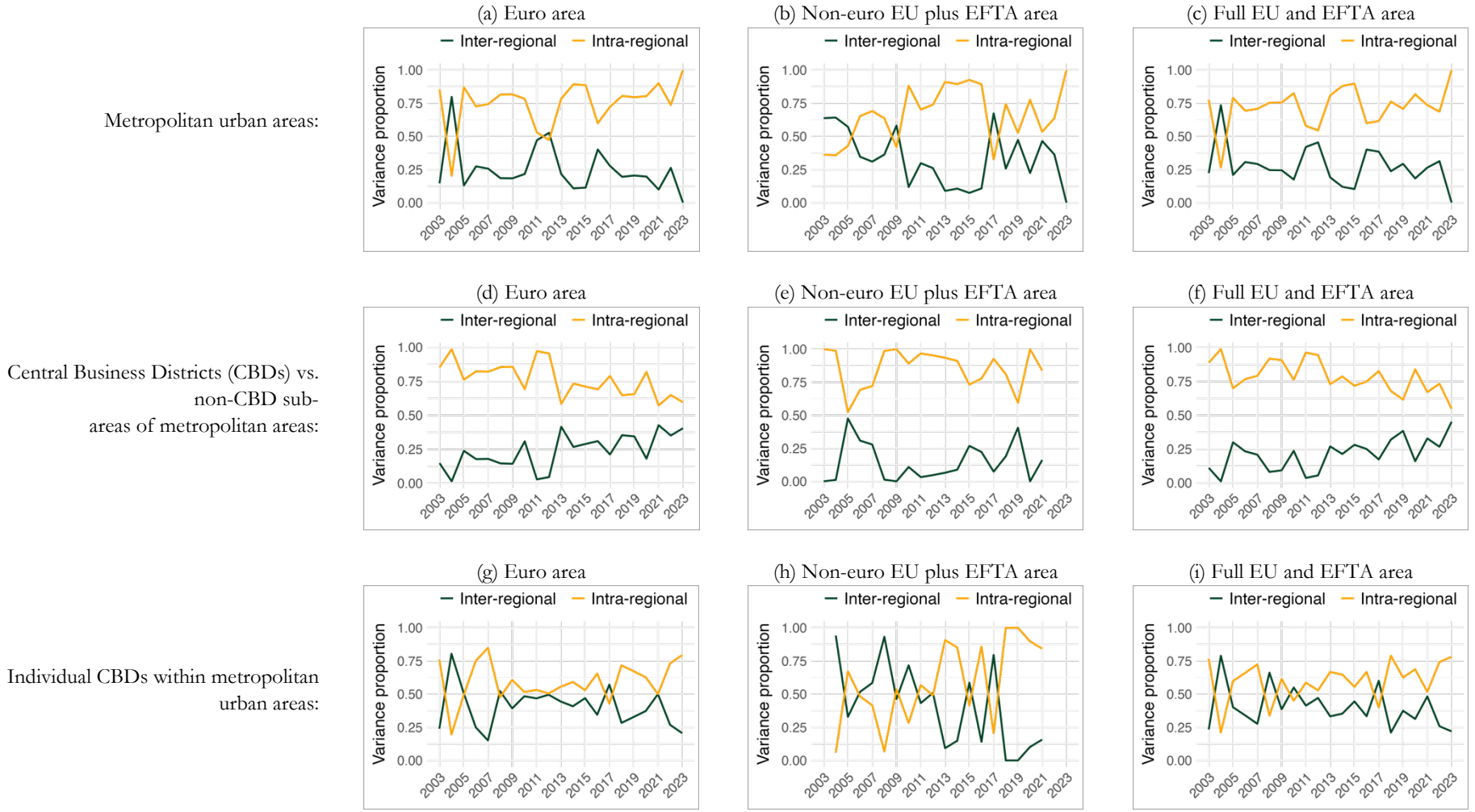


Figure 6. Inter-Regional and Intra-Regional Variance Decomposition of Risk Premia by Continental European Urban-Regional Grouping.[6]

[6] Figures 6e and 6h have missing information for the years 2022 and 2003, 2022, and 2023, respectively, due to limited variation in the non-Euro area data for these years.

In Figure 6a, when we take account of all Euro area metropolitan urban areas, we see that for much of the last two decades, the inter-urban variance in risk premia has accounted for between 20% and 40% of the total EU risk premia variance. During 2012, the inter-urban variance in risk premia was actually greater than the intra-urban variance, whereas today inter-urban variance in risk premia is zero and all variance is again intra-urban in nature. In Figure 6d, we consider central business districts (CBDs) across the Euro area, we see that inter-urban variance has been steadily rising over the last two decades with the inter-urban variance now accounting for over 40% of Euro area-wide urban variance in risk premia. In Figure 6g, when we consider the CBDs individually, for much of the last two decades, inter-urban variance has been close to half of all of the Euro area-wide variance in risk premia, only recently falling back to around 20%. If we compare Figure 3a and 3c with Figure 5e, we see that the Sterling-zone looks more like an optimal currency area than the Euro area, but only if London is removed from the Sterling-zone area. Similarly, using risk premia data from urban areas, if we compare Figure 4a with Figure 6a and also Figure 4c with Figure 6g, the Sterling-zone area today looks to be further away from being an optimal currency area than does the Euro area. Within CBDs, as we see from Figures 4b and 6d, the Sterling-zone looks closer to being an OCA than the Euro area, but not when we consider London versus the rest of the UK, Figure 4g and Figure 3b.

Our second perspective for discussing the optimal currency area argument comes from the examination of the absolute levels of variance in investment yields and investment risk premia displayed by regions, countries or combinations of regions and countries. Our data allow us to calculate spreads in risk-premia and investment yields for the UK, the Euro area and the rest of continental Europe. Figure 7a displays the average values along with the coefficients of variation for the risk-premia mark-ups over the respective sovereigns, while Figure 7b displays the average values along with the coefficients of variation (vertical bars) of the investment yields. In each case these are displayed for the Euro area and for continental Europe outside of the Euro area[7] after excluding the UK from the non-euro European countries.

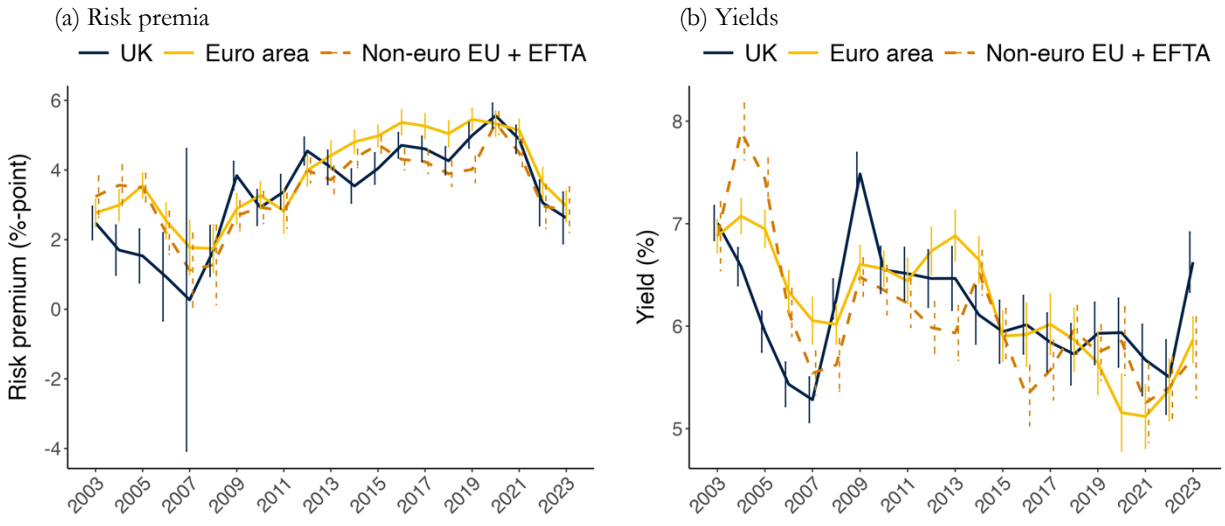


Figure 7. Mean Levels and Dispersion of Risk-Pricing for the UK, the Euro area and Non-Euro area Europe (excluding the UK)

[7] The other non-Euro area continental European countries are Poland, Sweden, Norway, Denmark, Switzerland, Czech Republic, Switzerland, and Hungary. We dynamically exclude the small number of investments in Latvia, Lithuania, Slovakia and Slovenia, countries which joined the Euro at a later date.

As we see in both Figures 7a and 7b, the Sterling-zone does not appear to be systematically less risky than either the Euro area or the non-Euro area, irrespective of whether risk is reflected either in investment yields or risk-premia mark-ups over the respective national official discount rates. Widespread criticism of the Euro area during the Eurocrisis in the years following the 2007-2008 global financial crisis, and especially from UK-based commentators, was not reflected in systematically lower investment yields or risk-premia in the Sterling-zone than either the Euro area or the non-Euro area parts of Europe. At least in terms of the minds of investors, it appears that the Sterling area was not seen as more of an optimal currency area set-up than the Euro area. As such, these observations would push against assertions (HM Government 2014) that the Sterling-zone displays all of the hallmarks of an optimal currency area, at least when measured against the rest of Euro area or non-Euro area Europe.

Meanwhile, Figures 8a and 8b display the coefficients of variation for the risk premia and investment yields, respectively for UK, Euro area and Rest of Non-Euro area Europe excluding the UK. As we see in Figure 8a, in terms of the risk premia, the UK Sterling-zone area appears to perform less like an optimal currency area than either the Euro area or the non-Euro area European countries. The UK displays a much higher coefficient of variation than either the Euro area or non-Euro area parts of Europe during the years either side of the 2007-2008 global financial crisis. Moreover, both in terms of risk premia and investment yields, the UK displays higher levels of dispersion than either the Euro area or non-Euro area parts of Europe for most of the last 21 years. In Appendix A we run similar comparisons with the USA, Germany and France in order to check that these results are not size-related, which our results confirm. Again, this would strongly push against assertions (HM Government 2014) that the Sterling-zone displays all of the hallmarks of an optimal currency area, or assertions that the Euro area fails to display OCA characteristics (King 2016; Krugman 2013). Indeed, in terms of the optimal currency area argument, the Sterling area would appear to have no stronger claim to be an optimal currency area than either the Euro area, or even the economic area covering all of the non-Euro area European countries added together across multiple currencies.

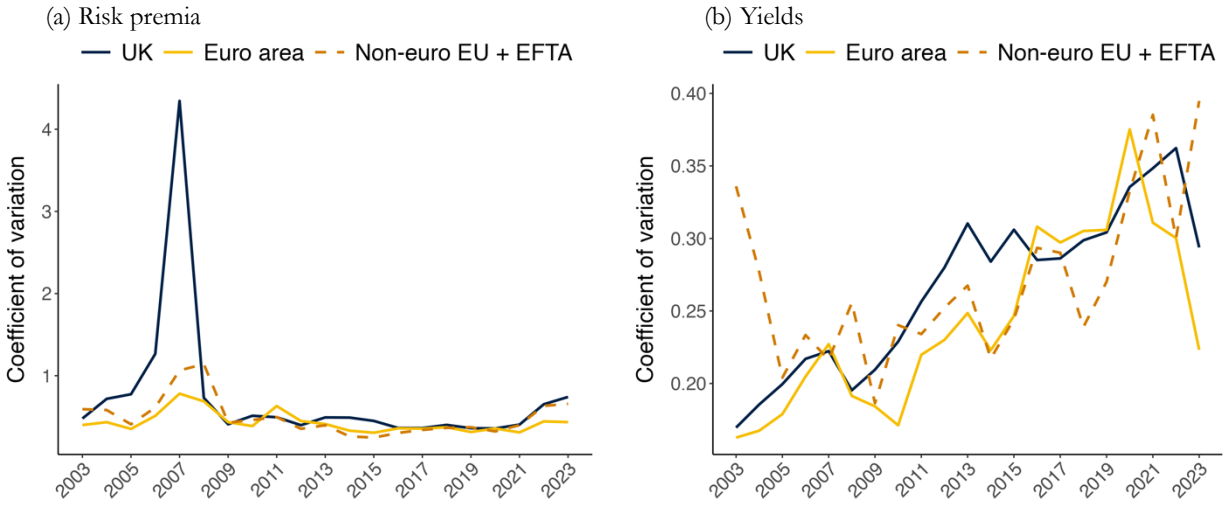
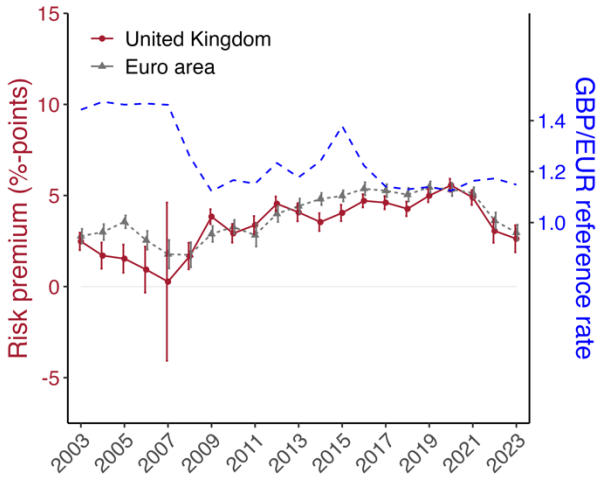
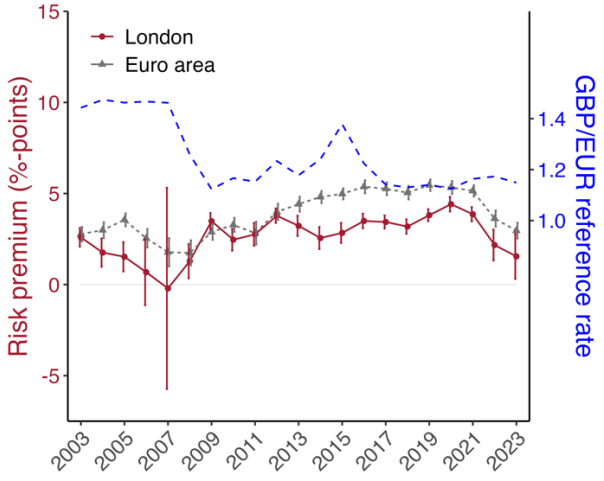


Figure 8. Coefficient of Variation of Risk-Premia for the UK, the Euro area and Non-Euro area Europe (excluding the UK)

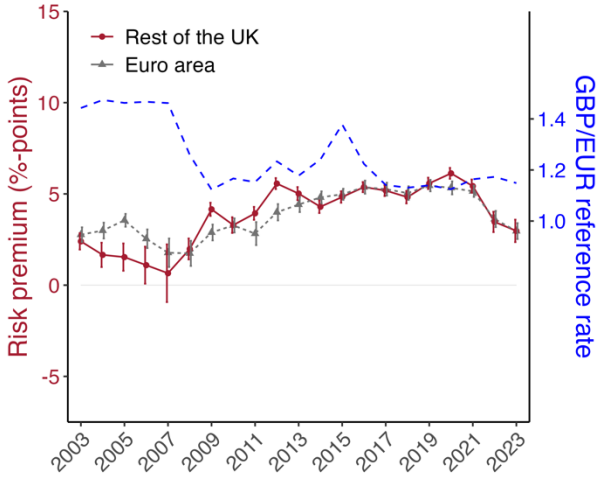
(a) UK and Euro area risk premia



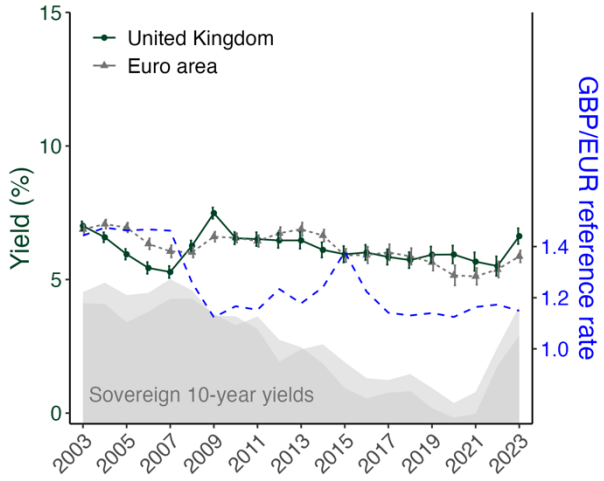
(b) London and Euro area risk premia



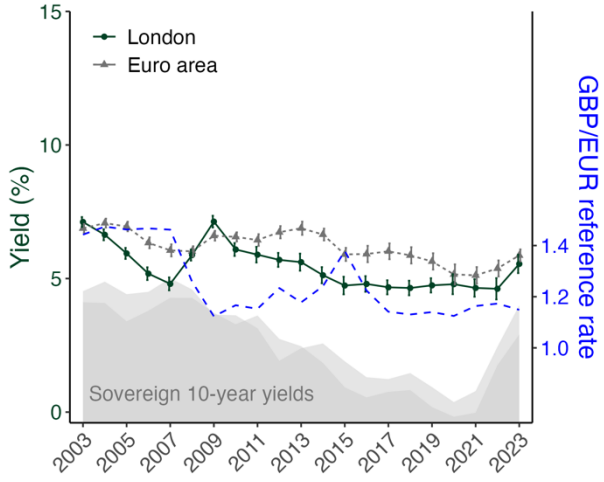
(c) Rest of the UK risk premia



(d) UK and Euro area yields



(e) London and Euro area yields



(f) Rest of the UK and Euro area yields

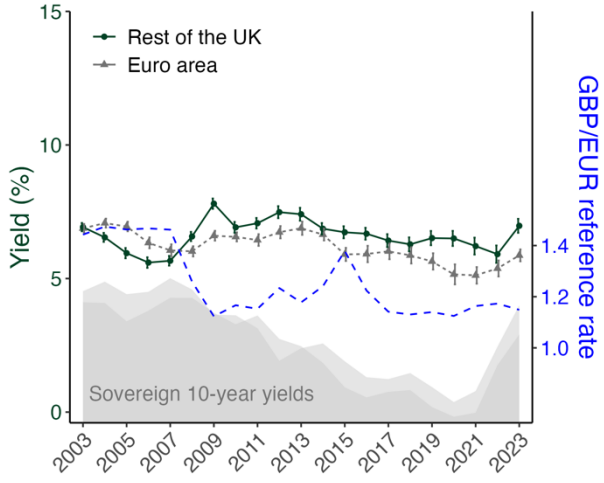


Figure 9. £/€ Currency Movements, UK National and Regional Risk-Premia and Investment Yields

Given that there are such stark interregional differences within the UK Sterling-area, reminiscent of those which are evident both within the Eurozone as well as across the non-Euro parts of Europe, in the spirit of the more Fleming-type aspects of the Mundell-Fleming approach (Mundell 2001; Obstfeld 2001) it is important to ask to what extent currency movements themselves contributed or responded to this state of affairs. Buiter (2000) had argued that an advantage of the UK joining the Euro set-up would be that reduced currency volatility risks would benefit UK regions which are specialised in price-sensitive tradable sectors heavily engaged with European markets, and these are typically the UK's weaker regional economies (Los et al. 2017). On the other hand, as we have already discussed, an alternative view might be that currency movements help the economy as a whole, including its various regions, to better adjust to shocks. Without making any claims regarding causality, our data also allows us to make some initial observations on these matters.

In Figure 9 we plot the £/€ exchange rates for each year 2003-2023 against the respective national and regional risk-premia and investment yields. In the first few years of the 21st century immediately after the establishment of the Euro, the £ Sterling was typically trading of the order of €1.45-1.65, falling then to approximately €1.3 in 2008 and then to some €1.12 by 2009. The £/€ exchange rates hovered at these levels for a couple of years until the Eurocrisis began to emerge from 2011 onwards such that the £/€ exchange rates began to appreciate steadily from 1.12 in 2011 up to 1.36 by mid-2016, followed by a fall after the Brexit vote, with the £/€ exchange rate remaining broadly at 1.11-1.17 between the second half of 2016 and the second half of 2023. When we compare the currency movements with the overall UK risk-premia and investment yields calculated across all UK cities, in broad terms what we observe in Figures 9a and 9d, is that the £/€ exchange rate appreciates when the UK risk premia and investment yields are lower than, and declining relative to, those in the rest of Europe. Conversely, the £/€ exchange rate depreciates when the UK risk premia and investment yields are higher than, and rising relative to, those in the rest of Europe. In Figure 9b and 9e we repeat the exercise but just for the London region. In this case we see a very clear correspondence between the £/€ exchange rate appreciation when the London risk premia and investment yields are lower than, and declining relative to, those in the rest of Europe. In contrast, in Figure 9c and 9f, when we compare the £/€ exchange rate movements with respect to the risk premia and investment yields in the rest of the UK cities and regions outside of London, there is very little correspondence. What these observations suggest is that dramatic falls in £/€ exchange rate have had little beneficial effects on enhancing investor confidence in the non-London regions. The exchange rate movements appear to be primarily related to the risk pricing associated with the London economy. As with the effectiveness of quantitative easing (QE) monetary policy, currency movements appear to have no traction outside of London. Again, these observations point to the Sterling-area being a long way away from an optimal currency area (OCA).

As a final note, as we have seen, strong assertions were made by the UK government regarding the supposed optimality of the Sterling-zone currency area (HM Government 2014) in the context of the Scottish independence referendum, while other arguments were put forward suggesting that adopting the Euro might be advantageous for an independent Scotland. In Appendix B we report similar OCA exercises for Scotland with respect to the Euro area and the rest of the UK, both including and excluding London. What is clear here is that in terms of the dispersion of risk premia and investment yields, Scotland most closely reflects the rest of the UK after London is excluded, whereas when London is included, as is the case of the whole Sterling-area, then Scotland more closely corresponds to the Eurozone than the Sterling-area. Of course, although OCA theory provides a purely technical description of currency areas linking external shocks to internal responses, the OCA theory provides little guidance regarding the complex political economy relationship between sovereignty and the formation and

governance of currency areas (Goodhart 1998), including both lender-of-last resort and buyer of last-resort functions of a central bank (Hardie 2022). Any transition towards either an informal currency union with the Sterling area or an independent currency for an independent Scotland would itself likely be fraught with additional risks and instability beyond the OCA empirics outlined here.

Discussion and Conclusions

Taken together, these observations raise profound questions as to whether the Sterling zone can in any way be considered an optimal currency area, and they also force us to reconsider the role of monetary policy with respect to different regions. The dispersion in risk-spreads and investment yields within the UK is today as large as, or larger than, the rest of Europe, both inside and outside of the Eurozone. As such, optimal currency area arguments against the Euro on the basis of different parts of the Euro area behaving differently would be just as applicable within the Sterling area. Consequently, assertions that the Sterling-zone displays all of the hallmarks of an optimal currency area would appear to be unfounded (HM Government 2014), as are official assumptions (Bunn et al. 2018) regarding the purported neutrality of monetary policy across UK regions. We know that differences in sectoral structures long ceased to have any explanatory power regarding interregional productivity differences (McCann 2016; Martin et al. 2018). However, the four decades-long decoupling of the London-plus-its-immediate-hinterland economy from the rest of the UK (McCann 2016) now means that the Sterling area appears to be very far away from anything like an optimal currency area (Harvey 2013). Moreover, a centralised UK monetary policy appears to be both ineffective and potentially distortionary, as is consistent with the arguments of Willem Buiter (2000) and with our data. Within the Sterling-zone there are powerful and complex relationships between regional risk-pricing, investment yields and monetary policy, which are simply ignored or assumed away by the currently specified official positions of UK central government financial and monetary policy institutions. There are arguments that taking account of regional disparities can reduce the costs of monetary policy (Angelini et al. 2008), but the stark continental-wide differences in regional risk-pricing and capital allocations experienced by UK regions in recent years ought to force a fundamental rethink as to exactly how UK monetary policy impacts on UK regions. Rebuilding investors' confidence (*Financial Times* 2025) in UK regions outside of London and its immediate hinterland would appear to be crucial (Daams et al. 2024a), and as well as fiscal considerations (Haldane 2024), in order to make monetary policy more effective, efforts to devolve the UK's banking and financial services sectors would appear to be paramount (Mayer et al. 2021; Daams et al. 2024c). This is especially important given the fact that the UK national growth problem is a regional growth problem to an extent which is almost unprecedented across OECD countries (McCann 2016, 2020).

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Appendix

A. Comparisons of the Sterling-Area with the United States, Germany and France

In the same light of the UK government's assertions regarding (HM Government 2014—c.f., Appendix *A*), another currency area complementary to those observed in the main analysis offers some relevant basis for comparison, namely the highly integrated US economy, which although being much larger than the UK is of a similar order of magnitude to the EU economy. In order to compare the dispersion of the Sterling-area risk premia and investment yields over time with those in the USA, we are able to use USA-wide investment data from 2003-2015 drawn from the Daams et al. (2024b) study of the office sector in US regions and metropolitan areas. These data are consistent with the present study's data in their measurement, enabling us to once again repeat the exercise of Figures 8b, but now for the office sector in the Sterling-area and the USA, as well as the office sector in the Euro area and the non-Euro EU+EFTA. The results are presented in Figure A1.

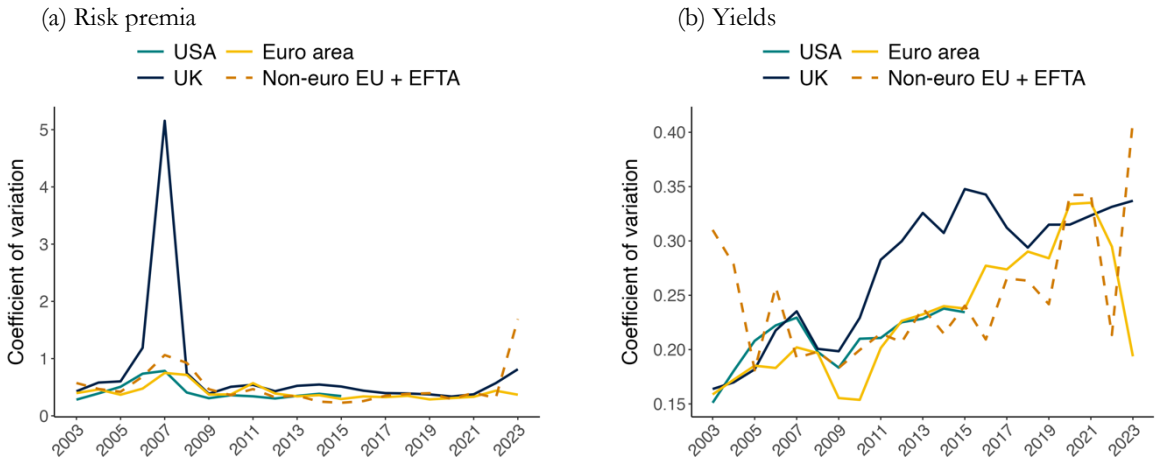

Figure A1. Coefficient of Variation in Investment Risk Premia and Yields in the office markets of the UK Compared with those in the USA as well as in the Euro Area and Non-Euro Area Europe (excluding the UK)

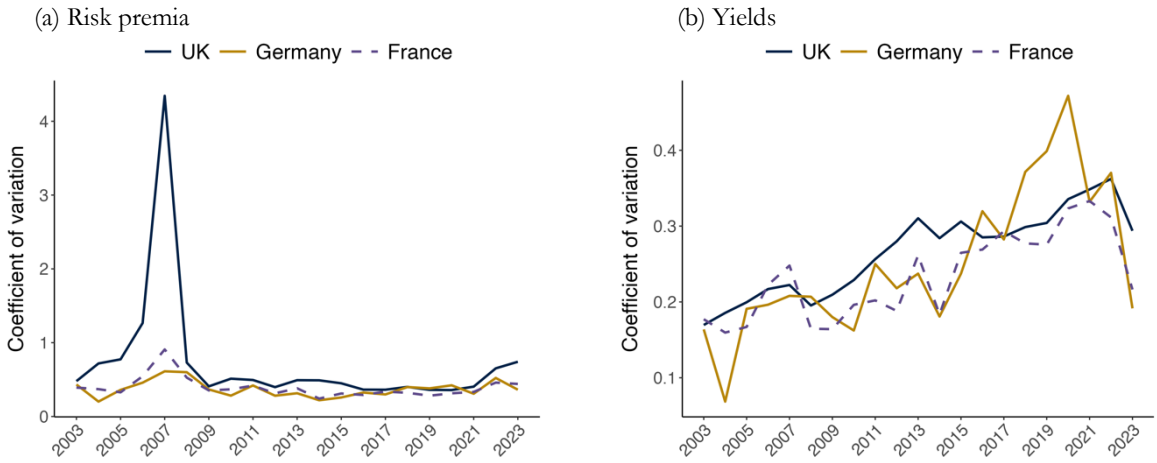

Figure A2. Coefficient of Variation in Risk Premia and Investment Yields Across All Sectors in the UK, Germany and France

As we see, in terms of risk-premia the UK displays a much higher coefficient of variation during the crisis than the USA economy, the Eurozone and the non-Euro parts of Europe, as well as an elevated dispersion in both risk-premia and especially in investment yields during the post-crisis period. However, in order to check that this is not simply a spurious scale-related effect, we can also repeat this exercise for all (office, industrial, retail) sectors by comparing the UK with the similar size economies of Germany and France. As we see in Figure A2, these general patterns still hold, with the UK typically displaying much higher dispersions in risk-premia and investment yields at the time of the global financial crisis, and then also in the post-crisis era.

B. Comparisons of Scotland with Respect to the Sterling-zone and the Euro area

In the light of the assertions by the UK government (HM Government 2014) that the Sterling-area displayed all of the hallmarks of an optimal currency area, and therefore a separate currency regime in an independent Scotland may not be advantageous, we investigate these claims in Figures A3 and A4 whereby we repeat the exercises undertaken in Figures 8a and 8b, but in this case we partition out Scotland and then compare the features of Scotland with respect to the Euro area and the Rest of the UK, both including and excluding London.

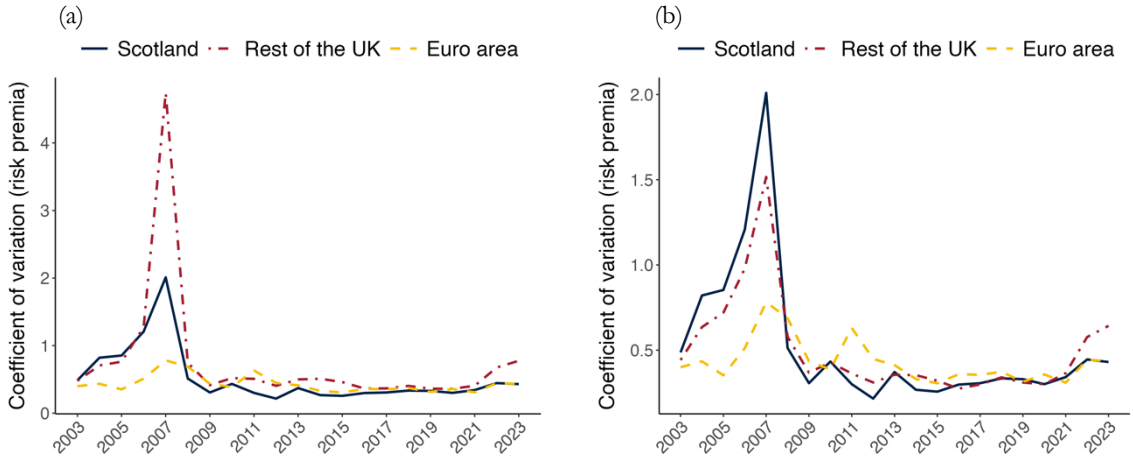

Figure A3. Coefficient of Variation in Risk-Premia in Scotland compared with the Euro area and the Rest of the UK (a) including London and (b) excluding London

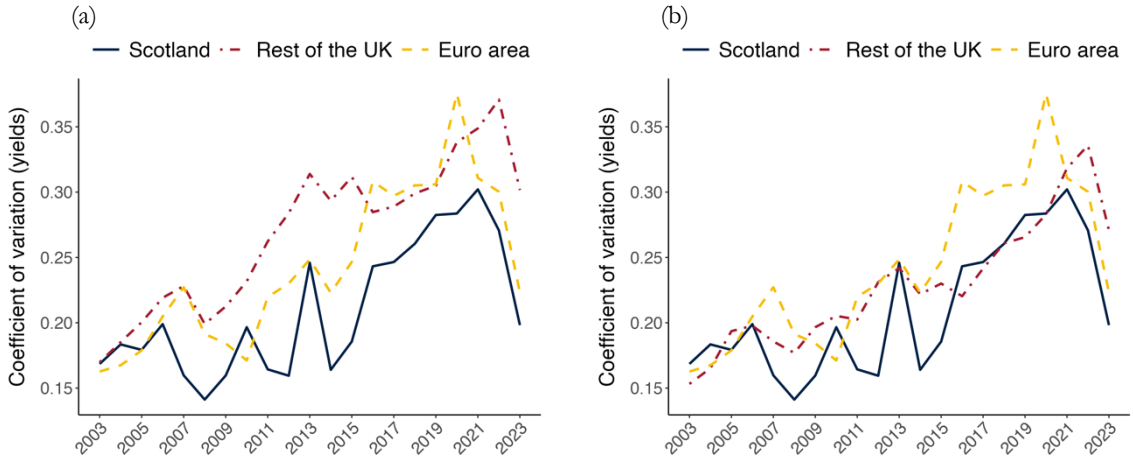

Figure A4. Coefficient of Variation in Investment Yields in Scotland compared with the Euro area and the Rest of the UK (a) including London and (b) excluding London

In both Figures A3 and A4 it becomes apparent that in terms of risk premia and investment yields, the Scottish economy closely mirrors the economy of the Rest of the UK, excluding London. It appears to be very different to both the Euro area and the Sterling-zone as currently constituted, but the latter result is due to the major differences between London and the rest of the UK. Indeed, the results displayed in Figures A3b and A4b excluding London mirror the results reported in Figure 3c. Scotland behaves in a similar manner to the rest of the non-London UK regions, rather than either London or the Euro area.