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MAPPING THE SHADOW ECONOMY: SPATIAL VARIATIONS IN THE USE OF HIGH DENOMINATION BANK NOTES IN BRUSSELS

Abstract. The aim of this paper is to map the spatial variations in the size of the shadow economy within Brussels. Reporting data provided by the National Bank of Belgium on the deposit of high denomination banknotes across bank branches in the 19 municipalities of the Brussels-Capital Region, the finding is that the shadow economy is concentrated in wealthier populations and not in deprived or immigrant communities. The outcome is a call to transcend the association of the shadow economy with marginalized groups and the wider adoption of this indirect method when measuring spatial variations in the shadow economy.
Key words: informal economy, undeclared work, cash deposits, Brussels.

1. INTRODUCTION

Is the shadow economy concentrated in marginalized areas and populations, such as in immigrant populations, and as a result, reduces the spatial disparities produced by the formal economy? Or is it concentrated in more affluent populations and, as a consequence, reinforces the disparities produced by the formal economy? This paper seeks answers to these questions. For many

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decades, intra-national variations in the size of the shadow economy have been studied using survey methods using interviews with respondents in different locality-types (e.g., Kesteloot and Meert, 1999; Williams, 2004). This is in stark contrast to the study of cross-national variations where indirect measurement methods using proxy indicators have been widely used for many decades (Buehn and Schneider, 2012; GHK and Fondazione Brodolini, 2009). Indeed, no studies have so far employed indirect methods to evaluate the intra-national variations in the size of the shadow economy. This paper therefore fills that gap. The aim is to employ an indirect measurement method, namely the use of high denomination bank notes approach, to analyse intra-national variations in the size of the shadow economy.

To do this, the first section will briefly review the findings of direct survey methods regarding intra-national variations in the size of the shadow economy and review the range of alternative measurement methods potentially available with a particular focus on the high denomination banknotes approach. Identifying that no studies have so far evaluated intra-national variations in the size of the shadow economy using indirect measurement methods, the second section then fills this gap by setting out the methods and data used to evaluate the local variations in the use of large denomination bank notes (over €50) in the 19 municipalities of the Brussels-Capital Region (BCR) in 2010. The third section then reports the results by analysing the deposit of large denomination bank notes across bank branches in the 19 municipalities of Brussels and how this is correlated with the level of affluence and presence of immigrant populations. The fourth section then draws some conclusions and calls for the wider use of this indirect measurement method when mapping intra-national variations in the size of the shadow economy.

Before commencing, however, the shadow economy needs to be defined. Ever since Hart (1973) first introduced the concept of the 'informal sector' in his study of Ghana 40 years ago, what is here termed the shadow economy has been defined in terms of what is absent from or insufficient about it relative to the legitimate economy(Williams and Lansky, 2013) and the most widely accepted definition is that these paid activities are not declared to the public authorities for either tax, social security and/or labour law purposes (European Commission, 2007a, b, 2014; OECD, 2002, 2012; Williams, 2004; Williams and Windebank, 1994, 1995). The prominent way they are hidden is by using cash since unlike bank transfers, cash transactions cannot be tracked by the fiscal or statistical authorities and given that larger banknotes (€100, €200 and €500) are not commonly available from ATMs, so must be deliberately acquired, there is strong suggestion that their use is symptomatic of shadow economy transactions.

2. BEYOND SURVEYS OF THE SHADOW ECONOMY: A REVIEW OF ALTERNATIVE METHODS

Until now, studies of local variations in the size of the shadow economy have used direct surveys of populations in contrasting localities. The result is that current understandings of the intra-national variations in the size of the shadow economy are premised entirely on this one measurement method. Reviewing the findings, these studies have tended to refute the 'marginalization thesis' which asserts that the shadow economy is concentrated amongst marginalized populations such as low-income populations and immigrant communities, who disproportionately participate in and gain from this realm (Ahmad, 2008; Castree *et al.*, 2004; Gutmann, 1978; Katungi *et al.*, 2006).

Instead, the finding of the vast majority of locality studies is that the marginalized benefit less from the shadow economy and that the shadow economy reinforces, rather than reduces, the inequalities produced by the legitimate economy (i.e., the reinforcement thesis). Direct surveys have displayed this not only in western and southern European nations (Barthe, 1985; Mingione and Morlicchio, 1993; Van Geuns *et al.*, 1987; Williams, 2004) but also in Central and Eastern European countries (e.g., Meriküll and Staehr, 2010; Onoshchenko and Williams, 2013; Pavlovskaya 2004; Williams *et al*., 2013). This finding regarding the local variations in the shadow economy, however, is premized on just one measurement method and also a method which has been shown to have a bias towards identifying small-scale odd-jobs undertaken in the shadow economy and under-reporting larger-scale shadow transactions (Ram and Williams, 2008).

When analysing cross-national variations in the size of the shadow economy however, a much wider array of measurement methods have been used. Besides direct surveys (e.g., European Commission, 2007b), a range of indirect measurement methods using various proxy indicators have been employed. These indirect methods can be divided into three broad types; those using non-monetary indicators, monetary proxy indicators and income/expenditure discrepancies. The most common non-monetary methods are those firstly, seeking traces in formal labour force statistics (e.g., Flaming *et al*., 2005; Hellberger and Schwarze, 1986), secondly, using very small enterprises as a proxy (e.g., ILO, 2002) and third and finally, using electricity demand as a surrogate (e.g., Friedman *et al*., 2000). Three principal monetary proxies, similarly, have been used, namely large denomination notes (Bartlett, 1998; Carter, 1984; Freud, 1979; Henry, 1976; Matthews, 1982), cash deposits (Gutmann, 1977, 1978; Tanzi, 1980) and money transactions (Feige, 2012) and more recently, a MIMIC (multiple indicators, multiple causes) approach (e.g., Schneider, 2005; Schneider and Williams, 2013). Third, and finally, income/expenditure discrepancies have been analyzed both at the aggregate national and household level (Paglin, 1994).

On the whole, these indirect measurement methods produce higher estimates of the size of the shadow economy than direct survey methods (Buehn and Schneider, 2012; GHK and Fondazione Brodolini, 2009; Ram and Williams, 2008). Although there is of course no way of knowing whether the higher estimates produced by these indirect measurement methods are indeed more accurate than the lower estimates of direct surveys (Fortin *et al*., 1996; Pestieau, 1985; Kesteloot and Meert, 1999; Williams, 2004; Williams *et al*., 2013), a strong consensus has emerged across the practitioner and academic communities that indirect measurement methods are the most appropriate method for measuring the variations in the size of the shadow economy and that survey methods should be confined to analysing its characteristics such as who does it and why they do it (European Commission, 1998, 2007b; OECD, 2012; Ram and Williams, 2008; Williams, 2013).

In this paper, we follow this consensus by using an indirect method for studying local variations in the size of the shadow economy. Until now, although indirect measurement methods are the norm when evaluating the cross-national variations in the size of the shadow economy, they have not been used when evaluating the intra-national variations. This paper fills that gap. To do so, the intention is to use the monetary method that examines the use of high denomination notes as a proxy indicator to evaluate how the size of the shadow economy varies across localities. Until now, this approach has been only used when making estimates at the national scale of the size of the shadow economy (Bartlett, 1998; Carter, 1984; Freud, 1979; Henry, 1976; Matthews, 1982).

Here, however, and for the first time, it is used to measure the local variations in the size of the shadow economy. Indeed, such an approach represents a useful counterweight to direct surveys. This is because direct survey methods, due to the social desirability bias of responses, tend to pick up a wide array of shadow economy transactions for relatively small amounts of money (e.g. Cornuel and Duriez, 1985; Evason and Woods, 1995; Williams, 2004) such as when people engage in baby-sitting for their neighbours or do small odd-jobs for family and friends, but fewer large transactions. This high denomination notes technique, however, captures primarily larger-scale shadow transactions. For example, 1 in 20 formal employees in the European Union receive both a declared wage from their formal employer and an additional undeclared ('envelope') wage and this envelope age paid in cash amounts on average to two fifths of their wage packet (Williams, 2009a, b; Williams and Padmore, 2013a, b). It is likely that the study of the deposit of high denomination bank notes will pick up some of this envelope wage work. It is also likely to identify more of the wholly undeclared full-time waged employment and also wholly undeclared self-employment where a small business conducts work on a cash-in-hand basis, as well as illegal activities such as the proceeds of crime.

Akin to all measurement methods of the size of the shadow economy, therefore, this method provides a better trace of some types of shadow economic activity

but not others. The advantage of this large banknotes method is that it enables larger transactions in the shadow economy to be traced rather than smaller-scale activities such as odd-jobs and one-off paid favours for relatives, neighbours and friends. This provides a useful counterweight to the conventional direct survey. As such, it will be interesting to explore whether the findings regarding local variations are similar to those identified by the direct survey method.

3. EXAMINING LOCAL VARIATIONS IN THE USE OF HIGH DENOMINATION BANK NOTES: METHOD AND DATA

To analyze the local variations in the use of large denomination notes as a proxy measure of the size of the shadow economy, we here report a data set made available by the National Bank of Belgium (NBB). This records all cash deposits, including what size of banknote was deposited from €5 up to €500, in all branches of private banks at the level of postal codes in 2010. We extracted all the postal codes corresponding to the 19 municipalities of the BCR, summing different postal codes within the same municipality (i.e. the Brussels-City Municipality includes postal codes 1000, 1020 and 1120) and excluding those referred to EU institutions (e.g. codes 1047, 1048 and 1049) or other specific cases (e.g. codes 1043 and 1044 refer to national public broadcasting channels). Here, this data is aggregated to the level of the 19 municipalities so as to enable comparison with other municipal-level socio-economic data in order to evaluate the validity of the marginalization thesis using this alternative measurement method. This socio-economic data on household income and the presence of immigrant populations at the municipal level is sourced from the statistical institute of the BCR (BISA/IBSA).

To analyze the localities in which large banknotes are disproportionately over- or under-used, we here employ the 'location quotient' (LQ) method. The LQ of X is calculated as a share of a certain indicator (i) on the total municipal value (p) weighted by the same ratio at the Brussels city region level (n):

Equation 1

$$Q_L = \frac{x_{i,p} / x_{.,p}}{x_{i,n} / x_{.,n}} .$$

This then makes it possible to identify the municipalities in which the deposit of large banknotes is higher or lower, using the BCR as the reference level for the municipal variations. The interpretation of the LQ is straightforward. Values above

1 mean that there is a greater preponderance to deposit high denomination bank notes, whilst a value below 1 indicates a lower than average preponderance. In this paper, when LQ values are between 0.90 and 1.10, we assert that no difference to the norm is detected.

In Belgium similarly to the rest of the Euro zone, banknotes above €50 are hardly ever used in everyday transactions and banknotes of €100, €200 and €500 are rarely even available and even more seldom used, although their tender is absolutely legal and by definition associated with higher value transactions, which would normally be conducted using a credit and debit card so far as most legitimate transactions are concerned. Indeed, there is an advantage to the consumer of using a debit or credit card since they can be blocked and money refunded. However, the transactions can be tracked by the authorities and cannot be hidden. These aspects do not apply when cash payments are involved, and one of the only advantages of using cash payments is that the transaction can be more easily hidden from the authorities. It is to be expected, therefore, that a large proportion of the deposits of high denomination banknotes will be the proceeds of shadow activities.

4. EVALUATING LOCAL VARIATIONS IN THE USE OF HIGH DENOMINATION BANK NOTES IN THE BRUSSELS-CAPITAL REGION: FINDINGS

Direct surveys, with their bias towards small-scale one-off shadow transactions, and as shown above, have refuted the marginalization thesis by revealing the size of the shadow economy is larger in relatively affluent localities. To analyze whether a similar relationship is found using this alternative method, with its bias towards larger-scale shadow economy transactions, we here first construct a 'wealth index' which evaluates the relative wealth of each locality within Brussels by examining the average household income, as calculated by the BISA/IBSA, weighted by the household income for the Brussels city region as a whole, so as to show whether a locality is above or below the average household income for the BCR.

As figure 1 displays, the spatial distribution of wealth in BCR involves a central axes (the Canal Zone and surrounding municipalities) which is poorer, and two richer sides on the North-West and on the South-East of Brussels. Examining how the deposit of high denomination bank notes of €100 and over is distributed, the finding is that in more affluent municipalities (mainly in South-East municipalities), the deposit of large banknotes is up to three times higher than in poorer municipalities (the Canal Zone). This is similarly the case in the more affluent North-West sector, although the situation there is less marked. The clear implication, therefore, is that the shadow economy is larger in more affluent localities, thus refuting the marginalization thesis.

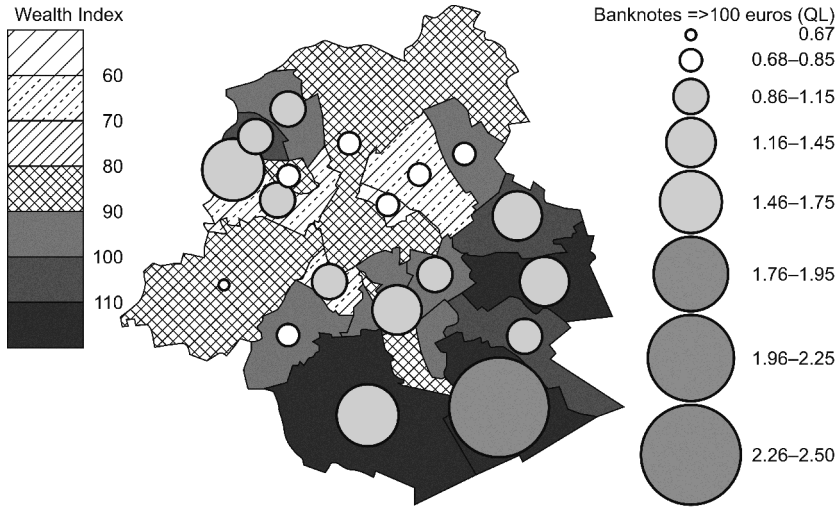

Fig. 1. Local varations in the use of high denomination bank notes in BCR: by the level of affluence of municipalities
Source: authors' elaboration

Indeed, this refutation of the marginalization thesis remains valid when a finer-grained analysis is undertaken of the deposit of all denomination values of large banknotes. Figure 2 provides a graphic representation of the usage of all the

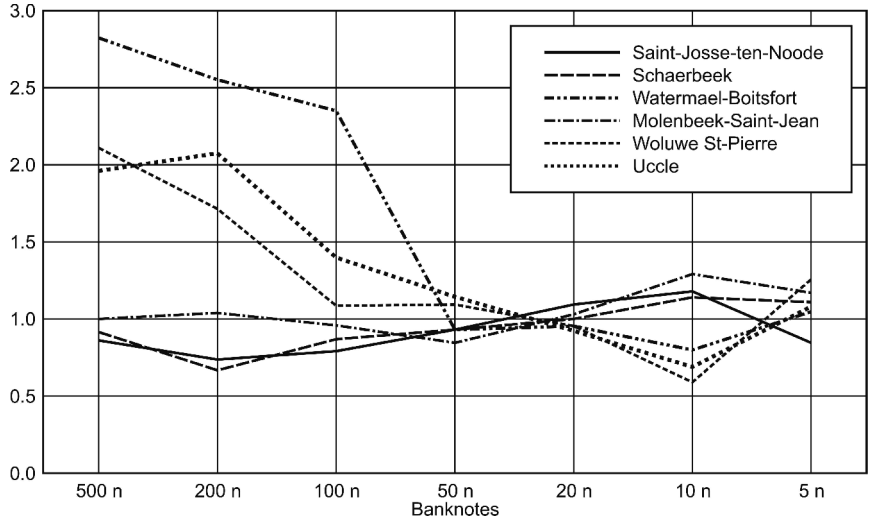

Fig. 2. Use of different denomination banknotes in the most affluent and deprived municipalities of Brussels
Source: authors' elaboration

possible banknotes in circulation (€5, €10, €20, €50, €100, €200, and €500) in two locality-types, namely the three richest municipalities in Brussels (Woluve-Saint-Pierre, Watermael-Boitsfort and Uccle) and the three poorest ones (Saint-Josse-ten-Noode, Molenbeek-Saint-Jean, and Schaerbeek). The finding is that in three relatively affluent localities, the use of banknotes above or equal €100 is much higher than in three poorest ones but that there are no significant differences in the use of €20 and €50 banknotes. The use of smaller banknotes (€5 and €10), however, is slightly higher in poorer municipalities, perhaps reflecting the flight of financial institutions from poorer populations and thus the financial exclusion of their populations (Leyshon and Thrift, 1995), making them more dependent on the use of cash rather than debit or credit cards when engaging in transactions.

It is not only when household income is analyzed that the marginalization thesis is refuted and the reinforcement thesis is validated. This is also the case when the relationship between the marginalization in the form of immigrant populations and the use of large banknotes is analyzed. This is the case for both immigrants as a whole as well as when a more nuanced analysis of different immigrant populations is analyzed.

Figure 3 provides a graphic representation of whether municipalities with large immigrant populations have a tendency to deposit large banknotes to a greater extent than municipalities with lower immigrant populations. The finding is that there is no clear relationship between municipalities with large immigrant populations and municipalities in which large banknotes are deposited to a greater

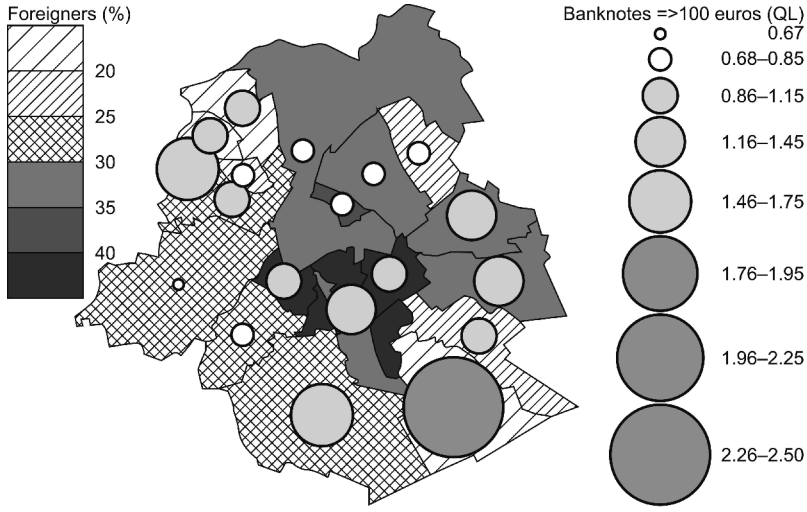

Fig. 3. Relationship between spatial distribution of immigrant population and the shadow economy in BCR
Source: authors' elaboration

extent. Indeed, quite the opposite is the case. Analysing this, the first important point to note is that in Brussels, the proportion of the population that is non-Belgian is relatively high, ranging between 20% and 30% in most municipalities. However, there are concentrations. Firstly, there is a major concentration in Ixelles and Etterbeek, where European Commission institutions are located, as well as in Saint-Gilles, where there is a mix of various immigrant population groups. In these municipalities, the deposit of large denomination bank notes is lower than average. Secondly, the municipalities in the north-west and south-east which have a lower percentage of immigrants, mainly related to higher house prices determining a 'qualitative' selection in favour of few richer immigrants, witness relatively higher deposits of large banknotes. And third and finally, the southern municipalities where there are universities, but relatively smaller immigrant populations, although some are not always registered in official statistics, have slightly higher deposits of large banknotes. On the whole, nevertheless, the finding is that there is no evidence that the deposit of large denomination bank notes in bank branches is concentrated in municipalities with high immigrant populations. Rather, it appears that the deposit of large banknotes is generally smaller in municipalities with large immigrant populations.

Does this refutation of the marginalization thesis hold, however, when these immigrant populations are broken down into different sub-groups possessing different cultural and socio-economic characteristics? To evaluate this, we break down immigrant populations into different sub-groups by their country of origin. This is important in the context of Brussels because the presence of European Commission institutions has resulted in an immigrant population that includes a relatively higher proportion of higher income and educated immigrants than in other European cities.

Starting with immigrant populations from Africa, mainly represented by Moroccans that are about 60% of the African community in the BCR, figure 4 reveals a clear concentration of this immigrant group in the central Canal-zone where the use of large banknotes is much lower. Indeed, there is a clear overall relationship between the municipalities where Africans are concentrated and the use of large banknotes. The deposit of larger banknotes is relatively low in all municipalities where African immigrants are concentrated, thus refuting the marginalization thesis and validating the reinforcement thesis.

It is similarly the case when the immigrant populations from Latin America are analyzed. Figure 5 displays a clear concentration of this immigrant group but again in municipalities where the use of large banknotes is much lower. Indeed, there is a clear overall relationship between the municipalities where Latin Americans are concentrated and the use of large banknotes. The deposit of larger banknotes is highest in the municipalities where Latin American immigrants are lowest, thus refuting the marginalization thesis and validating the reinforcement thesis.

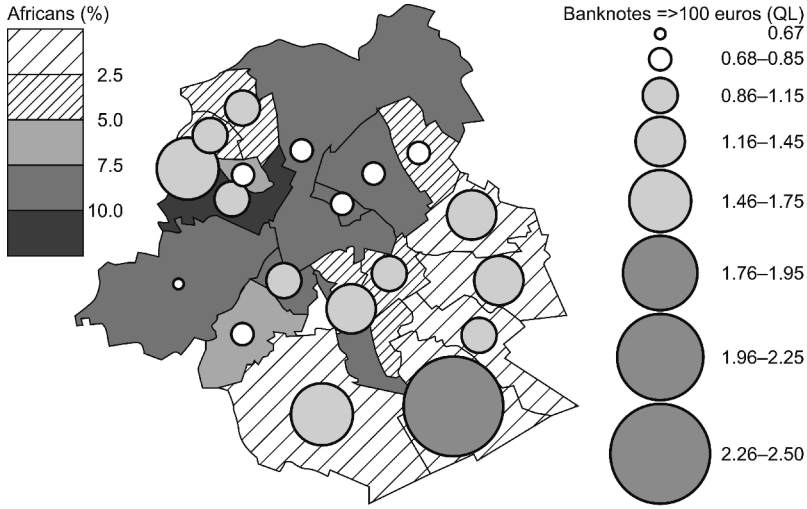

Fig. 4. Relationship between spatial distribution of African immigrants and the shadow economy in BCR
Source: authors' elaboration

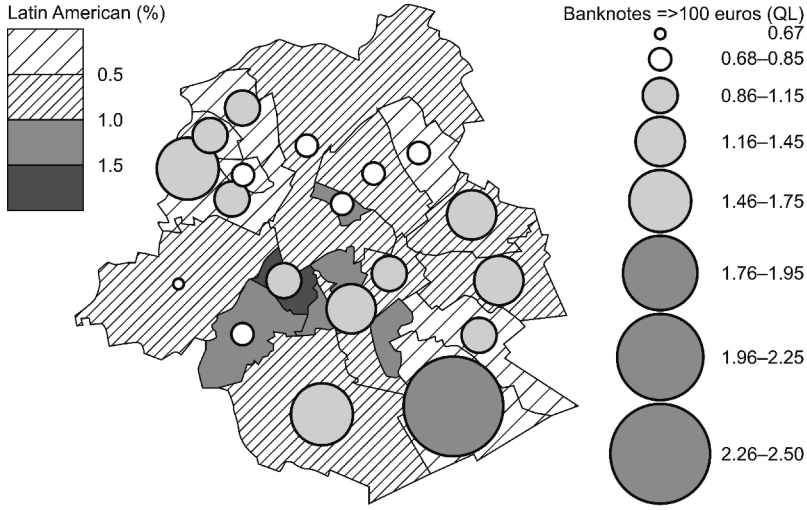

Fig. 5. Relationship between spatial distribution of Latin-American immigrants and the shadow economy in BCR
Source: authors' elaboration

Turning to an analysis of European immigrant populations, we here distinguish four groups for analysis:

– Southern Europeans: Greeks, Italians, Portuguese and Spanish;

– Central and Eastern Europeans: Bulgarians, Cypriots, Czech, Estonians, Hungarians, Latvians, Lithuanians, Maltese, Polish, Rumanians, Slovakians, and Slovenians;

– Northern Europeans: Austrians, British, Danish, Dutch, French, Finnish, Germans, Irish, Luxembourgers, and Swedish;

– Non-EU Europeans: Albanians, Macedonians, Montenegrins, Russians, Serbians, and Turks.

Starting with Southern European immigrants, these four immigrant populations of Greeks, Italians, Portuguese and Spanish are relatively established immigrant populations in Brussels, especially the Italians and Portuguese. As figure 6 reveals, these Southern European immigrants are concentrated in the municipalities from Anderlecht to Woluwe-St.-Pierre with a different geography to other immigrant populations. Nevertheless, the concentration of southern Europeans is clearly independent of the spatial patterns in the use of large banknotes. Again, therefore, there is no validation of the marginalization thesis.

Examining Eastern and Central European Union migrants, which include all countries that joined the European Union after 2004, a different distribution is apparent. This immigrant group is concentrated in municipalities in which the use of large denomination bank notes is lower (see figure 7). Northern

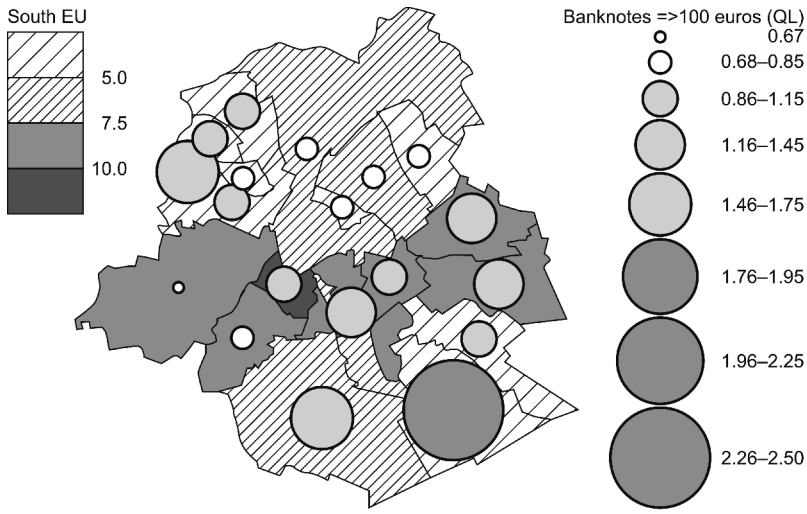

Fig. 6. Relationship between spatial distribution of Southern European immigrants and the shadow economy in BCR
Source: authors' elaboration

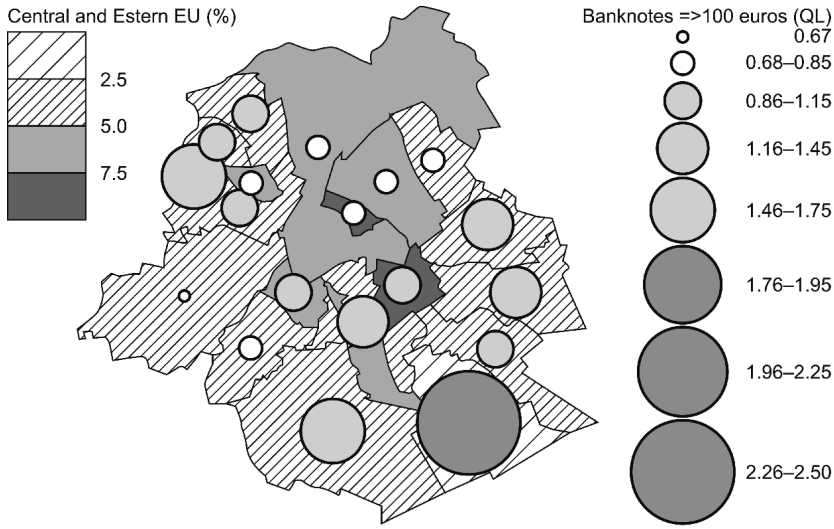

Fig. 7. Relationship between spatial distribution of Central and Eastern European immigrants and the shadow economy in BCR
Source: authors' elaboration

European migrant populations, meanwhile, is basically a label that includes all the EU nationals not included in the other two categories, although the label 'Northern' might sound inappropriate for countries like Austria and France. As figure 8 displays, these migrant populations are concentrated in central and south-eastern municipalities with a spatial distribution which is symmetric to African migrants. Again, however, the distribution of Northern Europeans does not match with the use of large banknotes. And finally, the non-EU European migrant population, which includes mainly Russians and Turks in Brussels, has a spatial distribution relatively similar to Southern Europeans (see figure 9). Again, therefore, there is no correlation between the spatial distribution of non-EU Europeans and the municipalities in which the deposit of high denomination bank notes is higher.

In sum, this analysis of different migrant communities has shown that the use of larger banknotes is not clustered in areas where they tend to be concentrated. Although migrant populations are clustered in particular municipalities, as is the deposit of large denomination bank notes clustered in specific municipalities, these clusters do not match each other. Therefore, the assumption of the marginalization thesis that the shadow economy is concentrated in poor areas where immigrants are concentrated cannot be confirmed. Instead, quite the opposite is the case. The use of large banknotes is more common where immigrations are not concentrated.

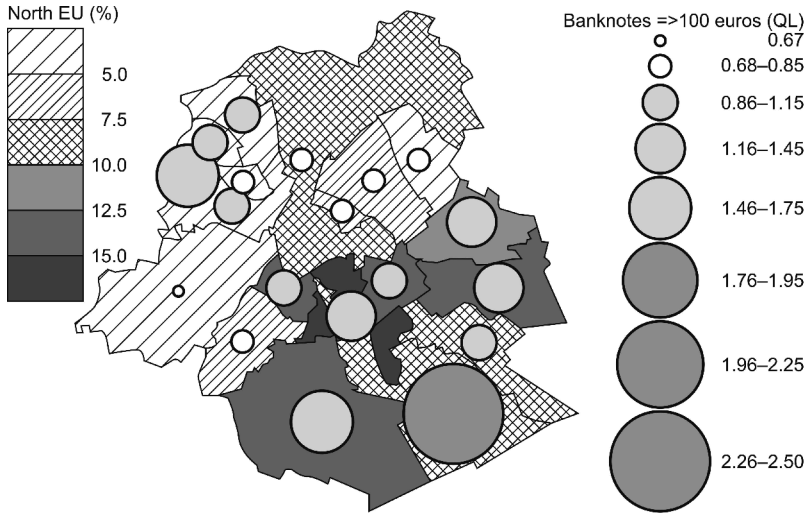

Fig. 8. Relationship between spatial distribution of Northern EU immigrants and the shadow economy in BCR
Source: authors' elaboration

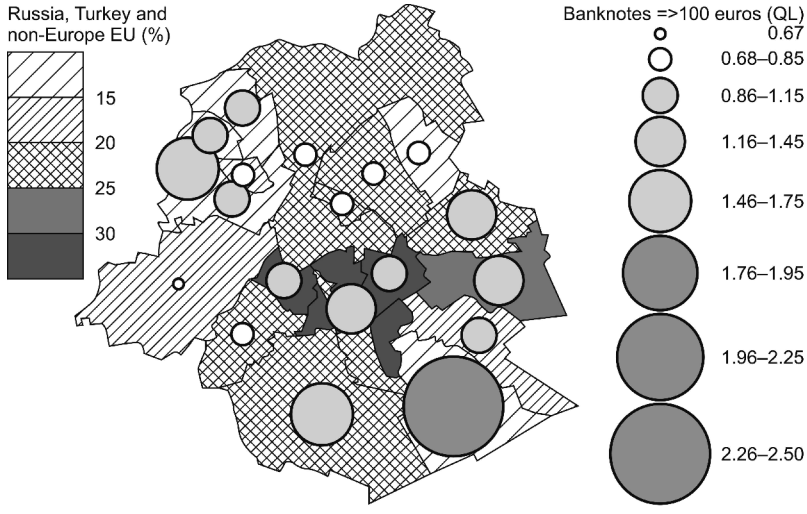

Fig. 9. Relationship between spatial distribution of non-EU European immigrants and the shadow economy in BCR
Source: authors' elaboration

5. CONCLUSIONS

This paper has for the first time evaluated the local variations in the size of the shadow economy by mapping the deposit of large denomination banknotes in bank branches on a spatial level. The logic is that given the rise of debit and credit cards, and the greater safety of using them to engage in transactions, and how large denomination banknotes are not available from ATMs and must be specifically acquired, the use of such large denomination banknotes can be taken as a proxy indicator of the desire of people to hide their transactions from the authorities for tax and social security purposes. To do this, the findings of a dataset of the National Bank of Belgium is analyzed which provides detail of the level of deposit of large denomination banknotes across bank branches in all 19 municipalities of the Brussels city region.

Until now, studies of the local variations in the size of the shadow economy have reported the findings of direct surveys, which tend to focus upon small-scale shadow activities and to under-report large-scale transactions due to the social desirability bias of small-scale transactions which tend to be paid favours conducted to help out close social relations and viewed as less fraudulent than larger-scale transactions (Williams, 2004). The finding is that the shadow economy is not concentrated in marginal populations (i.e., the marginalization thesis) but rather is concentrated in more affluent populations (i.e., the reinforcement thesis). In this paper, we have evaluated whether similar findings apply when this indirect method is used which focuses more upon larger-scale transactions. The finding is that this is indeed the case. The size of the shadow economy is larger, as measured by the deposit of large denomination bank notes in bank branches, in the more affluent municipalities of the BCR and also in municipalities where the proportion of the population that are migrants is lower. Put another way, the findings of this indirect method complement the findings of the direct survey method, showing that it is the reinforcement thesis rather than the marginalization thesis that is valid so far as the local variations in the shadow economy are concerned in the BCR.

In sum, this paper has revealed that studies of the local variations in the shadow economy do not need to rely solely on direct surveys. Indirect methods, which until now have been applied exclusively to the study of cross-national variations, can also be used to study local variations in the shadow economy. Indeed, they represent a useful complement to the direct survey method. If this paper thus encourages more research using indirect measurement methods when mapping intra-national variations in the size of the shadow economy, then it will have achieved its objective.

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