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Currency Redenomination Risk

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IA.A Measurement Concerns

IA.A.1 Liquidity and the Update to the ISDA Definitions

ISDA began the revision of its CDS definitions in May 2012, following the restructuring credit event in Greece. In November 2013, ISDA published a draft of the revised definitions to review comments from market participants ahead of the final release of the new definitions on February 21st, 2014. Trading in the new contracts began 7 months later on September 22nd.[1]

The release of the new definitions in February also announced the implementation process for the new set of definitions. For the majority of reference entities, existing contracts were migrated into new definitions on October 6th, but due to the expected pricing impact of the sovereign-specific changes (see also Section IA.A.2), most sovereign issuers were excluded from this adjustment such that CR contracts remained widely outstanding alongside the newly issued CR14 contracts. Among sovereign issuers, existing contracts were only migrated to the new 2014 definitions for emerging market sovereign issuers because ISDA was concerned that the resulting lack of liquidity in legacy CR contracts would be insufficient to support efficient trading in a bifurcated market (Simmons & Simmons (2016)). At the same time, there were no such liquidity concerns for developed-market sovereign issuers, including all countries studied in this paper. Due to the broad consultation of market participants in the revision process and the long lead time between the release of the final

[1]For details, see ISDA releases available at isda.org/a/24DDE/2014-credit-definitions-release-final.pdf and isda.org/a/eXEDE/isda-2014-credit-definitions-faq-v12-clean.pdf.

new definitions and the beginning of trading, it is reasonable to assume that market participants were fully aware of the contract differences upon launch of the CR14.

ISDA's decision to exclude the CR contracts written on developed market sovereigns from migration into the new definitions suggests that market liquidity was viewed as sufficient for price discovery in both markets. This view is consistent with the number of available quotes for both contract types: Table 1 reports market 'depth' as the number of quote submissions from dealers to Markit. Differences in market depth between the two contracts (far-right column) are small for all countries, and negative for many: the older contract type receives slightly *more* quotes on average, for most countries. The absolute market depth of around five intermediary submissions is consistent with the large concentration of these OTC markets among a few dealers (Giglio (2014); Siriwardane (2019)).

The synthetic control will account for liquidity-driven differences between old and new contracts, as long as such differences are common across treatment (G7-eurozone) and their matched control (non-G7 and/or non-eurozone) countries. However, the additional distinction between the two types in treated issuers may create clientele effects that generate price differences between CR and CR14 contracts as some investors shift holdings from CR to CR14 contracts and the market for CR adjusts to the new clientele. Such adjustments are not purely driven by an on-the-run versus off-the-run phenomenon, and would, therefore, be systematically different between treatment and control groups. But such adjustments are also likely to be transitory, since the launch of CR14 contracts was widely anticipated. Transitory price effects driven by clientele adjustments to the newly bifurcated market may be responsible for the relatively volatile redenomination spreads over the first year of the sample, over which the level, however, remains close to zero on average.

IA.A.2 Asset Package Delivery

A second change in the CR14 restructuring clause relative to the CR clause that relates particularly to sovereign issuers is the introduction of 'asset package delivery' (APD). This reform in the calculation of the recovery value is a direct response to the Greek debt restructuring of 2012.

When Greece restructured its debt in 2012, existing bonds with 1€ in face value were exchanged into a *package* of new securities: (i) 15 cents of face value in short-term notes to be repaid by the European Financial Stability Facility (EFSF), (ii) 46.5 cents of face value in new Greek bonds with 30 years to maturity and a coupon rate of 2%, and (iii) detachable GDP-warrants which pay a capped amount if Greek GDP growth exceeds certain projections.

Greek CDS payouts were triggered, but since old bonds were exchanged, the recovery was determined in an auction of the new 30 year bonds, which sold at approximately 30% of par value. As Duffie and Thukral (2012) outline, the *true* recovery is derived from the value of the total asset package that is received in exchange for the original bonds rather than the value of just the single security, which is determined to be the 'deliverable obligation' and auctioned by ISDA.

The APD clause addresses this flaw in the original CDS terms and specifies that recovery be based on the market value of the full asset package. Since the APD clause may impact the CDS payout, the change in this clause potentially introduces another difference between CR and CR14 CDS premia. As seen in Equation (1), the recovery value interacts with the default probability in determining the fair insurance premium. If the APD term is responsible for differences between CR and CR14 premia, this difference should therefore scale with the level of the premium. The synthetic control approach that matches on the default risk level accounts for this distortion.

IA.A.3 Deliverable Obligations

Beyond the APD clause described above, the 2014 definitions include a few more changes relative to 2003 with respect to deliverable obligations' ('DOs'). DOs are securities or assignable loans that can be delivered into the auction that sets the recovery value determining payouts to the protection buyer from the protection seller.

Since protection buyers are generally free to choose which DO to deliver (the 'cheapest-to-deliver option'), a larger set of DO's makes CDS protection more valuable. DOs have to satisfy certain DO characteristics, which may include currency of denomination, so a potentially relevant question with respect to the redenomination event is whether redenominated bonds are DOs. The

2014 definitions make sure that this is the case for any redenomination out of euros that is the result of a government action (thus including sovereign debt redenominations). The 2003 definitions do not expressly state that redenominated bonds must be DOs. However, they may be: like all contracts, CDS definitions are incomplete, so ISDA regularly convenes a "Determinations Committee" ('DC'). The DC determines whether any particular event constitutes a credit event under a given set of definitions, and if so, which obligations are DOs for the purposes of settlement.

Since the 2003 definitions do not explicitly *exclude* redenominated bonds from DOs, it is at the DC's discretion to include them and cure a problem arising from contract incompleteness (that is, the purpose of the DC). For the sake of the argument, consider the possibility, that the DC were to exclude redenominated bonds that were considered DOs prior to redenomination from the set of post-event DOs. This would render redenomination protection under CR contracts essentially worthless (for all eurozone countries). Under this extreme assumption, the redenomination spreads computed in Section III would be downward-biased, since the ISDA basis of the non-G7 eurozone countries used as a control would also contain a treatment effect.

This course of action by ISDA is unlikely as it would generate arguably unnecessary chaos in the CDS market. In line with this conclusion, each of the two placebo tests in Figure 2 provides explicit evidence *against* a meaningful effect of this possibility on CR pricing.

The CR contract for the UK is not subject to any such impact, as denomination in its currency does not make an obligation undeliverable under 2003 definitions (the currency of the UK is a 'Standard Specified Currency' under 2003 definitions, meaning this currency denomination satisfies the DO characteristics). If the ISDA basis of non-G7 eurozone countries included a component related to the impact of redenomination on DOs, the UK placebo test would show major deviations between the UK CR and the synthetic match around the French election (where the results in Section IV indicate substantial eurozone breakup risk). Figure 2 shows no such deviations.

Suppose, for the sake of the argument, that the UK placebo is unaffected for another reason: perhaps CR pricing for the eurozone countries matched to the UK in early 2017 (e.g., Austria, the Netherlands) does not deviate from pricing of UK CR contracts because markets consider the redenomination protection worthless for these countries anyway, rather than because market participants expect redenominated bonds to be DOs. The results in Section IV suggest that redenomination risk in these countries is negative, meaning a redenomination would not imply losses and accordingly not trigger any CDS payouts. If there is no credit event, the DO-definitions are irrelevant, rendering the UK placebo uninformative on this issue.

The Portugal placebo offers complementary evidence. If the DO-definitions matter in general, just not for countries like Austria or the Netherlands, then they certainly matter for Portugal and the countries matched to it in the placebo exercise (e.g., Greece, Cyprus). The fact that the placebo still produces a close fit implies that any pricing impact from the DO clause, like the pricing impact of any other contract difference, is also quantitatively similar between a country and its synthetic control. Thus, the synthetic control procedure still eliminates this component of the ISDA basis, and the computed redenomination spreads for G7-eurozone countries accurately capture the effect of the "Permitted Currency" clause described in Section II in isolation from the DO-related differences between CR and CR14 CDS.

IA.B Other Identification and Measurement Approaches

1 Approaches

Krishnamurthy, Nagel, and Vissing-Jorgensen (2018) quantify and decompose the effects of different ECB interventions. They extract redenomination risk as one component from a panel of yields, along with components relating to euro term premia, expected future short-term rates (both common across euro-denominated bonds), default risk, and market segmentation (country-specific, like redenomination risk). The yield panel contains euro-denominated sovereign bonds, dollar-denominated sovereign bonds, corporate bonds, and corporate CDS premia. The redenomination risk estimate is obtained by comparing dollar-denominated foreign-law sovereign bonds to their euro-denominated local-law counterparts as well as CDS-adjusted, euro-denominated, local-law corporate bonds.

Instead, Bayer, Kim, and Kriwoluzky (2018) compare foreign-law, euro-denominated corporate bonds (also CDS-adjusted) to local-law, euro-denominated sovereign bonds. Their focus is on the term-structure and differential effects of ECB Interventions at different maturities.

Unlike mine, both approaches target redenomination *including* the intersection with default. This has advantages and disadvantages, as it makes them unable to distinguish between potentially very different proximate causes of a eurozone exit. I argue that these channels are of separate interest, making it valuable to identify one (the 'political exit') in isolation from the other (the 'debt-driven exit'). More importantly, both rely on very different identifying assumptions from mine, which I outline below.

2 Identifying Assumptions

Foreign-law debt cannot be redenominated.—Bayer et al. (2018) make this assumption for euro-denominated corporate debt. Whether it holds depends on several factors (see also Section IA.D). Does the euro still exist? Does the contract reveal any intent as to whether the numéraire is that of the eurozone rather than that of the corporate's domestic country? If the answer to any of these questions is negative, a foreign court may well allow redenomination under application of the lex monetae principle. Krishnamurthy et al. (2018) make the same assumption for *dollar-denominated* (sovereign) bonds, where it is uncontroversial.

The CDS-bond basis is negligible.—Both papers use CDS premia to account for corporate credit risk. Mitchell and Pulvino (2012) and Bai and Collin-Dufresne (2019) show that arbitrage frictions in corporate bond markets create potentially large discrepancies between risk-free rates and CDS-adjusted bond yields. Figure 6 further shows that the CDS-bond basis is large and volatile in European sovereigns. The inferior liquidity of both corporate CDS and bonds relative to their sovereign counterparts likely make this issue more pronounced for adjustments to corporate bond yields than to sovereigns, and this differential impact of frictions distorts the measurement, even for deliberately chosen low-risk corporates. Instead, my baseline approach (Section III) starts with a different basis: the ISDA basis between two CDS. This basis is also plagued with frictions, but allows for the direct and explicit control outlined in Section III.B. The alternative measure presented in Section V does start with the CDS-bond basis, but only assumes that the frictions driving it are comparable across reasonably low-risk eurozone sovereigns, rather than comparable between sovereigns and corporates or, respectively, negligible in absolute levels.

Default risk is common to foreign-law and domestic-law debt.—Krishnamurthy et al. (2018) estimate redenomination risk as a common component to euro-denominated, local-law sovereign bonds and duration-matched, euro-denominated, local-law corporate bonds, but absent from the dollar-denominated foreign-law bonds. Default risk is estimated as the common component of foreign-law dollar-bonds and local-law euro-bonds, meaning variation in default risk for local-law, euro bonds that does not show up in foreign-law, dollar bonds may be wrongly attributed to redenomination risk.

While Reinhart and Rogoff (2011) find no clear discrepancy in the *frequency* of default on domestic versus foreign-law creditors, their data is silent on the relative *magnitudes*. The only precedent of a eurozone default suggests that recovery on local-law bonds is substantially lower than on foreign-law bonds: using domestic legislation, Greece effectvely eliminated the holdout problem in its local-law debt. Foreign-law creditors were formally offered the same deal as local-law creditors, but the exchange offer only succeeded for around three quarters of foreign-law face value. Holdouts were repaid in full (Zettelmeyer, Trebesch, and Gulati (2013)). The average haircut on local-law bonds (77% of face value) therefore far exceeded that on foreign-law bonds (around 57%). Time variation in expected recovery differences (e.g., due to landmark rulings in one jurisdiction; see Donaldson et al (2023)) and/or in the potential risk premium on such recoveries may therefore distort the measurement of Krishnamurthy et al. (2018).

Even if dollar- and euro-bonds were always treated equally in default, the different currency denomination is sufficient to generate a discrepancy in default-risk premia across the two bonds whenever the default event is correlated with the euro-dollar exchange rate (under the dollar-risk-neutral measure). This is the "quanto adjustment" discussed in Du and Schreger (2016). This adjustment is quantitatively large as shown by Du and Schreger (2016) and also evident from the price discrepancy between dollar- and euro-denominated CDS. Time variation in this quanto adjustment will distort the separate identification of default and redenomination risk. This is concern is particularly pressing when default risk is correlated between the sovereign and corporate borrowers used for estimation. This is likely the case for the corporate borrowers chosen for their low default risk, since all of them operate in highly regulated sectors such as energy or telecommunications and may therefore benefit from implied government guarantees on their borrowing.

IA.C Currency-Specific Risk-Neutral Measures

Risk-neutral measures are equivalent probability measures to the physical probability measure. I use superscripts to denote the respective stochastic discount factors (M) and risk-neutral expectations operators, and no superscript for the physical expectations operator. The risk-neutral measure of currency i is defined such that the price of a future payoff in currency i is equal to its i-risk-neutral expectation, discounted at the i-risk-free rate. To streamline the exposition, the below assumes market completeness. Let €$1 = \$e_t$, the price of an asset paying $\$X_T$ at time T is

$$\underbrace{\mathbb{E}_t\left(M_T^{\$}X_T\right) = \left(R_{f,t,T}^{\$}\right)^{-1}\mathbb{E}_t^{\$}\left(X_T\right)}_{\text{\$-price}} = e_t \times \underbrace{\left[\left(R_{f,t,T}^{€}\right)^{-1}\mathbb{E}_t^{€}\left(X_T/e_T\right)\right] = \mathbb{E}_t\left(M_T^{€}X_T/e_T\right)}_{\text{€-price}} \times e_t.$$

Rearranging and using the fact that $\mathbb{E}_t^{€}(R_T^{\$}\frac{e_t}{e_T}) = R_{f,t,T}^{€}$ for any dollar return $R_T^{\$}$, this implies that expectations under the two risk-neutral measures are linked according to

$$\mathbb{E}_t^{\$}\left(X_T\right) = \mathbb{E}_t^{€}\left(X_T\right) + \frac{R_{f,t,T}^{\$}}{R_{f,t,T}^{€}}\operatorname{cov}_t^{€}\left(\frac{e_t}{e_T}, X_T\right).$$

To derive the relationship for probabilities, let $X_T = 1$ in state s, which materializes with i-risk-neutral probability q_s^i, and zero otherwise. The above then implies that the ratio of risk-neutral probabilities is equal to the expected (under the euro measure) gross return in *euros* on the *dollar* risk-free asset in state s, discounted at $R_{f,t,T}^{€}$:

$$\frac{q_s^{\$}}{q_s^{€}} = \left(R_{f,t,T}^{€}\right)^{-1} \mathbb{E}_t^{€} \left(R_{f,t,T}^{\$} \frac{e_t}{e_T} \mid S = s \right).$$

We can derive a similar relationship for the probability under the physical measure, p_s:

$$\frac{q_s^{\$}}{p_s} = R_{f,t,T}^{\$} \, \mathbb{E}_t \left(M_T^{\$} \mid S = s \right) = \frac{\mathbb{E}_t \left(M_T^{\$} \mid S = s \right)}{\mathbb{E}_t \, M_T^{\$}} = R_{f,t,T}^{\$} \, \mathbb{E}_t \left(M_T^{€} \frac{e_t}{e_T} \mid S = s \right).$$

Risk-neutral measures assign higher probabilities to high-SDF (i.e., high marginal utility) states than the physical probability measure. If a eurozone exit or breakup is associated with a higher expected marginal utility than the unconditional expectation, estimates of the risk-neutral probability bound the physical probability from above. These relationships also show that both risk-neutral measures are valid and equivalent to the physical one, given positive, finite M_T^i and e_T, and a valid physical measure.

IA.D Further Background Discussion

IA.D.1 (When) Is Redenomination Legally Possible?

The relevant legal principle is *lex monetae*, a universally recognized concept stating that a sovereign issuing a currency has control over the definition of its units. In the case of euro-denominated bonds, applying this principle may become tricky, as there is no single country issuing the euro, whose law would prescribe the lex monetae. The question may have different answers depending on whether a single country leaves or the euro falls apart. With the caveat that the eurozone exit scenario is unprecedented, and that the legal arguments are necessarily speculative, the following is based on Gelpern (2017), Slaughter & May (2011), and Allen & Overy (2017).

If the eurozone continues to exist, but a single country leaves, the lex monetae would depend on the contracting parties and the governing law: for instance, a contract between Italian entities would be redenominated according to the currency of choice of the Italian state. There is more room for disagreement when one of the parties to the contract is foreign *and* the contract is governed by foreign law, but even then, there are several eventualities. As an example, a foreign court might look at the wording in the contract to determine whether the specified currency was *intended* to be that of the issuing sovereign (which happened to be the euro at the time of issuance), or the euro as the currency of the European Union according to the Treaty of Lisbon. In the former case, the foreign court may allow redenomination, whereas in the latter it likely would not. Another potentially relevant case is a eurozone exit with multilateral backing from remaining eurozone members. In this case, the European Parliament or Commission, as the entity designating the lex monetae for euro obligations, may produce legislation that makes the debt of the exiting country payable in its new currency, regardless of governing law or presumed intent.

In a breakup scenario, where the single designating monetary entity—the eurosystem under the governance of the ECB—ceases to operate, it is more likely that lex monetae would be determined to be that of the sovereign issuing the obligation, unless the contract explicitly contemplated this scenario and prescribed a different redenomination currency.

Which situation is most relevant for the results and interpretations presented in the paper? With the exception of Cyprus and Greece, the vast majority of euro-denominated eurozone sovereign debt is governed by local law (Chamon, Schumacher, and Trebesch (2018)). Particularly, none of the three G7-eurozone members have meaningful amounts of euro-denominated, foreign-law debt outstanding. Contracts governed by domestic law, and courts ruling on the enforcement of such contracts, may also additionally be bound by domestic legislation requiring payment in the new currency. The Greek restructuring of 2012 provides an example of how powerfully domestic legislation can shape the restructuring of sovereign debt governed by domestic law: by passing the *Greek Bondholder Act*, the Greek government retro-actively inserted Collective Action Clauses (CACs) into domestic government bonds. These clauses allowed it to exchange the bonds into new ones with longer maturities, lower principal, and lower coupons with the consent of a supermajority across all bondholders, with binding effect on all bondholders (Zettelmeyer et al. (2013)).

CACs raise an additional question about the ability to redenominate. As a lesson from the Greek restructuring, the eurozone has mandated that its members include CACs in all bonds issued after

January 2013. These clauses specify that financial terms such as principal, coupon, maturity, and currency of denomination may be changed if the proposal passes a number of different majority thresholds. Contrary to suggestions by some commentators (e.g., Guglielmi, Suarez, Signani, and Minenna (2017)), there are a number of reasons why this does *not*, however, mean that these bonds cannot be redenominated, even assuming that these thresholds would not be reached.

First and foremost, the clause specifies that the supermajority consent is a sufficient condition to change financial terms. If redenomination can be implemented via statute (i.e., through domestic legislation) rather than by majority vote, such statutes will override the contractual requirement for majority consent. While the mandate to include the CACs specifies that these are to be applied "uniformly" across the eurozone, which some creditors may interpret as them being necessarily involved in any restructuring, the CAC itself is not governed by EU law, but by the law governing the bond contract. As a result, a redenomination without use of the CAC would have to be adjudicated under domestic law. Creditors may challenge it as a treaty violation in European courts, but this chain of events is most likely to play out in a scenario in which the country has unilaterally chosen to issue its own currency. Since it is thereby already in violation of EU treaties, any effective enforcement against the additional violation is unlikely (Gelpern (2017)).

IA.D.2 Does Exit Imply Redenomination of Sovereign Debt?

In the case of a true breakup and the end of the euro, the likely answer is yes for lack of alternative. There are several reasons why redenomination is also likely in exiting countries when these leave an otherwise intact eurozone. In order for the new currency to start circulating, some contracts in the economy have to be redenominated, presumably including government-linked transactions such as tax payments, public employee salaries, and public defined-benefit pensions. The alternative to redenomination at the conversion rate is to leave sovereign debt in now-foreign currency indefinitely, or wait to redenominate at a market exchange rate. Bondholders then do not realize gains or losses at redenomination. In the latter case, they receive a strong incentive to launch speculative attacks on the new currency in order to redenominate their claims into the new numéraire at an artificially low entry price.

IA.D.3 Are CDS Enforceable in a Breakup Event?

In the context of CDS on the US federal government, a question that is sometimes discussed is whether CDS contracts would be enforceable in the event of a default of the United States. After all, the payoff relies on the ability of the counterparty to pay, when the US government cannot. The correlation of a counterparty's credit risk with its liabilities under a swap is sometimes referred to as 'wrong-way risk'. Du, Gadgil, Gordy, and Vega (2022) show that wrong-way risk shapes counterparty choice. As is anecdotally confirmed, this result suggests that US intermediaries dominate intermediation in eurozone sovereign CDS.

It is worth noting that claims from a CDS are not enforced against the relevant sovereign, nor necessarily under its jurisdiction, but among private counterparties under the governance of ISDA, a private organization of mostly private financial institutions.

A related concern is whether CDS would necessarily be triggered by a credit event. In the Greek restructuring, early discussions indicated that the haircut accepted by creditors via a bond exchange would be "voluntary" and market participants debated whether CDS payouts would be triggered. In the end, CDS were triggered, largely because the restructuring made use of CACs, meaning that any would-be holdouts participated in the bond exchange involuntarily. A redenomination could be effected in a mandatory way for all holders without the use of CACs but instead by direct decree (or less directly via enforcement through capital controls). This implementation of a restructuring is explicitly covered as a credit event that would trigger contracts under Section 4.1 of both the 2003 and the 2014 definitions.

IA.E Difference-in-Differences

In this appendix section, I provide a more detailed mapping of the slightly unconventional diff-in-diff approach presented in Section III.B of the main text to more familiar contexts and common tests associated with identifying assumptions.

Using generic terminology, the logic of diff-in-diff exercises is to (a) observe some form of treatment, (b) recognize that the differences between treated and untreated observations for a treated subject may be confounded by other factors, (c) select control observations that mirror the effect of confounders but not of treatment, (d) subtract the difference in control observations from the difference in treated and untreated observations for a treated subject, and (e) estimate the treatment effect via this difference in differences. For this to be valid the confounders need to affect the control observations in the same way as the observations for the treated subject.

In the present setting, treatment is G7 membership in the sense that a hypothetical redenomination by a G7-eurozone country would not trigger CR contracts. One can therefore think of the three G7-eurozone members as treated subjects, their CR CDS premia as treated observations, and their CR14 premia (which ignore G7 status) as the untreated ones. The confounders are liquidity and other contractual changes between CR and CR14, each described briefly in the main text, and in detail in Section IA.A.

IA.E.1 Dynamic Matching

The dynamic matching is not conceptually different from the static matching in conventional synthetic control approaches (e.g., Abadie and Gardeazabal (2003); Abadie, Diamond, and Hainmueller (2015)). In each case, the synthetic control is based on matching characteristics for *untreated* observations between the control and the (eventually) treated subject. The difference is a practical one: in the conventional case, the diff-in-diff is across time, meaning the untreated observations occur before a treatment event, and matching relates to pre-treatment observations. In the present setting, however, there is no *pre*-treatment, because the CR contract always excludes redenomination from credit events based on G7 status, and the CR14 never does. Here, being *untreated* is not a function of time but varies by variable according to whether G7 status determines how the variable reflects redenomination risk: it does so only for the CR premium, but not for any of the matching variables, regardless of when these are observed.

The familiar pre-/post setting does not allow for dynamic matching since any variable observed post-treatment may contain a treatment effect: matching dynamically on outcomes mechanically delivers an uninformative estimate of zero for the treatment effect. Analogously, I cannot—and do not—match on both the CR (treated) *and* the CR14 (untreated).

IA.E.2 Testing the Identifying Assumption

The general identifying assumption of the diff-in-diff approach is that of 'parallel trends': observations for the treated subject mirror those for the control subject in the counterfactual case of non-treatment. In the Abadie-Gardeazabal case, for instance, this translates to: economic outcomes for the Basque Country would have evolved similarly to those of the synthetic combination of control regions, *had there been no terrorism in the Basque Country following the early 1970s*. This assumption is obviously untestable, but the conventional is approach is to (a) show pre-trends as an imperfect but suggestive proxy, and (b) argue why any salient event in the post-treatment period (e.g., the economic downturn in Spain in the late 70s) should affect treatment and control similarly.

Here, the parallel-trends assumption is: the ISDA basis of a G7 countries would be similar to that of its respective (dynamic) synthetic control, if there were zero redenomination risk. This is untestable for eurozone-G7 countries, as times of zero redenomination risk are not identifiable without the measure under consideration. Figure 2 in the main text is analogous to pre-trend plots in conventional settings in that it tests a close proxy of the identifying assumption. It shows:

(i) The ISDA basis does not generally have a large and potentially time-varying idiosyncratic component: The Portugal placebo shows that one can match Portugal's CR premium using the weighted average CR of a set of other countries whose weighted average CR14 (and bond yield, CR14 depth, and bond bid-ask) matches that of Portugal. ISDA bases are *very* similar across similar countries, where the second ‘similar’ refers to matching on a set of variables that correlate with cross-sectional variation in CDS pricing but excludes the CR premium.

(ii) The ISDA basis does not systematically vary with G7 status: The country specific component may be similar for some countries and different for others. Since treatment is assigned via G7 membership, it is clearly not random: G7 countries tend to be larger and more important in economic and geopolitical terms. However, the identifying assumption *is literally testable* for *some* G7-countries: The ISDA basis for the UK does not contain redenomination risk: if, for whatever reason, the UK wanted to redenominate, it could do so into its own currency without triggering CR or CR14. The UK placebo shows that it is possible to mirror the CR premium of the UK using the weighted average CR of other countries whose weighted average matching variables match those of the UK. Whatever component of the ISDA basis varies across countries, it does *not* vary with G7 status conditional on the matching variables.

In summary, the ISDA basis differs from zero, over time, and across countries for many reasons, including some that are unrelated to redenomination (such as APD). The existence of such confounders does not invalidate the approach to extract redenomination risk from the ISDA basis, if such confounders affect the ISDA basis similarly for treatment and control. Matching dynamically is paramount in this case. The typical assumption of parallel trends *across time* would almost certainly be violated because there is a confounder that explicitly interacts with the default probability (APD), and default risk does not covary perfectly across countries. This is evident from Figure 2: the static match produces poor placebo results, meaning one cannot fix the synthetic control at a particular point in time. However, as outlined above, there is no need to match statically in a setting in which treated and untreated observations are observable simultaneously within country.

A perhaps simpler approach would be to subtract the average ISDA basis across all control countries from the treated country’s ISDA basis. Like other approaches using a single country as a control or benchmark (e.g., De Santis (2019); Cherubini (2021) who use Germany as a benchmark country) this approach runs into a similar problem: if the impact of confounders varies across countries—say, because the confounder (e.g., APD) mechanically interacts with characteristics like default risk—using the same control for different treated countries is bound to produce biased diff-in-diff estimates. Figure IA.1 plots the placebo errors from Figure 2 in the paper, but includes errors from a measure that subtracts the average ISDA basis among other countries from the British/Portuguese CR14 premium and compares this to their observed CR premium.

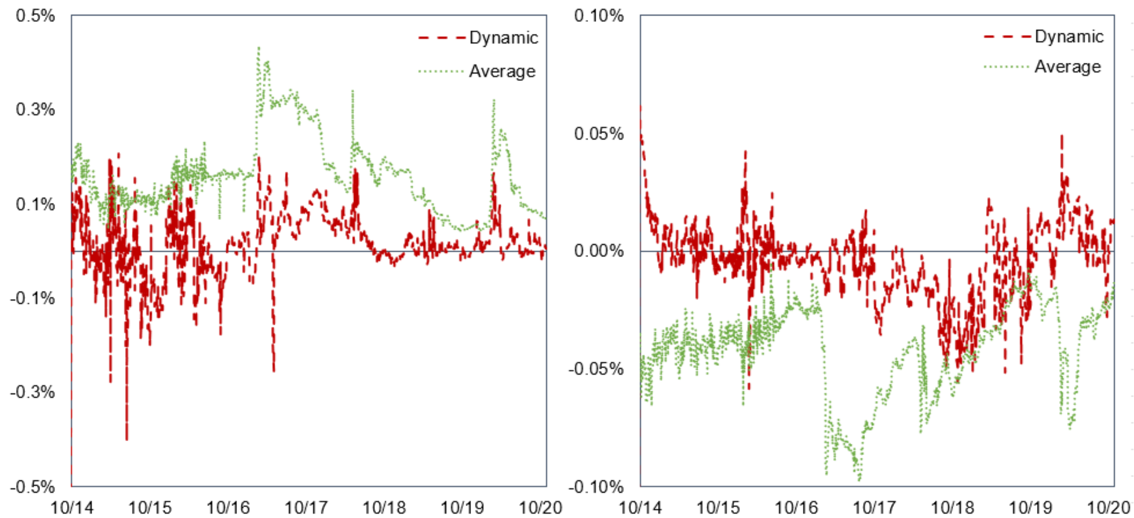


FIGURE IA.1: **The average country as a control: I plot the differences between the true Porgutuese (left) and British (right) CR and their CR14 adjusted for (i) the ISDA basis of the synthetic control (red, dashed), or (ii) the average ISDA basis across other control countries (green, dotted). That is, I plot the error incurred by the respective control methodology in the placebo test.**

Even excluding Greece and Cyprus from the average (as outliers on volatility/level, thus stacking the deck in favor of the "average-country control"), the synthetic match creates smaller absolute errors for both Portugal and the UK than the average country by around 5 to 10 bps. Between Portugal and the UK, the errors from the average control go in opposite directions, highlighting the key problem: this 'average country' may be similar (along dimensions relevant to how the confounders affect the ISDA basis) to some countries, some of the time, but it will not be similar to *each of* Germany, France, and Italy *simultaneously, all the time* (i.e., the parallel-trends assumption is violated for any static synthetic control, including the average across all control countries).

Including Greece and Cyprus in the average makes the errors less positive for Portugal on average, but does not change the conclusion that they are positive and larger than for the synthetic control, while more than doubling their standard deviation and obviously making errors more negative for the UK. The notion that, based on arguments of data quality or outliers, it is not clear which countries should be included in this average measure, is another incarnation of why a more careful match like the one presented in Section III.B outperforms the average-country control.

IA.F An Illustrative Model

There are two dates, *today* and *tomorrow*, and the model describes the bond market in a currency union of three countries, A, B, and H. On the supply side the asset universe consists of four zero-coupon bonds: a risk-free bond in net supply of σ_S (nominal face value), and three redenominatable government bonds issued by countries A, B, and H in nominal net supplies σ_A, σ_B, and σ_H, respectively. Today, all bonds are denominated in the common numéraire (let's call it 'euro') and their prices are determined by market clearing. Prices are expressed in terms of gross yield denoted by y_J for bond J, such that its price per unit of face value is $P_J = 1/y_J$. Countries A and B are individually at risk of exiting the currency union and redenominating their bonds into a national currency. Country H only redenominates if both A and B jointly exit, that is, if the currency union ceases to exist. There are four possible states tomorrow, denoted by $s \in \{1, 2, 3, 4\}$:

(1) Stability: no exit, no bond is redenominated,

(2) Isolated exit A: only A is redenominated,

(3) Isolated exit B: only B is redenominated,

(4) Breakup: all bonds, A, B, and H, are redenominated.

In case of redenomination, the face value is repaid in the new currency worth a euro-equivalent of $(1 - \delta_J)$ per unit, such that the gross return on bond J in case of redenomination is $y_J(1 - \delta_J)$. $\delta_A > 0$ and $\delta_B > 0$. That is, currencies A and B depreciate against the numéraire once they are introduced. In contrast, the new currency of country H (for *haven*) appreciates, $\delta_H < 0$, resulting in exchange rate gains to bondholders. The risk-free bond denoted by subscript S repays one unit of the numéraire per unit of face value in all states of the world. This bond can be thought of as a privately issued euro-denominated security with sufficient collateral to be default-free and remote from redenomination. The four linearly independent assets complete the market.

The demand side of the asset market consists of two risk-averse banks, a and b operating in countries A and B, respectively. Adding a third bank operating in country H does not change any of the model results in a meaningful way. I use lower case superscripts to refer to banks, and upper case subscripts to refer to countries/bonds. Today, the right-hand side of each bank's balance sheet consists of deposits, d, raised from households in the respective country, and bank equity, e. All variables are expressed in euros and $d + e = 1$. Households are passive, and their decisions are not modelled. Redenomination also extends to bank deposits: the euro-equivalent of deposits taken by bank a falls to $d(1 - \delta_A)$ after redenomination by country A, and equivalently for b and B.

Today, banks choose a portfolio of the four assets in order to maximize expected log utility over their respective equity tomorrow. Let w^i_J be the euro-investment of bank i in bond J, and by e^i_s the value of bank i's equity in state s. State-probabilities are denoted by p_s. I assume that deposits, d, and redenomination losses, δ, are sufficiently small, such that bank equity is strictly positive in all states and utility is, therefore, well-defined:

$$max_{\{w^i_A, w^i_B, w^i_H, w^i_S\}} \sum_s p_s \log\left(e^i_s\right) \quad \text{s. t.} \quad w^i_A + w^i_B + w^i_H + w^i_S = 1$$

Rather than to *generate* breakup risk, the aim of this exercise is to formally examine the relationships of the different asset prices *given* breakup risk or the lack thereof. Starting with the latter case, *isolated* redenomination risk, suppose that exits by A and B are independent, and the exit probabilities are ρ_A and ρ_B, respectively. Note that a (coincidental) breakup is still possible in the isolated case with independent exits. The probabilities of the four possible states are:

(1) Stability: $p_1 = (1 - \rho_A)(1 - \rho_B),$

(2) Isolated exit A: $p_2 = \rho_A(1 - \rho_B),$

(3) Isolated exit B: $p_3 = (1 - \rho_A)\rho_B,$ and

(4) Breakup: $p_4 = \rho_A \cdot \rho_B.$

Now consider the other extreme case: *breakup* with perfectly correlated redenominations. Suppose B exits and redenominates if and only if A does. The state probabilities in the breakup case are:

(1) Stability: $p_1 = (1 - \rho_A),$

(2) Isolated exit A: $p_2 = 0,$

(3) Isolated exit B: $p_3 = 0,$ and

(4) Breakup: $p_4 = \rho_A.$

IA.F.1 Equilibrium Results

Asset price comovements.—In the isolated case (with independent redenominations), an increase in A's redenomination probability, ρ_A, *lowers* the yield on country B's bonds. This result is illustrated in terms of comparative statics of equilibrium yields with respect to ρ_A in Panel A of Figure IA.2. It is an indirect spillover effect through portfolio substitution: rising risk in country A lowers yields in country B, because absent a change in yields, both banks shift portfolio weight from country A's bonds to those of country B (and those of country H, and the risk-free bond). Yields on bond B therefore need to fall to restore market clearing. This result arises because supply of the risk-free asset is not perfectly elastic.

In the breakup case, however, the sign and magnitude of asset price comovements from an increase in ρ_A on another country's bond are dictated by, respectively, the sign and magnitude of the other country's δ: since $\delta_B > 0$, country B's bond yield increases with redenomination risk in country A, while the yield on the bonds of country H falls ($\delta_H < 0$). Figure IA.2 Panel B illustrates the yield comovements in the breakup case.

Panel A: Isolated *Panel B: Breakup*

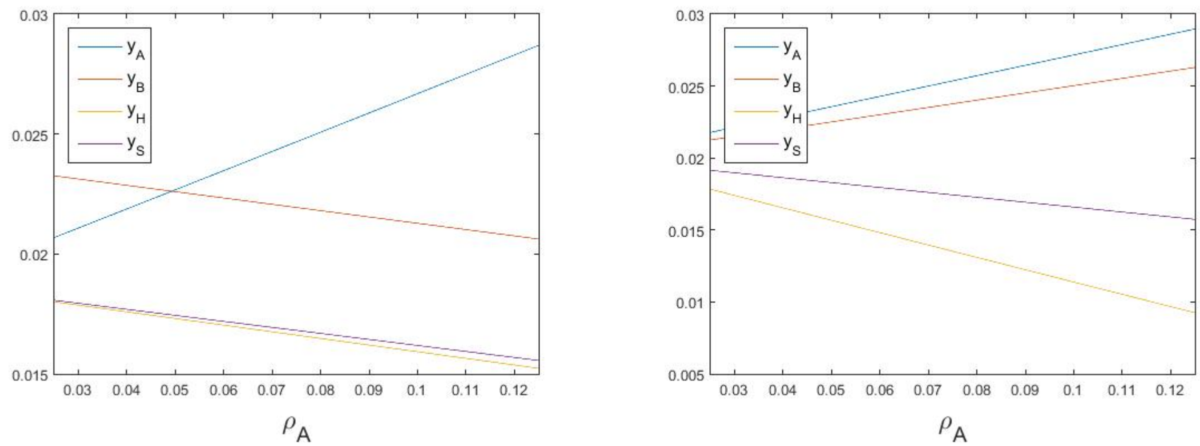


FIGURE IA.2: **Comparative statics of risky bond investments by banks a and b, and (net) bond yields with respect to the redenomination probability in country A. The chosen parameters are: $d = 0.02$, $\rho_B = 0.05$, $\delta_A = 0.1$, $\delta_B = 0.08$, $\sigma_A = \sigma_B = \sigma_H = \sigma_S = 0.51$.**

Home bias.—Sovereign bonds are predominantly held by domestic banks. Battistini, Pagano, and Simonelli (2014) note that the redenomination of liabilities gives domestic banks a "comparative advantage" in holding domestic sovereign debt.[2] This is precisely the mechanism behind this model result, which is a direct consequence of deposit redenomination: the losses from a redenomination of domestic government bonds on the bank's asset side are partially offset by the redenomination of its deposits. Accordingly, domestic bonds are less risky to domestic banks than to foreign banks, resulting in home bias in bond holdings. The proof is left to the next subsection. I document empirical home bias in Table IA.3 below using data as of June 2018, provided by the EBA: banks domiciled in most European countries hold a larger fraction of their liquid sovereign debt holdings in domestic government debt, in which most of their deposit-taking activity occurs. For eurozone-domiciled banks, for instance in Italy (57.7% of net sovereign bond exposure of Italian banks is to the Italian government), France (53.9%), Portugal (64.1%), or Germany (58.0%),

[2]Alongside redenomination risk, they note two primary motives for home bias in eurozone banks: (i) "moral suasion" by authorities to raise demand for domestic sovereign debt; and (ii) central-bank funded "carry trade" investments in high-yield eurozone sovereign debt (see also Acharya and Steffen (2015)), which are more attractive to banks in high credit-risk countries, given implicit guarantees.

redenomination risk means that currency matching between assets and liabilities implies home bias even in a currency union. Among eurozone banks, home bias is relatively low for the two Austrian banks included in the EBA stress tests. Both have large exposures to central and eastern European sovereigns, consistent with their prominent consumer banking presence (deposit base) in that region.

'Convenience yield'.—The nominal yield on bond H is below the risk-free rate. This result is straight-forward once redenomination leads to exchange rate gains from appreciation in the breakup case. Even if the risk-free rate is bounded below (say, by zero), 'haven' bond yields are not. This intuitive notion is important for monetary policy transmission in the presence of negative bond yields (proof below).

IA.F.2 Proofs

Figure IA.2 provides a visual exposition of the yield comovements in the two cases. The equilibrium objects, that is, four bond yields and six portfolio weights, are determined by the four market clearing conditions and six first-order conditions (or, equivalently, the Arrow-Debreu prices):

$$\text{for } J = \{A, B, S, H\} \qquad \sigma_J = (w_J^a + w_J^b) \cdot y_J$$

$$\text{for } i = \{a, b\} \qquad 0 = \left(\frac{p_1}{e_1^i} + \frac{p_3}{e_3^i}\right)(y_A - y_S) + \left(\frac{p_2}{e_2^i} + \frac{p_4}{e_4^i}\right)(y_A(1-\delta^A) - y_S)$$

$$\text{for } i = \{a, b\} \qquad 0 = \left(\frac{p_1}{e_1^i} + \frac{p_2}{e_2^i}\right)(y_B - y_S) + \left(\frac{p_3}{e_3^i} + \frac{p_4}{e_4^i}\right)(y_B(1-\delta^B) - y_S)$$

$$\text{for } i = \{a, b\} \qquad 0 = \left(\frac{p_1}{e_1^i} + \frac{p_2}{e_2^i} + \frac{p_3}{e_3^i}\right)(y_H - y_S) + \frac{p_4}{e_4^i}(y_H(1-\delta^H) - y_S)$$

Result 2: Home bias: $w_A^a > w_A^b$ and $w_B^a < w_B^b$.

Proof. Due to market completeness, marginal utility—and therefore wealth—is equal across agents state-by-state in equilibrium: $u'(e_s^a) = u'(e_s^b) \Leftrightarrow e_s^a = e_s^b \; \forall \, s$.

$$e_1^a = e_1^b \Leftrightarrow w_A^a y_A + w_B^a y_B + w_S^a y_S + w_H^a y_H - d$$

$$(\text{IA.F.1}) \qquad = w_A^b y_A + w_B^b y_B + w_S^b y_S + w_H^b y_H - d$$

$$e_2^a = e_2^b \Leftrightarrow w_A^a y_A(1-\delta_A) + w_B^a y_B + w_S^a y_S + w_H^a y_H - d(1-\delta_A)$$

$$(\text{IA.F.2}) \qquad = w_A^b y_A(1-\delta_A) + w_B^b y_B + w_S^b y_S + w_H^b y_H - d$$

$$e_3^a = e_3^b \Leftrightarrow w_A^a y_A + w_B^a y_B(1-\delta_B) + w_S^a y_S + w_H^a y_H - d$$

$$(\text{IA.F.3}) \qquad = w_A^b y_A + w_B^b y_B(1-\delta_B) + w_S^b y_S + w_H^b y_H - d(1-\delta_B)$$

$$e_4^a = e_4^b \Leftrightarrow w_A^a y_A(1-\delta_A) + w_B^a y_B(1-\delta_B) + w_S^a y_S + w_H^a y_H(1-\delta_H) - d(1-\delta_A)$$

$$(\text{IA.F.4}) \qquad = w_A^b y_A(1-\delta_A) + w_B^b y_B(1-\delta_B) + w_S^b y_S + w_H^b y_H(1-\delta_H) - d(1-\delta_B)$$

Combining Equations (IA.F.1) through (IA.F.3) yields $w_A^a - w_A^b = d^a/y_A > 0$ and $w_B^b - w_B^a = d^b/y_B > 0$. Home bias, defined as the difference between risky bond holdings by the domestic and the foreign bank, is positive and proportional to the domestic bank's redenominatable deposits. □

Note that this proof does not cover the extreme case of perfectly correlated redenominations, where $p_2 = p_3 = 0$. In that case, payoffs A, B, and H are no longer linearly independent and bond holdings are indeterminate. Assigning $\varepsilon > 0$ probability to states 2 and 3 in the breakup case restores the proof.

Result 3: 'Convenience yield': $y_H - y_S < 0$.

Proof. By each bank's Euler equation, the price of an asset with payoff X is given by $\mathbb{E}(y_S^{-1}u'(e^i)X)$. The Arrow-Debreu security that pays off in state (4) consists of $-\delta_H^{-1}$ units of bond H, and δ_H^{-1} units of bond S. Bond prices are y_H^{-1} and y_S^{-1} , respectively, and therefore

$$\delta_H^{-1}(y_S^{-1} - y_H^{-1}) = y_S^{-1} \cdot p_4/e_4^i$$

$$(\text{IA.F.5}) \qquad \Rightarrow \; \delta_H^{-1}(1 - y_S/y_H) = p_4/e_4^i$$

Equity is strictly positive by assumption and $p_4 \in [0,1]$. The RHS of (IA.F.5) is therefore strictly positive, which, together with $\delta_H < 0$, implies that $y_H < y_S$. □

IA.G Redenomination Risk and CIP

The distortion of risk-free rates also impacts seemingly unrelated questions. For instance, Section 5 of the Internet Appendix to Jiang, Krishnamurthy, and Lustig (2021) shows that the treasury basis constructed from US treasuries, German Bunds, and currency basis swaps is strongly correlated with the 'KfW basis' constructed from dollar- and euro-denominated KfW bonds and the same currency basis swaps. One interpretation is that KfW, like the US treasury, issues safe dollar assets that benefit from demand for safety in the form of time-varying convenience yields. That is, KfW yields correlate with US treasuries in their deviations from derivatives-implied *dollar* risk-free rates. An alternative explanation is that KfW's *euro* bonds, like Bunds, are subject to redenomination into a new German currency, while the dollar-bond and the swap contracts are not. Time variation in German redenomination risk creates a common factor in the euro-denominated yields independent from any convenience yields in the dollar-bonds.

I conduct a simple variance decomposition. Following Du, Im, and Schreger (2018), denote the market-implied forward premium by ρ and the treasury basis (CIP deviation) by Φ:

$$\text{(IA.G.6)} \quad \Phi_t = y^{Govt}_{€,t} - \rho_t - y^{Govt}_{\$,t} = \underbrace{(y^{Govt}_{€,t} - r_{€,t})}_{\text{€-conv. yield}} - \underbrace{(y^{Govt}_{\$,t} - r_{\$,t})}_{\text{\$-conv. yield}} + \underbrace{[(r_{€,t} - r_{\$,t}) - \rho_t]}_{\text{interest diff. – fwd premium}}.$$

Denoting risk- and convenience-free rates by r and abstracting from default risk, the second equation says that the CIP deviation is the sum of the relative convenience yields in government bonds and the discrepancy between the risk-free interest differential and the forward premium. The euro convenience yield includes premia arising from negative redenomination risk. Denoting KfW yields by y^K, each convenience yield can further be written as the sum of the KfW-convenience yield and the treasury-KfW spread:

$$\text{(IA.G.7)}\quad \Phi_t = (y^{Govt}_{€,t} - y^{K}_{€,t}) + (y^{K}_{€,t} - r_{€,t}) - (y^{Govt}_{\$,t} - y^{K}_{\$,t}) - (y^{K}_{\$,t} - r_{\$,t}) + [(r_{€,t} - r_{\$,t}) - \rho_{€,t}]$$

Next, take covariances of both sides of Equation (IA.G.6) with Φ_t and divide by its variance. The contribution of each component to treasury-basis variance is equal to its univariate OLS coefficient on Φ. (Then repeat the same for Equation (IA.G.7).)

$$\text{(IA.G.8)}\qquad 1 = \frac{\mathrm{cov}(y^{Govt}_{€,t} - r_{€,t}, \Phi_t)}{\mathrm{var}(\Phi_t)} + \frac{\mathrm{cov}(-(y^{Govt}_{\$,t} - r_{€,t}), \Phi_t)}{\mathrm{var}(\Phi_t)} + \frac{\mathrm{cov}(r_{€,t} - r_{\$,t} - \rho_{€,t}, \Phi_t)}{\mathrm{var}(\Phi_t)}$$

Table IA.1 implements this decomposition for the one-year treasury basis using OIS rates for r, euro-dollar ρ along with Bund and US treasury yields from Du et al. (2018), and one-year KfW yields in euros and dollars from Jiang et al. (2021).[3] The sample-correlation between the treasury basis and the KfW basis is 0.75.

TABLE IA.1: **Decomposing the Treasury Basis**

This table reports a time-series variance decomposition for the one-year euro-dollar treasury basis, Φ:

$$\begin{aligned}\Phi_t &= \underbrace{(y^{Govt}_{€,t} - r_{€,t})}_{(1)} - \underbrace{(y^{Govt}_{\$,t} - r_{\$,t})}_{(2)} + \underbrace{[(r_{€,t} - r_{\$,t}) - \rho_{€,t}]}_{(3)} \\ &= \underbrace{[(r_{€,t} - r_{\$,t}) - \rho_{€,t}]}_{(3)} + \underbrace{(y^{Govt}_{€,t} - y^{KfW}_{€,t})}_{(4)} - \underbrace{(y^{Govt}_{\$,t} - y^{KfW}_{\$,t})}_{(5)} + \underbrace{(y^{KfW}_{€,t} - r_{€,t})}_{(6)} - \underbrace{(y^{KfW}_{\$,t} - r_{\$,t})}_{(7)}\end{aligned}$$

Data on ρ and government bonds are from Du et al. (2018), KfW yields are from Jiang et al. (2021). I denote OIS swap rates by r and report univariate slope coefficients on Φ_t with heteroskedasticity-robust standard errors in parentheses and the component's sample standard deviation in brackets.

Sample period	(1)	(2)	(3)	(4)	(5)	(6)	(7)
09/2014 - 03/2018	0.649	0.202	0.149	0.129	0.371	0.521	-0.169
	(0.050)	(0.022)	(0.034)	(0.015)	(0.018)	(0.043)	(0.014)
	[0.174]	[0.077]	[0.113]	[0.054]	[0.080]	[0.140]	[0.071]
02/2017 - 04/2017	0.190	0.413	0.397	-0.048	0.609	0.238	-0.196
	(0.079)	(0.050)	(0.042)	(0.104)	(0.078)	(0.030)	(0.051)
	[0.057]	[0.045]	[0.044]	[0.068]	[0.066]	[0.025]	[0.031]

Over the sample, convenience yields in Bunds account for two thirds of the variance in the

[3] I am grateful to Zhengyang Jiang for helpful discussions on this topic.

euro-dollar treasury basis: one eigth of the total is exclusive to Bunds and absent from KfW yields, i.e., stems from the Bund-KfW spread, while half is attributable to the KfW-convenience yield and common to Bunds and KfW yields. On the dollar side, treasury convenience yields account for 20% of the total variance. The KfW-convenience yield and the treasury-KfW spread are negatively correlated, such that the latter accounts for all of the dollar-side's contribution. In other words, the similarity between KfW yields and government bond yields that produces correlated CIP deviations tends to occur on the euro-side of the euro-dollar pair. The remaining variance reflects deviations of the swap-rate differential from the forward premium.

Over the subsample of heightened breakup risk, the spread between KfW and Bunds is uncorrelated with the treasury basis: variation over this period stems from a convenience yield *common* to Bunds and euro-denominated KfW bonds (around one fifth), a convenience yield that shows up in US treasuries but not in KfW's dollar-bonds (around two fifths), and the discrepancy between the forward premium and OIS rates (the remaining two fifths). That is, during this particular period, KfW's euro-yields are indistinguishable from Bund yields regarding their contribution to the CIP treasury basis. This common component in euro- but not dollar-based convenience yields is consistent with the interpretation from Section IV that breakup risk drives the value of 'German euros' (owed on KfW bonds or bunds) during that particular period.

More broadly, Augustin, Chernov, Schmid, and Song (2023) assess the impact of country-specific sovereign risk and convenience yields on measured CIP deviations. My result here highlights a specific example of a convenience yield that must vary across countries, thus highlighting the impact of redenomination risk on economic questions that rely on sovereign or quasi-sovereign bonds to measure risk-free rates or convenience yields. My novel measure quantifies the extent of this measurement problem.

IA.H The French Election: Causality?

Redenomination risk in France is associated with empirical results indicating that this was seen as eurozone breakup risk (Section IV). One interpretation is that a French exit, following the election of a euro-skeptic president, was expected to trigger a disintegration of the eurozone. An alternative interpretation is that, as a country integral to the historical construction and development of the eurozone, a French exit could only be induced by a eurozone-wide shock that is sufficiently severe to equally induce exits by other countries. The results presented in Section IV do not directly identify one interpretation from the other.

Given that these results are inferred from a short period leading up to an election, it is tempting to conclude that they identify a causal chain of events from the French election outcome to the eurozone exit and the breakup. The French semi-presidential system offers candidates from smaller or less established parties better chances to attain executive power than parliamentary systems. This chance rises with the decline in support for the two traditionally dominant parties, and with the probability of a low-turnout second round against a similarly unestablished or extremist candidate. (In fact, winner Macron ran for a newly founded party and beat far-right candidate Le Pen in the run-off with the lowest turnout since 1969.)

Ahead of the first round, of the four candidates polling close to 20% with realistic chances of proceeding to round two, only centre-right candidate François Fillon (under embezzlement investigation) ran for one of the two formerly dominant parties. In the first round, these four candidates were separated by only 4.4 percentage points, with euro-skeptics Le Pen and Mélenchon placing second and fourth, respectively. Pro-EU candidate Macron placed first, eliminating the conceivable run-off between two euro-skeptics, or between a euro-skeptic and an establishment candidate under formal investigation, and therefore lowered the probability of a euro-skeptic president.

The identification problem, however, arises from the endogeneity of the election outcome to various state variables, perhaps in particular to the prevalence of euro-skepticism. This latent variable may be highly correlated across countries and therefore affect exit risk in all member countries. One could view the election outcome as revealing information about likely election outcomes elsewhere. With high cross-country correlation, even a small update about eurozone-wide sentiment from a narrow French outcome could in principle move estimates across the crucial thresholds between expecting pro-EU or euro-skeptic governments in other upcoming elections. In other words, it is possible that yields across the eurozone moved, not because of a change in expected French policy, but because the result revealed pan-European political sentiment, which made euro-skeptic governments elsewhere less likely.

How realistic is this explanation? Executive power in most other eurozone countries is held by parliaments with proportional representation. A eurozone exit would typically require backing from an absolute majority in parliament. The UK's withdrawal from the EU suggests that the implementation of such policy shifts is non-trivial, even (i) without the need for a currency reform, and (ii) after an explicit popular vote on the matter. A marginal change in French voting behavior would have to signal a meaningful chance of a euro-skeptic government in either many or in a few particularly relevant other eurozone countries. In Germany, the only relevant euro-skeptic party was polling close to 10% at the time, and was explicitly ruled out as a coalition partner by all others. Similarly, the Dutch "Party for Freedom" had just received 13% of the votes, but stood no realistic chance of participating in, let alone leading a governing coalition. The exception is Italy, where one of the parties which eventually formed a euro-skeptic coalition in 2018 already led opinion polls. However, Figure 3 shows that Italian redenomination risk remained elevated for some time, after and *despite* the signal that French voters elected a pro-European president.

Without further steps towards identification, I offer the following speculative interpretation. Beyond any signal about transnational state variables, the election is a discontinuous and potentially noisy mapping of political fundamentals into policy. Given this sharp discontinuity and the lack of a plausible signaling effect of similar magnitude, the election result may reasonably be interpreted as containing a shock that is exogenous to the political environments in other countries prior to the French election. It therefore appears more likely that the results presented in Section IV reflect responses to a shock to the expected French policy position, rather than to a partial revelation of latent transnational euro-skepticism.

IA.I Supplementary Figures and Tables

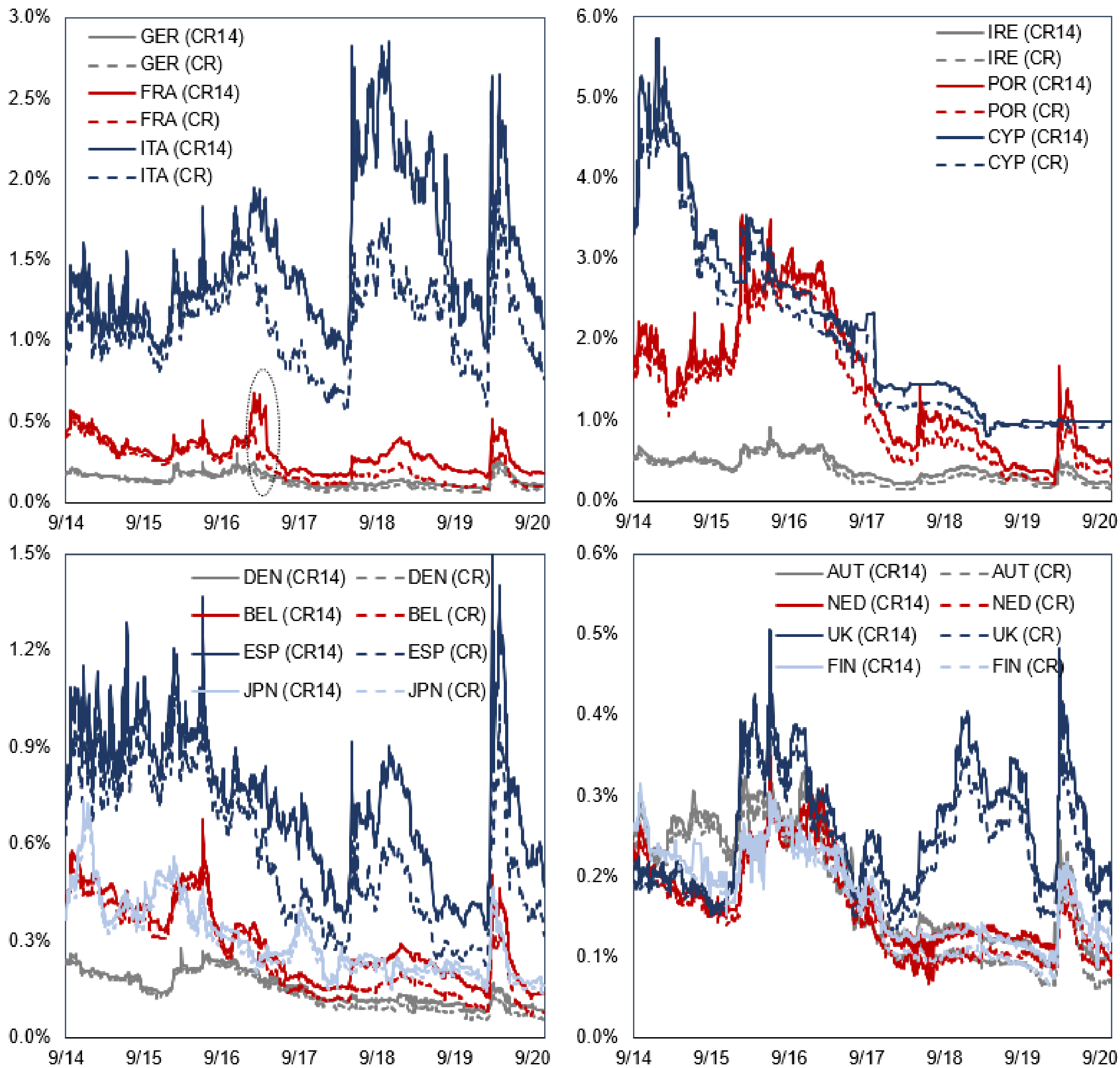


FIGURE IA.3: **CR and CR14 CDS Premia. This figure plots CR (dashed) and CR14 (solid) CDS premia by country. The circled area in the top-left panel marks the run-up to the first-round 2017 presidential election in France.**

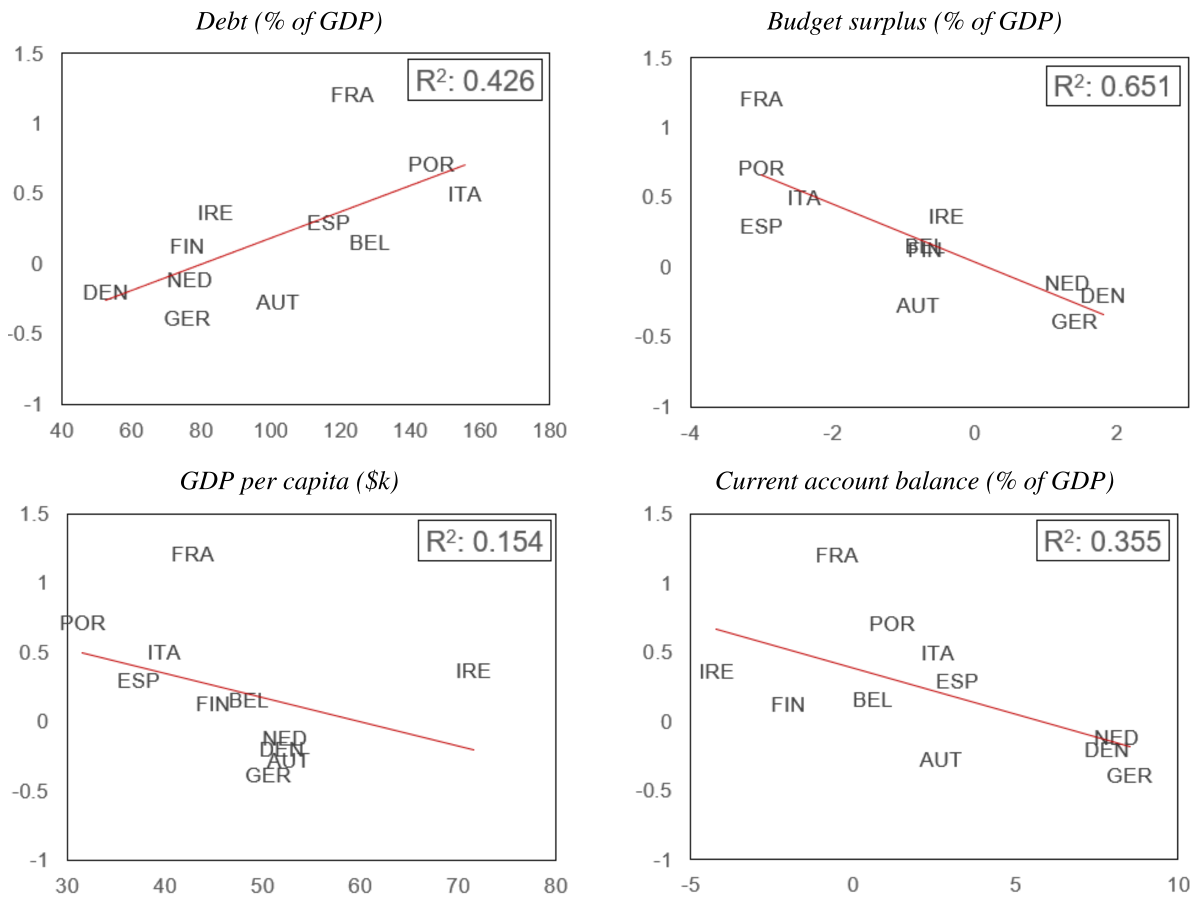


FIGURE IA.4: **Fiscal and Macroeconomic Fundamentals. This figure plots regression coefficients $\hat{\beta}_{i,FRA}$ from Regression (10) (vertical axis) against fiscal and macroeconomic variables obtained from the OECD (as of 2016) with univariate R^2.**

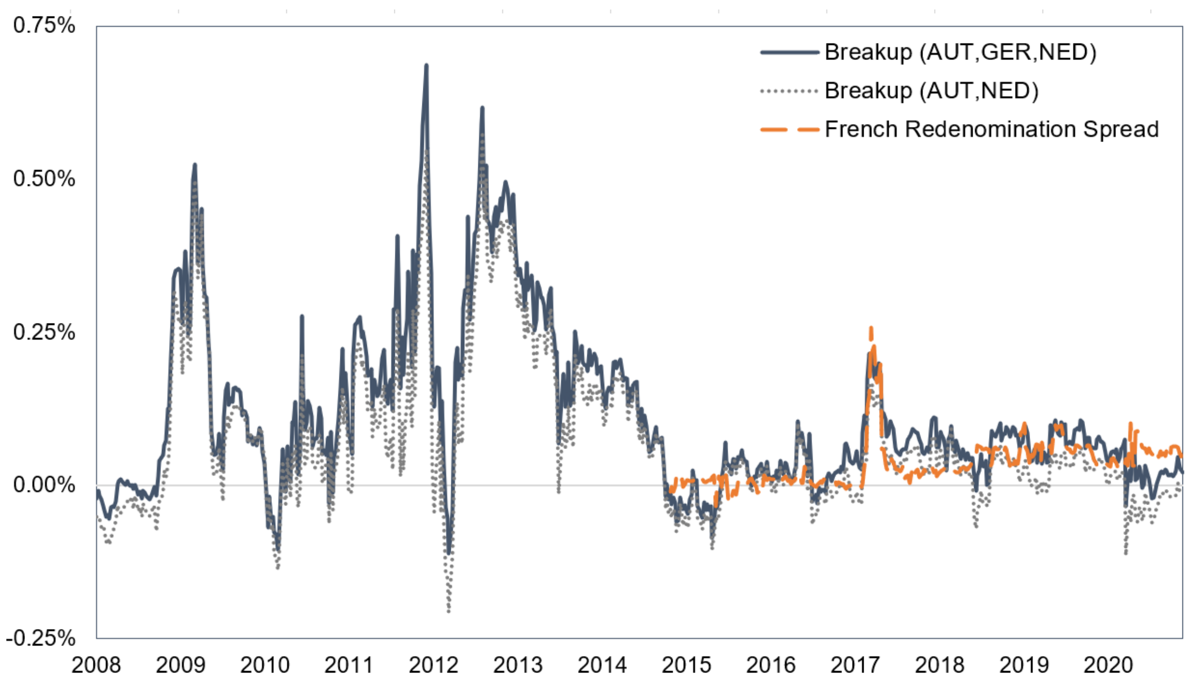
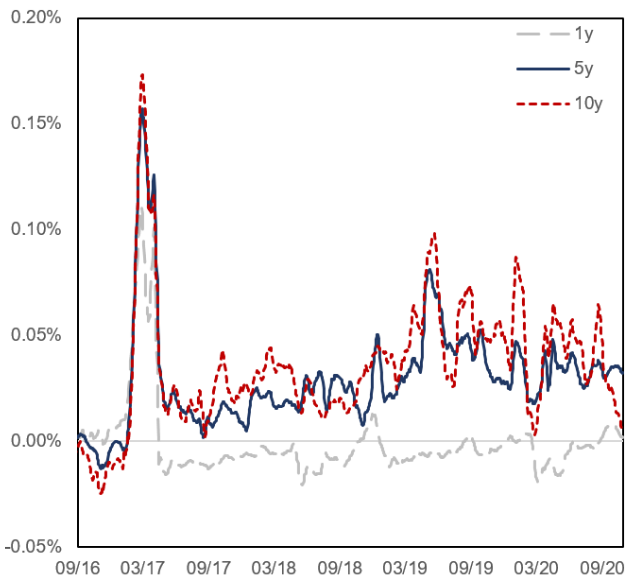


FIGURE IA.5: **CDS-bond Bases. This figure plots the bond-basis measure of redenomination risk from Figure 6 with a variant that excludes Germany from the construction. The resulting measure subtracts the average basis for Belgium, Finland, and Spain from that of Austria and the Netherlands. I also plot the French redenomination spread from Section III (from Sep 2014).**



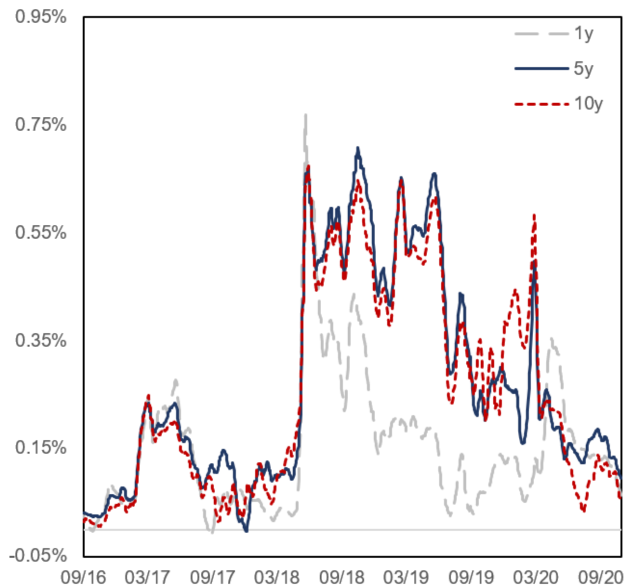


FIGURE IA.6: **Euro-Denominated Redenomination Spreads. This figure plots the euro-denominated 1, 5, and 10-year redenomination spreads for France (left) and Italy (right). Compared to the headline measure, constructed from 5-year dollar-denominated CDS, the euro-contracts are less liquid and prices noisier. I therefore plot moving averages over 10 trading days.**

TABLE IA.2: **Robustness: Regression of eurozone sovereign yields on RS**

This table reports robustness tests for the results from Regression (10). Panels A and B use wider event windows: for France, the event window now spans the whole pre-election period from 2/15/2017 to 4/27/2017 after the first round. For Italy, it spans the entire first Conte-government, from 5/11/2018 to 9/3/2019. Panels C and D drop the control for CR default risk premia.

$$\Delta(y_{i,t} - \text{OIS}_{i,t}) = \alpha_i + \beta_{i,j} \times \Delta\text{RS}_{j,t} \times \mathbb{1}^*_{j,t} + \gamma_{i,j} \times \Delta\text{CR}^{€}_{j,t} + \varepsilon_{i,t} \quad (10^*)$$

$$\Delta(y_{i,t} - \text{OIS}_{i,t}) = \alpha_i + \beta_{i,j} \times \Delta\text{RS}_{j,t} \times \mathbb{1}_{j,t} + \varepsilon_{i,t} \quad (10^{**})$$

As in Table 2, the dependent variable for i = ITA is $\text{RS}_{ITA,t}$, and $\text{RS}_{FRA,t}$ for i = FRA. The parentheses contain t-statistics based on heteroskedasticity-robust standard errors. The daily data run from September 2014 to November 2020.

	GER	AUT	NED	DEN	BEL	FIN	ESP	IRE	ITA	POR	FRA
	Panel A: Yields and French redenomination risk, wider event window, Regression (10*)										
$\hat{\beta}_{i,FRA}$	-0.207	-0.165	-0.086	-0.060	0.154	0.068	-0.013	0.266	0.557	0.109	0.845
	(-1.91)	(-1.96)	(-1.04)	(-1.20)	(1.09)	(0.53)	(-0.05)	(2.12)	(3.76)	(0.26)	(2.07)
$\hat{\gamma}_{i,FRA}$	-0.217	0.277	-0.088	0.100	0.242	0.533	1.852	0.684	0.512	2.949	0.574
	(-2.68)	(2.53)	(-0.96)	(1.44)	(2.43)	(6.87)	(9.90)	(7.32)	(2.67)	(9.18)	(7.00)
Observations	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,585	1,604	1,604
	Panel B: Yields and Italian redenomination risk, wider event window, Regression (10*)										
$\hat{\beta}_{i,ITA}$	-0.056	-0.059	-0.064	-0.033	-0.089	-0.074	-0.116	-0.131	1.461	-0.142	0.001
	(-1.85)	(-1.20)	(-1.95)	(-0.86)	(-2.62)	(-1.20)	(-1.49)	(-2.39)	(4.83)	(-1.42)	(0.07)
$\hat{\gamma}_{i,ITA}$	-0.081	0.032	-0.063	-0.008	0.012	0.096	0.496	0.148	1.210	0.744	0.012
	(-5.01)	(1.36)	(-3.64)	(-0.49)	(0.78)	(5.71)	(13.63)	(6.64)	(13.06)	(12.75)	(1.29)
Observations	1,606	1,606	1,606	1,606	1,606	1,606	1,606	1,606	1,606	1,606	1,587
	Panel C: Yields and French redenomination risk, no default risk control, Regression (10**)										
$\hat{\beta}_{i,FRA}$	-0.410	-0.247	-0.209	-0.106	0.154	0.212	0.488	0.437	0.555	1.019	1.269
	(-9.40)	(-4.73)	(-2.79)	(-1.55)	(0.70)	(1.23)	(3.03)	(2.58)	(6.30)	(3.31)	(3.07)
Observations	1,606	1,606	1,606	1,606	1,606	1,606	1,606	1,606	1,587	1,606	1,606
	Panel D: Yields and Italian redenomination risk, no default risk control, Regression (10**)										
$\hat{\beta}_{i,ITA}$	-0.122	0.072	-0.126	0.017	-0.057	-0.015	0.353	0.053	3.513	0.698	0.017
	(-1.81)	(1.05)	(-1.55)	(0.19)	(-0.91)	(-0.19)	(5.31)	(0.70)	(4.91)	(8.59)	(2.90)
Observations	1,600	1,604	1,606	1,606	1,584	1,606	1,606	1,606	1,606	1,606	1,600

TABLE IA.3: **Bank-sovereign home bias**

This table reports the relative exposures of banks to different sovereign issuers within liquid asset holdings. I consider net direct exposures in assets held as *available-for-sale (AFS)*, *held-for-trading (HFT)*, and *held-to-maturity (HTM)*. The data refer to balance sheet exposures as of June 30st, 2018 (obtained from the European Banking Authority).

							Sovereign							
Bank	**AT**	**BE**	**DE**	**DK**	**ES**	**FI**	**FR**	**GB**	**GR**	**IE**	**IT**	**NL**	**PT**	**SE**
AT	**30.7**	0.6	3.3	0.0	1.1	0.3	1.2	0.0	0.0	0.7	1.2	0.4	0.2	0.1
BE	0.3	**28.4**	7.6	0.0	3.8	0.1	7.2	4.4	0.0	0.7	12.3	0.7	2.1	0.0
DE	2.4	1.1	**58.0**	0.0	2.0	0.6	2.9	3.4	0.0	0.4	5.3	1.5	0.5	0.2
DK	1.9	2.1	7.3	**37.2**	3.5	8.5	4.8	2.5	0.0	4.0	2.2	2.4	0.1	14.0
ES	0.1	0.1	2.0	0.0	**51.0**	0.1	0.8	3.4	0.0	0.2	6.6	4.4	2.4	0.1
FI	0.2	0.2	4.6	0.0	0.0	**89.1**	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.0
FR	0.5	3.2	4.9	0.2	1.6	0.5	**53.9**	1.3	0.0	0.4	6.4	1.2	0.4	0.1
GB	0.4	1.2	7.0	0.1	0.9	0.5	3.9	**21.7**	0.2	0.2	2.1	0.6	0.2	0.5
GR	0.2	0.0	0.5	0.0	1.7	0.0	0.1	0.0	**74.8**	0.0	1.8	0.0	0.2	0.0
IE	0.3	4.4	8.3	0.4	8.4	0.0	5.9	2.1	0.0	**47.5**	4.0	0.8	1.0	0.1
IT	3.7	0.3	7.5	0.0	8.6	0.0	2.8	0.0	0.0	0.1	**57.7**	0.1	0.2	0.0
NL	2.4	9.4	9.4	0.1	1.6	2.1	3.5	0.2	0.0	0.1	0.2	**56.6**	0.0	0.1
PT	0.0	0.0	0.5	0.0	10.9	0.0	1.3	0.0	0.0	0.4	6.6	0.0	**64.1**	0.0
SE	-0.1	1.2	7.0	17.7	0.0	3.5	1.8	6.8	0.0	0.0	0.1	0.5	0.0	**44.5**

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