Expansionary credit dynamics before the global financial crisis evoke a distinctive systemic challenge in Central and Eastern Europe (CEE). In the upswing of the credit growth cycle, the proliferation of foreign currency (FX) loans generates unique channels of risk contagion across young regional financial markets. In specific contexts including Hungary, the denomination currency of the Swiss franc particularly questions structural resilience. Overall, with regulatory regimes dominantly addressing the issue *in retrospect*, the consolidation process is a strategic episode of global macroprudential reforms characteristic of the post-2008 era.

The paper sets out to present an overview of credit growth drivers, the systemic aspects of FX financial intermediation and the legal deliberation in CEE substantiating policy intervention. Specifically, the study evaluates the Hungarian settlement terminated by the late-2014 conversion of the remaining portfolio into domestic currency, as arguably the earliest and most comprehensive consolidation scheme. Subsequently, the empirics approximate the influence of policy spillovers on domestic FX loan demand. In this manner, the sections develop in chronological order in line with the changing regulatory paradigm.

First, credit market supply and demand components are specified within the context of post-socialist market transition and dismantled patrimonial state models. The interaction is considered between institutional characteristics and debtor choices. The portray of creditors is linked to macroeconomic fundamentals and financial regulation, and the foreign ownership structure of banks is critically discussed. The section concludes with the chronology of the FX credit boom in Hungary and contextual comparisons. Following the structural account of credit growth, the paper turns to the systemic components of the FX portfolio assessing the risks of 'liability dollarization'. Motivated by general market failures, the discourse reviews systemic risk measures which effectively address foreign currency mismatches and correct the shortcomings of pre-crisis metrics.

Next, the paper elaborates on the policy trade-off between efficient intermediation and systemic resilience. As the precise understanding of FX-risk often realizes *in retrospect*, arguments are considered to fair cost sharing and monetary policy mandate which typically precede policy action. The pillars of this discourse then enable a targeted enquiry into the nature of the intervention conducted in Hungary. Comparative examples are presented to prepare the statistical approximation of policy spillovers.

Overall, the paper contributes to the extensive literature on financial dollarization and systemic risk, a recurring theme not only in CEE but equally in the emerging economies of Latin America and the Middle East. In the focus region, reducing foreign currency exposure and introducing the macroprudential paradigm require the complex interaction of economic, political, and legal measures. As a result, the overview is conducive of a wide array of academic queries. These include but not limited to i) the accuracy of systemic risk measures; ii) the preservation of monetary sovereignty over the exchange rate channel; and iii) cross-border policy effects and collective supervision over structural exposure.

1. Lending chronology - Foreign currency credit drivers

The section critically evaluates CEE credit market characteristics at the time the majority of foreign currency loans are registered. This requires an understanding of the economic rationale that prompts borrowers and lenders to choose the FX product over alternatives; and a relative weighing of factors by importance. Assessing the role of foreign bank ownership reveals that financial de-regulation manifests as a *substitute* to patrimonial policy regimes. The section then concludes with the contextual review of the Hungarian credit boom.

1.1 Supply and demand constituents

It is important to note that FX lending patterns do not emerge in isolation from international credit dynamics. Kolozsi & Lentner (2019) state how 'borrowing above one's creditworthiness, over-indebtedness and the resulting debt traps have been (…) recurring fundamental problems in the world economy since the 1970s'. Similarly, Lentner (2015) argues that the loan-financed consumption pattern of Western economies frequently produces debt traps and excessive leveraging prior to 2008. Credit activity before the crisis is correspondingly intensive in the euro area where total lending doubles and the issued foreign currency loans *treble* ('97-07), most claimants being Austrian and German banks (Brown, Marcel & Wehrmüller 2009). In overall credit profile, the new member states (NMS) of the EU stand in contrast by declining or stagnating public debt levels – Hungary as the only exception. Nevertheless, by the recent market transition private lending is equally expansive in CEE with a significant portion denominated in foreign currency. In new EU member states over the 2002-10 interval the share of FX borrowing in relation to GDP rises from 4% to 15%, despite the ratio of foreign currency deposits remaining 'broadly stable' (Rosenberg & Tirpák 2008).

With respect to loan products denominated in Swiss franc, the end of 2007 documents outstanding loans to *non-bank* clients as CHF 238bn in the Eurozone and CHF 122bn on the outside, the dominant portion of the latter issued in Hungary, Poland the UK and Iceland (Brown, Marcel & Wehrmüller 2009).

In the following, the section studies the evolution of the foreign currency portfolio. The consecutive review of demand and supply side factors prepares the analysis of systemic risk components, which later enables to evaluate policy intervention considering strategic targets.

Demand side

First, it is instructive to review the economic setting where FX loans proliferate and how it shapes the preferences of borrowers. The post-socialist market transition and the stabilization of ensuing initial recessions exert a positive influence on CEE loan demand. Through the case of Hungary, Banai et al. (2011) note that growing income levels and a pension system viewed as inefficient encourage (loan-financed) real estate investment as a popular method of wealth accumulation. Simultaneously, rentals and intergenerational living are increasingly regarded as sub-par living options and with the reduction of state-funded social housing, private ownership is held key to existential security boosting the demand for loan alternatives.

Rosenberg & Tirpák (2008) further elaborate on the determinants of foreign currency borrowing in new EU member states, highlighting the rudimentary state of financial institutions and incomplete domestic currency markets. Nonetheless, in the transition period improved living standards lead borrowers to seek loan products to aid consumption smoothing and intergenerational wealth transfers. Apart from insufficient domestic alternatives, the frequent monetary choice of a credible fixed exchange rate regime means that already a small interest rate deviation across domestic and FX products would shift debtor preferences viewing the currency risk as negligible (Rosenberg & Tirpák 2008). In the academic literature, the formation of borrowing preferences in line with current interest rate differentials and expected inflation is better framed as a *tilt effect*. Dübel & Walley (2010) explain how in a high-inflation environment, the domestic currency loan is initially more expensive which 'tilts' the financial burden of debtors towards the onset, becoming gradually more affordable as a result of inflation and nominal wage improvements. In turn, assuming

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that the exchange rate is periodically updated for inflation the real expense on FX loans stays constant, yet their time distribution allows a larger initial volume at starting wage levels. Overall, then, low expected real devaluation by the monetary regime would induce additional borrowing in FX, and the authors indeed find the tilt effect as a significant driver in Hungary and Ukraine. Simultaneously, whereas certain debtors opt for a larger loan volume others might take a 'direct bet' on cross-border real exchange rates and essentially engage in carry trading. For example, in their framework Dübel & Walley (2010) argue that this second motivation is the 'only' feasible justification to explain demand for Swiss franc loan products in Austria.

Concerning the household segment, Fidrmuc et al. (2013) find that the natural hedging of remittances and FX income; but equally expectations of medium-term euro adoption shape foreign currency loan preferences. Simultaneously, they argue that institutional *trust* is a significant drive when allocating domestic against foreign assets. Empirically, it is challenging to capture the impact of credibility on credit demand and supply as a weak monetary regime induces both savings and lending to shift towards FX. Therefore, from household surveys in nine CEE states (2007-10), the authors combine preference for euro assets and declared borrowing intentions as a forward-looking measure of trust, demonstrating that confidence in the local currency reduces FX demand. Additionally, FX loan demand only declines about 4-6% in the sample even *following* the GFC, indicating that the factors persist behind the popularity of this credit option.

On the firm dimension, Brown et al. (2011) analyse three thousand entries from the BEEPS survey in twenty-five transition countries (2002-05). They reveal that the foreign currency funding structure of firms, such as FX revenue (9%) and foreign ownership (24%) are strong positive determinants of FX borrowing. Nonetheless, exploiting interest rate differentials is equally a significant driver as one-percentage added change between domestic and euro rates leads FX borrowing by 5%. Furthermore, the authors use distress costs and financial transparency measures and establish no supporting evidence to moral hazard by firms. This suggests that most retail clients are well-equipped to hedge their exposure. Importantly, however, the empirical interval does not cover a strategic fraction of the FX credit boom ('04-08) whereas most of the structural risk seems to have originated not within the firm but the household segment. Additionally, a micro-level dataset from Hungary uncovers that, although

many firms cover their currency exposure the 'self-selection' of unhedged firms for FX loans remains widespread (Vonnák 2018).

Supply side

Whereas demand conditions contribute to the FX expansion; the supply side of credit activity is equally relevant conditioned by the economic history of CEE, and the overlap between regional market transition and global financial deregulation.

Accordingly, Yesin (2013) argues that FX loans are in part supply driven, the choice of lending currency influenced by easier access to international capital markets by foreign-owned banks. Additionally, new entrants in CEE are hesitant to undertake long-term lending in domestic currency due to their information disadvantage. As Dübel & Walley (2010) rightfully point out, the fact that FX loans spread in low inflation economies with small cross-border interest rate differentials equally reflects on the 'privileged' low-cost funding access of foreign entrants. For instance, whereas in Hungary the tilt effect of demand is also perceptible, FX loans expand consistently in Poland with moderate domestic interest rates and Latvia where low inflation-targeting prepares imminent euro adoption (Dübel & Walley 2010). The funding model explanation is further confirmed by a unique dataset from Bulgaria of a hundred thousand loans issued to firms (2003-07), the study stating that in *one third* of the cases FX loans are originally requested in local currency, yet banks are reluctant to accept long-term exposure and choose to rely on available Euro funding (Brown, Kirschemann & Ongena 2010).

In the new member states of the EU, it is privatization and the swift reduction of capital controls to attract credit from investing parent banks. On economic grounds, the use of FX funding is not exceptional as the medium-term convergence to European financial centres is widely expected. The overall pattern shows that states of a small size and with high catch-up potential see a wider extension of 'liability dollarization' up to the GFC (Rosenberg & Tirpák 2008). Moreover, macroeconomic conditions are conducive of the lending boom. Ranciere et al. (2010) stress that real exchange rates *appreciate* in most CEE countries, whereas Buszko & Krupa (2015) expand that by this 'stable valuation' vis-a-vis the CHF and EUR, the low interest on FX loans improves borrower creditworthiness relative to domestic denomination. Typically

inflating real estate property prices further facilitate bank lending without violations of contemporary regulatory prescriptions.

Considering the public policy attitude, the inflow of foreign capital appears as a crucial funding source to small and medium enterprises to aid the course of privatization. Bitar (2021) remarks on the sluggish process of encouraging investor participation in underdeveloped domestic credit markets, which FX lending circumvents by enabling banks to enter with reduced credit exposure. In fact, the accommodating policy environment for FX loans might be perceived by banks as an implicit bailout guarantee by governments. A regulatory hiatus is possible to pinpoint in that banks occasionally judge creditworthiness in 'lenient' fashion, to households without considerable savings or even insufficient collateral as far as local currency loans would be concerned (Banai et al. 2011). In connection, a more vigorous argument is proposed by Lentner (2015) that the expansion of FX lending is the introduction of the contemporary financial status quo in CEE, with the disbursement of loans beyond population solvency expected to 'bridge the regime change that failed to bring economic-income convergence'. Although a normative interpretation as such is beyond the scope of the present paper, the interplay between CEE institutional history and the foreign funding structure of banks amount to an informative case study, which the section now turns to comment.

1.2 Foreign ownership and funding models

To frame the discourse within seminal economic models, it is useful to recall the analysis of Dell'Ariccia & Marquez (2004) on the private information of banks. In their model, 'borrower capture' improves profitability as reliable information on debtor solvency permits banks to serve less creditworthy customers at higher interest rates. In turn, the increased competition by foreign entrants forces the 'flight to captivity' of domestic lenders by shifting to sectors with more adverse selection problems. This prediction stands as high-quality borrowers communicate their creditworthiness to new entrants with relative simplicity, prompting domestic institutions to place additional weight on more captive borrower segments. In an extension to the model, the authors (Dell'Ariccia & Marquez 2006) describe the *cyclical* tendency of information asymmetries as in the expansionary phase of the business cycle, the system is shock-resistant and adverse selection problems are less severe. However, this low systemic vulnerability incentivizes reduced lending standards and higher aggregate

credit volume with a view to harvesting added profits. Consequently, lending booms lead eventual banking crises if the risk incentive structure is sub-optimally designed. Applied to CEE, foreign currency products cover a substantial part of the expansionary credit cycle and seemingly without sufficient address of their risk profile.

More precisely, Degryse et al. (2012) detail two competing hypothesis in relation to the lower lending rates and interest spreads applied by foreign banks. The *performance hypothesis* expects that superior efficiency and operating costs are passed onto borrowers, despite the handicap in distance, monitoring costs and institutional difference. In turn, as in information asymmetry models the *portfolio composition hypothesis* stresses that foreign banks target more transparent clients. In fact, the authors demonstrate from Poland that once controlling for the portfolio hypothesis lending rates are virtually identical across banks. Whereas the so-called 'greenfield' subsidiaries of parent banks produce superior efficiency this is not passed onto customers and rather used to extract additional rents (Degryse et al. 2012). This overview does not clarify however, how *domestic* credit institutions fund their FX portfolio and whether the structural risk originates locally or through foreign ownership constructs.

In this regard, Vidahazy & Yesin (2020) highlight that in CEE cross-border flows from parent banks and short-term wholesale funding are fundamental to the foreign currency lending boom. Their reasoning states that increased leverage and the balance sheet expansion of West European banks are partly financed by inducing cross-border solvency risk. Empirically, in a study of credit dollarization Luca & Petrova (2008) review aggregate data from twenty-one transition economies ('90-03) to reveal that foreign funding compensates for incomplete domestic credit markets, as loans are issued in local currency but denominated as foreign capital. Importantly, they explain that banks often shift the currency risk onto borrowers as FX products allow reduced exposure to *direct* currency risk but widen exposure to the 'currency-induced default risk' of debtors. Overall, the authors argue that credit dollarization is 'the combined outcome of domestic deposit dollarization and banks' desire for currency-matched portfolios beyond regulatory requirements'.

In a study of twenty-four transition economies (2000-06), Basso et al. (2011) reaffirm that foreign bank ownership is linked to higher credit euroization. The authors observe that aggregate data does *not* support standard models of financial dollarization as the uncovered

interest parity (UIP) condition would expect depositors and borrowers to choose the same currency denominations, banks acting as mere intermediaries. Instead, in transition economies credit and deposit dollarization are often negatively correlated due to banks applying foreign funding models to capture local market shares. These findings are in accordance with evidence that EU banks often set explicit market share targets as shown in De Haas and Naaborg (2005 in Basso et al.) and De Haas and Van Lelyveld (2010 in Basso et al.).

Conversely, in this discourse Brown & De Haas (2012) argue that the wholesale funding employed by parent banks is an *outcome* rather than a determinant to the proliferation of FX loans. Utilizing bank-level data from the 2005 round of the BEEPS survey, they study nearly two hundred foreign and domestic banks in twenty transition economies. In their view, the findings contradict that 'foreign banks have been driving FX lending (…) as a result of easier access to foreign wholesale funding'. Whereas the foreign acquisition of a bank induces the faster growth of the FX lending *volume* to households, it does not shift the *share* of household lending towards FX – this process occurs independently fuelled by general lending growth and borrower foreign currency preferences. Essentially, their argument reflects on the collective nature of the FX boom phenomenon reminding that the parent bank funding of subsidiaries is not to be regarded as the single most important credit driver. Instead, it is important to evaluate funding models together with regulatory shortfalls and excessive leveraging prior to the GFC, which eventually narrows down the policy opportunity space.

In conclusion, the ownership structure of subsidiaries is a relevant systemic variable influencing the shock resistance of domestic credit markets. Basso et al. (2011) summarize that within the intense retail competition in emerging economies, the motivation to capture market shares and shift risks beyond balance sheets is what partly provokes collective loan defaults. Nevertheless, the unfolding of FX loans is equally a *general* phenomenon in CEE irrespective of ownership models. Instead, it is insufficient credit rationing, regulatory shortcomings, and behavioural bias ('herding') that primarily motivate the spread of FX products (Ibid.). For instance, many borrowers ineligible for domestic currency loans are able to borrow in foreign legal tender even when all instalments are paid in local denomination. Regarding the FX preference of debtors, in certain cases carry trading and natural hedging capacity predominate, at other times it is the lack of creditworthiness for domestic currency

loans or weak trust in the monetary regime (Ibid.). Crucially, stable exchange rates and strong expectations of medium-term euro adoption guide risk underestimation by both demand and supply side actors. Before discussing this exposure in detail, the paper turns to an account of FX credit growth in Hungary and relevant regional comparisons.

1.3 Regional specifics

Naturally, the social and regulatory context informs the precise manner that foreign currency loans are introduced. The following is an account of regional particularities in CEE and to what extent Hungary fits in this image.

In the economic historiography of CEE, Bod (2011) records that the final decades of socialist regimes often feature 'hard currency dealing' to compensate for domestic currency volatility, sectoral prices routinely denominated in Deutsche Mark or US. dollar. Foreign currency is viewed as a strategic portfolio asset owing to the rudimentary state of financial institutions. Specifically, Hungary develops a commercial banking system only with the tutelage of the International Monetary Fund from 1987 onwards. Recollecting the seminal paper of Eichengreen & Hausmann (1999), this institutional precedent might constitute an 'original sin' whereby market participants are constrained to borrow funds for *domestic* use in foreign (hard) denomination. In fact, this dynamic is a relevant precursor to the FX crisis in that it foresees both a *currency* and a *maturity* mismatch, in so far as short-term and foreign denominated loans finance long-term projects that generate local currency revenue. Nevertheless, the insight proposed by Bod (2011) is exactly that the proliferation of FX loans in Hungary shall be viewed as a 'not too original sin', resting on the premise that the flow of non-debt creating liabilities from the late 1990s, as well as the EU membership from 2004 sufficiently establish the country's financial openness.

The validity of this argument notwithstanding, it is important to clarify the macroeconomic consequences of market transition. Lentner (2015) reports that wage levels in Hungary of the early 2000s fall 72% below the monetary average of the Eurozone, yet the social climate confides in imminent economic convergence. As a result, FX loans are seen as a convenient opportunity by both private and public actors to close the wage-consumption gap despite the lack of 'solvent demand' that would fully compensate. In relation, Pellényi & Bilek (2009) verify that FX borrowers in Hungary are *not* more financially literate, wealthy, or risk-loving

than domestic currency borrowers. They equally mention the factors of interest spreads, a stable exchange rate and foreign bank competition as fundamental drivers of FX credit. Limited incentives to self-restraint on either the demand or supply domains inflict that, in relation to the doubling of total cash and deposits volumes (2002-10) the volume of household consumer loans increases *five-fold* (2004-10). Specifically concerning the CHF portfolio – ultimately of the highest structural exposure in Hungary – in 2003 it represents 3% of total lending lifting to a 30% portion by 2007 (CHF32bn, 56% of total FX), disbursed and paid in Forint with outstanding payments indexed to the Swiss Franc (Brown, Marcel & Wehrmüller 2009).

Dübel & Walley (2010) consider Hungary as a 'delicate mix' of demand and supply factors, specifically mentioning the tilt effect of demand and new credit entrants seeking to capture market shares. Crucially, however, they emphasize the influence of the policy regime and specifically the halted subsidy programs which render FX loans almost instantaneously more attractive. Drawing on the following figure, the authors demonstrate that CHF loans esentially assume the role of subsidized HUF loans in terms of their features in cost and disponibility:

Figure1 – Subsidized and market rates for housing loans
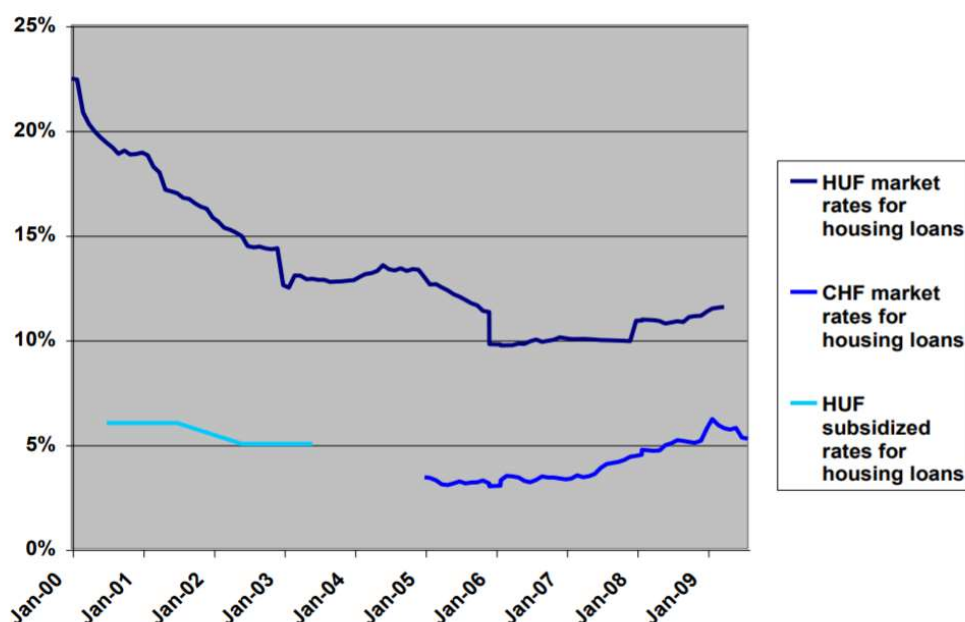
Source: Dübel & Walley 2010 compilation of MNB data

The chronology of state subsidy programs extends an understanding of this episode. Naturally, the regime change transforms public spending patterns in the housing sector. As Csizmady & Hegedűs (2016) document, whereas in the early nineties 3.7% of GDP is spent on housing allowances in the form of interest subsidy on loans, by the end of 1994 this value drops below 1%. At the same time, the municipal housing stock decreases from 19% to 3% in line with the privatization of the state rental sector and the consolidation of old loan volumes. In the second half of the decade contract saving, and mortgage banks are established prepared to supply credit in case macroeconomic conditions – income and investment demand – improve. Up to 2000, retail lending is 'marginal' without extensive capital markets and banks predominantly serving firms as customers (Banai et al. 2011). Subsequently, the pre-crisis interval demarcates two distinct periods to credit development. Banai et al. (2011) define 2000-04 as the *convergence period* where credit expansion answers to an equilibrium path. This chapter sees the competitive advantage of domestic banks owing to the short credit history of households, foreign banks prioritizing the corporate sector with multinational firms hedged by external trade. Importantly, sound macroeconomic fundamentals (GDP growth of 4%, low unemployment and fiscal deficit) enable the partial rehabilitation of the mortgage subsidy program in the form of income tax allowances, which typically cover more than half of mortgage loan volumes yet placing an unsustainable burden on the central budget (Csizmady & Hegedűs 2016). Although with the 2002 change of government most housing subsidies are driven out, the loan portfolio grows radically from 190bn to 1500bn HUF ('99-03) and even subsidy cuts are ineffective at halting credit expansion.

In fact, as Figure1 demonstrates the subsidy cuts appear to shift loan demand towards the newly introduced FX loan products that fill in the 'credit gap'. Accordingly, the 2004-08 period of *excessive credit expansion* completes with a 75% FX portion of the lending portfolio relative to the initial 16% share (Csizmady & Hegedűs 2016). For this period, Banai et al. (2011) confirm divergence from the equilibrium path and credit expansion beyond the natural hedging capacity of the financial sector; yet cheap interest rates and the subsidy cutback, as well as the 'risk-based competition for the household segment' by banks continue to escalate the credit boom. The recent EU membership of Hungary is expected to mitigate the exchange rate risk and sudden currency movements are viewed improbable, yet due to lax fiscal policy

the convergence criteria are not met, and the adoption of the common currency is repeatedly postponed.

In summary, as Csizmady et al. (2019) argue housing is seen both as a private portfolio asset and a milestone of state welfare systems in the period preceding the GFC. Accordingly, as the welfare regime reduces the weight on housing subsidies this provokes a proportionate growth in portfolio demand, many low-income households striving to recover their purchasing capacity by means of new loans. At this point, due to the National Bank of Hungary (MNB) keeping consistently high base rates the interest on domestic currency loans is more expensive by an average of four percentage points (Nagy 2015). In addition, as the monetary authority preserves an 'intervention band' on forint-to-euro rates from 2003 until its crisis-motivated abolition, interest rate targeting is subordinated to exchange rate policy making FX loans not only cheaper but perceived as less volatile. Combined with the implicit bailout guarantees coded in the heritage of state paternalism, consumers thereby view foreign currency loans as a secure and attractive credit option (Kolozsi et al. 2015). In the absence of an extensive mortgage market with long-term and fixed interest rate loans denominated in forint, up to 2008 all sides benefit from the expanding FX credit although at unequal risk and cost distributions.

Comparative examples

Overall, the time pattern of strong capital inflows in CEE is typical towards the final years before the GFC. For instance, Čeh et al. (2011) design a disequilibrium model for Croatia to separate credit market demand and supply constituents. They detect equilibrium credit behaviour throughout 2000-02 succeeded by intensive credit expansion and excess supply over 2002-09. Finally, they note that the abrupt halt in credit activity over the GFC is a result of a sudden bank liquidity shortage rather than real demand factors.

The financial profile of Croatia is relevant for the purposes of another theoretical consideration, as relative to Hungary here *deposit* dollarization is also sizable. Although high inflation is stabilized in the early nineties, the population retains a strong saving preference in foreign currency – initially the Deutsche Mark. This inherited dollarization presents the policy dilemma to either accept a strong deposit base in FX, or dramatically limit credit in the short-run and reform the banking system based on a reinforced domestic currency. Galac &

Kraft (2011) explain how Croatia sides with the former approach, with the total of banking assets beyond ninety percent foreign owned by 2000, and euro banknotes widely popular already from their 2002 domestic introduction. In this manner, the country benefits from international credit markets with 'substantial funding sources', however without direct monetary policy control over FX credit as a lender of last resort. Before the crisis FX deposits and liabilities constitute 75% of bank balance sheets which shifts the monetary regime towards tight exchange rate targets (within a 6.5% deviation for all of 1993–2011, Galac & Kraft 2011), and anticipating future convergence to the EU and the Eurozone.

Ultimately, the differentiation across two groups of CEE countries is justified by Kolozsi & Lentner (2019) in terms of credit growth dynamics. In the first group including Croatia, deposit driven euroization and distrust in the local economy promote savings and deposit holdings in FX, banks opening their FX position with a view to reduced exposure. In contrast, the second group is better attributed to 'carry trade euroization' without a confidence problem in the domestic currency, banks opening a (speculative) FX position without the corresponding natural hedging mechanisms denominated in foreign currency.

The closing remarks briefly draw on the example of market economies outside of emerging Europe, without the experience of financial transition regimes. As a demonstrative case, in Austria the proliferation of FX loans does not originate in *either* incomplete credit markets or deposit dollarization. Rather, as elaborated by Beer et al. (2010) FX products display attractive features by their variable interest structure and a repayment vehicle typically in equity investment (life insurance or mutual fund). As Austria adopts the common currency already in 1999, one might regard the appearance of CHF loans specifically as 'dollarization in reverse'. Conversely, the authors designate CHF loans as a unique portfolio component supported by demand-driven rational arbitrage. These loans in Austria are typically of 15-25 years maturity, repriced every three months and offering borrowers to switch currency at roll-over dates. Equally, their structure permits banks a forced conversion clause to euro without the explicit consent of the debtor. From representative financial wealth surveys, it is also clear that in Austria risk seeking, affluent, married, and financially literate households are more likely to pursue FX loans, reducing systemic default concerns relative to CEE – for instance Hungary without notable difference across borrower identities (Beckmann 2017). Overall, the properties of foreign currency credit and its macroeconomic context are arguably more

secure and integrated within the Austrian economy in comparison to most of the case studies from emerging Europe.

2. Systemic risk

In a joint definition proposed by international financial bodies, systemic risk is understood as 'a risk of disruption to financial services that is (i) caused by an impairment of all or parts of the financial system and (ii) has the potential to have serious negative consequences for the real economy' (FSB-IMF-BIS 2009 in Bitar 2021). It is beyond the scope of the paper to exhaustively diagnose the deficiencies of international financial standards before the economic crisis. The GFC is nonetheless relevant in two regards. First, it acts as the catalyst exposing the vulnerabilities of the foreign currency portfolio in CEE and particularly the insufficient hedging capacity of households. Housing finance plays a major role in contemporary financial regimes as a significant 'absorber of global liquidity' and thus a root cause to the GFC (Bohle 2018), with the dominant share of this credit FX-denominated in the focus region. Second, foreign currency loan consolidation is a representative episode of post-crisis macroprudential reforms to reinstitute credit intermediation, while attributing an interventionist role to the state.

2.1 Foreign currency intermediation

To frame the discussion, once more it is instructive to recall how Eichengreen & Hausmann (1999) conceptualize financial fragility in relation to the exchange rate. First, the implicit insurance of a currency peg against exchange rate risk might induce *moral hazard*. Second, *original sin* is identified if incomplete financial markets inhibit the use of local currency for domestic borrowing purposes. Finally, weak institutions incapable of enforcing intertemporal trade contracts might evoke a *commitment problem*. Already at this early stage, the authors register that small capital flows in emerging economies are consistent with the original sin hypothesis whereas their composition reflects on moral hazard. It is equally possible to evaluate FX growth dynamics in this framework, as in CEE the portfolio serves to escape the constraints of underdeveloped credit markets. Simultaneously, the opportunity cost is to tolerate the systemic build-up of moral hazard as borrowers stay unhedged to exchange rate movements.

It has been argued that the economic geography of CEE affects the risk profile of FX loans. Bohle (2018) attributes a model of 'familial residential capitalism' to the European 'periphery' characterized by high home ownership rates and mortgage markets below the 'critical point' of financialization. She argues that privatization, deregulation, and the expansionary monetary cycle of the European Central Bank (2004-07) produce excessive leveraging, maturity and currency mismatches as abundant foreign credit is accommodated on fragmented mortgage markets. From a different angle, the evolution of the FX portfolio can be discerned as a stage in the banking integration between emerging Europe and advanced continental economies. Brown & de Haas (2012) review early evidence that foreign entrants improve credit sector efficiency, even if their role in creating structural imbalances is increasingly questioned following the GFC. The authors maintain that FX lending is introduced in countries where it is justified from a macroeconomic perspective, mainly low real exchange rate volatility and prospective EU accession to prompt this funding structure. The evidence has also been reviewed that foreign banks do not lead the *share* of FX lending which is a sectoral phenomenon, even if the funding model of subsidiaries is equally prone to suffer from the credit crunch at the crisis.

Specifically, regarding CHF-denominated loans an initially plausible argument is that the crisis is 'imported' via a contagion effect from bank refinancing and thus originating outside of domestic credit markets. Indeed, at this era the Swiss banking sector displays the highest bank asset-to-GDP ratio within the G10 making it possible that excessive leveraging is present. Conversely, Batsaikhan (2012) reveals that a credit crunch does not occur in Switzerland – this is partly as Swiss banks maintain an excess capital buffer of 3,5-5%; but more fundamentally the CHF acts as a safe haven currency and continuously appreciates over the crisis interval. Additionally, timely monetary policy interventions including the currency board established vis-a-vis the Euro avoid the negative results of appreciation, guarantee the competitiveness of the currency and prevent the 'overheating' of housing markets (Batsaikhan 2012). In fact, it is exactly the relative strength of the CHF which later poses systemic difficulties in CEE once the Swiss National Bank (SNB) abolishes its currency board in 2015. In terms of the involvement of the Swiss financial sector, direct refinancing of CHF loans is only seen within the eurozone. For instance, in Austria Swiss-domiciled banks refinance 11% of loan volumes with the major share (40%) covered by the issuance of CHF bonds (Brown et al. 2009). In turn,

Brown et al. (2009) reveal that in CEE Swiss cash flows are 'rarely involved', refinancing conducted through other interbank loans or *currency swaps* with the parent company. Swiss interbank loans refinance only about 0.25% of CHF loan volumes in Hungary and Poland combined, most of the currency exposure covered in off-balance sheet operations. Importantly, currency swaps refinance 60% of loan volumes in Hungary and 50% in Poland, a relevant risk factor in so far as parent bank funding may dramatically reduce in a major crisis episode. This funding liquidity concern is especially relevant in CEE where on average 78% of banks operate with some degree of foreign ownership by the end of 2007 (Andrieş & Nistor 2018).

In hindsight, contemporary academic literature is in a stronger position to evaluate the risk components of financial intermediation conducted in foreign currency. In a recent work Bitar (2021) specifies three primary spillover channels. First, a *liquidity risk* presents as credit creation is conducted outside of the domestic monetary mandate. It is possible to view the gross liquid foreign assets of banks as their FX monetary base, where overall hedging capacity determines the multiplication potential through the fractional reserve principle. Bitar notes that in absence of a credible lender of last resort (especially if banks rely on noncore FX liabilities), only a 100% reserve requirement produces complete systemic coverage. Additionally, the paper notes how banks undertake a *direct* FX risk by the exchange rate sensitivity of bank balance sheets (stock aspect) and income statements (flow aspect); and crucially an *indirect* FX risk by the collective default risk of unhedged borrowers. This indirect exposure is what Yesin (2013) describes as the 'common market shock' perspective, exchange rate movements triggering defaults as banks finance short-term interbank liabilities by holding long-term FX loans to domestic households on the asset side. This is despite documentation that less than 10% of CESEE households had been naturally hedged (Pann et al. 2010 in Yesin 2013). Csajbók et al. (2010) also remark how the 'post-Lehman phase' of the financial crisis unveils the structural weakness of CEE financial markets. The repeated practice of banks to shift the currency risk onto individual debtors aggregates to systemic credit risk, posing serious problems to financial stability not least as central banks in emerging economies dominantly rely on the *exchange rate channel*. As FX loans intrinsically link credit market resilience to the volatility of exchange rates, both the relative stability of the domestic currency and the monetary actions of a foreign sovereign authority enter as variables of

structural importance. These policy considerations are expounded further in the related section, grounded on the risk characteristics of the FX portfolio which the present chapter strives to identify.

Overall, it is important to stress the *collective* nature of moral hazard which does not exclusively originate in the lack of policy correction and supply-based drives. Beckmann & Stix (2012) scrutinize micro-level evidence from the 2007 Euro Survey of the Austrian National Bank (OeNB). They show that households from CESEE are aware of the risks associated with FX loans and still the demand for the products stays 'remarkably stable'. In Hungary 90% of respondents hold FX as riskier and yet 43% insist on their relative attractiveness even *after* the GFC. The authors reaffirm in a later study reviewing exchange rate risk perceptions, that 'a misunderstanding of respective risks (is) not the main cause of widespread foreign currency borrowing' in Hungary and Croatia (Beckmann & Stix 2015). These structural considerations from the demand side point at the lack of long-term, fixed interest domestic loan alternatives as the catalyst to moral hazard.

2.2 Systemic profiles in CEE

In certain states of CEE particularly the Czech Republic and Slovakia, foreign currency credit does not constitute a major financial weakness at the time of GFC. Similarly, in other policy contexts such as the Baltic states the risk exposure is eliminated by eventual accession to the Eurozone. Within the remaining group of countries, it is primarily Poland, Romania, and Hungary where FX liabilities emerge without significant initial levels of deposit dollarization (Kolozsi & Lentner 2019). Hungary is the only regional country where the FX loan portfolio is completely phased out and converted into *domestic* currency, as well as the policy context of the earliest CEE conversion scheme. This warrants an overview of the country's systemic profile for later policy evaluation.

Banai et al. (2011) denote how in early 2003 the loan-to-deposit (LTD) ratio stands at 100% raising as high as 160% by the time of the GFC, together with the 'increasing weight on foreign liabilities' as the portion of foreign currency credit grows from 17% to 30%. A funding liquidity risk is evident as Hungarian banks typically close their open FX positions on swap markets using HUF-denominated resources on the deposit side. Furthermore, a renewal risk arises as the FX swap liquidity obtained is of shorter maturity relative to on-balance sheet funds.

Finally, the centrality of swap markets also means the contraction of banks' liquid assets portfolio (relative to total assets) resulting in insufficient capital buffers to hedge against crisis events (Banai et al. 2011). Despite these processes, no sufficient liquidity regulation addresses the risk constituents of FX loans partly due to the sensitive policy choice of temporary growth cutbacks at the time of an upswing in the economic cycle.

Regarding the household segment of CHF loans in particular, Banai & Vágó (2018) review quarterly data within 1998-2016 and show that housing prices lead credit risk during the housing market boom which need have been contained by prudential restrictions. As for the firm segment, Endrész et al. (2012) discover how lending is common in the (unhedged) non-tradable sector as well, cheap FX loans easing the liquidity constraint primarily of large and previously indebted firms. Specifically, the authors define funding mismatch in a categorical classification of firms by credit profile (no loans, FX or domestic loans) and trade involvement (no trade, net exporter or net importer). The two risk groups are specified by those firms indebted in foreign currency but *not* involved in export-generating activity. Crucially, according to this framework 7% of total Hungarian firms have mismatch problems, yet these firms hold 65% of all outstanding and 80% of all FX debt.

Overall, as the Forint depreciates by sixty to seventy percentage points against the CHF, it is approximately *every third* Hungarian family serving an FX loan in the autumn of 2011.

Figure2: The evolution of forint to CHF and EUR rates
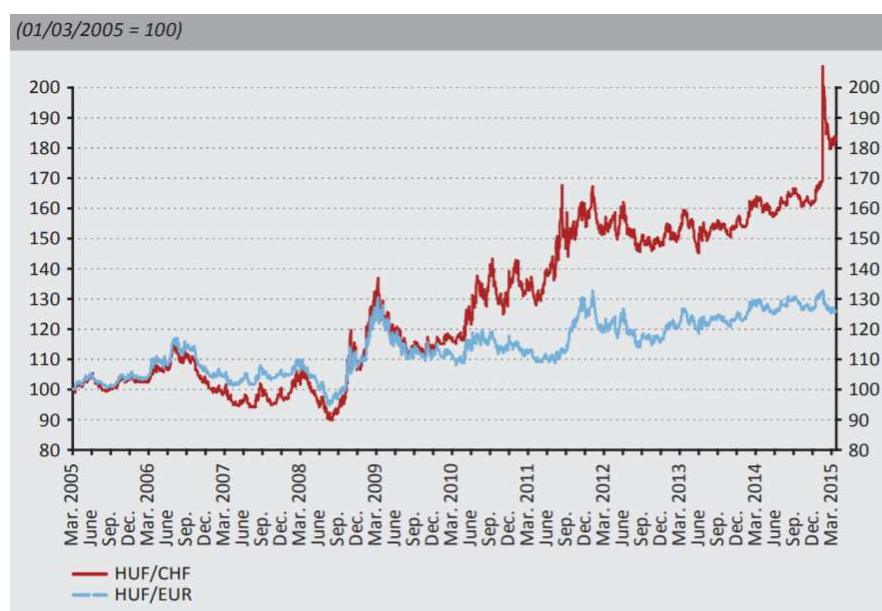
Source: Kolozsi et al. (2015) compilation of MNB data

At this point, the foreign currency loan stock covers 18% of GDP at the total value of CHF22bn, and daily exchange rate movements constitute a habitual news and conversation topic (Bod 2011). By 2014, through the impact of the GFC real house prices drop by a third and the share of non-performing loans grows from 5% to 20% (Csizmady & Hegedűs 2016). In the synopsis provided by Bethlendi (2016), then, the 'completely laissez faire' regulatory approach prevented the success of risk-shifting from bank balance sheets to the presumed hedging capacity of firms and households. Therefore, in terms of this exposure a relevant query is to what extent the funding risk had been understood by policy authorities to justify stronger regulatory intervention.

2.3 Risk metrics

In the following the paper studies the evolution of systemic risk metrics and contends that precise econometric tools are lacking prior to the GFC, subsequent models better suited to inform policy intervention. Accurate measurements allow to balance counter-cyclical regulation in inhibiting credit growth to prevent financial collapse in the bust cycle. In other words, policy makers seek to determine the 'price' of insurance against financial distress to design shock-resistant capital markets (Huang et al. 2012).

CoVaR, MES and precursors

Early strands of the empirical literature on structural risk rely on the contingent claims analysis of the assets of financial intermediaries (FI), however these often require 'strong assumptions' about the exact liability structure of FIs (eg. Lehar 2005 in Acharya et al.). Other early approaches draw on autocorrelations, tail betas or credit default swap (CDS) values for the portfolio analyses of systemic distress (Billio et al. 2012 or Segoviano & Goodhart 2009; in Acharya et al.). For our purposes, two standard regulatory metrics stand out to capture expected credit loss above a given share of total liabilities in the financial sector. First, the Value-at-Risk (VaR) approach sets a 95% confidence interval to the maximum value of institutional loss in the case of an extreme event; and second, the expected shortfall (ES) specifies the amount of average portfolio returns when losses nonetheless exceed the VaR threshold (eg. Kupiec 2002 or Jorion 2006, in Adrian & Brunnermeier 2016). In relation, the regulatory problem is exposed by Acharya et al. (2017) in that VaR cannot serve as a robust systemic measure due to its statistical blindness to 'asymmetric high-risk bets'. Equally, VaR

is not adequately suited to contain moral hazard as it does not weigh the social cost of collective losses beyond the VaR threshold which is left to be settled by government bailouts.

Similarly, Adrian & Brunnermeier (2016) recognize the major defect of VaR in failing to address to *contagion* effect of institutional risk as it does not identify either 'individually systemic' FIs or those only 'systemic as a herd'. Furthermore, the authors make the fundamental observation about risk procyclicality and the so-called *volatility paradox*. As initially it is precisely low-risk environments conducive of the build-up of structural weakness, systemic measures might be lagging and provide signals only once the crisis phase has already commenced. In truth, along these lines VaR is typically procyclical (low in the boom and high in the bust cycle) and therefore of limited policy reliability. The volatility problem equally affects measures that attempt to determine a 'risk-neutral' CDS price and set a distress insurance premium. For example, an estimator using this approach by Huang et al. (2012) increases rapidly from the summer of 2007, to decline again gradually after the spring 2009 peak of the crisis. The policy aim instead, is to arrive at reliable *counter-cyclical* risk estimates of the relative price of policy intervention in the trade-off between growth and stability.

For this purpose, recent important reformulations of econometric tools have been proposed. Adrian & Brunnermeier (2016) extend VaR utilizing data on the leverage, size, maturity mismatch and asset price indicators of over a thousand public FIs over the 1986-2014 period. They design the *CoVaR* metric defined as 'the change in the value-at-risk of the financial system conditional on an institution being under distress relative to its median state'. In other words, CoVaR measures the structural externality that a single bank inflicts on the system and estimates the 'spreading distress' in the case of a systemic financial event. This results in a 'countercyclical, forward-looking' systemic risk forecast from tail co-movements, mirroring VaR but with institutions no longer standing in isolation. Technically the corresponding inverse metric, Acharya et al. (2017) establish the 'systemic expected shortfall' (SES) of each FI defined as the propensity to be undercapitalized when the system as a whole is undercapitalized. In this manner, here the externality channel is reversed and shows the expected loss the system incurs on the bank in a potential crisis event. This measure is convenient to quantify using the 'marginal expected shortfall' (MES) of FIs set by their net equity returns during the worst 5% of market days to capture exposure to aggregate 'tail shocks'. The authors also argue the advantage relative to CoVaR, that systemic stress does

not vary cross-sectionally which allows the precise ranking of institutions by risk exposure and in fact their study successfully predicts the first FIs to collapse during the financial crisis. This advantage notwithstanding, Adrian & Brunnermeier (2016) point out that the MES design is less effective in addressing procyclicality and the volatility paradox. Overall, the policy use of CoVaR is to describe the evolution of systemic risk over a specific time horizon (ie. treat procyclicality), whereas MES is valuable to determine the *precise* exposure of institutions to structural risk linked to the collective profile of the financial sector. For instance, Acharya et al. (2017) remark how the MES framework is logically consistent and has natural additivity properties (with firm size and mergers), in this sense proposed by the authors as a potential basis to determine systemic taxes.

Currency mismatch

Equally, currency mismatch measures are of policy importance for the FX loan portfolio. In a review of statistical precursors, Tobal (2018) explains how the original sin approach considers only the liability side but not hedging FX assets. Subsequent external vulnerability indicators observe both sides of the balance sheet yet often not disaggregated into sectoral breakdown. To this end the author analyses financially dollarized Latin American economies and the FX assets and liabilities in private banking, disaggregated by currency and sectoral composition. In the CEE context, however, even such an approach might be insufficient to characterize the risk profile of unhedged debtors as most of the exposure is officially offset on balance sheet accounts.

Perhaps the most detailed treatment of this problem is the currency mismatch measure constructed by Ranciere, Tornell & Vamvakidis (2010). In their definition, CMM is 'the extent to which an economy's liabilities are denominated in foreign currency while its assets are denominated in domestic currency'. The motivation to this approach is that although 'notional' mismatch on balance sheets is usually low with FX loans registered as assets, the de facto CMM can be much higher if debtors do not cover their exchange rate risk. In fact, the authors contend that previous CMM measures did not account for this systemic element due to insufficient data on banks' asset-liability composition and the hedging capacity of borrowers. For instance, standard tools such as net external debt or external debt service over exports equally fail to predict the crisis event. Consequently, they propose a revised measure of CMM as defined by the fundamental equation:

Currency mismatch equation:

$$\text{Foreign currency mismatch index} = \frac{\text{FCY liabilities} - (\text{FCY assets} - \text{FCY loans to resident households and nonfinancial corporations})}{\text{Total assets}},$$

Source: Yesin (2013) via Ranciere et al. (2010)

- which provides the *upper bound* to systemic risk in case of the 'joint failure of households'. This approach eventually enables policy to prompt the credit sector to *internalize* the insolvency risk of unhedged households in the form of interest rates. The authors stress however, that this does not occur in CEE before the crisis where the 'violation of uncovered interest rate parity (is) a key driver of currency mismatch' (Ranciere et al. 2010). Subsequently, Yesin (2013) builds on their framework to quantify systemic risk and apply it to a quarterly data set (2007-11) on foreign currency loans in seventeen European economies. The data is the novel and confidential collection of the CHF Lending Monitor, compiled from the contribution of nineteen regional central banks on loan volumes, loan structure and refinancing information. The results confirm the unique position of CEE financial markets in that currency mismatch is only persistent in the non-euro area, ranging between 14-45% except for the Czech Republic and the UK – of course partly due to the euroization of credit that is excluded in the Eurozone per definition. In turn, within the Eurozone the upper bound never exceeds 3.2% with the role of the ECB not negligible as a lender of last resort with credible confidence instruments.

Recent literature contributions such as the work of Bitar (2021) criticize the original approach of Ranciere et al. (2010) for mixing two different types of risk: the direct FX risk being uniformly distributed whereas the *indirect* currency risk only materializing above a certain depreciation threshold set by the equity cushion of borrowers. Bank capital and bank credit risk are affected only once this cushion is eroded (and collective loan defaults initiate). Bitar therefore proposes that the primary contribution of CMM is not as a precise measure of mismatch but rather an indication of systemic volatility in 'extreme events'. In summary, equally the CMM measure and the updated CoVaR and MES models are substantial econometric contributions to the post-crisis policy discussion.

In the concrete application of these measures to CEE, Yesin (2013) suggests that it is non-CHF and specifically EUR denominated loan products to foster most of the currency mismatch

with the upper bound of 20%; in turn net unhedged CHF liabilities never exceed the 5% margin. However, it is important to point out that the results are expressed for the complete data set including countries with high deposit euroization (and in Croatia, with recent anticipations of euro adoption). Additionally, the measurements consider hypothetical extremes before the 2015 discontinuation of the CHF currency floor. In a more recent study, Andrieş & Nistor (2018) utilize hand-collected data in emerging Europe from the annual reports and financial statements of thirty publicly listed banks. They examine weekly stock prices over 2005-12 and give a systemic risk estimate to foreign currency lending calculating both through the CoVaR (bank-to-system) and MES (system-to-bank) methodologies. Their findings contradict Yesin in that FX positions in EUR and USD do not pose systemic risk concerns. Instead, so-called 'exotic' currencies such as the Swiss franc significantly enhance the systemic importance of any single credit institution. The average risk contribution of the CHF sample is 1.83% expressed in CoVaR (the annual percentage loss of the system's market equity) vis-a-vis 0.85% of the non-CHF sample. Similarly, via the MES approach the CHF sample displays a larger relative systemic exposure by 1.66% expressed in annual loss of market capitalization. Consequently, they argue that systemic movements are *primarily* driven by CHF, and further confirm empirically that supervisory boards and external governance measures are effective at mitigating this risk.

Having substantiated the argument that it is only the post-crisis interval to produce tools that allow adequate financial supervision, the paper turns to the policy dilemma surrounding loan consolidation and macroprudential reforms in CEE.

3. Policy Intervention

Reformulated accounts of systemic risk provide a steady grounding to the regulatory trade-off between the efficiency and risk resilience of financial intermediation. Next, a discussion follows on specific policy measures instituted before and after the crisis event, preparing the legal dispute surrounding the foreign currency loan portfolio in CEE.

3.1 Economic policy

Pre-GFC

In the credit boom phase, insufficient apprehension of procyclicality renders it difficult to justify the economic costs of intervention. Furthermore, Rosenberg & Tirpák (2008) observe that in new member states policy authorities are constrained as capital restrictions are disallowed in the EU and direct foreign funding access enables credit institutions to circumvent regulation. A commitment issue is also present as numerous CEE countries prepare euro adoption, public policy converges to the Maastricht criteria and banks logically count on the implicit promise of medium-term exchange rate stability (Brown & De Haas 2012). Nevertheless, the risk is recognized early, and some prudential controls applied on lending volume, capital minima for existing loans or to reduce maturity and currency mismatches on balance sheets (Fischer & Yesin 2019). Overall, due to the risk conducive pre-GFC macroeconomic climate a potential policy shortcoming is failing to encourage credit alternatives of lower structural exposure. Building confidence in domestic currency markets might be a more effective policy approach than placing direct limits on the wholesale funding of banks. As an example, Poland's so-called *Recommendation S* in 2005 prescribes stronger credit underwriting standards to 'restore a level playing field' between loans denominated in domestic and foreign legal tender, forcing banks to internalize the externality of their lending choices (Brown & De Haas 2012).

By the example of Hungary, Banai et al. (2011) equally stress that policy tools are not exhausted to restrain FX lending before the collapse of asset markets. More precisely, they highlight four intervention categories: *monetary* tools and reserve requirements, *administrative* bands and restrictions, *prudential* capital requirements on open FX positions and *fiscal* tax and subsidy incentives to boost demand for local currency loans. They state that although in the contemporary climate, monetary and administrative measures are easily circumvented or excessively limit banking competition; both prudential and fiscal tools could effectively address the short-termism in CEE credit risk profiles even if accepting the cost of these interventions is not politically viable.

Croatia is a demonstrative example to employ a broad set of prudential measures including reserve requirements and marginal reserve requirements (MRR) on the growth of FX

liabilities, FX liquidity minima and elevated capital adequacy ratios (Galac & Kraft 2011). A Credit Growth Reserve (CGR) is introduced in 2003 to constrain banks with loan portfolios that expand beyond the 4% rate to purchase low-yield central bank bills twice the overrun. At the same time, the CGR measure is removed in 2004 and re-established only in 2007 therefore arguably staying inactive in the period of the highest risk exposure. The MRR ratio on FX liabilities was set at an initial 24% raising as high as 55% by 2006. Yet as the loan product is often the sole option for bank subsidiaries to establish market shares, they are willing to accept proportionately lower returns. Finally, the tool of FX liquidity requirements is never increased or used countercyclically (Galac & Kraft 2011). Specifically, Novokmet (2021) reveals that neither the 17% liquidity requirement on FX liabilities, nor the limit on net open FX positions set at 20% of regulatory capital is ever depleted by banks. For example, the average of net open FX positions stands at 5% before the crisis, a reasonable value in light of high euroization in Croatia with 82% of total savings and time deposits denominated in FX over 2004-2020. In conclusion, Croatia is one of the policy cases from CEE with the most interventionist attitude preceding the crisis, grouped together with Romania and Bulgaria in this respect (Eller et al. 2020). Whereas Galac & Kraft (2011) find that these measures are insufficient to decelerate credit growth or capital inflows, they are nonetheless vital in requiring high liquidity and capital buffers from banks to meet the challenge of the GFC and essentially 'anticipate' the ensuing prudential reforms.

Post-GFC

By Eurostat estimates, the total costs of supporting financial institutions by general governments within 2007-17 jump to the sum of EUR 241.3bn (Sigmund 2021). Consequently, macroprudential reforms strive to contain system-wide distress and avoid the recurrence of a comparative macroeconomic toll. In preparation to the Basel III capital regulation framework, stress management primarily takes the form of *deleveraging* understood by Vidahazy & Yesin (2020) as 'the contraction of the balance sheet and increased reliance on customer deposits to fund lending'.

At the same time, especially in emerging economies deleveraging raises concerns about the *reversing* of financial integration given that credit is the dominant component of financial transmission and bank-centric financial systems have only recently developed (Bambulovic & Valdec 2020). Consequently, the Vienna Initiative is vital in the recovery process in ensuring

that parent banks roll over a fraction of the debt from CEE subsidiaries to avoid the fire sale of assets and resulting asset collapse (Ranciere et al. 2010). Importantly, these initial measures are concerned with immediate stabilization and a stress-resistant financial architecture, rather than the active distribution of recovery costs which is left to the legal deliberation of individual states.

In terms the FX portfolio, macroprudential measures can be framed as those 'regulations imposing a different treatment between bank operations denominated by domestic and foreign currencies' (De Crescenzio et al. 2017 in Bitar 2021). De Crescenzio et al. (2017) study the efficacy of currency-based capital management by examining banking flows from eighteen countries (2005-13) and reviewing patterns of external debt by maturity and instruments. They reveal that FX macroprudential tools are efficient at curbing short-term debt and interbank borrowing both of which contract to the highest extent during the crisis. In Austria, Sigmund (2021) analyzes the quarterly data (1998-2016) of nearly eight hundred Austrian banks and regards the more 'intrusive' legally binding measures after 2010 as most effective, while avoiding the unintended side effects of financial reversal or credit crunches. Ultimately, the macroprudential environment significantly improves in CEE as well – Kolozsi & Lentner (2019) draw on the example of Hungary and Slovakia with debt cap rules, mandatory loan-to-value and payment-to-income ratios, prudent evidencing of post-tax income (measured officially rather than left to banks) and loans with a longer 'interest fixation period'.

On the domestic level, Bohle (2018) identifies two distinct strategies by governments from the economic periphery of Europe. First, an interventionist attitude is representative of Hungary or Iceland which entails large-scale state funded programs, moratoriums and often the explicit recalculation of FX loans. The present work specifically details the Hungarian events as a natural experiment to eliminate liability dollarization. Second, Bohle discusses the alternative strategy of 'embracing financialization' pursued in Latvia or Ireland, by accepting enormous austerity costs and the weak legal protection of customers at least in the short run. Latvia is particularly adamant in defending its currency peg with the euro and sticking to the criteria to adopt the common currency, eventually closing the country's FX exposure via this path. In contrast, Hungary abandons the Maastricht criteria and enters a floating regime

already from February 2008 onwards, prioritizing the flexibility of a sovereign monetary policy over the previous course of financial convergence.

Efficiency vs. risk

Dell'Ariccia (2012) remarks that in advance to the crisis little policy attention is given to credit booms with regulation on the scale of individual institutions. This is partly as an interest and inflation targeting monetary regime disregards credit aggregates choosing to 'deal with the bust' rather than depressing the boom cycle. He stresses that policy can hardly separate healthy and 'unhealthy' boom periods and even then, intervention is restrained by cross-border banking flows allowing a degree of 'regulatory arbitrage'. Although monetary policy is perceived before the crisis as better equipped with economic *recovery* tools, this paradigm changes with macroprudential reforms that aim to integrate both sides of the trade-off between credit market productivity and shock resistance.

This dilemma is equally integrated by Ranciere et al. (2010) recalling that currency mismatch simultaneously produces 'higher growth in tranquil times but also more severe crisis'. The authors describe how CMM eases borrowing constraints, reduces the interest rate and nourishes growth especially for small and credit-constrained firms. However, if not sufficiently controlled mismatches exasperate crisis episodes as seen in Mexico ('94), East Asia ('97-98) and most recently Eastern Europe. Although the study demonstrates empirically that an elevated mismatch (6.6%) drives additional GDP expansion (+4%); some of this progress is exactly owing to the 'implicit subsidies' inflicted by risk-accommodating policy regimes which encourage banks to accept higher insolvency risk (Ranciere et al. 2010). In other words, the procyclicality problem prevails within pre-GFC regulation and shock propagation is characteristic of the FX portfolio as well (Vujčić & Dumičić 2016).

Bitar (2021) equally discusses the empirical link between liability dollarization and higher crisis frequency. The author contrasts the policy environments of Latin America and CEE, arguing that in the former case it is unsound monetary management and low institutional credibility to turn FX intermediation into a 'crisis amplification mechanism'. In turn, in emerging Europe with credible confidence instruments de-dollarization attempts might be justified to protect monetary policy efficacy and avoid indirect 'seignorage paid to a foreign country'. Bitar further argues that administrative macroprudential reforms are superior to

price-based initiatives as direct supervision curbs circumvention efforts. This stipulates the need for reliable econometric tools that correctly specify the share of credit institutions in systemic 'undercapitalization' considering both institution-level risk and the probability of a systemic event (Acharya et al. 2017). The coordinated consolidation of asset markets also appears necessary recalling the analysis on banking crises by Reinhart & Rogoff (2009), stressing that the global nature of the GFC makes it 'far more difficult for many countries to grow their way out through higher exports, or to smooth the consumption effects through foreign borrowing'.

Monetary policy mandate

When assessing loan consolidation, it is important to consider to what extent monetary policy instruments have been exhausted to contain the credit boom. Brzoza-Brzezina et al. (2010) emphasize that money and credit are not immediate targets of modern monetary regimes, even if credit creation is the 'driving vehicle' to transmit interest rate decisions to the real economy (recall Mishkin 1996, or Bernanke & Blider 1988 in Brzoza-Brzezina et al. 2010). The authors further point out that whereas FX and domestic currency loans are close substitutes monetary policy is only able to influence the relative price of *domestic* credit. Their study accordingly demonstrates from a panel of the four largest CEE countries that restrictive monetary policy depresses domestic but *increases* FX lending. These findings question the efficacy of orthodox monetary tools over the credit expansion phase, as they might simply change lending *composition*. In fact, the credit dollarization literature expects high asset substitution away from domestic currency whenever the inflation rate is high *in relation* to that of the real exchange rate (Ize & Yeyati 2003). This is a strategic policy concern as Yeyati (2006) explains how 'financially dollarized economies display a more unstable demand for money, a greater propensity to suffer banking crises, (and) slower and more volatile output growth'. Therefore, de-dollarization is often a strategic goal of the sovereign monetary authority as a recurring theme seen in Latin America, CEE or the Middle East.

Equally in the credit expansion phase, Csajbók et al. (2010) review stylized facts (1999-2008) from the new EU member states to demonstrate that FX borrowing is less prevalent where interest rate differentials are low, *fixed interest rate* domestic mortgage financing is available and crucially the *fear of floating* behaviour exhibited by central bank is low. In contrast, if the central bank actively smoothes the exchange rate this renders monthly

instalments more sensitive to interest rate than to exchange rate changes. Subsequently, by the liquidity constraint of households the demand for FX products raises in line with the 'relative risk-adjusted returns on FX versus domestic currency loans'. Luca & Petrova (2008) equally stress that with the monetary regime preserving tight exchange rate targets, only long-term and fixed interest rate domestic currency mortgage loans provide a credible alternative to FX. Crucially, they underline the feasible alternative of allowing additional exchange rate flexibility to control FX demand. However, this path appears difficult in countries that follow convergence criteria to adopt the euro, whereas in emerging economies the currency risk from speculative transactions is also sizable. Finally, empirical studies suggest that even a flexible exchange rate regime might increase *deposit* dollarization (Arteta 2002). Overall, by the lack of long-term and fixed-rate domestic mortgage markets and with reduced opportunity to adopt a floating exchange rate strategy, monetary instruments in CEE are restricted to impede FX loan proliferation before the crisis.

A different monetary dilemma emerges over the bust cycle and loan consolidation plans. Following the crisis, in certain small open economies of CEE monetary policy prioritizes the *exchange rate channel* and uses the depreciation of the local currency as a tool to competitiveness and economic recovery (Endrész et al. 2012). However, in this case central banks face the fundamental problem that the competitiveness channel is offset by balance sheet effects – as depreciation drives debt volumes up and creditworthiness down – which impairs monetary transmission to stimulate the economy (Ibid.). As a result, a justification to consolidate the outstanding FX stock is the re-institution of the exchange rate channel for the benefit of the monetary mandate. In fact, throughout economic recovery restrictive monetary policy has been shown to reduce the transmission delay of macroprudential intervention (Revelo et al. 2020). Credit registry data from Latin America equally confirms that macroprudential tools regulate credit more efficiently if strengthened by policy incentives set by the central bank (Gambacorta & Murcia 2020). Naturally, another imaginable solution to eliminate the exchange rate dilemma is full euroization as chosen in Latvia, and theoretically a medium-term policy objective in CEE EU member states – although not necessarily viable in terms of immediate crisis management.

3.2 Legal deliberation

In the following, the task is to observe the division of recovery costs and the surrounding legal dispute as well as regional intervention precedents. Although arguments to fairness are considered the objective is an academic rather than normative discourse grounded on the legal mandate of strategic institutions.

The complexity of the dispute is not only conditioned by the relatively abstract notion of economic fairness, but equally it is not straightforward which gains and losses result from a specific intervention type. In this respect, Fischer & Yesin (2019) present evidence that reducing CHF-denominated exposure *increases* mismatch in a different designation, especially in the group of countries where euro loans are already widespread. They argue that targeting the risk profile of a particular currency primarily benefits debtors but is not necessarily suited to reduce the structural weakness on balance sheets. Nevertheless, as in 2008-09 most CESEE currencies remain relatively stable vis-a-vis the euro but depreciate considerably against the CHF, the franc is in the centre of early policy disputes and presents a problem of higher magnitude to unhedged borrowers (Beckmann 2017). In September 2011, the SNB declares 'unlimited foreign currency purchases' to maintain an exchange rate floor of 1.20 CHF against the euro staying in effect until its January 2015 discontinuation. This episode represents the relative urgency facing policy makers to treat the CHF portfolio; as in early 2015 many Swiss franc mortgages immediately require 20% higher repayments (Fischer & Yesin 2019). The events further reflect on the economic dilemma facing CEE states of pursuing an interventionist recovery or continuing the course of financial convergence. In Hungary the former strategy completes loan conversions by the time of the discontinuation, albeit in a legally contested manner and with somewhat reduced economic integration.

Generally, market failures in CEE produce 'heavily politicized' debates to attribute proportional responsibility to various stakeholders (Csizmady et al. 2019). A common argument to justify intervention is the 'far more extensive toolset' of the banking sector relative to borrowers to hedge the FX risk in the boom cycle (Kolozsi et al. 2015). To some extent, this view is confirmed in the May 2015 opinion of the European Systemic Risk Board (ESRB) concluding that CESEE countries (with the exception of Bulgaria) largely complied with fundamental recommendations when lending in foreign legal tender (Beckmann 2017). The

ESRB however proposes no intervention guidelines beyond the Basel and Vienna capital consolidation schemes restoring basic confidence in credit markets.

As the paper has observed regulatory inadequacy not only in Hungary but equally in Croatia with extensive policy tools, the question arises what fraction of the responsibility ought to be shouldered by the state. Lentner (2015) posits that debtor responsibility is difficult to challenge in an economic environment where market institutions are novel, and banks' communication of the exchange rate risk has been documented as superficial. He also comments on inhibited monetary instruments to control the CHF 'credit fever' which is not covered by base money in Swiss franc, yet customers with insufficient creditworthiness in HUF are routinely eligible to take on FX loans. Consequently, Lentner argues for the joint responsibility of the non-regulating state benefitting from credit expansion on the one hand, and the moral hazard behaviour of banks on the other.

In relation, the more fundamental query is how legal deliberation integrates these considerations to prepare a state intervention episode. The work of Vassileva (2020) includes a remarkably extensive legal synthesis of assigning financial responsibility. Three pillars emerge which merit an extended overview to evaluate policy actions:

i) First, the *contract law perspective* asks whether loan conditions from the formation stage are fulfilled and valid. Some deliberation arises with the entry of the Swiss franc surge into the contract as a potential 'change of circumstances'. Certain Serbian scholars attribute to banks the 'breach of duty' to inform and care for clients, however this is hard to validate with stable initial exchange rates and CHF perceived as a safe asset (in Serbia, 12% of remittances were also in this currency).

ii) Second, the *consumer law perspective* considers the fair distribution of rights and obligations and whether these are to the detriment of the consumer. Vassileva remarks that denoting the respective financial burden requires the precise understanding of bank funding models, with the fear that national judges are not sufficiently qualified to state this. At the contract formation 'mutual obligations' are equivalent, and banks equally needed to administer their CHF funding.

iii) Third, the *financial regulation perspective* integrates a systemic element and considers the social impact of loan consolidation. Vassileva argues that following the CHF

discontinuation episode, the Serbian Central Bank acted in line with this perspective by offering four binding recommendations to loan renegotiations; as opposed to Croatia where a blanket solution incurred 1.1bn EUR of losses to the banking sector (and heavily criticized by the ECB).

It is beyond the scope of the present paper to establish how a policy action weighs these legal perspectives. However, they demonstrate that loan consolidations fundamentally connect to overall financial reforms and the corresponding legal codification. Fischer & Yesin (2019) propose two distinct intervention patterns: *government-sponsored* approaches as observed in Hungary and Croatia; and *private sector* conversion with Romania as the leading example. The former approach is typically backed by legal mandate and a certain degree of social consensus, the process publicly communicated and forcing banks to act in concert to relieve affected debtors. In other words, adjustment costs are covered in a single policy initiative. In turn, the private sector approach guides a staggered consolidation and enables banks to command the individual conditions. Here, the process is not necessarily public or elevated to the level of state administration.

Approaching the case of Hungary, it is important to consider the diminished capacity of stakeholders to negotiate as a homogenous group. Csizmady & Hegedűs (2016) explains that the collective position of credit institutions is fragmented as banks without a previous FX portfolio argue that the increased risk was to be internalized in interest rates so as not to produce eventual capital losses. The high court of Hungary, Kuria initially does not clearly sanction the responsibility of banks but changes position as the social and political conflict unfolds. Accordingly, the most fundamental legal decision of 2014.06.16. mandates that: (i) The transfer of foreign exchange spreads onto borrowers is unfair, the MNB central rate to be used afterwards; (ii) the unilateral recalculation of interest on monthly instalments by banks is unfair; yet crucially beyond these two cost items: (iii) The exchange rate risk is to be assumed by debtors (Kolozsi et al. 2015).

This decision is of comparative importance within the CEE legal paradigm. In Croatia, court verdicts equally posit that unilateral interest rate changes without a clear market benchmark (defined as 'discretionary' or 'administrative' rates) violate economic fairness. However, here a corresponding third clause is missing to denote the responsibility of borrowers in bearing the exchange rate risk even in the case of systemic events.

In Hungary, up to the strategic Kuria decision the legal challenge is also complex and possible to evaluate only considering the post-2010 change of policy authority. Chronowski & Gárdos-Orosz (2017) argue that following the financial crisis the Constitutional Court operates with the modus operandi of 'extraordinary' circumstances and with legal 'deference' to the interventionist actions of the government. In fact, they contend that when the FX consolidation is concerned, the legal principles of 'separation of powers, judicial independence, nonretroactivity of law and the right to fair trials' have been diminished. Instead, normative considerations of human dignity and the state protection of customers elevate to constitutional position. The authors themselves are undecided whether this is to be regarded as a change of legal paradigm or a one-time extra-legal intervention to aid the consolidation process. With respect to European repercussions, the monetary opinions of the ECB express more support to certain consolidation plans than others. Following legal deliberation in Croatia the ECB underlines that 'introducing measures with retroactive effect such as the draft law will undermine legal certainty and is not in line with the principle of legitimate expectations' (ECB 2015). In turn, whereas the ECB criticizes single measures in Hungary it is more allowing of the closing conversion scheme writing that:

"From a financial stability perspective, the conversion of FX loans should greatly reduce or even eliminate currency mismatches in households' balance sheets, which is expected to contribute to reducing the credit risk of banks in the longer term. The ECB appreciates that the method for calculating the exchange rate to be used for the conversion of the loans in question was set with the intention of avoiding an additional significant burden on the banking sector (ECB 2014)."

Having outlined the necessary economic and legal components to evaluate consolidation schemes, the paper now turns to inspect the Hungarian process in detail, subsequently discussing its significance in terms of regional financial markets.

4. Consolidation and conversion

Similarly to the variety in legal responses, there is regional discrepancy in the practical execution of loan consolidation. The following is an account of the Hungarian intervention eventually utilizing a 9bn EUR volume of foreign monetary reserves. As most CHF conversion plans are scheduled after the SNB discontinuation event, it is relevant to study how they draw on the policy prototype of Hungary as an early, state-assisted, and complete de-dollarization scheme.

4.1 Hungary - Orthodoxy

There are various economic stages to the Hungarian consolidation, departing from market distortions and an initial repayment option which highly disfavours banks. Nonetheless, the closing conversion event returns to 'neutrality' in the sense of determining cost coverage based on legally defined responsibilities.

Initial consolidation

The 2008 scrap of the forint currency band vis-a-vis the euro suggests the recovery choice of abandoning financial convergence and preparing intervention. Following the general elections of 2010, the newly appointed government enjoys broad legal and political instruments strengthened by the qualified majority of parliamentary mandates. In the words of Hegedűs (2013), this signals the start of unorthodox market interventions according to a 'modified neo-Keynesian' economic policy grounded on tax cuts and state expenditures. He remarks how the objective is to restore fiscal balance without austerity measures, four pillars leading the 'radical re-distribution of the economic burden'. One such pillar is increased state influence in sectors deemed strategic for economic recovery, which entails beyond 50% domestic ownership in the banking sector as well as the redistribution of private resources by special taxes levied on foreign-owned banks.

The starkest intervention step is the so-called Early Repayment Scheme (ERS) launched between September 2011 and February 2012, aiming at a controlled solution as market self-regulation seems unable to restore credit markets. Under the ERS, with market rates of the forint against the Swiss franc falling within the 235-250 margin the Parliament defines a repayment rate of 180 and as such setting the price 20-25% below the true exchange value, which further depreciates as a result of this decision (Bod 2011). The ERS is the most forceful

market interference of the consolidation process given that 23.3% of CHF-denominated mortgage loans are repaid in this manner, constituting a total volume of 984bn HUF at the discounted and 1355bn HUF (3.3bn EUR) at the current exchange rate (Hegedűs 2013). This is true even if eventually 30% of the 400bn capital loss of banks is written off from the special bank levy producing a final 70-30 cost sharing between banks and the state, respectively (Hegedűs 2013). Credit ratings immediately express concern over the certainty of the Hungarian financial sector, noting the double asymmetric shock of newly introduced tax categories and the controlled repayment rate (Bod 2011).

A fundamental element to the ERS scheme is the background of repayments as only a third of debtors finance their expense by means of new loans (32%), the remaining segment relying on savings, securities, and life insurance (Hegedűs 2013). This demonstrates that it is dominantly creditworthy households with substantial savings to benefit from the scheme (Kolozsi et al. 2015). Essentially, it is the best-paying 15% portion of the CHF portfolio which disappears from the balance sheets of banks, influencing the ratio of non-performing loans accordingly from 4.1% in 2009 to 16.2% by 2012 (Hegedűs 2013). In addition, as a display of the early interventionist approach although 15% of the ERS expenses are connected to the informal economy, the corresponding legal directive explicitly states that tax authorities shall not track the origin of these payments (Ibid.). In summary, the early consolidation signifies a more arbitrary economic climate relative to the eventual conversion scheme.

Additional measures provide temporary relief including a moratorium on evictions from 2009 for non-performing FX collaterals, and an outright ban on FX mortgage products from mid-August 2010 (Banai et al. 2011). Another program introduces a cap on FX repayment rates with the interest component above 180 HUF covered by banks and the government according to a 1:2 ratio, although few households opt for this scheme expecting the development of more comprehensive policy (Hegedus 2013). Combined, these measures exercise a broad impact on the relative weight of foreign currency loans reducing from a peak 19bn value to a sum of 9bn EUR by the time the conversion takes place (Kolozsi et al. 2015). Overall, initial measures tilt the financial burden towards credit institutions and constrain banks to keep 'bad debt' on balance sheets, as well as the interventionist behaviour of the state impairs borrower willingness to pursue repayments (Beckmann 2017).

Before turning to the conversion episode, it is useful to review the elements of the Hungarian settlement in terms of economic orthodoxy. In the definition of Csizmady & Hegedűs (2016), orthodox measures are substantiated by evidence that market-based solutions do not work, involve all parties, and designate costs according to capacity to pay while reallocate present expenses into the future. In many instances including the final conversion, the Hungarian consolidation contains orthodox elements; yet equally the post-2013 leadership of the MNB actively reinforces the unorthodox policy stance of the state on requisite occasions.

In this sense, the authors register the unorthodox measures primarily in the 2009-12 moratorium and the ERS scheme and specify the orthodox initiatives in the 'national asset management company' to avoid evictions, buy-to-rent schemes and caps on the interest rate and negative amortization on FX loans. However, many of the latter measures remain unpopular as borrowers expect a more overarching debt relief package. Overall, despite the early imbalanced cost division at the expense of banks it is argued that the state returns to orthodoxy and the eventual conversion process respects the above principles such as relying on a valid market exchange rate. By 2013, Hungary is removed from the excessive deficit procedure of the EU meaning that fiscal state instruments can simultaneously relieve debtors and consolidate the financial position of the credit sector while also restoring legal certainty (Lentner 2015). Credit institutions that are able to recover losses by increased service fees and loan restructuring, enter the final conversion process with a view to 'preparing for a new period as creditors' (Csizmady et al. 2019).

4.2 Hungary - Conversion

As noted, it is the landmark Kuria decision of June 2014 which provides legal grounding to the imminent settlement of the remaining FX loan portfolio. The official opinion of the high court ends a period of credit sector uncertainty about the future division of the financial burden. In the following, the chronology of events is reviewed relying on Nagy (2015):

Before the November conversion event, parliamentary legislation introduces a Consolidation Law proposal (09.23.) to inform remaining financial disputes according to the three pillars of the Kuria decision. By this point, credit institutions expect an evident reduction of the FX portfolio but hitherto of unknown dimensions. As the foreign currency position of

banks is expected to open the Monetary Council of the MNB announces that the necessary liquidity will be granted up to a 3bn EUR budget. However, based on partial predictions banks obtain half of the requisite FX liquidity *prior* to the MNB announcement, and as the consolidation law is accepted (09.25.) only the remaining half is obtained via the first round of MNB tenders (from 10.13). At this point, the monetary dilemma emerges whether this half-ratio will apply for the complete portfolio if banks anticipate full-scale conversion and seek to obtain corresponding funds from the open market. With a total FX liquidity demand of 8bn EUR, this would unsustainably shock the currency and price stability (Nagy 2015).

The MNB resolves the climate of uncertainty by acting as first-mover to schedule the conversion, contractually fixing that the requisite liquidity will be allocated from foreign monetary reserves. As Kolozsi et al. (2015) discuss, this closing consolidation is conducted at the first possible time owing to the interplay of various factors. First, the easing of Forint base rates (2012-14) from 7% to 2.1% ensures that the real interest expense on FX loans does not grow because of the conversion. Second, from CDS data the improved sovereign risk profile of the country is apparent. Third, the adequate volume of central bank reserves permits the MNB to supply the necessary legal tender and avoid open-market bank purchases. In fact, as the FX portfolio stands below one half of its original volume 25% of foreign reserves by the MNB prove to be sufficient to convert (Nagy 2015). All factors considered, Kolozsi et al. (2015) argue that the expected social and welfare benefits of the conversion balance the risks of the intervention.

More specifically, the conversion entails a distinct *legal* and *financial* episode. Legally, three contracts are signed during the weekend of 7-9th November 2014 (Kolozsi & Lentner 2019). First, by the MNB deadline every bank in possession of a sizable foreign currency portfolio signs with the monetary authority to exclusively obtain FX liquidity through central bank tenders. Second, the Banking Alliance fixes the additional legal details of conversion with MNB leaders. Third, the Banking Alliance and the government set the conversion rate settling at the official MNB exchange rates from the most recent trading day (11.07), at the forint value of 256,5 to CHF, and rates determined for the euro and JPY as well.

Eventually, while the corresponding conversion law is accepted by Parliament only two weeks later the process is regarded complete as the necessary funds are guaranteed to banks, their acquisition is conducted outside of open markets and the FX tenders of the central bank

conclude by the exchange floor discontinuation of the SNB, enabling the direct exchange of Euro funds at the valid fixed rate (Nagy 2015). In the economic sense, then, the conversion is concluded by the above set of contracts as from this point onwards the portfolio is not subject to exchange rate changes (Kolozsi et al. 2015).

On the financial side, the conversion requires banks to either repay FX liabilities (on-balance sheet) or close FX swap transactions (off-balance sheet). These financial operations realize without a significant monetary shock due to the collective participation of banks, the coordinated foreign currency sale of the MNB and a surplus forint liquidity in the banking sector beyond the requisite volume for settlement (Kolozsi et al. 2015). The total hedging requirement of credit institutions to initiate conversion stands at 8bn euro, as an impairment of 1.56bn is subtracted from the initial portfolio (9bn) of which the MNB estimates 0.4-0.6bn to have been 'released' upon successful individual settlements (Kolozsi & Lentner 2019). Accordingly, the central bank holds a total of twelve tenders selling up to EUR 9.1bn, thereby covering the entire foreign currency demand and an additional hedge for individual disputes. Eventually, the total volume (7.83bn) allocated at MNB tenders means that banks 'nearly completely hedge their conversion via the instruments of the central bank' (Kolozsi & Lentner 2019). The comprehensive expense coverage is also evidenced by no exchange rate deviations from the normal volatility of the Forint, together with the near disappearance of the FX swap exposure of the banking sector (Kolozsi et al. 2015).

Figure3: Change in the FX swap stock of the Hungarian banking sector, 2003-15
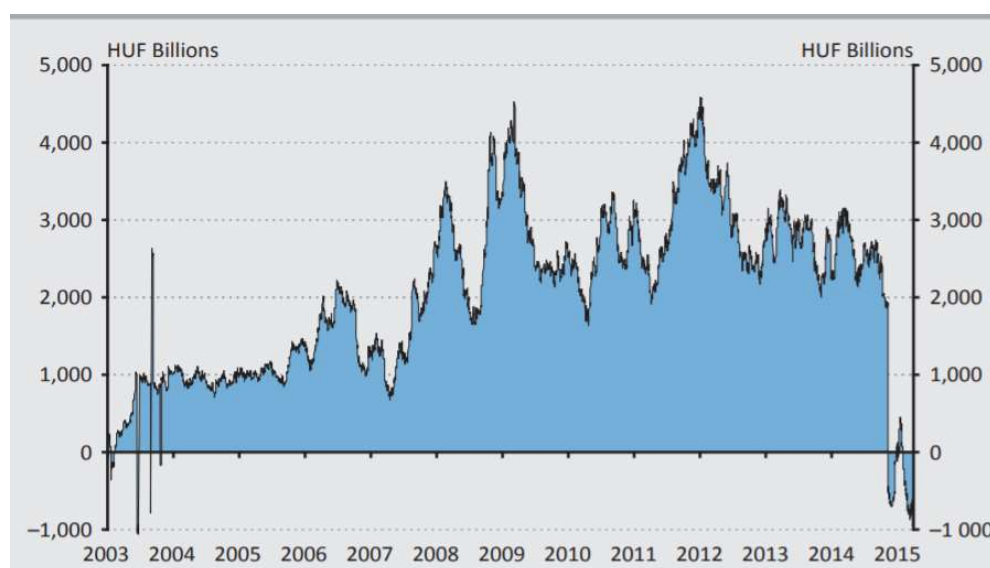
Source: Kolozsi et al. (2015) compilation from MNB data

In conclusion, it is possible to assert the orthodox nature of the phase-out and arguably, orthodoxy equally holds for the *impact* of the settlement as household wealth is stabilized, the shock resistance of the financial system is re-instituted, and the efficacy of monetary policy instruments restored (Kolozsi et al. 2015). Despite the short-term negative impact on bank capital and profitability, in the long run the risk premia of credit intermediation is reduced, debtor confidence regained, the yield on government securities declines; and the MNB is able to target long-term trends supported by restored monetary transmission (Ibid.). The second figure of the appendix presents the evolution of the Hungarian loan portfolio for the complete focus period, initial programs gradually decreasing the share of foreign currency loans until driven out by the eventual coordinated settlement.

4.3 Comparative policy profiles

In the remaining sections, the paper conceptualizes the impact of the Hungarian settlement on the foreign currency loan profile of CEE. First, it is instructive to review major differences with regional consolidation schemes.

The paper has considered credit development in Croatia, and by its interventionist features it is straightforward to contrast this policy environment. As noted, in the country high levels of unofficial euroization equally condition foreign currency loans, to the degree that in 2009 the CNB counters the depreciation pressure by setting a 75% 'kuna holding requirement' with the central bank. In fact due to the predominance of the euro, in 2011 compared with the share of FX loans (37%) the total share of CHF-denominated loans (4.4%) is relatively small (Yesin 2013). Nevertheless, the CHF portfolio is amongst the most problematic having primarily accommodated borrowers without sufficient credit capacity in euro. Furthermore, as Croatia does not reach a comprehensive loan settlement before the SNB discontinuation event, this radically modifies the risk profile of CHF loans. By currency, the share of non-performing mortgage loans stands at 3.01% (EUR) and 5.73% (CHF) in 2010; evolving to 6.05% and 63.43% before the start of 2016 (Novokmet 2021). Accordingly, from January 2015 the Parliament temporarily freezes the CHF rate and amends the Credit Institutions Act and the Consumer Credit Act to prepare the retroactive conversion of the loans into euro at exchange rates from the time of issuance (Fischer & Yesin 2019). The ECB envisions that costs as high as 1.1bn EUR will be shifted onto the banking sector, and expresses concerns over damaged capitalization, profitability and future lending. Legal conclusions are similar to Hungary

regarding the variable interest and currency clauses, the major contrast being the absence of a third pillar mandating borrowers to bear a fair portion of the foreign exchange risk. Overall, although the Croatian conversion has the advantage of a comprehensive resolution plan, the backward-looking legal approach prioritizes debtors without adequately considering the funding model of credit institutions (Vassileva 2020). As a result, banks continue their legal dispute uncertain whether the eventual costs of settlement will shift a portion of the burden back onto the public budget (Novokmet 2021).

Relative to unorthodox responses in Hungary and Croatia the Polish reaction is seemingly more pragmatist. This is in part due to favourable macroeconomic conditions, but equally a relatively well-designed early regulatory framework. In 2005, *Recommendation S* already establishes depreciation buffers in assessing borrower creditworthiness, then in 2008-11 *Recommendation T* introduces debt-to-income ratios and forces conformity between the FX exposure of debtors and the income currency used for payments (Bitar 2021). Up to 2016, no legal directives consolidate the FX portfolio beyond voluntary state recommendations of conversion into Zloty. In January 2016, a proposed conversion plan is withdrawn due to legal criticism and motivates ongoing debate about the potential reimbursement of foreign exchange spreads to debtors (Beckmann 2017). Crucially, the lack of active intervention schemes in Poland is also justified by the fact that the CHF loan portfolio constitutes higher overall loan quality relative to domestic currency, owing to positive selection by the strong limitations placed on credit capacity (Buszko & Krupa 2015). Potentially, the Polish case is a blueprint of macroprudential risk prevention even if the 2015 SNB decision strongly impacts on the financial expenses of debtors. Recent arguments propose that a state support program would negatively affect banking sustainability, as the higher foreign exchange risk following the crisis did not deteriorate the overall quality of FX loans amongst whom the proportion of CHF debtors is decreasing (Buszko 2018). In turn, the current structural danger is the increased LTV ratio due to the high valuation of CHF denominated debt, whereby banks retain a credit risk exposure and legal uncertainty discourages the sale, trading, or securitization of these items. In recent years, the six largest banks hold in between 12-52% of their loan portfolio in CHF (Buszko 2018).

Within the legal review of Vassileva (2020), the Croatian case is further contrasted with the policy approaches of Bulgaria and Serbia. In the Bulgarian 'bystander' case any loan relief

is by the dispute of individual claims in court (via the Directive 93/13/EEC), the key debate being to what extent variable interest rates and foreign exchange risk are core terms of FX contracts. Collective class action claims are launched in the country against the three largest banks but with 'dissimilar results' – overall, the approach is non-interventionist aiming at forward-looking cost division. In comparison, a supreme court ruling from 2019 allows collective loan conversions in Serbia by offering four detailed options to banks: two to convert to Euro (at favourable exchange rates) and extend loan maturity, and two to preserve the CHF denomination but with lowered interest rates and extended maturity. This approach stands in disparity especially with Croatia, again following the principle of 'forward-looking risk apportionment' and seeking a compromise solution (Vassileva 2020). Nevertheless, despite the timely and orthodox manner of the Serbian intervention only a marginal fraction of debtors appear to have taken advantage of it. In part, this might be due to borrower expectations of a stronger paternalistic intervention with retroactive effect; motivating further investigation into the exact mechanism of regional policy spillovers.

5. Cross-border risk management

5.1 Policy spillovers

The diversity across intervention schemes foresees the difficulty in isolating the regional impact of a single policy event. Nevertheless, growing empirical data reflects on the loan consolidation process in Central and Eastern Europe. Fischer & Yersin (2019) apply the currency mismatch index to model aggregate change in risk exposure with varying results. Whereas in Hungary foreign credit risk is virtually driven out, in Croatia the structural vulnerability is shifted onto the euro portfolio – at least until the duality between euroization and a sovereign currency persists. Vidahazy & Yesin (2020) confirm from the central bank compiled data set of the CHF Lending Monitor (2009-19) that financial de-dollarization has concluded in Hungary and Swiss-francization is nearly eliminated on a regional scale. At the same time, the authors reaffirm that in various instances liability euroization remains a systemic concern.

The theoretical review considered options to resolve risk exposure *in isolation*, requiring a monetary compromise either through complete de-dollarization or strong exchange rate

controls and eventual convergence to the common currency. Provided that an economic regime does not pursue either of these blanket solutions, the embeddedness of regional credit institutions is expected to transmit the effect of regulatory actions across borders. In the simplest terms via the ESRB, a policy spillover is understood as the domestic impact of a macroprudential action carried out in a foreign country (ESRB in Bambulovic & Valdec 2020). For instance, Andrieş & Nistor (2018) observe the positive relationship between parent bank performance and systemic risk in the country of the subsidiary, concluding that the restrictive monetary measures of an outside jurisdiction effectively reduce moral hazard even domestically.

The methodology of Beckmann (2017) exploits data from the 2015 round of the OeNB Euro Survey to test the relationship between debt relief and FX loan demand. She notes that bailout awareness is the highest in Hungary and Croatia, and whereas expected debt relief does not influence overall loan demand it significantly enhances its FX proportion: with definite expectations of future state support the demand for FX loans is 20% higher, a result not driven by individual countries (Beckmann 2017). Essentially, Beckmann argues that in a rational expectations framework borrowing in FX is reasonable for unhedged debtors if they expect the government to assume the costs from sudden depreciation. In this sense, the Hungarian relief process eliminates the dilemma entirely by banning FX products and shifting the portfolio into domestic currency.

Given the novelty of *macroprudential* measures as a response to systemic risk, the empirical documentation of their efficacy is finite. In Croatia, Bambulovic & Valdec (2020) compare fifty-four tightening and loosening events against the supervisory reports (1999-2018) of thirty-one banks and measure abnormal growth rates against a mean adjusted normal standard. They find a differential effect with respect to ownership: on average, tightening measures decelerate credit growth by 1% for foreign-owned and 0.4% for domestic credit institutions. In addition, regulatory spillovers are detectable both within the direct parent-subsidiary channel and via the overall macroprudential policy stance of the EU (Bambulovic & Valdec 2020). The authors also design a 'macroprudential policy stance index' which confirms Croatia as one of the most interventionist regimes before the GFC, whilst Hungary overtakes at the time of its loan conversion episode:

Figure4: Macroprudential policy stance, Hungary & Croatia vs. EU
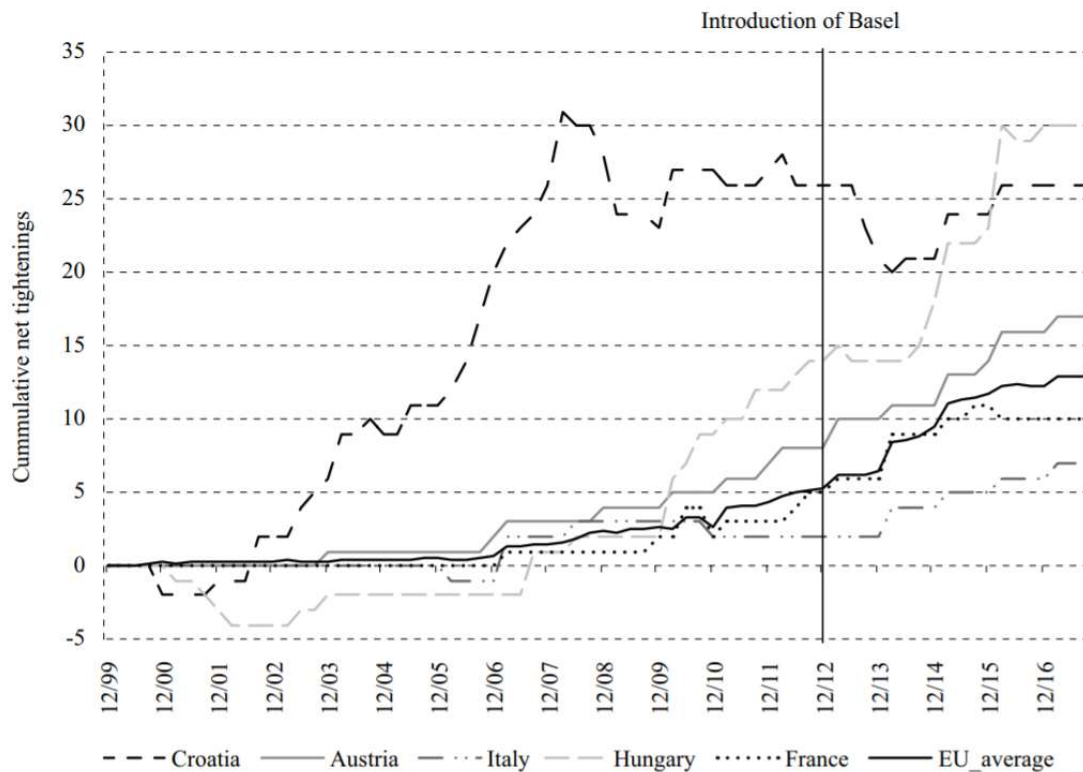
Source: Bambulovic & Valdec compilation of CNB and ECB (MaPPED) data

Grounded on the existing empirical studies from CEE on policy spillovers and foreign currency loans, the purpose of the statistical contribution in the remaining sections is to synthesize these approaches. Specifically, the analysis approximates the impact of the external policy climate on domestic expectations and the demand structure of foreign currency loans.

5.2 Data and Methodology

By the short time-scale between interventions and the diverse monetary strategies in CEE it is difficult to isolate the effects of a single consolidation scheme. Instead, the empirical approach takes a regional focus and tests a plausible causative link, by which the external policy climate is *mediated* to locally influence debtor choices. Household survey results are integrated with a macroprudential dataset to map the impact of a composite policy index on domestic loan preferences. The section thereby builds on the previous results of Beckmann (2017); but shifts the focus from domestic to external policy awareness as shaping

expectations and loan demand. A macroprudential index serves to proxy for the regional policy climate which ultimately influences debtor choices. The key methodological assumption is that external regulatory interventions might not only exercise a spillover impact on the price and risk structure of FX loans, but directly affect loan demand mediated by expectations of future credit risk. The limitations of this framework are accordingly discussed.

Methodology

Interventions are encoded from the integrated macroprudential policy database (iMaPP) of the IMF, originally construed by Alam et al. (2019) and recording tightening (+) and loosening (-) events as unit entries with monthly frequency. The dataset specifically tracks regulation on foreign currency lending and the net open FX position of banks, however these sub-categories contain insufficient information when arranged into panel data. Instead, two strategic variables are inferred: first, an index which observes the average of tightening and loosening actions across the sample while *excluding* domestic interventions, capturing the intensity and direction of external policy. The figure below follows the evolution of this index, individual variations representing regional means when the country's own policy profile is unobserved. Nine CESEE states are included in the final sample matching the focus region of the OeNB survey rounds:

Figure5: Change in external policy profile, average of macroprudential (+/-) actions
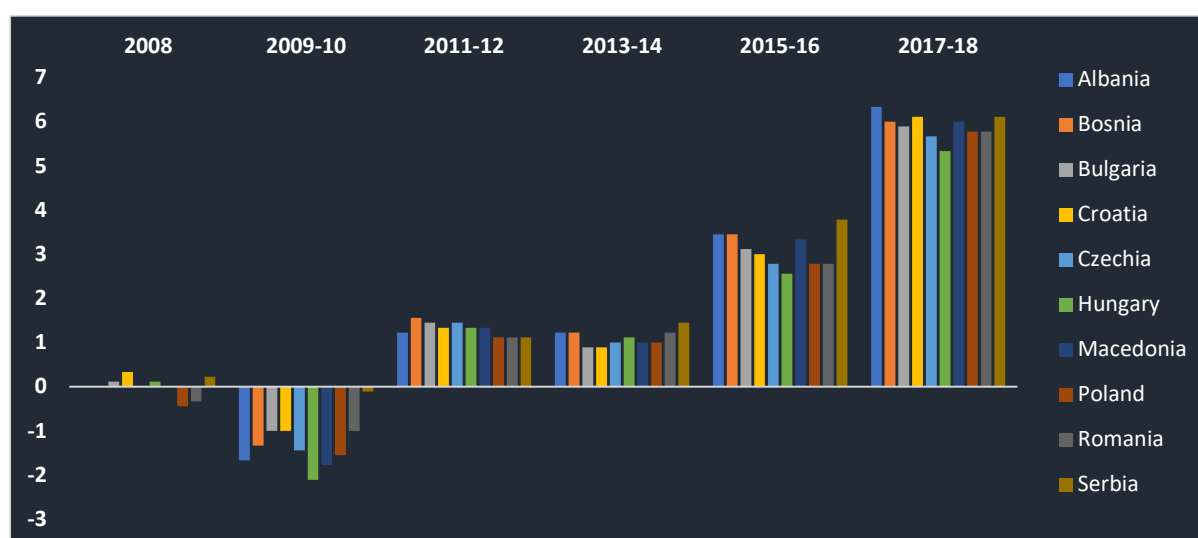
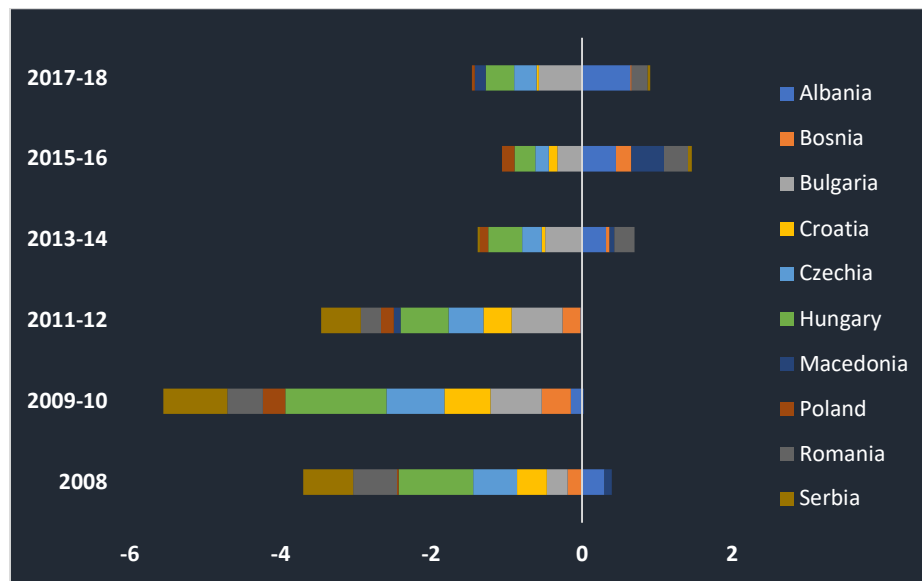*Source: Author's compilation of IMF iMaPP data*

The corresponding domestic measure, the combined strength of macroprudential events often results in incomplete information for the six-period panel, for instance as a zero entry might equally reflect on the lack of intervention or extensive but balanced reforms. Instead, the research observes the absolute frequency of interventions to represent the local policy climate as a continuous and testable variable. This proxy is somewhat justified as from 2015 onwards the highest values are associated with Hungary. Alternative variables are tested such as local policy distance from the regional mean or relative policy strength, but generally of low predictive power.

The selected iMaPP sample matches the nine CESEE countries included in the Euro Survey of the Austrian National Bank (OeNB 2021), with publicly posted results on asset and liability euroization, trust and economic expectations indicators. Data entries are retrieved in two-year intervals from 2007-08, with the final period excluded due to absent iMaPP data in the last year. Additionally, macroprudential measures are encoded starting from 2008 and subsequently observing regulatory change in two-year intervals against this anchor.

Key variables from the OeNB set consider liability euroization: the share of respondents planning to take out a loan and their proportion expressing a foreign currency preference. For this purpose, the survey is expected to provide stable estimates. For instance, Csajbók et al. (2010) note that the *current* share of FX debt is only a 'lagging indicator' relative to new borrowing choices, whereas the conditional probability of opting for FX incorporates a forward-looking component. Importantly, this approach captures demand irrespective of credit market characteristics – for example, in Hungary the FX share of demand is highest after the conversion event despite the lack of a receiving market, confirming Beckmann's (2017) results about bailout expectations.

Together with loan demand, the second focus variable tracks household expectations of an improved financial position within the next twelve months. This variable is multi-faceted and difficult to apply directly as a proxy, nonetheless it is informative to test whether financial expectations mediate between the regional policy climate and loan demand.

Source: Author's compilation of OeNB Euro Survey Data

The figure tracks developments in the expected financial position of households, evaluated on a five-unit scale then averaged for individual countries and aggregated to the regional level. It is possible to detect the gradual recovery of financial expectations relative to the first four post-crisis years, in certain countries turning to positive by the time consolidation schemes are introduced.

Across the focus variables, three panel regression equations are tested: first, between external policy profile and domestic financial expectations. Second, between external policy and the foreign currency share of loan demand without expectation controls. Finally, the same relationship with added expectations to monitor potential mediation through changes in explanatory power. To demonstrate relationships, a two ways Breusch-Pagan test excludes a pooled OLS approach. For all of the three equations designed the Hausman test favours random effects estimation over fixed effects models. Therefore, panel regression is conducted by the Wallace-Hussain random effects estimator, controlling for alternative random effects transformations, and discussing potential inconsistency across their findings.

Controls

Additional entries from the OeNB set serve as reasonable controls when consumer preferences are evaluated in isolation from credit sector dynamics. As for the financial expectation of households, institutional trust controls are added with respect to banks, the

EU and the national government, as well as expectations of the overall *economic* situation in the next five years. When considering loan demand, these factors are extended by asset euroization controls of hedging capacity, primarily the overall euroization share of the cash-and-deposits money aggregate.

Macroeconomic controls are derived from the World Development Indicators of the World Bank (2021), including GDP percentage growth at constant local currency prices. Bambulovic & Valdec (2020) argue that a composite GDP measure reflects on overall economic demand, as micro-level alternatives such as unemployment, wage or asset price growth are highly correlated and cannot be simultaneously tested. Percentage change of CPI is included in all of the equations. In the final two models, the reference euro exchange rate is standardized utilizing data from the ECB (2021), positive values associated with relative local currency depreciation. It is important to note however, the existence of fixed or semi-fixed exchange rate regimes in at least three of the observed cases. Together, the inflation and exchange rate indicators are expected to reflect on the tilt effect of demand even without precise knowledge of interest rate differentials. Finally, the absolute frequency of local policy interventions is controlled in all of the models extracted from the iMaPP data.

Limitations

Naturally, limitations apply to the empirical design. Using macroprudential data as a proxy for the regional policy climate excludes strategic events with spillover effects such as the Hungarian conversion itself, as long as they do not inflict regulatory modifications. Furthermore, Budnik & Kleibl (2018) explain how it is a frequent flaw of macroprudential metrics to report solely on the activation of instruments while ignoring their 'further evolution or termination'. This criticism stands for the iMaPP dataset as well which records introduction dates and does not necessarily describe tightening and loosening events as a process. Nevertheless, the chosen external policy measure is expected to contain relevant information about the collective attitude of regional authorities.

An evident limitation is that the two-year intervals of the panel might omit relevant information which would manifest with added time variation. There is an additional variety of potentially omitted factors which would simultaneously influence foreign macroprudential intervention, domestic financial expectations, and loan demand – especially as supply side

drivers are unobserved in the model. This implies that the predictive power of the findings is to be treated with caution. A data package with precise specification from the OeNB would provide additional detail, for instance concerning financial literacy indicators. Overall, whereas further model calibration would be required to sufficiently establish the causative chain, no serial correlation is detected by the Breusch-Godfrey test and the chosen random effects approach is superior to alternative approximations for the observed data categories.

5.3 Findings and commentary

First, change in external policy profiles is tested against household financial expectations:

Table1: External policy and domestic financial expectations

L-M twoways (Breusch-Pagan) test for balanced panels (p<0.001)
Hausman test (p = 0.99)
Random effects (Wallace-Hussain)

Dependent:	**Exp.Household** (Improve in 12 months; +/- 2.5)	
Predictor:	*Marginal effect*	*Confidence interval*
(Intercept)	-0.72 **	-1.16 – -0.28
Ext. policy (+/-)	0.04 *	0.01 – 0.06
Local policy freq.	-0.02 *	-0.04 – 0.00
trust Local currency (+/- 2.5)	0.18	-0.16 – 0.52
trust € vs. local currency (+/- 2.5)	0.13	-0.13 – 0.38
Exp.Economic	-0.14	-0.37 – 0.09
trustEU (%)	0.00	-0.01 – 0.01
trustGov (%)	0.01 **	0.00 – 0.02
trustBank (%)	0.00	-0.01 – 0.01
GDP (% growth LCU)	0.04 **	0.01 – 0.07
CPI (%)	-0.03 **	-0.06 – -0.01
Observations (n)	60	
R^2 (adj.)	0.625	
theta effects (Individual vs. idiosyncratic)	0.613	

* p<0.05   ** p<0.01   *** p<0.001
Source: Author's calculations from IMF iMaPP, OeNB Euro Survey & World Bank data

In the tested relationships, economic performance indicators and trust in the governing authority shape the financial outlook of survey respondents. Negative correlation with the frequency of domestic interventions suggests that events which trigger regulatory action generally challenge the financial position of households. Considering the external macroprudential profile, the relationship is of similar magnitude but with opposite effect. Although higher level-of-detail information would be essential to evaluate these results, they

allow to theorize that collective macroprudential tightening in the region improves financial risk perceptions in the domestic economic environment. Next, external policy profiles are compared against the foreign currency share of domestic loan demand. Additional controls are included in terms of exchange rate variability and overall hedging capacity (asset euroization index) in each focus environment. The first model excludes expectation indicators to test whether the predictive association between external policy and domestic FX demand is mediated by financial perceptions.

Table2: External policy and foreign currency loan demand

F-test for individual effects ($p_{1,2}<0.05$)
Hausman test ($p_1 = 0.482$, $p_2 = 0.308$)
Random effects (Wallace-Hussain)

Dependent:	**Fxloan** (% demand share)			**Fxloan**	
Predictor:	*Marginal effect*	*Confidence interval*		*Marginal effect*	*Confidence interval*
(Intercept)	6.50 **	2.76 – 10.24	(Intercept)	8.55 ***	3.87 – 13.23
Ext. policy	-0.64 ***	-0.97 – -0.31	**Ext. policy**	-0.63 ***	-0.97 – -0.29
Local freq.	0.17	-0.07 – 0.41	Local freq.	0.08	-0.19 – 0.36
EURind. (% M2)	-0.03	-0.06 – 0.01	EUR ind.	-0.02	-0.06 – 0.02
trustX Local	2.77	-0.41 – 5.95	trustX Local	1.35	-2.11 – 4.82
trustX Relative	0.71	-2.26 – 3.68	trustX Relative	0.19	-2.81 – 3.18
trustEU	-0.10 *	-0.18 – -0.02	trustEU	-0.09 *	-0.18 – -0.01
trustGov	0.00	-0.08 – 0.08	trustGov	-0.03	-0.12 – 0.06
trustBank	0.17 **	0.04 – 0.30	trustBank	0.16 *	0.04 – 0.29
GDP	0.54 **	0.21 – 0.86	GDP	0.41 *	0.06 – 0.77
CPI	0.55 ***	0.27 – 0.83	CPI	0.60 ***	0.31 – 0.90
€ ex.rate (std.)	-0.40	-1.33 – 0.53	€ ex.rate (std.)	-0.54	-1.48 – 0.41
			Exp.Economic	2.31	-0.22 – 4.84
			Exp.Household	0.49	-2.48 – 3.46
N	60			60	
R² (adj.)	0.557			0.592	
theta effects	0.482			0.308	

* p<0.05   ** p<0.01   *** p<0.001
Source: Author's calculations from IMF iMaPP, OeNB Euro Survey, World Bank & ECB data

In the models, change in the relative strength of the local currency (CPI) strongly leads the FX share of loan demand, as well as overall economic performance and trust in credit institutions. Interestingly, trust in the European Union has negative marginal effect. In the first equation, applying the Nerlove and Amemiya random effects transformations shifts the relationships within the trust variables from institutional factors (EU, banks) to confidence in

the local currency, both in absolute levels and when observed against the euro. This potentially reflects on multicollinearity across the financial trust estimators. In the second equation, the three random effects estimators are broadly consistent (whereas the Swamy-Arora transformation is not feasible due to the numeric constraint of the coefficients).

In each of the models, the average marginal effect of external macroprudential interventions is negative and significant on FX demand. In turn, no significant relationship is established with the frequency of domestic interventions (and tested alternative policy distance variables). Crucially, when the target variable (Fxloan) is replaced to test for general loan demand, equally no significant relationships are demonstrated. This suggests that external policy only relates to the foreign currency share of the demand profile but not its general magnitude. A plausible line of arguments is that if the regional macroprudential climate is loose (-) this preserves a financial environment where FX loans are relatively more attractive. In turn, collective tightening actions would force banks to internalize the real costs of FX loans, ultimately influencing expectations and loan demand.

Importantly, as the second estimation does not relate household financial expectations to FX loan demand or improve the predictive power of the model, the mediation of policy spillovers across this channel is not established. The expectation variables might be overly multi-faceted to reflect on the causative link of interest. Additional empirical enquiry is encouraged to test policy spillovers in CEE, simultaneously relying on supply and demand constituents and measuring household expectations in more categorical detail.

Concluding remarks

In the run-up to the global financial crisis, foreign currency loans with unique structural attributes cover a dominant share of credit expansion in Central and Eastern Europe. The ongoing consolidation of this exposure reflects on the monetary dilemma between policy autonomy and financial convergence, while introducing broad scale macroprudential reforms throughout the post-crisis period.

The paper has demonstrated diverse regional strategies to treat liability dollarization. The Hungarian scheme eliminates currency mismatches for the swift recovery of monetary

autonomy and does so directly before the currency floor discontinuation of the Swiss franc – thereby constituting an informative case study of a targeted credit market intervention. In certain policy contexts such as the Baltic states, it is the eventual adoption of the euro to drive out FX credit risk. Where neither of these blanket solutions are feasible, the challenge of liability dollarization persists with distinct financial stability characteristics and regulatory spillovers.

The paper revisited the economic drivers to FX credit growth in the institutional context of post-socialist market transition. Broadly speaking, sound macroeconomic fundamentals, expectations of economic convergence, implicit bailout incentives and the low-cost funding model of foreign currency loans have equally contributed to their proliferation. By the econometric review of systemic risk measures, it has further been contended that the structural profile of FX loans is only sufficiently treated following the GFC. Improved metrics provide the opportunity for macroprudential design to integrate the collective and institutional dimensions of systemic risk, while considering the upper bound currency exposure of the credit sector.

On this basis, the paper has reviewed common economic and legal arguments in the division of recovery costs. The Hungarian consolidation equally comprises of unorthodox and orthodox market interventions although eventually following the principle of cost apportionment. Finally, in the focus region an empirical relationship has been tested across the external macroprudential climate, domestic financial expectations, and the foreign currency share of loan demand. The findings confirm that external policy and FX loan demand are related, motivating additional investigation to establish the mediating factors in their interaction.

In conclusion, the paper has contributed to the extensive economic literature on liability dollarization and systemic credit risk, providing a theoretical synthesis and observing the particularities of the coordinated Hungarian intervention. Conceptually, the discourse incorporates generalizable arguments expected to apply outside of the CEE focus environment. Specifically, regional studies display the available regulatory toolkit to incentivize stress resistant financial intermediation, while also taking into account the collective essence of risk supervision and cross-border spillover effects.

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Appendix

Appendix #1: MNB foreign currency tenders and allocated FX volume

Results of the settlement and conversion tenders

Allocation of central bank instruments related to settlement and forint conversion (EUR billion)

Tender dátuma	Instruments related to settlement		Instruments related to forint conversion		Total
	Conditional instrument	Unconditional instrument	Conditional instrument	Unconditional instrument	
13.10.2014	230	750	–	–	980
20.10.2014	0	0	–	–	0
27.10.2014	0	0	–	–	0
03.11.2014	13	0	–	–	13
10.11.2014	0	0	1627	6207	7834
11.11.2014	–	–	28	32	60
17.11.2014	0	0	–	–	0
24.11.2014	0	0	–	–	0
01.12.2014	0	0	–	–	0
08.12.2014	50	38	–	–	88
22.12.2014	–	–	–	50	50
23.01.2015	–	–	–	102	102
Total:	293	788	1655	6391	9127

Source: Kolozsi et al. (2015)

Appendix #2: The evolution of the FX loan portfolio in Hungary over 2003-2016
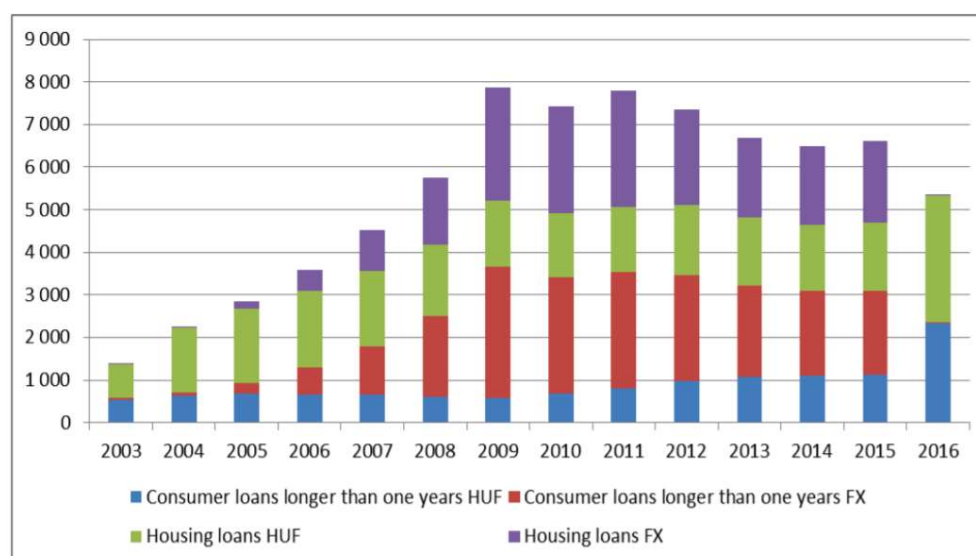
Source: Csizmady & Hegedus (2016) from the MNB Report on Financial Stability 2016