

Currency substitution in CESEE: why do households prefer euro payments?

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This paper uses microdata from 2014 to examine the determinants of currency substitution in Central, Eastern and Southeastern European (CESEE) countries. To analyze the hysteresis of euroization in these countries, we combine the standard search-theoretic model of money demand with recent findings on the preference of CESEE households for saving in cash as well as with aspects of economic geography. In Southeastern Europe, unlike in Central and Eastern Europe, network externalities and lower trust in the local currency than in the euro are still important factors. Expectations that the local currency will depreciate, income in euro and the expectation of an official adoption of the euro are important explanatory factors for all CESEE countries. Despite the heterogeneity across the region, our results suggest that institutions and policies that foster trust are key to promote de-euroization.

JEL classification: E41, O16, D12, P34

Keywords: euroization, currency substitution, hysteresis, microdata, CESEE

CESEE countries have a long history of currency substitution, i.e. using foreign currency as a secondary currency. Before the introduction of the euro, these secondary currencies were the Deutsche mark, Austrian schilling and U.S. dollar. Unofficial euroization emerged in times of high inflation, currency crisis or banking crisis, as foreign currencies were used as a store of value and then, if the crisis deepened (e.g. hyperinflation or confiscation of savings deposits) and lasted longer, also as a medium of exchange.² It is well established in the literature on dollarization that de-dollarization does not necessarily occur, at least not fully, once macroeconomic stabilization has been achieved (e.g. Feige et al., 2002, for Latin America and Feige and Dean, 2004, for CESEE and the Commonwealth of Independent States). Economic agents continue to use the foreign currency for both savings and transactions. Calvo and Vegh (1992) first examined this ratchet effect and identified two potential explanations for this phenomenon: The first relates to an expected loss of purchasing power of the domestic currency due to expected depreciation or expected high inflation. Dollarization persists because economic agents continue to have doubts in the future stability of the domestic currency even if the exchange rate is currently stable or inflation is currently low. The second explanation relates to network externalities, which reduce the transaction costs associated with using the foreign currency. Network externalities are endogenous to the level of currency substitution, as economic agents in a multi-currency environment prefer the currency which is already being widely used (Craig and Waller, 2004). Hence, if dollarization reaches sufficiently high levels during periods of macroeconomic crisis, it will persist after the crisis because the foreign currency has become a well-established medium of exchange. Both explanations are essentially rooted in a loss of trust. Once trust is lost, it returns only very gradually (Hosking, 2014).

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² For a brief historical survey of how the euro came to the CESEE region, see Ritzberger-Grünwald and Scheiber (2012).

This paper contributes to examining the determinants of currency substitution in CESEE countries; in particular we aim to analyze the relative importance of the various explanations of why households prefer to receive certain payments in euro.

We do so by using microdata from the OeNB Euro Survey, a regularly conducted survey of individuals in CESEE. When comparing the results of the first wave of the OeNB Euro Survey in fall 2007 to 2014 data, we witness an ongoing decline in euro cash holdings per capita in Southeastern European (SEE)³ countries. This decline is associated in part with a portfolio reshuffling as SEE households substitute foreign currency deposits (which are mainly denominated in euro) for euro cash and in part with a decline in CESEE households' trust in the euro due to the sovereign debt crisis in the euro area (ECB, 2013). The question arises whether this decline in euro cash in circulation in CESEE countries has an impact on the importance of the individual determinants underlying the persistence of currency substitution in CESEE. In particular, we wonder whether the influence of network externalities has weakened. Furthermore, to our knowledge, at least Bosnia and Herzegovina, Croatia, the FYR Macedonia, Romania and Serbia have legal acts in place to restrict the use of foreign currency as a means of payment in their countries,⁴ which may have influenced the extent of euroization in these countries. There is also the possibility that survey data from these countries are distorted as respondents might not reveal their real preferences due to legal restrictions.

Our analysis is based on CESEE households' preference for receiving certain payments in euro rather than on information about their actual payment behavior, because asking people from a seller's perspective might reveal their real preference more reliably than asking them from a buyer's perspective (Valev, 2010). Camera et al. (2004) show that if a stable foreign currency is preferred over a risky local currency, people usually try to get rid of their local currency holdings and use this less trusted currency as much as possible for payments (*Gresham's Law*). In their model, the sellers of goods are reluctant to sell goods in exchange for risky currency, hence the prices of goods denominated in local currency will be higher, reflecting the risk assumed by the seller. Therefore we surveyed people's preference via a direct survey question: Respondents were asked what currency they prefer when they receive payments from a real estate sale, a car sale, a real estate rental agreement, and their salaries.⁵ Our approach is along the lines of Valev (2010).

What distinguishes the euroization experience in the CESEE region from e.g. the dollarization phenomenon in Latin America is EU integration in both institutional and economic terms. The progressive development of European value chains and the free movement of people within the EU and in part also with (potential) candidate countries are possible reasons why CESEE residents receive an increasing share of their income in euro. In this context, the possible adoption of the euro

³ Our sample comprises seven SEE countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the FYR Macedonia, Romania and Serbia.

⁴ Although restricted, there are explicit exemptions in most countries. For instance, Serbia allows the sale and lease of real estate in foreign currency, while Romania allows foreign currency transactions among residents for occasional operations.

⁵ Note that the survey question does not explicitly refer to cash transactions. The preference for receiving euro for certain payments might include cashless transactions as well.

as legal tender when their country joins the euro area might have an impact on households' preferences, too. Hence one might ask whether EU integration and changes in economic geography do in fact add new momentum in the formation of households' preferences for receiving certain payments in euro.

Our contribution aims at complementing recent research on euroization and focuses on an analysis of the determinants of currency substitution in CESEE economies. The starting point of our analysis are the insights of Valev (2010), who examined currency substitution and hysteresis for Bulgaria using survey data from 2003. First, we expand his conceptual framework by introducing more differentiated controls for monetary expectations (backward- and forward-looking measures of purchasing power risk), network externalities and transaction costs. Second, we add explanatory variables to control for respondents' preference for saving in cash, income in euro, expected adoption of the euro and economic geography. Third, the rich set of socioeconomic variables which the Euro Survey covers allows us to control for various aspects of the standard search-theoretic models of money demand. Finally, the sample comprises 10 CESEE economies, which differ substantially with respect to their catching-up process, exchange rate regimes, historical experiences, public and private institutions and the extent of euroization.

This paper is structured as follows: Section 1 introduces the dataset and presents descriptive results on the use of the euro as a means of payment, while section 2 specifies the conceptual framework. Section 3 draws a line from theory to our hypotheses and describes the empirical strategy we used based on the available data. Section 4 discusses the estimation results, and section 5 concludes.

1 Dataset and descriptive results

1.1 Data

We employ data from the OeNB Euro Survey, which collects information from individuals about their euro cash holdings, saving behavior and debt positions and looks into respondents' economic opinions, expectations and experiences. The survey, which comprises six EU Member States (Bulgaria, Croatia, the Czech Republic, Hungary, Poland and Romania), three EU candidate countries (Albania, the FYR Macedonia and Serbia) and the potential candidate country Bosnia and Herzegovina, has been conducted semiannually since fall 2007. For this study, we use data from the fall 2014 wave, which focused on currency substitution. In each country face-to-face interviews were carried out with about 1,000 randomly selected individuals aged over 14 years. The sample is representative with respect to age, gender and regional distribution.⁶ The annex provides a definition of the variables used (table A1) and summarizes the descriptive evidence by country (table A2).

1.2 Descriptive results: the euro as a means of payment in CESEE

Based on the results of the OeNB Euro Survey, we find that euro cash holdings are still widespread in CESEE countries. In Albania, Croatia, the Czech Republic, the FYR Macedonia and Serbia, euro cash holdings were quite common in fall 2014,

⁶ See <https://www.oenb.at/en/Monetary-Policy/Surveys/OeNB-Euro-Survey.html> for details.

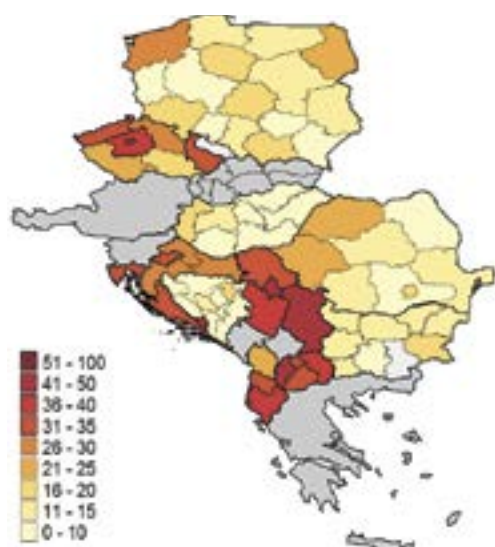
with an average share of above 24%. Furthermore, some regions that share a common border with euro area countries (e.g. some regions of the Czech Republic) or with Kosovo and Montenegro (both of which use the euro as legal tender), exhibit higher shares of euro cash holdings (see the left map of chart 1). However, the incidence of actual payments in euro is much lower across the CESEE region than euro cash holdings.⁷

Chart 1

Cash holdings in euro are more frequent than actual payments in euro

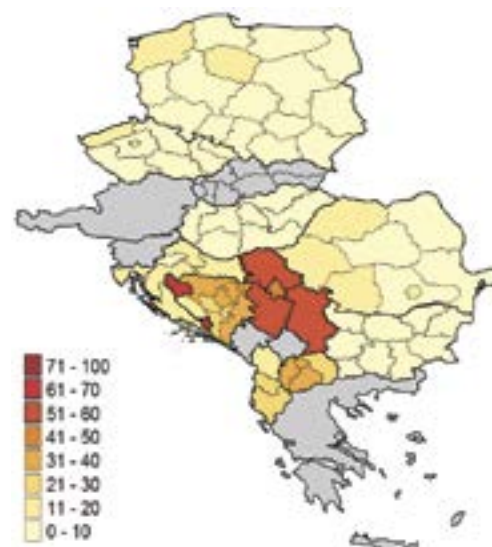
Cash holdings in euro

% of respondents



Actual payments in euro over last 6 months

% of respondents



Source: OeNB Euro Survey fall 2014.

Note: Regional averages calculated by the authors.

People in CESEE economies hold euro cash for a variety of reasons (chart 2). One main motive cited by respondents in all countries except the Czech Republic in fall 2014 was that they hold euro cash as a general reserve or as a precaution. Stix (2013) observed that people in CESEE countries generally have a preference for cash over interest-bearing assets. Besides hoarding, cash of course functions as a medium of exchange. Anecdotal evidence suggests that the euro is also used as a means of payment – e.g. real estate and cars are frequently paid for in euro. Some other purchases and rental prices are indexed to the euro. The salaries of employees at international companies are also regularly indexed to the euro (Ritzberger-Grünwald and Scheiber, 2012). According to Dvorsky et al. (2008), respondents in SEE mentioned that they occasionally use their euro cash hoardings for domestic payments while respondents in Central and Eastern Europe (CEE)⁸

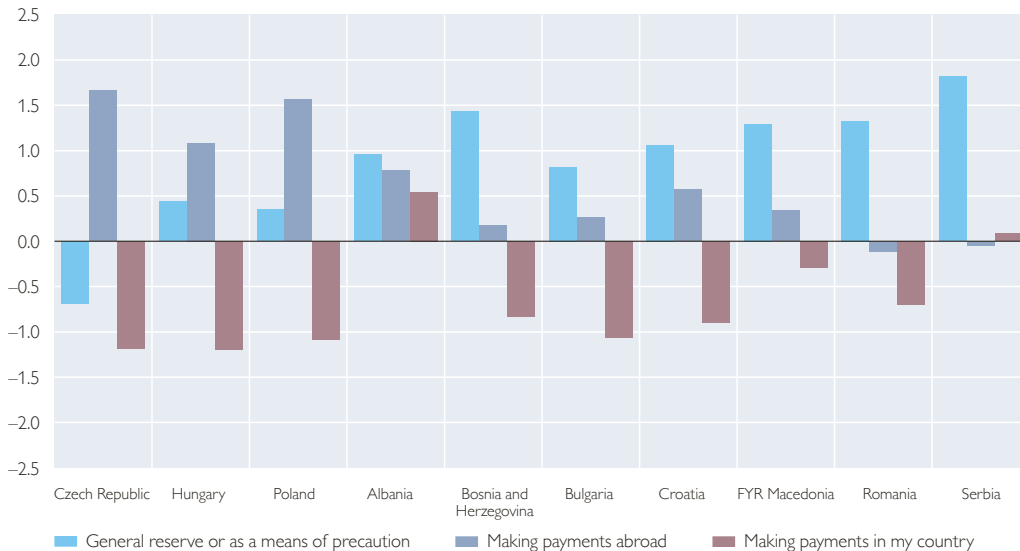
⁷ Bosnia and Herzegovina is somewhat puzzling in this respect: While reported euro cash holdings are relatively low, payments in euro are relatively frequent. One explanation could be that respondents are reluctant to reveal their euro cash holdings. Cashless payments and the indexation of prices to the euro could be another reason for the high level of payments in euro.

⁸ In this contribution, CEE refers to the Czech Republic, Hungary and Poland.

Chart 2

Motives for holding euro cash

Normalized sample means per country (–2.5 fully disagree, 0 neutral, +2.5 fully agree)



Source: OeNB Euro Survey, fall 2014.

Note: Respondents were asked whether they agree or disagree on a scale from 1 (fully agree) to 6 (fully disagree) with the following statements: "I hold euro cash ... as a general reserve or as a means of precaution," "...to make payments in [my country]" or "...to make payments abroad, for holidays." Respondents answering "don't know" or who gave no answer are excluded.

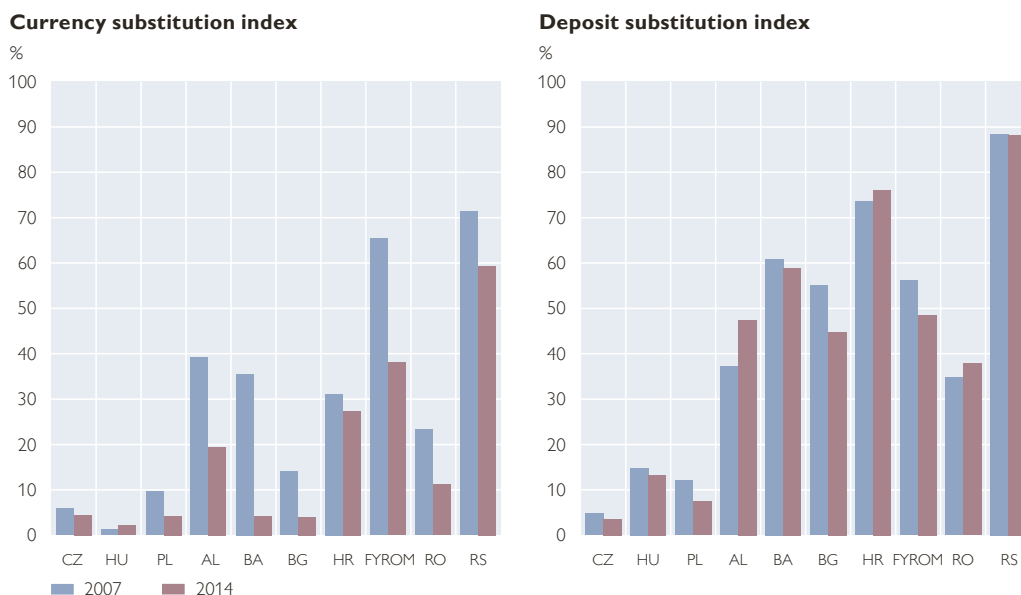
reported that they plan to spend their euro cash mainly abroad (data for 2007 and 2008). Since then, the motive of holding euro cash for domestic payments has become somewhat less important in SEE countries except for Albania.⁹

To highlight the change in importance of foreign currency on a macroeconomic scale, we draw on the currency substitution index and the deposit substitution index for CESEE introduced by Scheiber and Stix (2009). The currency substitution index is calculated as the ratio of euro cash divided by euro cash plus national currency in circulation, whereas the deposit substitution index is the ratio of foreign currency deposits to total deposits of the household sector. Chart 3 contrasts the index values of both indices for each country at two points in time (2007 and 2014).

The currency substitution index shows that currency substitution decreased significantly from 2007 in almost all countries under review. However, Serbia, the FYR Macedonia and Croatia still experience a high level of currency substitution. In Serbia the index value was still above 50% in 2014. Turning to the deposit substitution index in SEE, in 2014 the share of deposits denominated in foreign currency ranged from 37% in Romania to 88% in Serbia. Compared with 2007, deposit substitution increased substantially in Albania but decreased in the FYR Macedonia and particularly in Bulgaria; in the other SEE countries the deposit substitution index remained virtually unchanged. In Bulgaria and Bosnia and Herzegovina, which have a currency board against the euro, currency substitution decreased significantly from 2007 but deposit substitution is still substantial.

⁹ Due to space limitations, we did not include an additional chart on this issue. See Dvorsky et al. (2008) for 2007 and 2008 data.

Currency and deposit substitution indexes show different pictures



Source: OeNB Euro Survey, national central banks.

Note: Currency substitution index = ratio of euro cash to euro cash plus national currency in circulation (average of October and November).

Deposit substitution index = ratio of foreign currency deposits to total deposits of the household sector (annual average). For details see Scheiber and Stix (2009).

A different picture emerges for the CEE countries, where both the currency substitution index and the deposit substitution index are comparatively low. In particular the deposit substitution index draws a clear line between CEE and SEE countries in terms of usage of the euro.

The OeNB Euro Survey provides us with information on the extent to which the euro is used as a means of payment in CESEE (chart 4). We find that payment practices differ between the ten countries under review and between CEE and SEE countries. In Serbia and the FYR Macedonia more than 50% of respondents state that they use the euro as a means of payments and that they prefer to receive euro when they e.g. sell real estate. In other countries (Czech Republic, Poland, Hungary and Bosnia and Herzegovina), less than 5% of respondents indicate that they actually pay in euro. However, in almost all countries and for all kind of payments (real estate and car sale, rental income and salary) the preference for receiving payments in euro is much higher than the incidence of actual payments in euro. There are a few exceptions with regard to salary, though: In the Czech Republic, Bosnia and Herzegovina, the FYR Macedonia and Serbia, the actual incidence of payments surpasses the preference for salaries in euro.

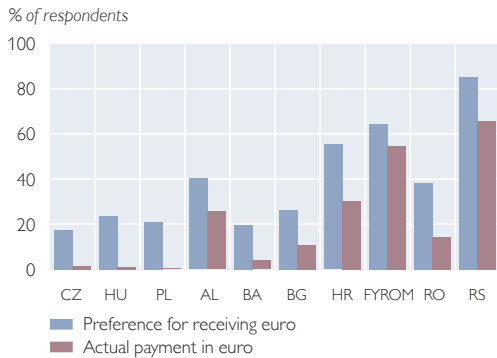
In addition, the OeNB Euro Survey allows us to differentiate between types of transactions (real estate sale, rental income, car sale and salary). We expect the results for transactions that are performed quite frequently, e.g. rental income or salary, to differ from those for rare transactions, e.g. real estate or car sale.

In light of the differences in motives for holding euro cash across countries and the overall level of euroization we decided to split the countries in two groups (CEE and SEE) for the regression analysis.

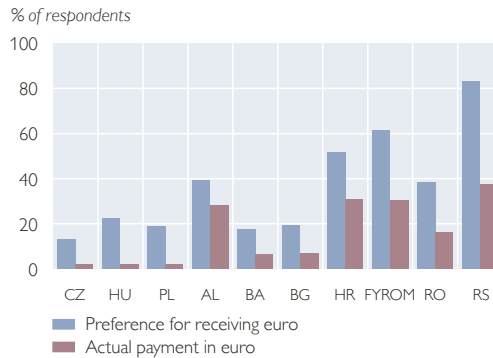
Chart 4

Preference for receiving euro for certain transactions vs. actual payment behavior

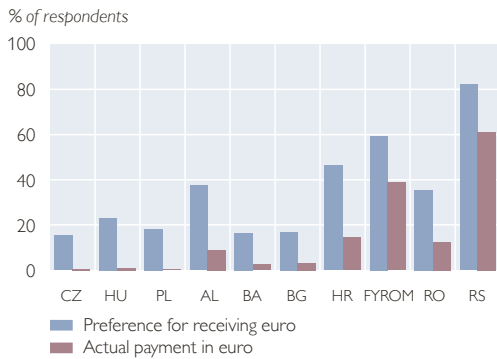
Real estate



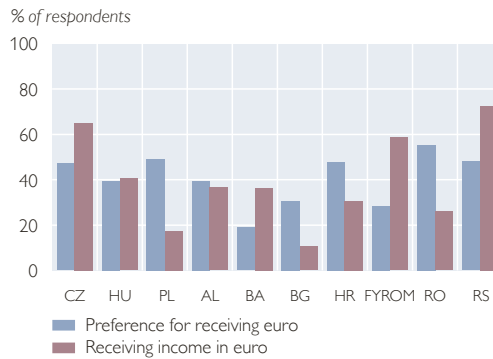
Car



Rent



Salary



Source: OeNB Euro Survey, fall 2014.

Note: The panels reflect answers to the questions if respondents prefer to receive payments in euro and in which areas they actually made payments in euro during the last six months. In the salary panel the binary information on receiving income in euro is derived from the reported share of total household income that the household received in euro over the last 12 months. All panels exclude respondents who answered "Don't know" or who gave no answer as well as respondents who indicated that they did not make such payments. Number of observations see annex A2.

2 Conceptual framework

Our aim is to model people’s preference for receiving certain payments in euro, and we propose a simple conceptual framework to help us choose the right explanatory variables. This framework combines findings from search-theoretic models of money demand, which stress the role of purchasing power risk, transaction cost and associated network externalities in explaining the hysteresis of currency substitution, with recent findings on the preference of CESEE households for saving in cash (Stix, 2013). Furthermore, our framework controls for the geographical dimension of economic activity in the region, which might give rise to additional factors driving the euroization of transactions in CESEE not captured so far in the theoretical models of currency substitution.¹⁰

¹⁰ Although we present the three elements of the model framework as separate, they are closely connected. Money serves as a medium of exchange and as a store of value. The latter function connects people’s payment behavior with the two saving decisions taken by households in a dollarized economy. While Stix (2013) examined the decision of cash vs. bank deposits, Brown and Stix (2015) look at the households’ currency choice regarding their savings deposits, which is again strongly influenced by monetary expectations and network externalities. Developing a fully-fledged model which incorporates all these elements in a unified framework is beyond the scope of this paper.

The role of purchasing power risk, transaction costs and associated network externalities

Tandon and Wang (2003), Craig and Waller (2004), Camera et al. (2004) and Engineer (2000) apply search-theoretic considerations to model the demand for money in a dual-currency economy. In these models two main factors explain the extent of the dollarization of transactions: the purchasing power risk associated with using the local currency and the transaction costs associated with using the foreign currency.¹¹ Accepting the local currency in transactions is perceived as risky because it might lose its value before it can be exchanged for goods.¹² Therefore, persistent expectations of currency depreciation lead to a persistent dollarization of transactions. However, the local currency does not disappear completely in these models but remains a viable medium of exchange because using the foreign currency entails transaction costs (e.g. non-zero time cost of holding money, shoe leather cost, conversion cost, counterfeit risk or information cost). Hence, multiple equilibria are possible if people's beliefs about the value of a currency as a store of value and medium of exchange affect its actual use (Craig and Waller, 2000; Camera et al., 2004). This theoretically derived partial acceptance of currencies reflects a widely observed feature in many developing and transition economies with dual currencies, in particular if the use of the foreign currency is illegal (Craig and Waller, 2000).

Interestingly, de-dollarization might not occur automatically after credible macroeconomic stabilization.¹³ Uribe (1997) argues that due to network externalities, the cost of transacting in foreign currency decreases with a rise in the level of currency substitution. The foreign currency can become widely used because economic agents believe it is useful as a medium of exchange. Similarly, Craig and Waller (2004) argue that the more often a currency is used, the more likely it will be accepted in transactions, thereby increasing its appeal as a medium of exchange. As a result, its use as a medium of exchange essentially becomes a social convention. Feige et al. (2002), Feige (2003), Feige and Dean (2004), Reding and Morales (2004), Oomes (2005), Kumamoto and Kumamoto (2008) and Valev (2010) provide empirical evidence of the hysteresis of dollarization by showing for various countries that network externalities are one key factor explaining why a foreign currency will continue to be used long after the episode of instability has ended.

Summing up, the empirical literature confirms two independent effects which can contribute to the hysteresis of dollarization: First, the history of exchange rate instability or high inflation in a country feeds into expectations of future instability. Second, network externalities decrease the transaction cost associated with using the foreign currency, i.e. the foreign currency will be preferred if it is already being widely used.

¹¹ An increase in purchasing power risk leads to greater currency substitution and hence stronger demand for foreign currency. For a given level of currency risk, an increase in transaction cost lowers the level of currency substitution and hence leads to weaker demand for foreign currency.

¹² For example, Craig and Waller (2004) and Camera et al. (2004) model purchasing power risk as a random government tax on domestic money holdings.

¹³ For example, when the exchange rate has been re-pegged successfully, even if the peg is fully credible (Bulgaria), or after a successful transition from inflation taxation to inflation targeting (Croatia, Serbia); also, deposit substitution and currency substitution may follow different paths (see chart 3).

Preference for saving in cash

Money serves as a store of value and as a medium of exchange. Hence currency substitution also impacts savings decisions. Engineer (2000) analyzed the role of transaction costs in an economy with competing fiat currencies. The model predicts that the low-transaction-cost currency (domestic currency) is used for everyday purchases, whereas the low-growth-rate currency (foreign currency) fills the precautionary demand for money and has a lower velocity of circulation, i.e. foreign currency is hoarded as a store of value and used to make occasional large payments. In his analysis of why CESEE households hold sizeable shares of their assets in cash at home rather than at banks, Stix (2013) finds that a lack of trust in banks, memories of past banking crises and weak tax enforcement are important factors in explaining respondents' preference for saving in cash. Moreover, the preference for cash is stronger in dollarized economies where a "safe" foreign currency serves as a store of value.

Controlling for economic links with the euro area

Our dataset comprises six EU Member States and four (potential) candidate countries. The very close economic links between the CESEE region and the euro area might give rise to additional factors that drive currency substitution in CESEE but have not been captured in theoretical models of currency substitution so far. Respondents who live in relatively close proximity to the euro area, Kosovo or Montenegro (both of which have unilaterally introduced the euro as their sole legal tender), are more likely to be involved in cross-border economic activities such as travelling, temporary labor migration, or cross-border commuting. The OeNB's Euro Survey data confirm that 8.2% of respondents receive all or parts of their household income in euro. Balance of payments statistics underpin the importance of remittances and factor incomes from abroad. Although there is no strong theoretical justification to do so, we expect that these cross-border activities will have a positive influence on respondents' preference for receiving certain payments in euro. Additionally, we presume that respondents who expect their country to adopt the euro as legal tender within the next decade will have a higher preference for payments in euro.

3 Empirical hypotheses, definition of explanatory variables and empirical strategy

3.1 Purchasing power risk

Against the background of the findings of Brown and Stix (2015) we refine Valev's "hypothesis 2" on the role of purchasing power risk. Brown and Stix show that deposit euroization in the CESEE region is strongly related to individual monetary expectations and network effects. In particular households that expect a depreciation of the local currency over the next year or have little trust in the long-term stability of the local currency are more likely to prefer foreign currency deposits. Moreover, deposit euroization in the CESEE region has been strongly influenced by past financial crises as well as current policies and institutions. Hence, the monetary expectations that drive euroization exhibit both a forward- and a backward-looking dimension. Drawing on these findings, we formulate the following two hypotheses.

Hypothesis 1a along the lines of Valev (2010): *The euro will be preferred by economic agents who expect the local currency to depreciate (forward-looking approach).*

We use respondents' expectations regarding the depreciation of the local currency vis-à-vis the euro over the next five years as a measure of the forward-looking dimension of purchasing power risk.

Hypothesis 1b: *The euro will be preferred by economic agents who place higher trust in the euro than in their respective domestic currency (backward-looking).*

According to Beckmann and Scheiber (2012, table 4), the variable of relative trust in the euro is significantly correlated to respondents' memory of past periods of high inflation. Hence, it mainly captures the backward-looking component of purchasing power risk.

3.2 Transaction costs

Valev (2010) showed that people in small villages are more likely to face binding trade frictions and therefore appreciate the comparatively lower transaction costs of the local currency. Therefore, we derive two hypotheses on the transaction costs associated with using the foreign currency.

Hypothesis 2a: *The euro will be less preferred by economic agents who face higher trade frictions, i.e. who live in places that lack basic banking and payment infrastructures.*

Hypothesis 2b: *If the economy is already highly euroized, then a rise in conversion costs will increase the demand for foreign currency (Craig and Waller, 2000).*

Our rich dataset allows us to control for different kinds of transaction costs or dimensions of payment and banking infrastructures.

First, similarly to Valev (2010), we can control for trade frictions by employing data on whether the respondent resides in a small town. Alternatively, as a proxy for a possible lack of a basic financial infrastructure at the place of residence, we employ information gathered by the interviewer or the survey institute about whether an ATM is available at a specific primary sampling unit. If there is no ATM available at the place of residence, we presume a higher likelihood of binding trade frictions.

Second, access to basic banking services has improved in CESEE countries over the last decade, even in rural places. According to our survey data, an average 70% of respondents owned a current account in fall 2014. Still, there are substantial differences in the incidence of current accounts among CESEE countries, ranging from only 30% in Albania to 95% in Croatia. A current account should essentially reduce transaction costs compared with cash hoarding, which would imply a negative relation with respect to the dependent variable.¹⁴

Third, foreign currency deposits essentially shield the respondents' savings against currency risk. We expect a positive correlation between the preference for receiving payments in euro and foreign currency deposits – people who hold foreign currency deposits are both concerned about exchange rate risk and prepared to receive euro payments.

Fourth, we can employ a direct measure of conversion costs.

Fifth, access to banking services also comprises a subjective component of distance to the nearest bank branch. Respondents were asked how much they

¹⁴ We are drawing on the stylized fact that households' current accounts are predominantly denominated in the local currency.

agree with the statement “For me it takes quite a long time to reach the nearest bank branch” using a six-point Likert scale. Stix (2013) found a significant positive effect of respondents’ subjective distance to the nearest bank on their preference for saving in cash.

3.3 Network externalities

Drawing on the literature and in particular on the empirical study by Valev (2010) on the hysteresis of currency substitution in Bulgaria, we can formulate two hypotheses regarding the impact of network externalities on economic agents’ preference for receiving certain payments in euro. First, hypothesis 3a, which is analogous to Valev’s hypothesis 1: *The [euro] will be preferred by economic agents who believe that the [euro] is already widely used [for domestic payments] in the economy.*

In order to test hypothesis 3a, we use a subjective measure of network externalities, which relies on a direct survey question. Respondents were asked how much they agree with the statement “In my country it is very common to make payments in euro.” on a six-point Likert scale. Beliefs are important in motivating behavior. Yet Brown and Stix (2015), who use the same survey question for measuring network externalities, argue that the measure based on individual beliefs is an imperfect proxy for network effects for two reasons. First, the reference group in the question is not the relevant peer group of the respondent’s potential trading partners. Second, the responses may be influenced by a self-serving bias because people are inclined to infer from their own behavior what others will do. Therefore we refine hypothesis 3a into hypothesis 3b: *The euro will be preferred by economic agents who live in neighborhoods where the euro is already widely used for domestic payments.*

In order to overcome these shortcomings, we constructed an alternative and more objective measure of network effects based on the actual behavior of a narrower reference group. To this end, we used the geographic coordinates of the primary sampling units to construct a spatial weights matrix according to the *k nearest neighbors* concept (LeSage and Pace, 2009) with *k* equal to 20. Then we calculated the first order spatial lag of the frequency of actual payment in euro of the *k* nearest neighbors.¹⁵ The average distance between the 20th neighbor and the respondents amounts to 60 km, which seems to be a plausible distance for defining a relevant peer group of potential trading partners.¹⁶ Note that, by definition, the respondents’ own payment behavior is excluded from the calculation of the spatial weights matrix, in order to clearly separate network effects on the dependent variables from respondents’ own actual payment behavior. We also control for the latter effect (cf. variable of actual payments in euro).

The objective network effects variable is an index which increases both with the number of neighbors who reported domestic payments in euro over the past six months and with the frequency of domestic payments in euro, which is operationalized in three categories. Therefore the index ranges from 0 to 60, where the

¹⁵ We used the Stata module *spwmatrix* (Jeanty, 2010b) to generate the spatial weights matrix and the Stata module *spagvar* (Jeanty, 2010a) to generate the spatially lagged variables.

¹⁶ Primary sampling units are selected via a multistage stratified random sample procedure, which implies that the sample is representative with respect to the regional and sub-regional distribution of the population as well as with respect to the distribution between rural and urban areas. Hence any variations in average distances for each observation to the 20 nearest neighbors should capture the true variation in distances in each country.

upper bound implies that all 20 neighbors report the highest frequency. The empirical sample range is from 0 to 37. For reasons of presentation, we rescaled the variable into an index ranging from 0 to 100. Chart 5 illustrates the subjective and objective measures of network externalities calculated as the mean over each region.

Chart 5

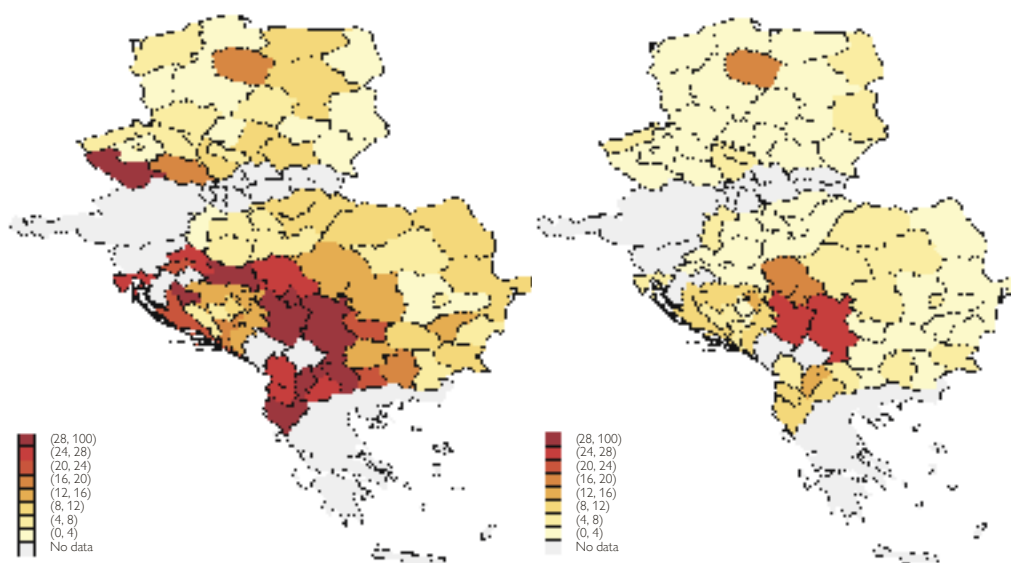
Measures of network externalities

Subjective measure based on individual beliefs

% of respondents (common to pay in euro)

Objective measure based on actual payment behavior of 20 nearest neighbors

Index=100



Source: OeNB Euro Survey fall 2014.

Note: Regional averages calculated by the authors.

3.4 Preference for cash

In order to control for respondents' preference for saving in cash, we use a direct survey question which served as a dependent variable in the analysis of the preference for saving in cash by Stix (2013). According to Stix, the variable captures the lack of trust in banks, memories of past banking crises and weak institutions. In addition we explicitly control for weak tax enforcement, as payments in foreign currency might also be motivated by tax evasion considerations.

3.5 Economic geography and economic links with the EU

The following three variables control for different aspects of economic geography and economic links with the EU. The first variable is the distance from the respondent's place of residence¹⁷ to the border of the nearest country which uses the euro as legal tender, i.e. the countries of the euro area as well as Kosovo and Montenegro. The second variable is income in euro,¹⁸ which encompasses all kinds of labor and capital income, pension payments, as well as remittances; and the third variable is respondents' expectations regarding the adoption of the euro in their respective country.

¹⁷ Specifically, the geographic coordinates of the primary sampling unit to which the respondent belongs.

¹⁸ Note that the variable covers income in euro from both domestic sources and abroad.

3.6 Socioeconomic variables

In addition to the theoretically informed variables, the Euro Survey allows us to control for household-level socioeconomic characteristics which are likely to affect the demand for foreign currency. With regard to the search-theoretic models of money demand, we control for income level, education, financial literacy, age and gender. With regard to transaction and precautionary demand, we additionally control for household size, the respondent's employment status, wealth,¹⁹ whether the respondent is in charge of household finances and risk aversion based on self-assessment. The definitions and summary statistics of all control variables are presented in the annex (table A1 and A2).

3.7 Empirical strategy

We estimate probit regressions with four variables of preference for receiving certain payments in euro as the dependent variable.

Our sample is characterized by strong regional heterogeneity. We control for potentially important institutional variables which describe between-country differences by including country-specific fixed effects. This focuses our analysis on regional as well as interpersonal differences in the preference for receiving certain payments in euro.

The dataset contains 1,214 primary sampling units. All reported estimation results are based on standard errors which account for clustering at the level of the primary sampling units.

4 Results

4.1 SEE economies

Table 1 presents the average marginal effects of the determinants of respondents' preference for receiving certain payments in euro. Columns 1 to 4 refer to the specification which uses the subjective measure of network externalities (which, in turn, is based on direct responses to the question whether it is very common to make payments in euro). Columns 5 to 8 refer to the specification which uses the objective measure of network externalities based on the actual payment behavior of the respondents' 20 closest neighbors. Our results for the socioeconomic variables of age, gender and income assemble the stylized facts from the empirical literature on euroization and in particular on currency substitution (e.g. Valev, 2010; Stix, 2013; Brown and Stix, 2015).

¹⁹ The dataset does not include a direct measure of household wealth. As an alternative, we use a proxy variable which relies on the interviewer's assessment of the condition of the respondent's house compared to houses in the neighborhood. For details, see table A1 in the annex.

Table 1

Determinants of preferences for receiving certain payments in euro – Southeastern European economies

	I	II	III	IV	V	VI	VII	VIII
	Real estate	Car	Rent	Salary	Real estate	Car	Rent	Salary
Actual payments in euro	0.154*** (0.023)	0.152*** (0.021)	0.143*** (0.020)	0.094*** (0.017)	0.145*** (0.021)	0.143*** (0.020)	0.137*** (0.020)	0.078*** (0.016)
Subjective measure of network externalities	0.064*** (0.018)	0.057*** (0.017)	0.065*** (0.017)	0.051*** (0.015)				
Objective measure of network externalities					0.002 (0.001)	0.002* (0.001)	0.002 (0.001)	0.003*** (0.001)
Expected depreciation	0.046*** (0.017)	0.045*** (0.016)	0.063*** (0.017)	0.068*** (0.015)	0.047*** (0.017)	0.045*** (0.016)	0.061*** (0.016)	0.063*** (0.014)
Relative trust: euro vs. local currency	0.072*** (0.015)	0.071*** (0.015)	0.072*** (0.015)	0.068*** (0.014)	0.074*** (0.015)	0.071*** (0.014)	0.072*** (0.015)	0.069*** (0.014)
Relative trust: don't know/no answer	0.035 (0.021)	0.032 (0.021)	0.001 (0.022)	0.034* (0.020)	0.029 (0.020)	0.029 (0.020)	-0.003 (0.021)	0.030 (0.019)
Cash preference	-0.000 (0.010)	-0.004 (0.010)	0.002 (0.010)	-0.011 (0.009)	0.000 (0.009)	-0.004 (0.009)	0.002 (0.009)	-0.011 (0.009)
Cash preference: don't know/no answer	-0.025 (0.039)	-0.007 (0.039)	-0.018 (0.036)	-0.097*** (0.034)	-0.027 (0.038)	-0.003 (0.037)	-0.027 (0.035)	-0.089*** (0.031)
Expensive conversion	0.047*** (0.017)	0.035** (0.017)	0.050*** (0.017)	0.027* (0.015)	0.045*** (0.017)	0.033* (0.017)	0.050*** (0.016)	0.027* (0.015)
No ATM in town	-0.036 (0.024)	-0.049** (0.024)	-0.053** (0.025)	-0.056** (0.024)	-0.040* (0.024)	-0.052** (0.023)	-0.056** (0.024)	-0.061*** (0.023)
Current account and/or debit card	0.007 (0.018)	0.009 (0.018)	0.008 (0.018)	-0.030* (0.018)	0.011 (0.017)	0.009 (0.017)	0.009 (0.017)	-0.026* (0.015)
Foreign currency deposits	0.097*** (0.031)	0.078*** (0.029)	0.065** (0.027)	0.074*** (0.025)	0.096*** (0.030)	0.077*** (0.029)	0.065** (0.027)	0.077*** (0.024)
Subjective distance to nearest bank	0.006 (0.005)	0.010** (0.005)	0.007 (0.005)	0.002 (0.005)	0.005 (0.005)	0.009* (0.005)	0.006 (0.005)	0.003 (0.005)
Common to pay cash to avoid tax	0.020 (0.017)	0.023 (0.017)	0.030* (0.018)	0.009 (0.017)	0.024 (0.018)	0.026 (0.017)	0.032* (0.018)	0.011 (0.017)
Common to pay cash to avoid tax: don't know/no answer	0.004 (0.032)	0.018 (0.032)	0.003 (0.033)	-0.003 (0.027)	0.008 (0.030)	0.035 (0.029)	0.012 (0.030)	0.011 (0.026)
Distance to nearest euro border incl. KO, ME	-0.005*** (0.002)	-0.004** (0.002)	-0.003* (0.002)	0.001 (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.003 (0.002)	0.001 (0.002)
Income in euro	0.088*** (0.023)	0.101*** (0.023)	0.109*** (0.022)	0.082*** (0.021)	0.087*** (0.023)	0.099*** (0.022)	0.105*** (0.021)	0.072*** (0.020)
Expected euro adoption	0.036** (0.015)	0.033** (0.015)	0.026* (0.015)	0.050*** (0.014)	0.038** (0.015)	0.033** (0.015)	0.027* (0.015)	0.047*** (0.014)
Age (decades)	0.087*** (0.028)	0.048* (0.027)	0.093*** (0.028)	0.001 (0.027)	0.083*** (0.027)	0.047* (0.026)	0.089*** (0.027)	-0.017 (0.027)
Age squared	-0.011*** (0.003)	-0.007** (0.003)	-0.011*** (0.003)	-0.002 (0.003)	-0.011*** (0.003)	-0.007** (0.003)	-0.011*** (0.003)	-0.000 (0.003)
Female	-0.030** (0.012)	-0.042*** (0.012)	-0.024* (0.012)	-0.041*** (0.011)	-0.032*** (0.012)	-0.042*** (0.012)	-0.026** (0.012)	-0.041*** (0.010)
High income	0.096*** (0.024)	0.077*** (0.023)	0.048** (0.022)	0.057*** (0.021)	0.095*** (0.023)	0.077*** (0.022)	0.051** (0.022)	0.058*** (0.020)
Medium income	0.060*** (0.021)	0.045** (0.020)	0.042** (0.020)	0.026 (0.018)	0.051** (0.020)	0.039* (0.020)	0.039* (0.020)	0.022 (0.018)
Income: don't know/no answer	0.067*** (0.023)	0.063*** (0.023)	0.056** (0.023)	0.063*** (0.022)	0.068*** (0.023)	0.063*** (0.022)	0.061*** (0.022)	0.062*** (0.021)
House in better condition	0.022 (0.016)	0.029* (0.016)	0.027* (0.016)	0.026* (0.015)	0.025 (0.016)	0.033** (0.015)	0.028* (0.015)	0.030** (0.014)
House in poorer condition	-0.000 (0.025)	-0.008 (0.025)	-0.013 (0.025)	0.012 (0.022)	0.006 (0.025)	-0.001 (0.025)	-0.008 (0.025)	0.023 (0.021)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-2,902.5	-2,868.8	-2,840.6	-2,747.4	-3,033.6	-3,001.6	-2,969.4	-2,873.8
Pseudo-R2	0.19	0.20	0.20	0.11	0.19	0.21	0.20	0.11
Wald Chi2(44)	647.53	707.50	619.09	407.65	662.91	724.09	656.56	412.24
Number of observations	5,150	5,201	5,155	5,402	5,404	5,464	5,413	5,694
P(DepVar=1)	0.51	0.48	0.45	0.26	0.50	0.47	0.44	0.25

Source: Authors' estimations.

Note: Average marginal effects from probit models; standard errors are adjusted for potential clustering at the level of the primary sampling unit and reported in parentheses. ***, **, * denote that the marginal effect is statistically different from zero at the 1%, 5% and 10% level, respectively. For a definition of the main variables, see annex table A1. P(DepVar=1) denotes the unconditional sample probability of the respective dependent variables. All regressions include country fixed effects. Dummies for education, risk aversion, head of household finances, household size, children, and employment status as well as the indicator variable for financial literacy are not shown. The sample for Southeastern Europe comprises Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the FYR Macedonia, Romania and Serbia.

Network externalities

First, respondents' actual payment behavior over the past six months shows a significant positive link with their preferences in both specifications. It turns out to be a key explanatory variable and underlines that actual behavior tends to be consistent with preference. Of course, the endogeneity issue with respect to this variable impedes causal interpretation, since preference might also impact actual behavior.

Second, regarding the subjective measure of network externalities, reported experience has a strong, positive and significant effect on respondents' preferences. These results are in line with the findings of Valev (2010) for Bulgaria and confirm hypothesis 3a. The average marginal effects of network externalities have about two-fifths to one-half the strength of the marginal effects of respondents' actual behavior. Interestingly, the variation between the four different dependent variables is rather small. A discrete switch of the subjective measure from 0 to 1 increases the probability of a preference for payments in euro by about 5 to 7 percentage points on average.²⁰ These results seem to rebut the prediction by Engineer (2000), who stated that network externalities will be smaller for everyday purchases (regular transactions) than for the occasional sale of high-value goods.

Third, the objective measure of network effects based on the actual behavior of the geographically closest 20 neighbors exhibits a significant positive effect on people's preference for both frequent transactions (salary) and occasional car sales but not for rental income and real estate sales. These results confirm hypothesis 3b for two items but disprove Engineer (2000) again, as the network effects for smaller everyday transactions are not smaller than those for occasional sales of high-value goods.

At first sight, the size of the average marginal effect looks small. For reasons of comparison, it is more informative to calculate the conditional marginal effect at the mean. For instance, for the dependent variable of the car sale, we obtain an objective network effect at the mean of individual responses of roughly 8. Doubling the index score to 16 would increase the preference for receiving the revenue of a car sale in euro by about 8 percentage points, which is about two-fifths the size of the conditional actual payment effect of 20 percentage points.²¹ Hence estimation results for both specifications confirm that there are still significant network externalities at play in the SEE countries.²²

Country dummies in both specifications indicate high heterogeneity across the group of euroized countries. *Vis-à-vis* the base category Bulgaria, especially Croatia, the FYR Macedonia, Romania and Serbia exhibit significant positive country fixed effects. An analysis of the variance of the objective network effect variable shows that between-country variation is significantly larger than within-country variation. This dominance of the between variation in a pooled estimation framework implies that country-specific differences in the objective network effect variable will be partly captured by country fixed effects rather than

²⁰ Conditional marginal effects at the mean range between 6% and 10% with overlapping confidence intervals.

²¹ For real estate sales and rental income, the respective probability would increase by 8 percentage points; for salary, the increase in probability would be weaker at about 3 percentage points.

²² The results of a simple linear model with the same specifications give confidence that the results do not rely on the choice of marginal effects.

by the explanatory variable alone. Hence estimating the actual extent of network externalities for each country individually seems to be appropriate for deriving policy advice.²³

Purchasing power risk

Looking at hypotheses 1a and 1b on purchasing power risk, we find a significant positive impact of both factors, i.e. the rather forward-looking expectations of local currency depreciation and the rather backward-looking measure of relative trust in the euro vis-à-vis the local currency. Furthermore, the average marginal effects across both specifications are of similar size. Concerning the first specification (columns 1 to 4), the sums of the marginal effects of both explanatory variables of purchasing power risk are still smaller than the average marginal effect of the actual payment behavior variable, except for salary.

Looking at the results for the expected depreciation variable, we observe higher magnitudes of average marginal effects for rent and in particular salary than for occasional sales of cars or real estate in both specifications. This seems plausible as rent and salary payments are typically more exposed to purchasing power risk than occasional sales of high-value goods. It fits our anecdotal evidence of rent indexing in some SEE countries, too.

By contrast, the marginal effects of the rather backward-looking measure of relative trust are of similar size across all four dependent variables in both specifications. Moreover, the marginal effects of the relative trust variable are larger than those of the respective expected depreciation variable, except for salary (column 4). The legacy of past financial crises still seems to exert a significant influence on the formation of currency preferences for transactions in SEE countries. This result confirms findings from the euroization literature on the importance of trust and crisis experiences in shaping saving behavior in the CESEE region (e.g. Brown and Stix, 2015; Stix, 2013; Mudd et al., 2010).

Transaction costs

The results highlight the role of conversion costs and of basic payment and banking infrastructures, which confirms hypotheses 2a and 2b. As expected, the lack of a basic payment infrastructure as measured by the “no ATM in town” dummy dampens the preference for receiving certain payments in euro, except for real estate sales. Similarly, higher conversion costs lead to a higher preference for receiving payments in euro, even for real estate sales. The magnitude of the marginal effects is rather small in both specifications. The preference for local currency turned out to be stronger for regular income streams, which are mainly used to finance everyday purchases. Comparing Valev’s estimates for 2003 with our estimates for 2014, we find that these relations have clearly weakened. The corresponding tables are available from the authors upon request.

Furthermore, owning a current account reduces the preference for receiving payments in euro only with respect to salary, while holding foreign currency deposits yields a positive and significant impact on the preference for euro for all dependent variables.

²³ Country-specific estimation results are available from the authors upon request. Although country estimates have fewer observations, the estimates remain relatively precise.

Finally, the measure of subjective distance to the nearest bank turns out to be almost irrelevant, which ties in with the stylized fact that the banking infrastructure has been expanded even into rural areas of CESEE. Overall, these results are in line with Brown and Stix (2015), who show that deposit euroization is largely demand driven and not a consequence of constrained access to banking services in local currency. Many CESEE households have access to banks and a broad range of savings products both in local and foreign currency, which weakens the role of transaction costs associated with using the foreign currency.

No role for cash preference and tax avoidance, but economic geography matters

In contrast to Stix (2013), we do not find evidence that the preference for saving in cash or weak tax enforcement influence the preference for receiving certain payments in euro.

Interestingly, though, all three explanatory variables controlling for aspects of economic geography seem to have an impact on respondents' preferences.

First, income in euro has a strong, positive and significant impact on the preference for receiving certain payments in cash. The average marginal effect ranges between 7 and 11 percentage points.

Second, we find evidence that the preference for receiving certain payments in euro decreases with the distance from the respondent's place of residence to the border of the nearest country that uses the euro as legal tender, which points to some importance of cross-border activities. The average marginal effect is up to -4 percentage points per 100 km distance for real estate and car sales; the results are mixed for rental income and no significant effect can be found for salary income.

Third, we confirm that respondents who expect their country to adopt the euro as legal tender within the next decade have a higher preference for receiving certain payments in euro (3 percentage points); for salary the marginal effect is somewhat stronger.

Interaction of basic payment and banking infrastructure and depreciation expectations

Valev (2010) finds for Bulgaria that expected devaluation decreases the preference for payments in Bulgarian lev only if respondents reside in small towns and villages.²⁴ Valev presumes that this effect is related to a lack of experience in using the foreign currency and to higher transaction costs due to missing payment and banking infrastructures. Including an interaction term of basic payment and banking infrastructure ("no ATM in town") and depreciation expectations in our specifications for SEE leads to the expected negative average marginal effect of the interaction term, reflecting the higher transaction costs (see table 2), yet the effect is not significant. Furthermore, the marginal effects of the expected depreciation variable remain highly significant, while the influence of the "no ATM in town" dummy disappears. These findings corroborate the prior conclusion that the prevailing currency substitution is mainly demand driven. Interestingly, the tests for the joint significance of the partial effect of expected depreciation and the

²⁴ Moreover, the results of the respective specifications show that respondents in small towns and villages prefer the local currency and that devaluation expectations have no significant effect on currency preference.

interaction effect turn out to be highly significant, indicating that depreciation expectations increase the preference for foreign currency, even in places lacking basic payment and banking infrastructures.

Table 2

Interaction of depreciation expectations and basic payment and banking infrastructures – Southeastern European economies

	I	II	III	IV	V	VI	VII	VIII
	Real estate	Car	Rent	Salary	Real estate	Car	Rent	Salary
Actual payments in euro	0.153*** (0.023)	0.151*** (0.021)	0.142*** (0.020)	0.093*** (0.017)	0.144*** (0.021)	0.142*** (0.020)	0.136*** (0.020)	0.077*** (0.016)
Subjective measure of network externalities	0.064*** (0.018)	0.057*** (0.017)	0.065*** (0.017)	0.051*** (0.015)				
Objective measure of network externalities					0.002 (0.001)	0.002* (0.001)	0.002 (0.001)	0.003*** (0.001)
Expected depreciation	0.059*** (0.020)	0.056*** (0.019)	0.074*** (0.018)	0.081*** (0.017)	0.059*** (0.019)	0.055*** (0.018)	0.072*** (0.018)	0.075*** (0.017)
Interaction of expected depreciation * no ATM in town	-0.046 (0.038)	-0.044 (0.036)	-0.041 (0.036)	-0.052 (0.036)	-0.045 (0.037)	-0.039 (0.035)	-0.040 (0.036)	-0.049 (0.035)
No ATM in town	-0.018 (0.028)	-0.032 (0.027)	-0.037 (0.029)	-0.033 (0.026)	-0.023 (0.027)	-0.036 (0.026)	-0.040 (0.028)	-0.039 (0.025)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-2,901.2	-2,867.6	-2,839.5	-2,745.4	-3,032.3	-3,000.6	-2,968.3	-2,871.9
Pseudo-R ²	0.19	0.20	0.20	0.11	0.19	0.21	0.20	0.11
Wald Chi ² (40)	647.44	705.6	619.66	409.33	662.27	721.74	656.3	414.05
Number of observations	5,150	5,201	5,155	5,402	5,404	5,464	5,413	5,694
P(DepVar=1)	0.51	0.48	0.45	0.26	0.50	0.47	0.44	0.25

Test for joint significance of coefficients of expected depreciation and the interaction term

Chi ² (2)	9.02	9.21	16.55	23.82	9.19	9.18	16.22	21.74
Probability > Chi ²	0.011	0.010	0.000	0.000	0.010	0.010	0.000	0.000

Source: Authors' estimations.

Note: Average marginal effects from probit models; standard errors are adjusted for potential clustering at the level of the primary sampling unit and reported in parentheses. *** ** * denote that the marginal effect is statistically different from zero at the 1%, 5% and 10% level, respectively. For a definition of the main variables, see annex table A1. P(DepVar=1) denotes the unconditional sample probability of the respective dependent variables. All regressions include country fixed effects. "Other controls" comprises all the variables as in the specifications of table 1. The sample for SEE comprises Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the FYR Macedonia, Romania and Serbia.

4.2 CEE economies

Table 3 presents the average marginal effects of the determinants of respondents' preference for receiving certain payments in euro for the CEE countries. Again, columns 1 to 4 refer to the specification based on the subjective measure of network externalities, and columns 5 to 8 refer to the specification using the objective measure of network externalities. As discussed in the introduction, CEE and SEE countries differ substantially with respect to the catching-up process, exchange rate regimes, historical experiences and public and private institutions as well as the extent of euroization. So do the drivers of currency substitution in the two regions.

Table 3

Determinants of preferences for receiving certain payments in euro – Central and Eastern European economies

	I	II	III	IV	V	VI	VII	VIII
	Real estate	Car	Rent	Salary	Real estate	Car	Rent	Salary
Actual payments in euro	0.126*** (0.046)	0.132*** (0.039)	0.113*** (0.040)	0.087** (0.035)	0.126*** (0.040)	0.136*** (0.037)	0.119*** (0.039)	0.115*** (0.032)
Subjective measure of network externalities	0.077** (0.038)	0.062* (0.034)	0.071** (0.035)	0.023 (0.032)				
Objective measure of network externalities					0.001 (0.004)	-0.000 (0.002)	0.000 (0.003)	-0.004 (0.003)
Expected depreciation	0.060*** (0.023)	0.029 (0.021)	0.059*** (0.021)	0.026 (0.019)	0.066*** (0.022)	0.038* (0.021)	0.063*** (0.020)	0.034* (0.018)
Relative trust: euro vs. local currency	0.012 (0.023)	0.022 (0.021)	0.016 (0.022)	0.010 (0.018)	0.021 (0.022)	0.024 (0.020)	0.021 (0.021)	0.015 (0.018)
Relative trust: don't know/no answer	0.051 (0.032)	0.055* (0.030)	0.030 (0.030)	0.020 (0.027)	0.035 (0.030)	0.036 (0.028)	0.017 (0.029)	0.015 (0.025)
Cash preference	-0.018 (0.016)	-0.009 (0.015)	-0.023 (0.016)	-0.014 (0.014)	-0.018 (0.016)	-0.008 (0.015)	-0.023 (0.015)	-0.012 (0.014)
Cash preference: don't know/no answer	0.027 (0.069)	0.008 (0.065)	0.020 (0.066)	-0.056 (0.060)	0.001 (0.063)	-0.010 (0.061)	-0.001 (0.061)	-0.054 (0.053)
Expensive conversion	-0.007 (0.024)	0.010 (0.022)	-0.012 (0.019)	-0.009 (0.032)	-0.010 (0.023)	0.006 (0.021)	-0.014 (0.022)	-0.010 (0.019)
No ATM in town	0.003 (0.037)	0.010 (0.035)	0.016 (0.037)	-0.015 (0.032)	0.002 (0.037)	0.009 (0.035)	0.019 (0.036)	-0.025 (0.032)
Current account and/or debit card	-0.007 (0.033)	-0.006 (0.030)	-0.021 (0.031)	-0.021 (0.028)	-0.013 (0.032)	-0.001 (0.029)	-0.022 (0.030)	-0.024 (0.027)
Foreign currency deposits	0.043 (0.052)	0.020 (0.047)	-0.009 (0.051)	-0.000 (0.045)	0.050 (0.051)	0.025 (0.046)	-0.003 (0.050)	0.004 (0.045)
Subjective distance to nearest bank	0.004 (0.009)	0.004 (0.008)	-0.000 (0.009)	-0.002 (0.008)	0.004 (0.009)	0.004 (0.008)	-0.002 (0.009)	-0.001 (0.008)
Common to pay cash to avoid tax	0.009 (0.023)	0.011 (0.022)	-0.001 (0.022)	0.016 (0.021)	0.013 (0.023)	0.010 (0.022)	0.006 (0.021)	0.015 (0.021)
Common to pay cash to avoid tax: don't know/no answer	-0.014 (0.035)	-0.011 (0.033)	0.010 (0.035)	0.022 (0.029)	0.004 (0.034)	0.004 (0.031)	0.023 (0.033)	0.038 (0.028)
Distance to nearest euro border incl. KO, ME	-0.001 (0.002)	-0.001 (0.002)	-0.000 (0.002)	-0.002 (0.002)	-0.000 (0.002)	-0.001 (0.002)	0.000 (0.002)	-0.001 (0.001)
Income in euro	0.174*** (0.045)	0.184*** (0.046)	0.185*** (0.044)	0.175*** (0.038)	0.154*** (0.045)	0.167*** (0.044)	0.170*** (0.043)	0.169*** (0.038)
Expected euro adoption	0.055*** (0.021)	0.038** (0.019)	0.050** (0.020)	0.040** (0.017)	0.053*** (0.021)	0.039** (0.019)	0.050*** (0.019)	0.040** (0.016)
Age (decades)	0.026 (0.039)	0.019 (0.036)	0.009 (0.039)	-0.008 (0.034)	0.023 (0.039)	0.020 (0.036)	0.011 (0.038)	-0.007 (0.034)
Age squared	-0.005 (0.004)	-0.004 (0.004)	-0.003 (0.004)	-0.001 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.003 (0.004)	-0.001 (0.004)
Female	-0.011 (0.018)	-0.017 (0.016)	-0.012 (0.017)	-0.016 (0.015)	-0.013 (0.018)	-0.022 (0.016)	-0.016 (0.017)	-0.018 (0.015)
High income	0.006 (0.032)	-0.001 (0.030)	0.034 (0.030)	0.019 (0.028)	0.016 (0.032)	0.010 (0.030)	0.043 (0.029)	0.027 (0.027)
Medium income	-0.024 (0.026)	-0.027 (0.025)	0.007 (0.026)	-0.033 (0.023)	-0.017 (0.026)	-0.021 (0.024)	0.010 (0.025)	-0.025 (0.022)
Income: don't know/no answer	-0.043 (0.039)	-0.030 (0.036)	-0.026 (0.037)	-0.021 (0.033)	-0.040 (0.037)	-0.025 (0.034)	-0.024 (0.036)	-0.017 (0.031)
House in better condition	-0.005 (0.024)	-0.021 (0.023)	-0.027 (0.023)	-0.008 (0.020)	0.000 (0.023)	-0.010 (0.023)	-0.022 (0.023)	-0.005 (0.020)
House in poorer condition	-0.034 (0.031)	-0.002 (0.030)	-0.013 (0.029)	-0.001 (0.026)	-0.039 (0.030)	-0.005 (0.030)	-0.021 (0.029)	-0.006 (0.026)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-995.6	-917.9	-955.3	-944.8	-1052.9	-971.6	-1001.0	-994.3
Pseudo-R2	0.07	0.09	0.07	0.07	0.07	0.08	0.07	0.07
Wald Chi2(40)	131.29	149.30	122.08	130.75	132.92	151.00	126.55	147.24
Number of observations	2,052	2,082	2,060	2,278	2,163	2,192	2,168	2,403
P(DepVar=1)	0.22	0.19	0.20	0.16	0.22	0.19	0.20	0.16

Source: Authors' estimations.

Note: Average marginal effects from probit models; standard errors are adjusted for potential clustering at the level of the primary sampling unit and reported in parentheses. ***, **, * denote that the marginal effect is statistically different from zero at the 1%, 5% and 10% level, respectively. For a definition of the main variables, see annex table A1. P(DepVar=1) denotes the unconditional sample probability of the respective dependent variables. All regressions include country fixed effects. Dummies for education, risk aversion, head of household finances, household size, children, and employment status as well as the indicator variable for financial literacy are not shown. The sample for Central and Eastern Europe comprises the Czech Republic, Hungary and Poland.

Purchasing power risk still important but forward-looking depreciation expectations dominate

Hypothesis 1a is confirmed, a higher preference for the euro is related to forward-looking depreciation expectations. Compared with the results for the SEE countries, forward-looking depreciation expectations are now more dominant than the backward-looking and insignificant relative trust measure. We interpret this finding to mean that the influence of past experiences of financial crises on monetary expectations has vanished almost completely in the Czech Republic, Hungary and Poland. The fact that they were quicker to achieve macroeconomic stabilization after transition and that their catching-up process is more advanced than that of the SEE economies may have helped overwrite these collective memories. Furthermore, compared with the SEE countries, the importance of age as a significant explanatory factor has disappeared. This is also in line with the insignificant role of the backward-looking relative trust measure. Hence, we conclude that in the CEE countries memories of past crises no longer influence the formation of preferences.

Economic geography

Interestingly, income in euro exhibits a positive and significant effect and turns out to be a key determinant, with average marginal effects of up to 18 percentage points. Yet, aggregate significance is limited, as only 3.2% of respondents in CEE indicate that they receive all or parts of their income in euro. Geographical proximity to the euro area seems to have no impact, whereas the expected adoption of the euro has a positive and significant effect.

4.3 Robustness of results

The country sample is rather heterogeneous with respect to the level of euroization, hence the grouping of countries clearly has an impact on the coefficients. In order to check the robustness of the results within the SEE and CEE groups, we apply the jackknife technique by systematically leaving out each country. For SEE, the results are robust for the main explanatory variables of actual payments in euro, the subjective measure of network externalities, expected depreciation and relative trust. The objective measure of network externalities in the case of car sales is somehow driven by Albania and Romania. Leaving out Croatia or Bosnia and Herzegovina would yield significant marginal effects for real estate sales and rental income, too. The significance of the marginal effect of high conversion costs on salary relies mainly on Croatia, while the significance of the marginal effect of “No ATM in town” for rental agreements relies on Serbia. For CEE, the results for actual payments in euro in the case of real estate sales or rental income are driven by the Czech Republic, while the results for the subjective measure of network externalities and for depreciation expectations in general are driven by Hungary. Finally, the significance of the marginal effect of euro adoption expectations relies on Poland. These results do not call into question the robustness of our results at large but serve as a reminder to pay attention to country-specific institutions before deriving policy advice.

Moreover, the pseudo R-squared and log-likelihoods of the CEE analysis are rather low compared with the SEE analysis. Running separate regressions for the network effects, cash preferences and geographic variables does little to improve

the explanatory power of the specifications. In line with the results of the jack-knife procedure above, the low explanatory power is probably driven by country differences. Country-specific regressions for CEE show contrasting patterns of the significance of the main explanatory variables and exhibit substantially higher values for the pseudo R-squared.

Concerning the robustness of the objective measure of network externalities, we varied the number of nearest neighbors, setting k to 10, 50, and 100. We find the typical pattern that the effects of the first order spatial lags wash out if the number of nearest neighbors increases (LeSage and Pace, 2009) but the other coefficients are left more or less unchanged.

5 Conclusions

This paper contributes to examining the determinants of currency substitution in CESEE countries. To analyze the hysteresis of euroization in these countries, we combine search-theoretic models of money demand with recent finding on the preference of CESEE households for saving in cash. In addition, we control for the geographical dimension of economic activity, which has not been captured in theoretical models of currency substitution so far.

We distinguish between two subgroups of countries: SEE with a medium to high level of euroization on the one hand and CEE with a low to nonexistent level of euroization on the other. Our results are based on survey data from the year 2014.

For SEE we find that actual payment behavior, network externalities and monetary expectations are still significantly associated with the formation of households' preferences for receiving certain payments in euro. In this region, relative trust in the euro versus the local currency (which is mainly related to past financial crises) turns out to be even more important than the forward-looking measure of depreciation expectations. With respect to the transaction costs associated with using the foreign currency, we confirm the theoretical prediction that the euro is less preferred by economic agents who face higher trade frictions, i.e. lack of basic banking and payment infrastructures, and who face low conversion costs. Overall, the results for SEE are in line with Brown and Stix (2015), who show that deposit euroization is largely demand driven and not a consequence of constrained access to banking services in local currency. Many CESEE households have access to banks and a broad range of savings products both in local and foreign currency, which weakens the role of transaction costs associated with using the foreign currency.

For CEE we find that only actual payment behavior and forward-looking depreciation expectations have a significant impact on the preference for receiving certain payments in euro. Based on the objective measure of network externalities, which utilizes the actual payment behavior of the geographically nearest 20 neighbors, the hypothesis on network externalities is rejected.

Moreover, we find for both country groups that income in euro is related substantially to the formation of preferences, yet only a minority of households receive part of their income in euro. More important at the aggregate level is the finding that the expected adoption of the euro within the next decade exerts a significant impact on households' preferences. Furthermore, the preference of SEE households for receiving certain payments in euro correlates negatively with

the distance to the euro area itself as well as Kosovo and Montenegro (both unilaterally euroized).

From a policy perspective, our results show that depreciation expectations are important in SEE and CEE countries. This means that for reducing the use of the euro as a means of payment, it is important for both country groups to follow stability-oriented macroeconomic policies, which help stabilize exchange rate trajectories vis-à-vis key currencies (especially the euro) and consequently exchange rate expectations.

Furthermore, it seems important for SEE countries to enhance trust in the local currency by establishing a track record of reliable economic policy and fiscal institutions. However, especially in countries which experienced periods of hyperinflation and/or currency crises, households need time to overcome their memories, and trust returns only very gradually – a fact that has been stressed by Brown and Stix (2015), too.

The mere prohibition of foreign currency as a means of payment usually does not lead to the desired outcome, as several attempts in Latin America have shown (see e.g. García-Escribano and Sosa, 2011) and may only be successful where this measure is embedded in a comprehensive framework of strengthening the reliability of institutions, sustainable economic growth and macroeconomic stability. The experience of CEE countries shows that it is possible to overcome currency substitution: Network effects and backward-looking monetary expectations are no longer associated with people's preferences. EU integration, including economic policy coordination and surveillance, may have helped speed up the process of re-establishing trust in the domestic currencies. In other words, reliable institutions and policies that foster trust are also key to promote de-euroization.

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Annex

Table A1

Data and variable description

Label	Description
Preference for receiving payments in euro – real estate, rent, car, salary	Derived from answers to the question “Suppose you could choose the currency in which you receive the following payments. Would you prefer to receive local currency, euro, U.S. dollar or another currency?”. Payments are: a) salary, b) payment from a car sale, c) payment from a real estate rental agreement and d) payment from a real estate sale. Dummy variable that takes the value 1 if respondent indicated that they prefer euro for the payments mentioned above, else zero. Each payment is a separate dependent variable.
Actual payments in euro	Derived from answers to the question “Did you make any payments in euro during the last six months in your country?”. Answers are 1) “no,” 2) “yes - several times per month,” 3) “yes - about once per month,” 4) “yes - less frequently,” d) “don’t know,” 6) no answer. Dummy variable: 1 if the respondent answered 2) to 4). Variable takes the value zero if respondent answered “no.”
Actual payments in euro – real estate, rent, car	Derived from answers to the question “And in which currencies do you usually make the following payments?”. Payments are for: a) daily shopping, b) furniture, household appliances, c) bills for home repair services (e.g. plumber), d) car purchase, e) house or apartment rent and f) house or apartment purchase. Dummy variable that takes the value 1 if respondents indicated that they make payments in euro for the payments mentioned above, else zero.
Subjective measure of network externalities	Dummy variable: 1 if the respondent strongly agreed or agreed to the statement “In my country it is very common to make payments in euro,” else zero.
Objective measure of network externalities	An index based on the actual payment behavior of the 20 nearest neighbors. The index ranges from 0 to 100 and increases with both, the number of neighbors who reported domestic payments in euro over the past six months and with the frequency of domestic payments in euro, which is operationalized in three categories.
Expected depreciation	Derived from answers to the question “How do you think will the exchange rate of the local currency against the euro develop over the next five years?”. Answers are “the local currency will lose value,” “will stay the same,” “the local currency will gain value,” “don’t know” and no answer. Dummy variable: 1 if the respondent answered “the local currency will lose value,” else zero.
Relative trust: euro vs. local currency	Subtraction of the values attributed to individual reactions to the statements “Over the next five years, the euro will be very stable and trustworthy” and “Over the next five years, the local currency will be very stable and trustworthy.” Answers are 1) “strongly agree,” 2) “agree,” 3) “somewhat agree,” 4) “somewhat disagree,” 5) “disagree,” 6) “strongly disagree.” Transformation into a dummy variable: 1 if relative trust in euro is higher (value of the above calculation > 0) than in the local currency, else zero.
Relative trust: don’t know/no answer	Dummy variable: 1 if the respondent answered “don’t know” or refused to answer, else zero.
Preference for cash	Derived from reactions to the statement “I prefer to hold cash rather than a savings account.” Variable is zero (weak) if answers are “disagree” or “strongly disagree;” 1 (medium) if answers are “somewhat agree” or “somewhat disagree” and 2 (strong) if answers are “strongly agree” or “agree”. Answers “don’t know” and “no answer” take the value zero.
Preference for cash: don’t know/no answer	Dummy variable: 1 if respondent said “don’t know” or refused to answer.
Expensive conversion	Derived from reactions to the statement “In my country it is expensive to convert local currency into euro.” Dummy variable: 1 if respondent strongly agreed, agreed or somewhat agreed, else zero.
Subjective distance to nearest bank	Variable between 1 (“strongly disagree”) and 6 (“strongly agree”) for the statement “For me, it takes quite a long time to reach the nearest bank branch.”
No ATM in town	Dummy variable: 1 if there is no ATM in town/village. Information provided by interviewer.
Current account and/or debit card	Derived from answers to a question on current account ownership. Note that respondents who own debit cards or wage cards (the latter are rather frequent in some countries; these cards are used to withdraw the salary or the pension at an ATM) are also included as current account owners. Dummy variable: 1 if the respondent has a current account and/or debit/wage card, else zero.
Foreign currency deposits	Dummy variable: 1 if the respondent has foreign currency deposits, else zero.
Common to pay cash to avoid tax	Dummy variable: 1 if respondent strongly agreed, agreed or somewhat agreed with the statement “It is very common that people pay cash to avoid taxes,” else zero.
Common to pay cash to avoid tax: don’t know/no answer	Dummy variable: 1 if respondent said “don’t know” or refused to answer.
Distance to nearest euro border incl. KO, ME	Distance of primary sampling unit to boarder of the next country which has the euro as a legal tender, including Kosovo and Montenegro.
Income in euro	Derived from answers to the question “Over the last 12 months: Which share of the total household income did your household receive in local currency, euro or another foreign currency?” Respondents should indicate (in %) how much they received in each currency. Dummy variable: 1 if the respondent indicated a positive percentage for income in euro.
Expected euro adoption	Dummy variable: 1 if the respondent expects an introduction of the euro within 10 years, else zero.
Age, age squared	Age of respondent divided by 10, age squared of respondent.
Female	Dummy variable that takes the value 1 if the respondent is female, else zero.
Income	Dummy variables; level of income (high, medium, low, don’t know/no answer). Omitted category: low income.
Education	Dummy variables; degree of education (high, medium, low). Omitted category: education low.
Financial literacy	Based on answers to three questions, one regarding real interest rates, one regarding exchange rates and one regarding risk diversification. Variable between zero and 3 (3 = all questions regarding financial literacy were answered correctly by the respondent).
Risk averse	Dummy variable, 1 if respondent strongly agreed or agreed to the statement “In financial matters, I prefer safe investments over risky investments”, else zero.
Risk averse: don’t know/no answer	Dummy variable: 1 if respondent said “don’t know” or refused to answer.
House in better condition	Variable takes the value 1 if the interviewer indicated that the dwelling is in a better condition than neighboring dwellings.
House in poorer condition	Variable takes the value 1 if the interviewer indicated that the dwelling is in a poorer condition than the neighbouring dwellings.
Manages household finances	Dummy variable: 1 if the respondent is in charge of managing household finances.
Household size	Dummy variables; number of persons who live permanently in the household (two persons, three or more persons). Omitted category: single person.
Children	Dummy variable: 1 if children (up to and including 18 years of age) live permanently in the household.
Employment	Dummy variables; employment status (self-employed, unemployed, retired, student). Omitted category: employed.

Source: OeNB Euro Survey.

Table A2

Descriptive statistics

	Min./ max.	Number of observations	CZ	HU	PL	AL	BA	BG	HR	FY- ROM	RO	RS	Total
Preference for euro – real estate	0/1	8,722	0.18 (0.38)	0.25 (0.43)	0.21 (0.41)	0.44 (0.5)	0.21 (0.41)	0.29 (0.45)	0.55 (0.5)	0.64 (0.48)	0.43 (0.5)	0.88 (0.32)	0.41 (0.49)
Preference for euro – rent	0/1	8,726	0.15 (0.36)	0.24 (0.43)	0.19 (0.39)	0.40 (0.49)	0.18 (0.38)	0.18 (0.39)	0.47 (0.5)	0.59 (0.49)	0.39 (0.49)	0.84 (0.36)	0.37 (0.48)
Preference for euro – car	0/1	8,840	0.14 (0.34)	0.23 (0.42)	0.19 (0.39)	0.42 (0.49)	0.19 (0.4)	0.20 (0.4)	0.52 (0.5)	0.61 (0.49)	0.42 (0.49)	0.87 (0.34)	0.38 (0.49)
Preference for euro – salary	0/1	9,432	0.13 (0.33)	0.21 (0.4)	0.20 (0.4)	0.36 (0.48)	0.12 (0.33)	0.17 (0.38)	0.27 (0.45)	0.21 (0.4)	0.23 (0.42)	0.42 (0.49)	0.23 (0.42)
Actual payments in euro	0/1	10,103	0.06 (0.23)	0.04 (0.19)	0.07 (0.25)	0.17 (0.37)	0.15 (0.35)	0.04 (0.2)	0.10 (0.3)	0.21 (0.41)	0.08 (0.27)	0.48 (0.5)	0.14 (0.35)
Actual payments in euro – car	0/1	5,790	0.03 (0.16)	0.01 (0.12)	0.02 (0.15)	0.30 (0.46)	0.04 (0.2)	0.05 (0.22)	0.28 (0.45)	0.36 (0.48)	0.14 (0.35)	0.41 (0.49)	0.15 (0.36)
Actual payments in euro – rent	0/1	4,374	0.01 (0.1)	0.01 (0.12)	0.01 (0.07)	0.15 (0.36)	0.03 (0.16)	0.03 (0.17)	0.16 (0.36)	0.44 (0.5)	0.12 (0.33)	0.66 (0.48)	0.13 (0.34)
Actual payments in euro – real estate	0/1	4,102	0.02 (0.13)	0.01 (0.12)	0.01 (0.07)	0.35 (0.48)	0.04 (0.2)	0.12 (0.33)	0.28 (0.45)	0.54 (0.5)	0.14 (0.34)	0.70 (0.46)	0.19 (0.39)
Subjective measure of network externalities	0/1	9,130	0.12 (0.33)	0.06 (0.23)	0.06 (0.24)	0.28 (0.45)	0.16 (0.36)	0.14 (0.34)	0.25 (0.43)	0.32 (0.47)	0.09 (0.28)	0.28 (0.45)	0.18 (0.39)
Objective measure of network externalities	0/37	10,103	1.86 (2.78)	0.76 (1.52)	1.96 (4.1)	5.40 (4.91)	4.64 (4.88)	1.46 (1.73)	2.64 (3.18)	6.75 (5.64)	2.54 (2.54)	12.98 (8.56)	4.13 (5.59)
Expected depreciation	0/1	10,014	0.25 (0.43)	0.56 (0.5)	0.23 (0.42)	0.33 (0.47)	0.16 (0.36)	0.26 (0.44)	0.55 (0.5)	0.31 (0.46)	0.40 (0.49)	0.70 (0.46)	0.37 (0.48)
Relative trust: euro vs. local currency	0/1	10,103	0.30 (0.46)	0.57 (0.5)	0.33 (0.47)	0.50 (0.5)	0.34 (0.47)	0.35 (0.48)	0.49 (0.5)	0.48 (0.5)	0.40 (0.49)	0.52 (0.5)	0.43 (0.49)
Relative trust: don't know/no answer	0/1	10,103	0.12 (0.32)	0.16 (0.36)	0.18 (0.39)	0.12 (0.33)	0.06 (0.24)	0.37 (0.48)	0.12 (0.33)	0.11 (0.31)	0.17 (0.38)	0.20 (0.4)	0.16 (0.37)
Preference for cash	0/2	10,103	0.86 (0.69)	1.28 (0.66)	1.04 (0.72)	0.91 (0.77)	1.11 (0.72)	1.04 (0.85)	1.26 (0.83)	1.14 (0.84)	1.07 (0.74)	1.35 (0.78)	1.10 (0.78)
Preference for cash: don't know/no answer	0/1	10,103	0.02 (0.14)	0.01 (0.12)	0.04 (0.2)	0.02 (0.15)	0.05 (0.22)	0.08 (0.27)	0.01 (0.09)	0.02 (0.15)	0.06 (0.24)	0.09 (0.29)	0.04 (0.2)
Expensive conversion	0/1	8,906	0.60 (0.49)	0.83 (0.37)	0.68 (0.47)	0.68 (0.47)	0.54 (0.5)	0.66 (0.48)	0.72 (0.45)	0.47 (0.5)	0.74 (0.44)	0.87 (0.34)	0.67 (0.47)
Subjective distance to nearest bank	1/6	9,930	2.99 (1.28)	2.30 (1.3)	2.80 (1.42)	3.21 (1.67)	3.41 (1.58)	2.39 (1.52)	2.56 (1.67)	3.35 (1.94)	3.04 (1.52)	3.02 (1.7)	2.92 (1.62)
No ATM in town	0/1	10,103	0.32 (0.47)	0.08 (0.27)	0.20 (0.4)	0.30 (0.46)	0.47 (0.5)	0.15 (0.36)	0.17 (0.37)	0.35 (0.48)	0.31 (0.46)	0.26 (0.44)	0.26 (0.44)
Current account and/or debit card	0/1	10,022	0.90 (0.3)	0.78 (0.41)	0.84 (0.36)	0.30 (0.46)	0.59 (0.49)	0.71 (0.45)	0.95 (0.21)	0.76 (0.43)	0.46 (0.5)	0.75 (0.43)	0.70 (0.46)
Foreign currency deposits	0/1	10,103	0.02 (0.15)	0.05 (0.21)	0.03 (0.16)	0.06 (0.24)	0.03 (0.17)	0.04 (0.21)	0.15 (0.36)	0.08 (0.27)	0.03 (0.16)	0.06 (0.24)	0.06 (0.23)
Common to pay cash to avoid tax	0/1	10,103	0.57 (0.5)	0.44 (0.5)	0.53 (0.5)	0.68 (0.47)	0.55 (0.5)	0.67 (0.47)	0.65 (0.48)	0.67 (0.47)	0.68 (0.47)	0.59 (0.49)	0.61 (0.49)
Common to pay cash to avoid tax: don't know/no answer	0/1	10,103	0.14 (0.34)	0.14 (0.35)	0.16 (0.37)	0.05 (0.22)	0.06 (0.24)	0.19 (0.39)	0.09 (0.28)	0.05 (0.22)	0.11 (0.31)	0.16 (0.36)	0.11 (0.32)

Source: OeNB Euro Survey, fall 2014.

Note: Descriptive statistics are the means and standard deviations in brackets. "Total" is the average across countries that is not weighted by size.

Descriptive statistics (continued)

	Min./ max.	Number of observations	CZ	HU	PL	AL	BA	BG	HR	FY- ROM	RO	RS	Total
Distance to nearest euro border incl. KO, ME	0/53	10,103	5.98 (3.43)	6.90 (4.91)	18.09 (11.94)	5.81 (2.75)	10.94 (3.87)	13.69 (5.31)	8.13 (7.08)	2.87 (1.83)	31.29 (7.8)	13.60 (5.85)	11.15 (9.64)
Income in euro	0/1	10,103	0.04 (0.19)	0.02 (0.15)	0.04 (0.2)	0.14 (0.35)	0.07 (0.25)	0.08 (0.27)	0.15 (0.35)	0.11 (0.31)	0.06 (0.24)	0.16 (0.37)	0.09 (0.28)
Expected euro adoption	0/1	10,103	0.54 (0.5)	0.29 (0.45)	0.36 (0.48)	0.54 (0.5)	0.21 (0.4)	0.38 (0.49)	0.26 (0.44)	0.58 (0.49)	0.43 (0.5)	0.19 (0.39)	0.39 (0.49)
Age (decades)	1/9	10,103	4.59 (1.76)	4.61 (1.47)	4.40 (1.71)	3.74 (1.53)	4.33 (1.7)	4.48 (1.7)	4.53 (1.64)	4.49 (1.78)	4.73 (1.65)	4.17 (1.53)	4.39 (1.67)
Age squared	2/83	10,103	24.13 (16.74)	23.39 (14.21)	22.25 (16.24)	16.30 (12.77)	21.66 (15.87)	22.92 (16.17)	23.19 (15.31)	23.32 (16.99)	25.11 (15.91)	19.70 (13.33)	22.08 (15.61)
Female	0/1	10,103	0.49 (0.5)	0.60 (0.49)	0.52 (0.5)	0.55 (0.5)	0.49 (0.5)	0.48 (0.5)	0.53 (0.5)	0.56 (0.5)	0.52 (0.5)	0.50 (0.5)	0.52 (0.5)
High income	0/1	10,103	0.26 (0.44)	0.26 (0.44)	0.23 (0.42)	0.30 (0.46)	0.14 (0.35)	0.26 (0.44)	0.23 (0.42)	0.25 (0.43)	0.24 (0.43)	0.21 (0.4)	0.24 (0.43)
Medium income	0/1	10,103	0.37 (0.48)	0.21 (0.41)	0.32 (0.47)	0.32 (0.47)	0.18 (0.38)	0.25 (0.44)	0.22 (0.41)	0.29 (0.45)	0.18 (0.39)	0.24 (0.43)	0.26 (0.44)
Low income	0/1	10,103	0.35 (0.48)	0.27 (0.45)	0.30 (0.46)	0.24 (0.43)	0.16 (0.37)	0.26 (0.44)	0.26 (0.44)	0.33 (0.47)	0.26 (0.44)	0.26 (0.44)	0.27 (0.44)
Income: don't know/no answer	0/1	10,103	0.03 (0.17)	0.26 (0.44)	0.17 (0.38)	0.14 (0.35)	0.53 (0.5)	0.25 (0.43)	0.29 (0.45)	0.14 (0.35)	0.35 (0.48)	0.31 (0.46)	0.24 (0.43)
High education	0/1	10,084	0.12 (0.33)	0.16 (0.37)	0.14 (0.35)	0.24 (0.43)	0.09 (0.29)	0.21 (0.41)	0.13 (0.34)	0.21 (0.41)	0.24 (0.43)	0.23 (0.42)	0.18 (0.38)
Medium education	0/1	10,084	0.77 (0.42)	0.70 (0.46)	0.61 (0.49)	0.62 (0.49)	0.66 (0.47)	0.64 (0.48)	0.76 (0.43)	0.72 (0.45)	0.69 (0.46)	0.52 (0.5)	0.67 (0.47)
Low education	0/1	10,084	0.10 (0.31)	0.14 (0.35)	0.25 (0.43)	0.14 (0.35)	0.25 (0.43)	0.15 (0.35)	0.11 (0.32)	0.08 (0.26)	0.07 (0.26)	0.24 (0.43)	0.15 (0.36)
Financial literacy	0/3	10,103	1.82 (1.09)	1.97 (1.05)	1.32 (1.11)	1.15 (0.94)	0.87 (0.99)	1.91 (1.01)	1.92 (1.03)	1.40 (1.05)	1.44 (1)	1.95 (1.09)	1.57 (1.1)
Risk averse	0/1	10,103	0.63 (0.48)	0.48 (0.5)	0.50 (0.5)	0.53 (0.5)	0.46 (0.5)	0.59 (0.49)	0.61 (0.49)	0.85 (0.36)	0.49 (0.5)	0.79 (0.41)	0.60 (0.49)
Risk averse: don't know/no answer	0/1	10,103	0.02 (0.16)	0.07 (0.25)	0.05 (0.22)	0.06 (0.24)	0.12 (0.32)	0.13 (0.33)	0.05 (0.22)	0.02 (0.14)	0.12 (0.32)	0.03 (0.17)	0.06 (0.25)
House in better condition	0/1	10,071	0.23 (0.42)	0.16 (0.37)	0.17 (0.38)	0.27 (0.44)	0.31 (0.46)	0.27 (0.44)	0.25 (0.43)	0.29 (0.45)	0.28 (0.45)	0.22 (0.41)	0.25 (0.43)
House in poorer condition	0/1	10,071	0.14 (0.34)	0.07 (0.25)	0.08 (0.27)	0.08 (0.27)	0.10 (0.3)	0.07 (0.26)	0.08 (0.26)	0.13 (0.34)	0.06 (0.24)	0.11 (0.31)	0.09 (0.29)
Manages household finances	0/1	10,103	0.83 (0.37)	0.89 (0.32)	0.81 (0.39)	0.55 (0.5)	0.71 (0.46)	0.83 (0.38)	0.80 (0.4)	0.61 (0.49)	0.87 (0.34)	0.71 (0.46)	0.75 (0.43)
One-person household	0/1	10,103	0.13 (0.34)	0.23 (0.42)	0.18 (0.39)	0.02 (0.14)	0.09 (0.29)	0.15 (0.36)	0.12 (0.33)	0.07 (0.26)	0.22 (0.41)	0.07 (0.25)	0.13 (0.33)
Two-person household	0/1	10,103	0.36 (0.48)	0.33 (0.47)	0.27 (0.44)	0.14 (0.35)	0.19 (0.4)	0.30 (0.46)	0.27 (0.44)	0.20 (0.4)	0.34 (0.47)	0.17 (0.37)	0.25 (0.43)
Three-or-more-person household	0/1	10,103	0.52 (0.5)	0.48 (0.5)	0.58 (0.49)	0.84 (0.36)	0.72 (0.45)	0.57 (0.5)	0.63 (0.48)	0.74 (0.44)	0.47 (0.5)	0.77 (0.42)	0.64 (0.48)
Children	0/1	10,103	0.39 (0.49)	0.30 (0.46)	0.41 (0.49)	0.40 (0.49)	0.44 (0.5)	0.36 (0.48)	0.33 (0.47)	0.39 (0.49)	0.28 (0.45)	0.47 (0.5)	0.38 (0.49)
Employed	0/1	10,003	0.66 (0.47)	0.65 (0.48)	0.62 (0.49)	0.54 (0.5)	0.28 (0.45)	0.55 (0.5)	0.50 (0.5)	0.37 (0.48)	0.46 (0.5)	0.55 (0.5)	0.52 (0.5)
Self-employed	0/1	10,003	0.10 (0.31)	0.07 (0.26)	0.08 (0.28)	0.18 (0.38)	0.02 (0.16)	0.09 (0.28)	0.06 (0.23)	0.05 (0.22)	0.06 (0.23)	0.05 (0.22)	0.08 (0.27)
Unemployed	0/1	10,003	0.08 (0.27)	0.09 (0.28)	0.09 (0.29)	0.22 (0.41)	0.41 (0.49)	0.11 (0.32)	0.17 (0.37)	0.35 (0.48)	0.13 (0.33)	0.16 (0.37)	0.18 (0.39)
Retired	0/1	10,003	0.15 (0.36)	0.22 (0.41)	0.17 (0.38)	0.08 (0.28)	0.19 (0.39)	0.20 (0.4)	0.25 (0.43)	0.20 (0.4)	0.31 (0.46)	0.13 (0.34)	0.19 (0.39)
Student	0/1	10,003	0.08 (0.27)	0.03 (0.16)	0.06 (0.24)	0.15 (0.36)	0.08 (0.28)	0.07 (0.26)	0.07 (0.26)	0.08 (0.28)	0.05 (0.22)	0.13 (0.33)	0.08 (0.28)

Source: OeNB Euro Survey, fall 2014.

Note: Descriptive statistics are the means and standard deviations in brackets. "Total" is the average across countries that is not weighted by size.