

# Systemic risk in Europe due to foreign currency loans<sup>1</sup>

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## **Abstract:**

Foreign currency loans given to the unhedged non-bank sector are remarkably prevalent in Europe. Especially Swiss franc denominated loans, which are widely popular in Eastern European countries, are believed to pose a significant exchange-rate-induced credit risk to the European banking sectors. A sudden depreciation of the domestic currencies in Eastern European countries could trigger simultaneous bank failures, if unhedged borrowers cannot service their foreign currency loans anymore. Therefore they pose a systemic risk from a “common market shock” view.

This paper attempts to quantify the systemic risk arising from foreign currency loans in 17 European countries quarterly between 2007:Q1 and 2011:Q3. For that purpose, I use a novel dataset collected by the Swiss National Bank and I build on the method suggested in Ranciere, Tornell, and Vamvakidis (2010). In particular, I calculate to which extent the European banking sectors’ balance sheets would be affected if households and/or non-financial firms cannot pay back their foreign currency loans.

I find that the systemic risk in Eastern Europe is substantial, while it is relatively low in the remaining European countries. However, CHF-denominated loans are not the main source behind the systemic risk in Eastern Europe, contrary to what the policymakers and the general public might perceive. I find that loans denominated in other foreign currencies (possibly in euros) contribute to the systemic risk in Eastern Europe significantly more than CHF loans do. Furthermore, systemic risk shows high persistence, and low volatility during the sample period. Last but not least, banks in Europe have been persistently holding more foreign currency denominated assets than liabilities, indicating that they are aware of the exchange-rate-induced credit risk they are facing.

**Keywords:** Systemic risk, exchange rate shock, banking sector, foreign currency loans.

**JEL Classification:** F3, G2

# 1. Introduction

Systemic risk in the financial system is a multifaceted phenomenon: First, it can arise in the form of contagion among financial institutions where one institution's failure can trigger cascading defaults of the others via to their linkages with each other in the interbank market. Second, systemic risk can appear in the form of joint failures of financial institutions due to their exposure to a common market shock, as it happened during the financial crisis when mortgage-backed-securities lost their value significantly and damaged countless banks' balance sheets simultaneously. Last but not least, systemic risk can develop in the form of informational spillovers, where bad news about one financial institution increases refinancing costs of the others, and with that development their probability of default also increases<sup>3</sup>.

This paper attempts to measure systemic risk in the European banking sectors arising from foreign currency loans to domestic non-banks<sup>4</sup> in their balance sheets. In order to do that, it adheres to the "common market shock" view, where banks could fail jointly due to their exposure to unhedged non-banks, who borrowed in a foreign currency without having a steady income in that currency. In this case, the common market shock would be a sharp exchange rate movement triggering defaults of, for example, domestic households on their foreign currency denominated mortgages. Such a shock would lead to a simultaneous deterioration of financial conditions of numerous banks in Europe, because they hold sizeable foreign currency loans to domestic households on the asset side of their balance sheets, and have short-term foreign currency liabilities in the interbank market.

Foreign currency loans are remarkably prevalent in Europe. In 2011:Q3 the majority of the outstanding loans given to the non-bank sector in Eastern Europe was denominated in a foreign currency (Figure 1). Even if borrowing in euro might be considered rational for some non-euro area countries, which are "closer" to a euro-adoption<sup>5</sup>, there are many other countries where it will take many more years before officially adopting the euro. Moreover, there is also considerable amount of borrowing in other foreign currencies by the non-bank

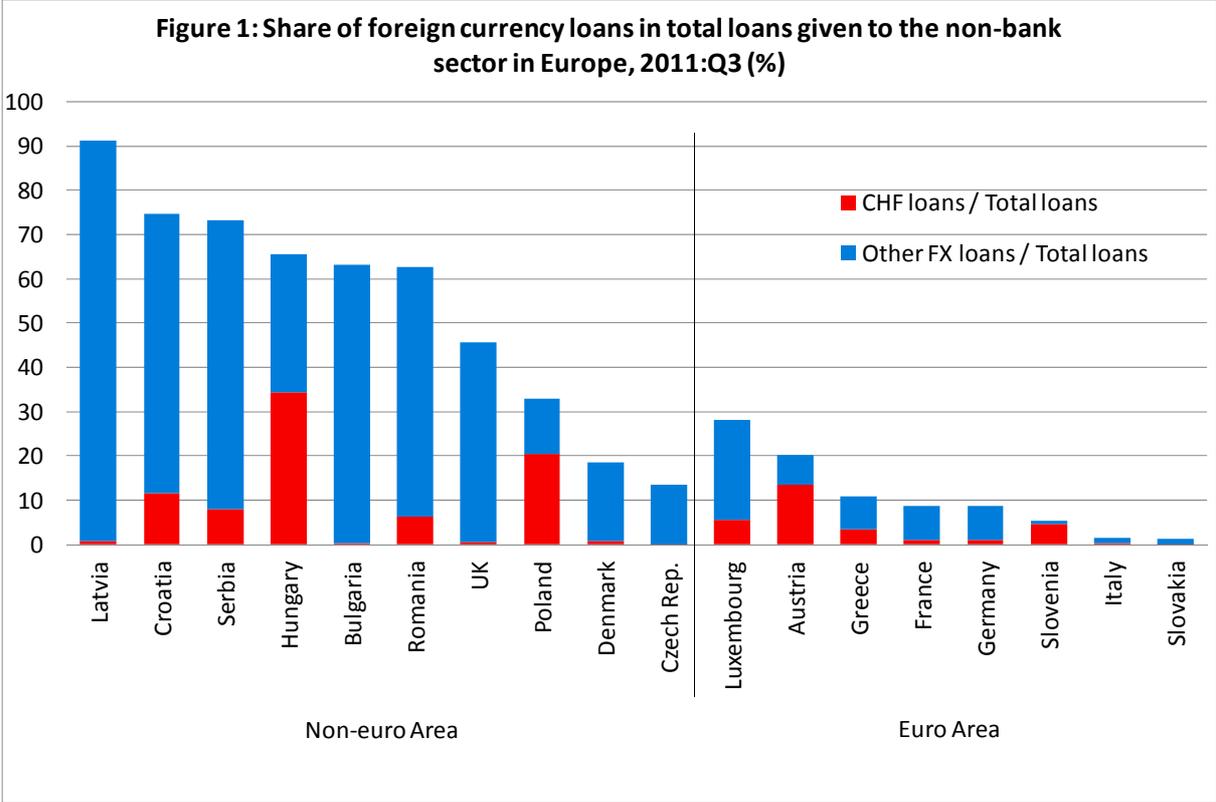
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<sup>3</sup> See, for example, De Bandt and Hartmann (2000) and Georg (2011) for a characterization of systemic risk. See Schwaab, Koopman and Lucas (2011) for systemic risk diagnostics.

<sup>4</sup> The non-bank sector comprises the sub-sectors households, non-financial corporations, non-bank financial institutions, general government, and non-profit institutions serving households (see the European System of Accounts 1995).

<sup>5</sup> As of July 2012, there are only two currencies in the Exchange Rate Mechanism II (): Latvian lat and Danish krona. Latvia is expected to join the euro area in 2014. Its currency, Latvian lat, has been in the ERM II since 2005. Danish krona has been in the ERM II since 1999, but the country has no specific plans to join the euro area. According to the European Commission "Participation in ERM II is voluntary, although, as one of the convergence criteria for entry to the euro area, a country must participate in the mechanism without severe tensions for at least two years before it can qualify to adopt the euro".

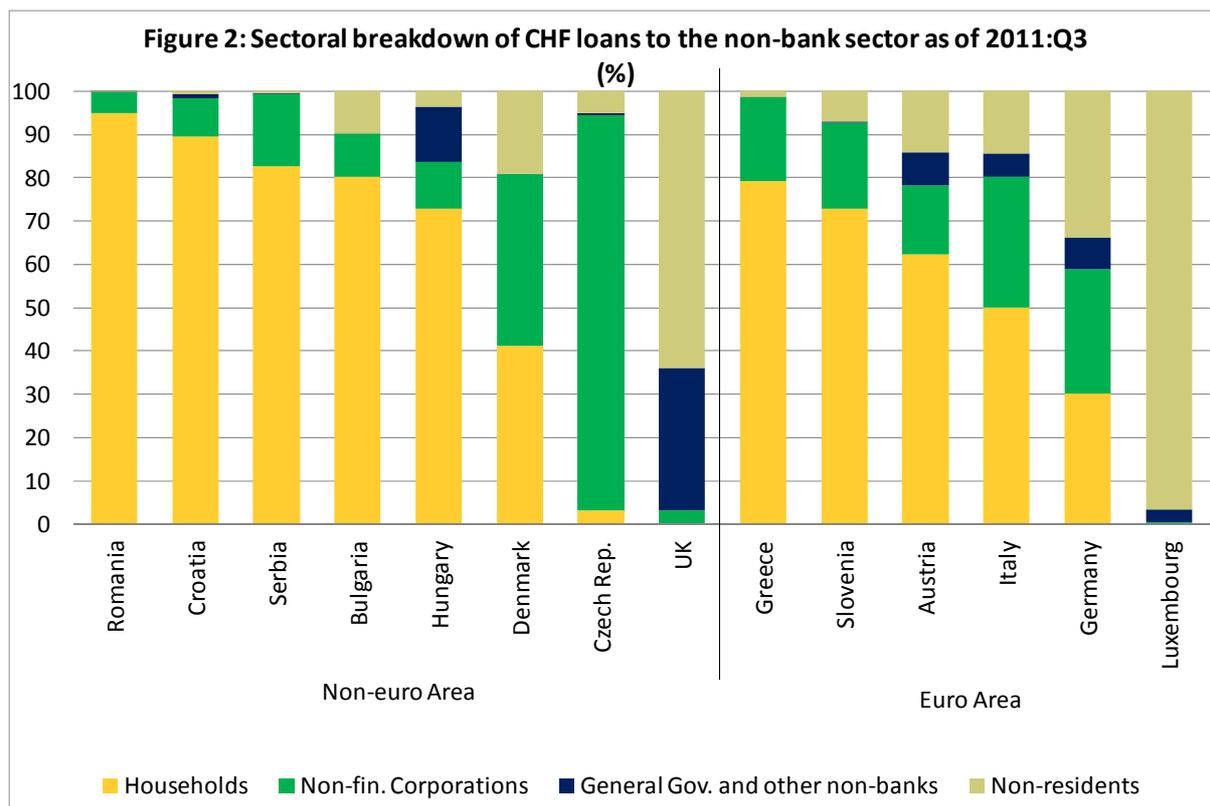
sector in Europe. For example, loans denominated in Swiss franc (CHF) constitute a significant share of total loans in some countries, such as Austria, Croatia, Hungary, and Poland.



Interestingly, within the non-bank sector in Europe, it is particularly the household sector that is borrowing in foreign currencies. Figure 2 shows the sectoral breakdown of CHF loans to the non-bank sector as of 2011:Q3. Note that in almost all countries in the sample, more than 40% of the outstanding CHF loans are given to the domestic household sector (the exceptions are the Czech Republic, the UK, Germany, and Luxembourg). Only in the UK and Luxembourg, a large share of CHF loans are given to non-residents – reflecting these countries’ statuses as international financial centers.

Therefore, foreign currency loans in Europe are mainly considered to be “small men’s carry trade”: Households (and small firms) are borrowing in a lower-yielding foreign currency and are investing in a high-yielding domestic currency (e.g., in the form of a home mortgage or car loan). While doing that, they are expecting that the domestic currency will continue to appreciate as it did in the past, a reoccurring violation of the uncovered interest parity<sup>6</sup>.

<sup>6</sup> See Galati, Heath and McGuire (2007) on the recent build-up of carry trade positions due to low exchange rate volatility and persistent interest rate differentials. The literature on the uncovered interest parity is vast. Francis, Hasan and Hunter (2002), for example, find persistent violation of the uncovered interest parity in emerging market economies.



While there are some immediate benefits of borrowing in a foreign currency for the non-bank sector, such as lower interest rates and longer maturities, these loans also carry a significant exchange rate risk along. The domestic household sector is unlikely to have income in a foreign currency or to use sophisticated hedging instruments against the exchange rate risk. Therefore, a sharp depreciation of the domestic currency can lead to the outcome that borrowers cannot service their foreign currency loans anymore<sup>7</sup>. As a result, the sizable foreign currency loans in the balance sheets of banks can pose a significant systemic risk.

The European Systemic Risk Board (ESRB), an independent EU institution watching over the financial stability within the EU, recognized the systemic risk that the foreign currency loans pose to the European banking sectors and made an official recommendation on lending in foreign currency on November 22, 2011<sup>8</sup>. In particular, it stated the following:

*“(1) Foreign currency lending to unhedged borrowers has increased in a number of Union Member States.*

<sup>7</sup> This became an important issue during the financial crisis when, for example, Hungarian forint and Polish zloty depreciated sharply and both the stock and the ratio of non-performing loans rose in the portfolio of banks.

<sup>8</sup> [http://www.esrb.europa.eu/pub/pdf/recommendations/2011/ESRB\\_2011\\_1.en.pdf?3304c9df8c9cecd453b4ecba b95d359d](http://www.esrb.europa.eu/pub/pdf/recommendations/2011/ESRB_2011_1.en.pdf?3304c9df8c9cecd453b4ecba b95d359d)

*(2) Excessive foreign currency lending may produce significant systemic risks for those Member States and may create conditions for negative cross-border spillover effects.”*

Similarly, the Hungarian Financial Supervisory Authority (HFSA) voiced its concerns regarding systemic risk due to foreign currency loans in the Hungarian banking sector, and advised the banks resident in Hungary to swap the CHF-denominated loans into euro loans in 2011 to reduce the systemic risk<sup>9</sup>. In fact, since summer 2010, new foreign currency loans to non-banks is prohibited in Hungary. However, the outstanding foreign currency loans to the non-banks still pose a significant risk to the economy and the Hungarian authorities have been working on a plan to contain it.

The European Bank for Restructuring and Development (EBRD) also acknowledged foreign currency loans in the EBRD region<sup>10</sup> as a “*key vulnerability*” and therefore launched a major initiative in 2010 to develop local currency and capital markets in order to help reduce unhedged foreign currency borrowing<sup>11</sup>.

While policymakers in Europe repeatedly express their concern regarding the systemic risk that foreign currency loans create<sup>12</sup>, there is a lack of literature on the exact measurement of this systemic risk. Previous literature cannot answer questions such as:

- What is the magnitude of the systemic risk for the European banking sectors due to foreign currency loans given to the non-bank sector?
- To what extent would the banking sectors’ balance sheets be affected when the (unhedged) non-bank sector cannot service its foreign currency debt anymore due to a sudden exchange rate movement?
- Are CHF-denominated loans the main driver of a systemic risk in certain countries as perceived in the general public?

This paper attempts to fill this void in the literature by using a novel dataset on foreign currency loans in Europe and by building on a method suggested in Ranciere, Tornell and

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<sup>9</sup> <http://www.reuters.com/article/2011/01/11/hungary-loans-idUSLDE70A17S20110111>

<sup>10</sup> The EBRD region consists of the transition countries in Eastern Europe and the CIS countries (formerly the USSR).

<sup>11</sup> <http://www.ebrd.com/pages/news/press/2010/100515a.shtml>

<sup>12</sup> During the financial crisis, when many Eastern European currencies depreciated significantly, many borrowers could not service their foreign currency debt anymore. Non-performing loan ratios have increased during the crisis and policymakers were concerned regarding the systemic threat that these foreign currency loans pose to the banking sector.

Vamvakidis (2010). The quarterly data is collected by the Swiss National Bank since 2009 from 19 European central banks under its *CHF Lending Monitor* project.

Systemic risk measure in this paper is defined as the impact of writing down the unhedged foreign currency loans on banks' balance sheets. This measure takes into account the indirect exchange rate risk that banks undertake when they lend to unhedged borrowers (i.e., resident households and non-financial corporations). In particular, it calculates the net unhedged foreign currency liabilities as a share of total assets. The larger this number is in a given country, the higher is the systemic risk in its banking sector.

The four distinct contributions of this paper to the literature are as follows:

1. Since data from the CHF Lending Monitor is reliable and consistent across countries, and is more detailed than what has been publicly available until now, these new systemic risk measures are more accurate than the ones in Ranciere, Tornell and Vamvakidis (2010).
2. I can separately identify the aggregate systemic risk due to all foreign currency loans and the particular systemic risk resulting from CHF loans in Europe.
3. A sectoral breakdown of systemic risk is possible in this dataset.
4. The quarterly data of the CHF Lending Monitor allows me to observe the evolution of the currency mismatch on a quarterly basis from 2009:Q1 until 2011:Q3. For a subset of countries the measure can be calculated from as early as 2002:Q1 on<sup>13</sup>.

First, I find that the systemic risk due to foreign currency loans is quite high in the majority of the non-euro area countries: net unhedged foreign currency liabilities of the banking sectors correspond to more than 20% of their total assets. However, net unhedged CHF liabilities are always less than 5% of their total assets. Therefore I conclude that CHF loans are not the main driver of a systemic risk in Europe, despite the common belief that CHF loans pose the greatest threat among foreign currency loans.

Second, sectoral breakdown of systemic risk shows that banks are trying to hedge against the foreign currency induced credit risk on their balance sheets by holding more foreign currency assets than their foreign currency liabilities in a persistent manner. However, the mere size of the foreign currency loans to unhedged households exceeds this buffer in most countries resulting in a positive and in certain countries sizeable systemic risk.

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<sup>13</sup> The present paper only reports systemic risk measures starting from 2007.

Third, I find that systemic risk has been quite persistent and not volatile in Europe since 2007. This confirms the findings of previous research that non-banks take long-term loans in foreign currency and are not involved in short-term speculative carry-trade activity solely based on short-term changes of the macroeconomic environment<sup>14</sup>.

This paper is structured as follows: Section 2 gives an overview of previous literature on foreign currency loans and systemic risk. Sections 3 and 4 explain the method and the data used, respectively. The findings are laid out in Section 5, while conclusions and policy implications are discussed in Section 6.

## 2. Previous Literature

Previous literature on foreign currency borrowing focuses mostly on household, firm, or bank level survey data to understand the factors at play. A common finding is that there may be excessive risk-taking by households and small firms because they do not necessarily have foreign currency income and because foreign banks in Eastern Europe may be a driver of foreign currency loans in the region. For example, Brown, Ongena and Yeşin (2011) study firm and country-level determinants of foreign currency borrowing by small firms in transition countries and find that although firms with foreign currency income are more likely to borrow in a foreign currency, there is still a significant amount of foreign currency borrowing done by local currency earners. Similarly, Beer, Ongena and Peter (2010) analyze empirically foreign currency borrowing by households in Austria and find that risk seeking, affluent, and married households are more likely to take a housing loan in a foreign currency. Brown, Kirschenmann and Ongena (2011), on the other hand, study loan-application and approval data at a bank in Bulgaria, and find that foreign currency borrowing may be partly supply-driven by banks hesitant to lend long-term in local currency<sup>15</sup>. Theoretically, it is also shown that persistent violation of the uncovered interest parity may lead to more foreign currency borrowing in equilibrium, if the banks have imperfect information about borrowing firms' revenue level and currency (Brown, Ongena and Yeşin (2012)). Likewise, Degryse et al. (2012) find that foreign banks who entered the emerging markets through greenfield investment tend to extend more loans in foreign currency, possibly due to their easier access

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<sup>14</sup> Brown, Ongena, and Yeşin (2011) find that foreign currency borrowing by small firms in transition countries is much stronger related to firm-level foreign currency revenues than it is to country-level interest rate differentials.

<sup>15</sup> Brown and de Haas (2012) also have a similar finding.

to foreign currency funding in international money markets. All in all, the existing literature on foreign currency loans point to the emergence of a systemic risk in the European banking sectors.

In this paper, systemic risk corresponds to the joint failure of several banks due to their exposure to a common market shock (i.e. simultaneous default of unhedged foreign currency borrowers due to a sharp exchange rate movement), because banks tend to hold similar assets on their balance sheets. Undoubtedly, contagion via interbank market or information spillovers among banks could be a significant part of systemic risk due to foreign currency loans. However, the emerging literature on systemic risk after the financial crisis perceives common shocks to be quantitatively the greater threat to the system and points to the need to further understand the source and impact of them. For example, Acharya and Yorulmazer (2008) show that banks herd and undertake correlated investments so as to minimize the impact of information contagion on the expected cost of borrowing. Such a herding among banks would lead to a greater exposure of the financial system to a common shock.

Also data limitations currently do not allow to do a contagion analysis in this regard. Cerutti, Claessens and McGuire (2011) argue that systemic risk analysis is very difficult, even impossible, with the existing bank-level data and suggest collection of consistent bank-level data showing aggregate positions and linkages to appropriately measure and monitor systemic risk also across borders.

Therefore, this paper adopts the “common shock” approach rather than the “contagion” or “informational spillover” view, in order to measure the systemic risk arising from foreign currency loans.

### **3. Method**

I build on the approach suggested in Ranciere, Tornell and Vamvakidis (2010) to calculate new currency mismatch indices for the European countries’ banking sectors. Their approach is different from the previous ones used in the currency mismatch literature, since it takes into account the indirect exchange rate risk that banks undertake when they lend to unhedged borrowers. In other words, these currency mismatch indices consider the “exchange-rate-induced credit risk” and are an evaluation of the currency mismatch in the balance sheets of the European banking sectors in the case of a joint failure of households to service their foreign currency loans.

In the literature, currency mismatch in a banking sector is usually measured as the net foreign currency liabilities (i.e. the difference between foreign currency liabilities and foreign currency assets) as a share of total assets of the banking sector. However, banks usually match their foreign currency assets and foreign currency liabilities so that their difference would be almost (or sometimes by regulation identically) zero. Furthermore, the simple measure treats all foreign currency assets equally without considering the risks associated with foreign currency loans given to unhedged borrowers.

Therefore, Ranciere, Tornell and Vamvakidis (2010) propose to calculate the net foreign currency liabilities as a share of total assets, but not including the “risky” foreign currency assets in the foreign currency assets. In other words, foreign currency loans given to the domestic<sup>16</sup> non-bank sector are not included in total foreign currency assets.

Thus in a given country, the foreign currency mismatch index in the banking sector equals to net foreign currency denominated liabilities plus unhedged foreign currency assets divided by total assets.

Therefore,

*foreign currency mismatch index*

$$= \frac{FX \text{ Liabilities} - (FX \text{ Assets} - FX \text{ Loans to resident households and nonfin. corporations})}{Total \text{ Assets}}$$

As detailed info on CHF-denominated loans is available in the *CHF Lending Monitor*, one can also calculate the systemic risk arising from CHF loans only, by applying the same method.

Thus,

*CHF mismatch index*

$$= \frac{CHF \text{ Liabilities} - (CHF \text{ Assets} - CHF \text{ Loans to res. households and nonfin. corp.})}{Total \text{ Assets}}$$

Similarly,

*other fx mismatch index*

$$= \frac{Other \text{ FX Liabilities} - (Other \text{ FX Assets} - Other \text{ FX Loans to res. h. holds and nonfin. corp.})}{Total \text{ Assets}}$$

Note that,

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<sup>16</sup> Domestic = Resident

*foreign currency mismatch index*

$$= \text{CHF mismatch index} + \text{other FX mismatch index}$$

Furthermore, these indices can be broken into three components: net foreign currency liabilities, foreign currency loans to households, and foreign currency loans to non-financial corporations, all as a share of total assets. In other words, a sectoral breakdown of systemic risk is possible.

Note also that the mismatch indices are upper bounds for the systemic risk, because they assume that *none* of the domestic households or non-financial corporations can service their foreign currency debt. More detailed information on each country regarding the characteristics of domestic borrowers can certainly refine these indices. That is one can substitute the share foreign currency loans by domestic borrowers without a foreign currency income into the equation to get a more precise measure.

There are a few possible extensions and refinements to this measure of systemic risk. One possible extension would be to vary the “default rate” of the borrowers in relationship with the size of the depreciation and calculate an elasticity of systemic risk vis-à-vis the exchange rate. This extension would rely on individual countries’ non-performing loan ratios in the past. Another possible extension would be to use this approach for individual banks, rather than the whole banking system. National central banks and/or financial market regulators can have access to bank-level data in their countries and can easily calculate this systemic risk measure for individual banks. This extension can help policymakers to identify banks that are most exposed to the common shock, as well as banks that contribute significantly to the systemic risk. Because such detailed data is not available (yet) or is confidential to the author currently, these extensions may be only analyzed in future work.

## **4. Data**

All data is taken from the *CHF Lending Monitor*, which is an ongoing Swiss National Bank project to understand the scope of CHF lending in Europe. Nineteen European central banks<sup>17</sup> have been contributing to it each quarter since 2009<sup>18</sup>.

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<sup>17</sup> The nineteen contributing central banks are from: Austria, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Greece, Hungary, Italy, Latvia, Luxembourg, Poland, Romania, Serbia, Slovakia, Slovenia, and the UK.

<sup>18</sup> Some of the countries reported also data going back as much as 2002:Q1.

The *CHF Lending Monitor* data consists of aggregate banking sector statistics on both the asset side (such as loans and other assets) and the liability side (such as deposits, own securities issues, and other liabilities) of the balance sheets of resident banks in respective countries.

Sectoral breakdown of loan and deposit data is available for the following categories: resident banks, resident households, resident non-financial corporations, resident government, non-resident banks, non-resident non-banks.

Furthermore, currency breakdown of loans, deposits, and own securities issued is available for the following categories: domestic currency, CHF, and other foreign currency.

Such detailed information on the banking sector's assets and liabilities on an aggregate level make it possible to calculate the systemic risk due to a foreign currency shock accurately. Furthermore, the data is accurate as it relies on central banks' reporting and does not involve a guess or an uninformed estimation<sup>19</sup>.

## 5. Findings

Table 1 lists the systemic risk measures across countries in Europe as of 2011:Q3. It also shows the currency breakdown of systemic risk between CHF mismatch index and Other FX mismatch index<sup>20</sup>.

First, note that the foreign currency mismatch index varies significantly across European countries, from -0.8% in France to 44.3% in Latvia. It is generally higher in the non-euro area than in the euro area. For example, in all of the non-euro area countries except the Czech Republic and the UK, the FX mismatch index is between 14% and 45%. In other words, net unhedged foreign currency liabilities of the banking sectors constitute between 14% and 45% of their total assets. Consequently, these countries contain high systemic risk in their banking sectors. On the other hand, the FX mismatch index is relatively lower in the euro area countries. Net unhedged foreign currency liabilities constitute always less than 3.2% of total banking sector assets.

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<sup>19</sup> Data received from the UK includes some estimated sector split information.

<sup>20</sup> The currency mismatch indices cannot be calculated for Denmark as data on banking sector's liabilities is missing. CHF – and Other FX mismatch indices cannot be calculated for France, Latvia, Poland, and Slovakia due to missing data.

**Table 1: Systemic Risk Indices in Europe as of 2011:Q3  
due to foreign currency loans (%)**

		FX mismatch index	CHF mismatch index	Other FX mismatch index
Non- euro area	Latvia	44.3	<i>n.a.</i>	<i>n.a.</i>
	Croatia	36.7	4.4	32.3
	Serbia	31.8	1.9	29.8
	Romania	29.6	2.3	27.3
	Bulgaria	26.6	0.0	26.6
	Hungary	21.1	3.7	17.4
	Poland	14.3	<i>n.a.</i>	<i>n.a.</i>
	CzechRep	3.5	-0.2	3.7
	UK	-0.1	0.0	0.0
Euro area	Slovenia	3.1	3.1	0.1
	Austria	2.2	0.8	1.3
	Greece	1.6	-0.4	2.0
	Slovakia	1.1	<i>n.a.</i>	<i>n.a.</i>
	Germany	0.6	-0.1	0.7
	Luxembourg	0.2	-0.7	1.0
	Italy	0.1	0.0	0.1
	France	-0.8	<i>n.a.</i>	<i>n.a.</i>

Notes: 1. *n.a.* means not available

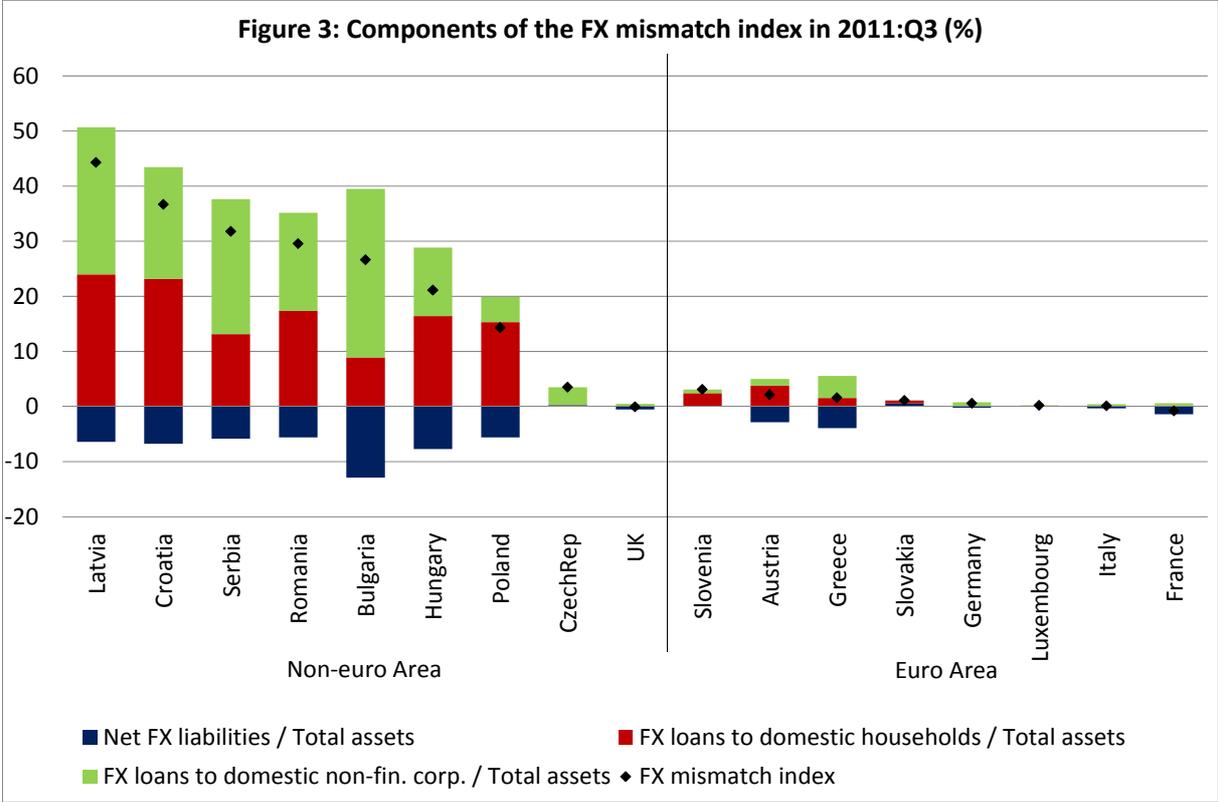
2. A higher mismatch index means higher systemic risk

3. FX mismatch index = CHF mismatch index + Other FX mismatch index

Interestingly, the CHF mismatch index is fairly low in all of the European countries. For example, in Croatia the foreign currency mismatch index is 36.7% where only 4.4% is due to loans denominated in CHF. The rest of the systemic risk is due to loans denominated in other foreign currencies (Other FX mismatch index in Croatia is 32.3%). Thus CHF loans given to households and non-financial corporations are not the main driver behind the high systemic risk in the non-euro area countries. Consequently, loans denominated in other foreign currencies contribute by far more to systemic risk in Eastern Europe.

Figure 3 shows the individual components, i.e., the sectoral breakdown, of the FX mismatch index across European countries. These components are net foreign currency liabilities, foreign currency loans to domestic households, and foreign currency loans to domestic non-financial corporations (all as a share in total assets). The figure reveals that most banking sectors in the non-euro area are possibly trying to hedge against the exchange rate risk by having (significantly) more foreign currency assets than foreign currency liabilities. However,

the volume of foreign currency loans to domestic households and non-financial corporations are considerably large relative to their total assets. Therefore the resulting currency mismatch indices are substantial in several of the non-euro area countries.



The high systemic risk in the non-euro area countries is due to two factors:

- The banking sectors in those countries have sizable foreign currency assets (and liabilities) relative to their total assets;
- A very large fraction of the foreign currency assets are in the form of foreign currency loans given to domestic households and non-financial corporations.

Similarly, Table 2 shows the sectoral composition of the CHF mismatch index in 2011:Q3 across Europe. As shown in Table 1, the CHF mismatch index, and hence the systemic risk resulting from CHF loans, is relatively low in all of the countries. However, in a few countries, this is due to banks holding significantly more CHF assets than CHF liabilities (particularly remarkable in Hungary, Croatia, and Austria). These net CHF assets compensate for the sizeable CHF loans to domestic borrowers in those countries. Consequently the resulting CHF mismatch index is relatively low.

**Table 2: Components of the CHF mismatch index in 2011:Q3**

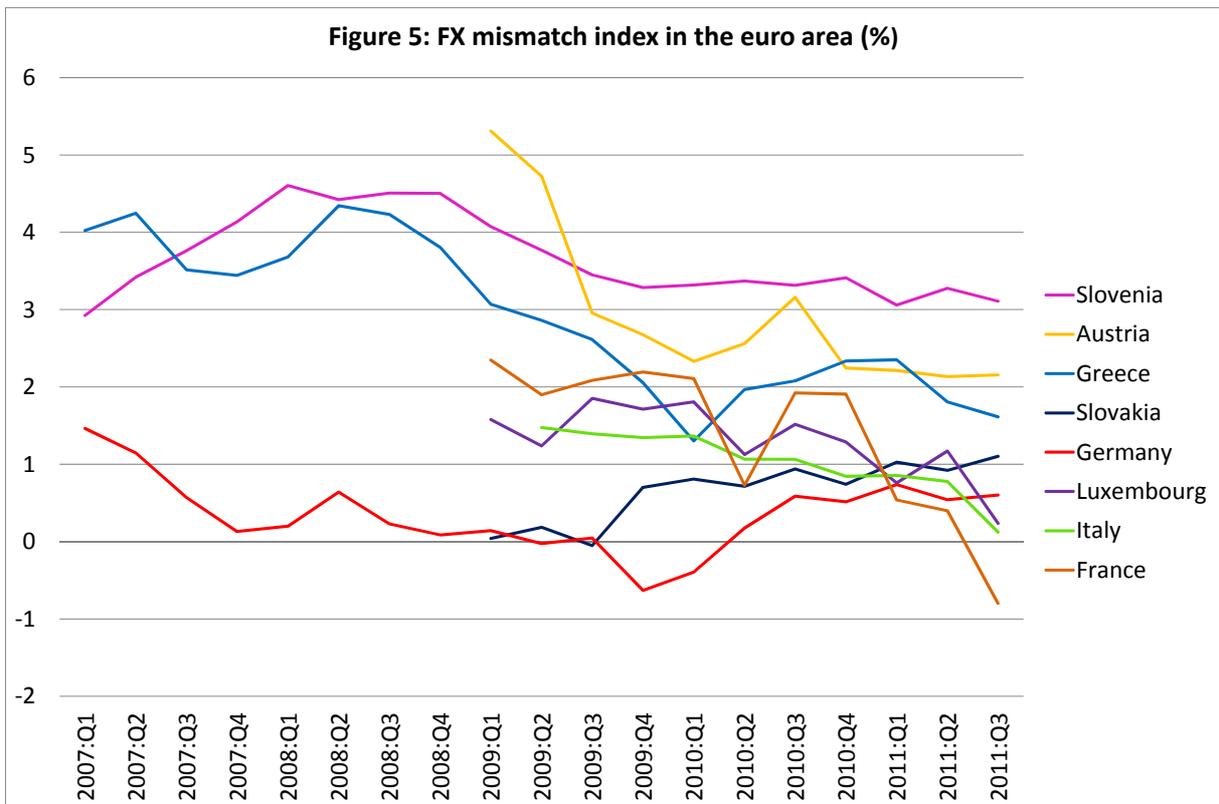
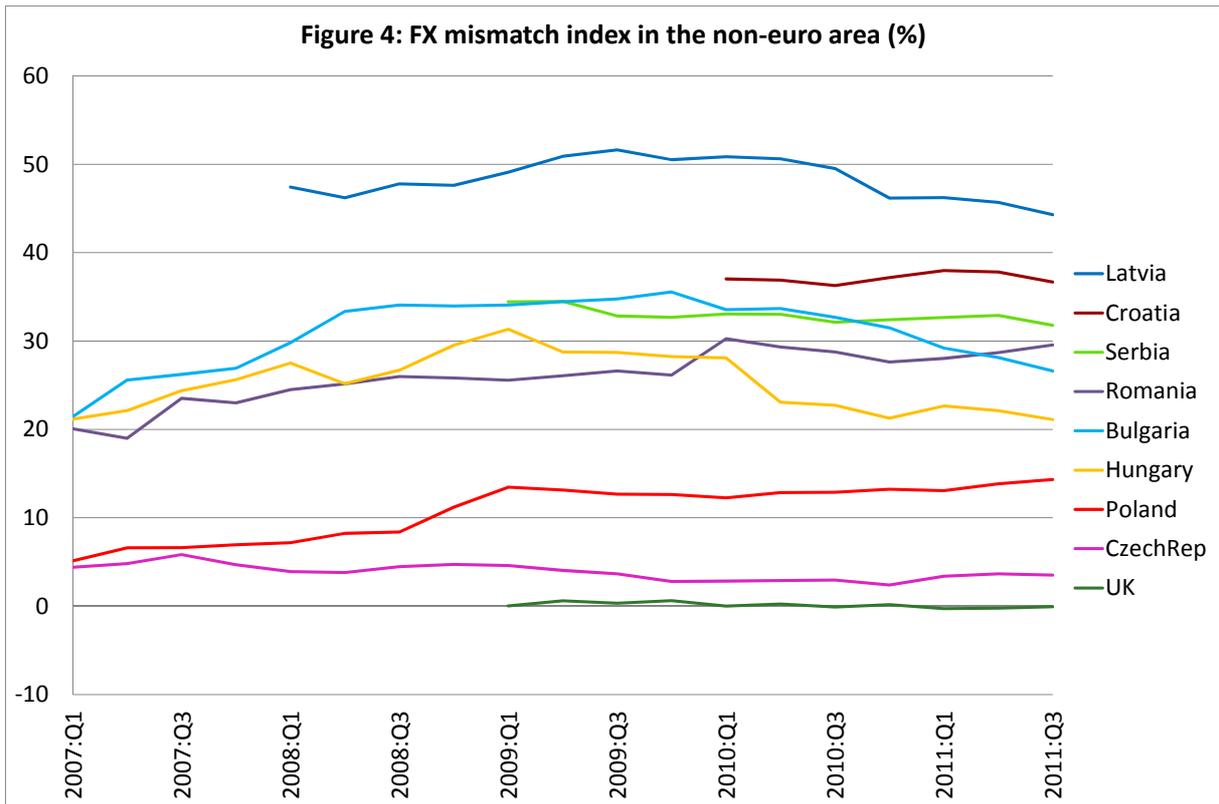
		Net CHF liabilities / Total assets (%)	CHF loans to domestic households / Total assets (%)	CHF loans to domestic non-fin. corp. / Total assets (%)	CHF mismatch index (%)
Non-euro area	Croatia	-3.2	6.9	0.7	4.4
	Hungary	-12.8	14.4	2.1	3.7
	Romania	-1.3	3.5	0.2	2.3
	Serbia	-2.7	3.9	0.8	1.9
	Bulgaria	-0.2	0.2	0.0	0.0
	UK	0.0	0.0	0.0	0.0
	Czech Rep	-0.2	0.0	0.0	-0.2
Euro area	Slovenia	0.0	2.4	0.7	3.1
	Austria	-3.6	3.5	0.9	0.8
	Italy	-0.1	0.1	0.0	0.0
	Germany	-0.3	0.1	0.1	-0.1
	Greece	-2.3	1.5	0.4	-0.4
	Luxembourg	-0.7	0.0	0.0	-0.7

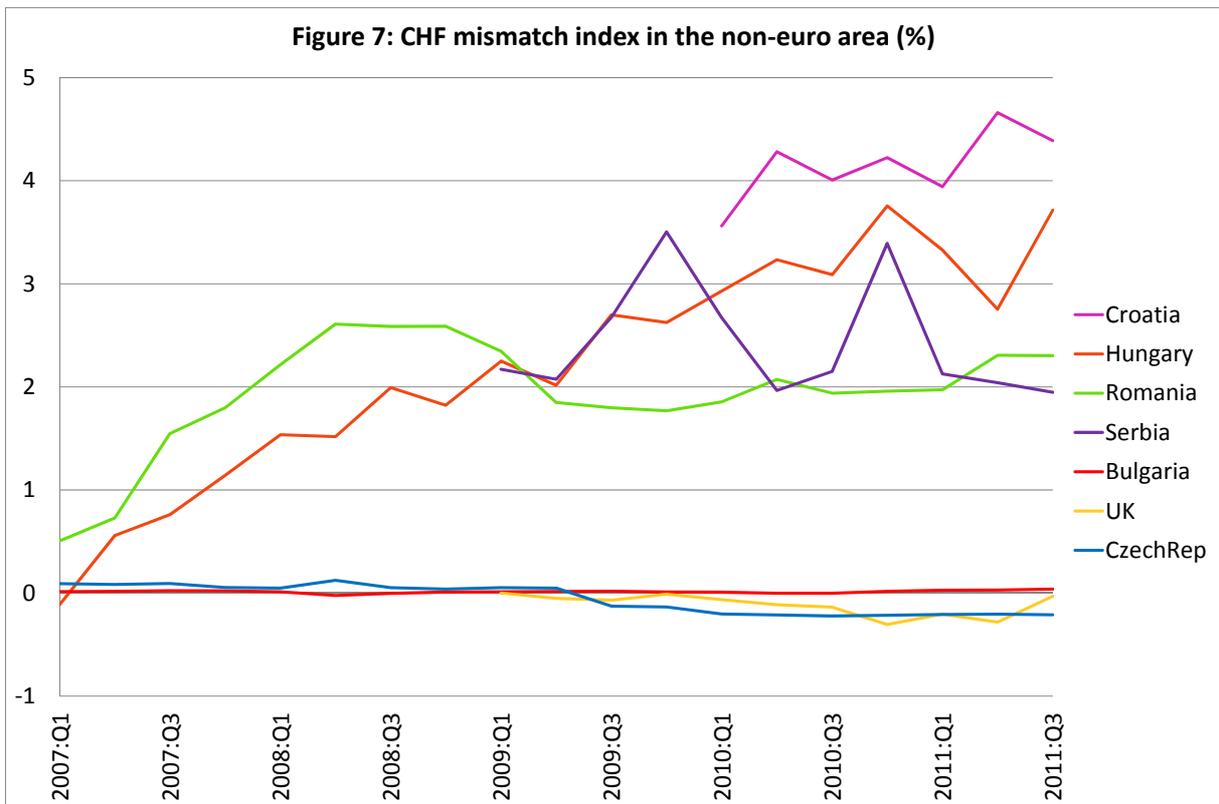
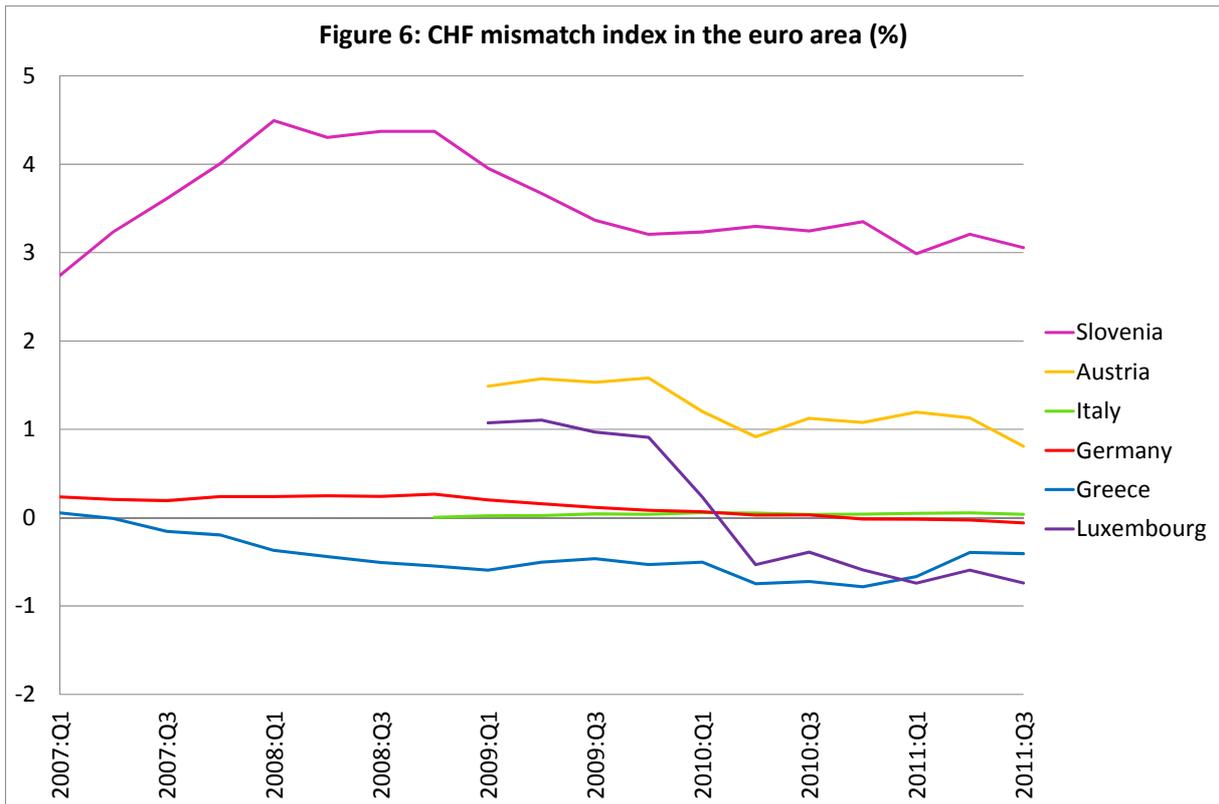
*Note:* CHF mismatch index is the sum of the following three components: net CHF liabilities, CHF loans to domestic households, and CHF loans to domestic non-financial corporations (all as a share of total assets)

The time evolution of systemic risk in Europe is displayed in Figures 4 and 5. Note that both the foreign currency mismatch index as well as the CHF mismatch index have been fairly persistent over time for most countries and do not show big fluctuations during the period they are available.

In Figure 4, the FX mismatch index shows an upward trend in a few countries in the first half of the sample period, such as Latvia, Bulgaria, Romania, and Poland. However, it remains fairly flat or declines slowly in the second half of the sample period. In the remaining non-euro area countries, it is fairly stable during the time period observed. Figure 5 similarly shows high persistence and low volatility of the FX mismatch index in the euro area, albeit at a much lower level of systemic risk.

Finally, Figures 6 and 7 depict the time evolution of the CHF mismatch index across Europe. Again persistency and low volatility of the systemic risk are present. A few countries, such as Croatia and Hungary, do show a slight upward trend in the CHF mismatch index over time; however, the CHF mismatch index remains at relatively much lower levels than the FX mismatch index during the sample period.





## 6. Conclusion and some policy implications

In this paper, I quantify the systemic risk in European countries due to foreign currency loans from a “common market shock” view. For this purpose I use data from the CHF Lending Monitor and build on the method suggested by Ranciere, Tornell and Vamvakidis (2010). These accurate, frequent, and detailed measurements of systemic risk in the form new currency mismatch indices may help policymakers to gauge the system-wide risks associated with foreign currency loans more accurately.

I find that in majority of the non-euro area countries, the systemic risk in the banking sector is very high: net unhedged foreign currency liabilities of the banking sectors correspond to more than 20% of their total assets as of 2011:Q3. However, net unhedged CHF liabilities are less than 5% of their total assets. Thus other foreign currency loans (probably denominated to a large extent in euros<sup>21</sup>) contribute to systemic risk far more than the CHF loans in Eastern Europe. Therefore switching the CHF-loans into euro loans in Eastern Europe, as it was recently suggested by the Hungarian Financial Supervisory Authority, would not eliminate the systemic risk due to foreign currency loans.

Furthermore, foreign currency mismatch indices show persistence and low volatility during the sample period they are available. Thus, short-term policies cannot have a strong impact in reducing systemic risk in Europe immediately. Encouragement of local currency borrowing can be a long-run solution, as recently promoted by the EBRD initiative.

A sectoral breakdown of systemic risk indicates that banks may be aware of the exchange-rate-induced credit risk they undertake when they lend to unhedged borrowers. That is evident from their balance sheets with significantly more foreign currency assets than foreign currency liabilities.

Last but not least, the role of the ECB as the “lender of last resort” within the EU needs to be discussed among the policymakers. In the non-euro area countries, where “eurozation” took place unofficially within the financial system before the formal adoption of euro, significant threats can suddenly materialize in the case of sharp exchange rate movements. A sizeable depreciation of Eastern European currencies vis-à-vis the euro can damage the balance sheets of banks resident in those countries irreversibly.

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<sup>21</sup> Further breakdown of currencies is not available in the CHF Lending Monitor, hence euro mismatch index in the non-euro area countries cannot be calculated separately.

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