SOCIAL NETWORKS BEHIND INFORMAL WORK: EVIDENCE FROM ARGENTINA

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Abstract

By making use of data of immigrants in Argentina, this paper attempts to identify the role of social networks in the probability of working formally. My empirical strategy asks whether new immigrants surrounded by a social network with a high proportion of formal workers have a higher probability of becoming formal workers compared to those with more informal workers in their social network. The use of a Card-type instrument as well as destination and nationality fixed effects allows me to eliminate many of the problems in previous studies. The results provide the first empirical evidence of the importance of the social networks in labor informality and confirm that the *quality* of the network is important in determining the type of job obtained by new immigrants.

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1 Introduction

Labor informality remains a pervasive characteristic of labor markets in Latin America and the Caribbean (Gasparini and Tornarolli (2009)). Economists have traditionally associated informal economic actitivity with developing countries, assuming that it is an alternative to unemployment and poverty and thus tends to disappear as the country develops.[1] Nonetheless, the evidence of increasing informality both in expansions and downturns in several countries, as well as the resurgence of informal economic activity in industrialized countries contradicts this theory and calls for explanations that go beyond the economic cycle. In this paper I analyze the role of one possible determinant: social networks. Contacts can affect the behavior of individuals by providing information or affecting his preferences (Bertrand *et al.* (2000)). Many studies have documented the impact of social networks on a broad set of variables, such as wages, employment status, individual's occupation (Beaman (2012), Munshi (2003), Bentolila *et al.* (2008)), and welfare participation (Bertrand *et al.* (2000)), among others. Although previous studies about informality highlight that social networks might also have an impact on this dimension, I have found no empirical paper testing this hypothesis.

This study tries to fill this gap by using data of immigrants in Argentina in order to test the hypothesis that a newly arrived immigrant with a social network with a high proportion of informal workers will receive information of job vacancies mainly in the informal sector, and hence his probability of being employed in this sector will be higher. This will be reinforced by the fact that working in the informal sector will not be seen as something *bad* within this network, and as a consequence, the individual will not feel the pressure to find a job in the formal economy.[2] Hence, I consider that the effect of the network depends on the type of contacts. In line with this, I follow Bertrand *et al.* (2000) in constructing a network measure interacting the *size* of the network with its *quality*, where the latter is defined as the proportion of formal workers among network members.

Following previous literature about social networks, I make use of country of birth of immigrants in Argentina to identify these networks within destinations

[1] Edgecomb *et al.* (2002) present a thorough informal economy literature review.

[2] In this paper the term *informality* always refer to *labor informality*. Moreover, whenever I use the terms *informal sector*, or terms related to *informality* I am referring to the International Labor Organization (ILO) newer focus on informal employment defined according to the *social protection* or *legalistic* view of job status: Informal workers are those whose labor relationship is not subject to labor legislation and tax rules, and have no access to social protection or right to certain labor benefits (ILO (2002)).

since migrant communities tend to be more socially cohesive. One advantage of using Argentina is that this country has been a destination for immigrants from many different countries since the end of the 19th century.[3] This has led to the presence of groups that differ in customs and levels of development of their origin country, but that share the same territory and face the same environment and shocks. Therefore, this study exploits the differences across cities and nationalities in the level of formality and in the inflow rate of immigrants in order to shed light upon the impact of social networks on formal work. Moreover, the tendency of newly arrived immigrants to settle in places with existing clusters of immigrants from their same country, allows me to address the concern that immigrants self-select into departments in Argentina. Widely used in studies for the U.S. and Europe, I am the first to use a Card-type instrument for Argentina. The idea of this instrument is to assign recent immigrants to the destinations where their countrymen were living at some point in the past. Therefore, this instrument gives the size of the network that we would observe if there had not been internal migrations and if the spatial distribution of nationalities among destinations were held constant at the past's distribution.

My empirical strategy relies on the use of a Card-type instrument for the size of the network as well as destination and nationality fixed effects in a linear probability model to circumvent many omitted variable problems present in previous studies. By making use of 2001 Argentinian census data, I focus on new immigrants (those who arrived between 1995 and 2001) and I consider their social network is formed by the individuals from the same nationality, living in the same destination in Argentina, who declared arriving five years before the census.

Although it has already been documented, I first test the role of social networks in the probability of being employed. I find a positive but not statistically significant coefficient for the size of the network. This may be due to the static nature of my approach, which may miss the presence of network effects due to the existence of two offsetting effects, the provision of information and the competition effect, as noted by Beaman (2012). The former effect points to the fact that network members will provide information about job vacancies and hence a

[3] Appendix table 1 presents the evolution of the population living in Argentina by nativity status according to Argentinian censuses. At the beginning of the 20th century immigrants represented 30% of the population living in the country, and the origin was mainly from overseas (Italy and Spain). In the following decades, neighbouring countries increased their relative importance among immigrants (in 2001, 60% of the immigrant population was born in neighbouring countries).

larger social network will increase the probability of being employed of the new immigrant. On the other hand, due to the latter effect, a larger social network may be prejudicial if most members are unemployed, given that they will compete with the new immigrant for job referrals from other members, instead of providing information about job vacancies. As a way to capture the competition effect, I include the employment rate among the network members as explanatory variable (as well as its interaction with the size of the network). As expected, the increase in the number of contacts increases the probability of being employed of a new immigrant only if the rate of employment among network members is high (otherwise, the competition effect would be higher than the information providing service effect).

The main contribution of this paper is to provide the first empirical evidence of the importance of social networks on the informal work. Restricting attention to the formality status of the new immigrant's job as the outcome of interest, I analyze the impact of the number of network members (*size*), the proportion of formal workers within the social network (*quality*) as well as the interaction between the two. I find that an increase in the formality share of the network increases the probability of having a formal job, for any network size. In particular, an increase in 0.18 in the mean formality of the contacts increases by 5 percentage points the probability of being a formal worker (in the case of new immigrants with large social networks). Moreover, the positive and statistically significant coefficient of the interaction term suggests that the transmission of the quality of the network to the new immigrant is higher the larger the size of the group of contacts. In addition to this, an increase in the size has a positive effect on the formality status, which is increasing in the proportion of formal members in the network. Overall, results confirm the hypothesis that not only the size of the social network, but also its quality is important when it comes to affecting the formality of new immigrants.

Results are robust to the inclusion of unemployed immigrants to the specification and to the sample choice (excluding very small social networks or dropping departments with very large population). As final robustness checks, a probit model without fixed effects is done and also the concern about the possible endogeneity of the formality share of the network is addressed.

The rest of the paper is organized as follows. Section 2 reviews related literature on informality and social networks. Section 3 describes the data and

descriptive analysis. Section 4 explains the methodology, after which section 5 presents the empirical results. Finally, section 6 concludes the paper.

2 Related Literature

Informality has received attention from scholars due to its negative impact on the welfare of the worker and his family, as well as due to its negative effects on economic growth. There is evidence that informal workers receive a lower labor income compared to those workers in the formal sector. Gasparini and Tornarolli (2009) exploit a large database of more than 100 household surveys, providing estimates of the conditional wage gap of being informal. They find that on average, informal male workers without a secondary education earn 30% less than their formal counterparts. In a document from the World Bank (2007) it is suggested that the lack of social protection implies a situation of vulnerability to some types of misfortune (in particular, health). Moreover, there also may be negative externalities for society in, for instance, families undersaving for retirement that could lead to the underfunding of the social security system. In addition to this, informality itself has been postulated to have adverse impacts on productivity. As noted in Perry *et al.* (2006), workers uninsured against health, old age, and other risks may have lower productivity and fewer incentives to invest in human capital.

In light of these adverse effects of informality, previous studies have tried to understand its determinants. As pointed out in Edgecomb *et al.* (2002), close ties to neighbors, friends and family members often play a role in the existence of informal work activities. Social networks emerge as a possible determinant given their documented influence in individual behavior. Bertrand *et al.* (2000) suggests that social networks affect individual behavior through two channels: information and norms. The information channel emphasizes how a person's knowledge depends on the information others provide. The social norm channel emphasizes how a person's preferences themselves may depend on the behavior of others, either directly by affecting taste or indirectly via social pressure. In accordance with these ideas, this paper develops an empirical analysis of the social networks as determinants of informal work.

The impact of social networks on employment and occupational choices has long been studied before. Munshi (2003) analyzes the impact of networks among Mexican migrants in the U.S. on employment status and individual's occupation.

He verifies that the same individual is more likely to be employed and to hold a higher paying nonagricultural job when his network is exogenously larger by using rainfall in the origin-community as an instrument for the size of the network at the destination. More recently, Beaman (2012) has provided evidence that this positive impact on employment holds in the case of an increase in the number of tenure members (given that they provide job vacancies information), but the impact is negative if there is an increase in the number of members who arrived in the same year or one year prior to a new arrival (due to a competition effect). Bentolila *et al.* (2008) highlight another negative side of social networks, since they not necessarily help to find jobs in the occupations where workers are more productive. Hence, they find that social networks are associated with wage discounts. In line with Bertrand *et al.* (2000), this study emphasizes instead, that the goodness of the networks may depend on the quality of these contacts.

Given the absence of a natural experiment that provides exogenous variations in network size, this study borrows from immigration literature that resorts to the use of spatial distribution of earlier immigrants to adopt an instrumental variables approach. While this instrument has already been used in studies of the U.S. (Card and DiNardo (2000) and Card (2001)) and Europe (Gonzalez and Ortega (2011)), to the best of my knowledge, I am the first one to use it for immigrants in Argentina.

3 Data and descriptive analysis

3.1 Data

In order to do my analysis, I use 2001 Argentinian census data available through the Integrated Public Use Microdata Series (IPUMS), which includes 10 percent of the Argentinian population.[4] In particular, I consider information about current place of residence disaggregated at the department level, as well as place of birth and individual characteristics (age, gender, marital status and education).[5]

Crucial for this study are the questions: *In this job, do they discount your pay for retirement?* and *Do you contribute for your retirement on your own?*,

[4]I wish to acknowledge the statistical office that provided the underlying data: National Institute of Statistics and Censuses, Argentina.

[5]Department is the second-largest-scale geographic identifier available in the Argentinean samples. It refers to the territorial division of each Argentinian province and the City of Buenos Aires (but these territorial divisions of second order are called in fact *partidos* in Buenos Aires province and *comunas* in the City of Buenos Aires).

since they allow me to infer the informality status of the worker. Given that these questions refer only to the main occupation of the worker, I am not able to identify those informal jobs that are supplementary for those in the formal sector. Therefore, I focus on the informality status of the main occupation.

Following the social protection definition of labor informality adopted in Argentina, I consider as informal workers:

- Employees who are not facing retentions for retirement.
- Independent workers who are not making contributions for retirement.

Although the census questionnaire included a question about the number of years an immigrant had lived in Argentina, this information is not available in the IPUMS sample. This is an important drawback for my analysis, since it only allows me to adopt a static approach.I have to draw on the information about the place where the person lived five years before the census, and identify as *new immigrants* those individuals who were born outside Argentina, and who declared living abroad in 1996.

In addition to the 2001 census, I make use of the 1980 Argentinian census (also available through IPUMS) to calculate the number of immigrants of each nationality living in Argentina in 1980, and the spatial distribution of these immigrants among Argentinian departments.

3.2 Descriptive analysis

Given that the focus of my analysis is on a labor outcome, I restrict 2001 sample to those individuals who declared being employed or looking for a job by the time of the census (they constitute the Economically Active Population, EAP). Moreover, I only consider those above 18 years old, since the obligation to retain for retirement does not hold for workers below this age. Table 1 reports some descriptive statistics for the variables included in all the regressions, as well as employment rate. I describe separately the samples for natives and immigrants. On average, immigrants seems to be older and less educated than natives (20% of the immigrant population have less than primary education compared to 11% of natives, and there is a lower percentage of migrants with secondary completed compared to Argentinians). Although employment rates are equal for both groups, foreign population presents lower levels of formality (0.46 versus 0.59 if we consider only employed population, and 0.32 versus 0.43 among EAP). This is consistent

with the fact that migrants tend to be more flexible to accept more precarious labor conditions (as suggested in Cerrutti and Maguid (2006)).

In order to compare the differences in characteristics among job statuses, I present in table 2 summary statistics for the subsample of new immigrants (which includes those immigrants who declared living abroad five years before the census) split in formal workers, informal workers and unemployed. It is important to highlight that employment rate among *new* immigrants is larger than among natives and *all* immigrants (0.75), but formality rate is well below the ones reported for natives and for the whole sample of immigrants (it is 0.2 among employed new immigrants). In this table, I essentially find the same patterns that have already been documented by descriptive studies of informality in Argentina: informal workers tend to be less educated, younger and more likely to be women than their formal counterparts. Unemployed immigrants are similar to informal workers in terms of gender and age, but they are even less educated.

4 Methodology

According to my hypothesis, the effect of the social network on the new immigrant will depend on the type of contacts this immigrant has. Hence, in order to study the impact of social networks on informal employment, I follow Bertrand *et al.* (2000), in constructing a network measure interacting the *size* of the network with its *quality*. I define these variables as follows:

- *Size*: number of individuals from the same nationality living in the same department in Argentina, who declared living there five years before the census.

- *Quality*: proportion of formal workers in the network.

Informal status is a characteristic observable only if the immigrant is working. Therefore, unless otherwise stated, I further restrict the sample to those immigrants who were working by the time of the census. Although this gives rise to a possible sample selection bias, I address this issue in section 6. As mentioned in the previous section, I follow the specific social security definition of labor informality adopted in Argentina. Using the information on deduction and support for retirement, I construct a formality dummy F_{ijk} which is equal to one if the

Table 1: Sample characteristics of the data

	Total population	Natives	Immigrants
	(1)	(2)	(3)
Employment rate	0.73	0.73	0.73
	(0.44)	(0.44)	(0.45)
Formality rate among employed	0.58	0.59	0.45
	(0.49)	(0.49)	(0.50)
Formality rate among EAP	0.42	0.43	0.32
	(0.49)	(0.50)	(0.47)
Age	38.5	38.2	43.5
	(13.7)	(13.6)	(14.2)
Male	0.59	0.59	0.58
	(0.49)	(0.49)	(0.49)
Single	0.43	0.43	0.36
	(0.50)	(0.50)	(0.48)
Married	0.47	0.47	0.53
	(0.50)	(0.50)	(0.50)
Separated	0.07	0.07	0.06
	(0.25)	(0.25)	(0.24)
Widowed	0.03	0.03	0.04
	(0.17)	(0.17)	(0.21)
Less than primary completed	0.12	0.11	0.20
	(0.32)	(0.32)	(0.40)
Primary completed	0.46	0.46	0.46
	(0.50)	(0.50)	(0.50)
Secondary completed	0.34	0.34	0.28
	(0.47)	(0.47)	(0.45)
University completed	0.08	0.08	0.06
	(0.29)	(0.28)	(0.25)
Number of observations	1,478,341	1,400,446	77,895

a. The samples include only economically active population above 18 years old.
b. Standard deviations are in parentheses.
c. EAP stands for economically active population.

Table 2: Sample characteristics of the data. Only new immigrants

	Formal (1)	Informal (2)	Unemployed (3)
Age	35.1	30.8	30.5
	(11.1)	(9.8)	(11.0)
Male	0.61	0.43	0.45
	(0.49)	(0.50)	(0.50)
Single	0.44	0.62	0.63
	(0.50)	(0.48)	(0.48)
Married	0.52	0.32	0.33
	(0.50)	(0.47)	(0.47)
Separated	0.04	0.03	0.03
	(0.19)	(0.18)	(0.17)
Widowed	0.01	0.02	0.02
	(0.10)	(0.13)	(0.13)
Less than primary completed	0.08	0.15	0.17
	(0.28)	(0.35)	(0.38)
Primary completed	0.24	0.33	0.43
	(0.43)	(0.47)	(0.49)
Secondary completed	0.40	0.46	0.35
	(0.49)	(0.50)	(0.48)
University completed	0.27	0.06	0.05
	(0.44)	(0.24)	(0.21)
Number of observations	1025	4115	1713

a. The samples include only economically active immigrants above 18 years old, who arrived between 1996 and 2001.
b. Standard deviations are in parentheses.

individual i in department j from nationality k is a formal worker. I start estimating the following linear probability model for formal work: [6]

$$F_{ijk} = ln(S_{jk})\theta + X_i\beta + \gamma_j + \delta_k + \epsilon_{ijk} \tag{4.1}$$

where i indexes individuals, j indexes departments in Argentina, k indexes nationalities. S_{jk} is the size of the network of an immigrant from nationality k living in department j. X_i are individual characteristics, which include age, age squared, gender, four education dummies and four marital status dummies. [7] Finally, γ_j and δ_k are fixed effects for departments and nationalities, and ϵ_{ijk} is the error term.

In order to test the hypothesis that not only the size but also the quality of the network is important for the probability of being a formal worker, I consider the following complete specification:

$$F_{ijk} = ln(S_{jk})\theta + \overline{FS}_{jk}\psi + (ln(S_{jk}) * \overline{FS}_{jk})\alpha + X_i\beta + \gamma_j + \delta_k + \epsilon_{ijk} \tag{4.2}$$

which adds the interaction of the log of the size and the quality of the network $(ln(S_{jk}) * \overline{FS}_{jk})$, as well as the direct effect of the latter. Here $\overline{FS}_{jk}$ represents mean formality of the network.

I expect the effect of the network to be marginally decreasing. Hence, I use the log of the size of the network in the specifications.[8] These specifications can be interpreted as having the $ln(S_{jk}/P_j)$, with P_j representing the population living in department j, since in the log specification the denominator is absorbed by the

[6] I estimate a linear probability model rather than a non linear one because of the well known incidental parameter problem. If there is not enough within group information to estimate consistently the fixed effects for nationality and departments, this will bias the estimation of the common parameters in a non linear setting. On the flip side, a linear probability model lacks this problem. As a specification test, I include a probit model without the fixed effects and find similar results (see section 6 for details).

[7] In the regressions, gender is captured by the binary variable male. The four education dummies are less than primary completed, primary completed, secondary completed and university completed. In the regressions the omitted variable is less than primary completed. The four marital status dummies are single, married, separated and widowed. In the regressions, the omitted variable is single.

[8] I have checked the robustness of the results to this choice. Using directly the size or the square root of the size produce similar results. Also doing a piecewise linear specification with different cutoffs, which in addition provides evidence of a concave relation between the size of the network and the formality of the new immigrant.

department fixed effects. In this case, what would be important is the proportion of the population in department j who belongs to the social network of nationality k, and not just the size of the network.

One could argue that indeed marital status is endogenous. The network may also affect the probability of being formal by affecting this variable. For example, an immigrant may be more likely to be formal if the network affects his probability of getting married (since a married person may assign a higher value to the protection of his family that is possible through a formal job). Nevertheless, I include this variable in the regression since it may also control for omitted personal characteristics. Including this control in the regression can only lead to an *underestimate* of the effect of contacts. Hence, finding evidence in spite of controlling for marital status, only strengthens my case.

The methodology presented above allows me to control some common omitted variables biases. First, γ_j deals with any unobserved differences between areas. For example, departments with more strict control of informality may imply a higher probability of the new immigrant of working as formal, as well as a higher mean formality of the network. This would lead to an overestimation of α if department fixed effects are not included. Second, δ_k absorbs omitted characteristics of nationality groups, such as discrimination at the national level for certain nationalities.

However, there is one problem that remains: omitted personal characteristics that are correlated with $S_{jk} * \overline{FS}_{jk}$ may bias the regression. The problem arises if there are group-specific demand shocks that attract immigrants of a certain nationality and preference for formality to certain departments. In this case, I would find spurious correlation between the network and the formality of the new immigrant. The selection of foreigners to the department where they migrate calls for the use of an instrument for the spatial distribution of immigrants among destinations. A natural candidate is a Card-type instrument, widely used in studies of immigration in the U.S. and Europe. This instrument is based on the documented tendency of newly arrived immigrants to locate in places with existing clusters of immigrants from their same origin country (Card (2001)). In the case of Argentina, I find that according to the International Migration Complementary Survey (ECMI), 77% of the immigrants who arrived between 1980 and 2003 knew at least one countrymen living in the first destination in Argentina they lived.[9]

[9] The ECMI was part of the 2001 Argentinian national census, carried out by the National Institute of Statistics and Censuses (INDEC) between September of 2002 and September of 2003.

Hence, it seems that this regularity of immigration flows also holds in Argentina.

Card's idea is to assign recent immigrants to the destinations where their countrymen were living at some point in the past. It is hoped that at a point far enough in the past the location of immigrants is exogenous to current demand conditions. Lamarche *et. al* (1998) provide evidence that the relative positions of the provinces in Argentina in the unemployment ranking in 1980 has no relation with those in 1997. Given that the data used in this paper is from 2001, I repeat the same analysis, but comparing the unemployment ranking positions of those conglomerates in 1980 with the positions in 2001. The Spearman's rho is 0.320, but not statistically significant.[10] Therefore, one can argue that indeed those demand conditions that may have attracted immigrants before 1980 to determine locations in Argentina, changed markedly in the following years. Hence, I consider that a Card-type instrument is very appropriate for this study, because there is evidence that suggests its relevance and exogeneity.

The size of the network is one of the explanatory variables I need to instrument. I build a Card-type instrument, but with some differences since in this paper the explanatory variable is the "stock" of immigrants in a certain department, and not the flow of new immigrants (as in Card (2001)). I decompose the size of the network from nationality k, in department j, in 2001 as follows:

$$S_{jk,2001} = S_{jk,1980} + \Delta S_{jk,1980,2001} \tag{4.3}$$

In light of the evidence just mentioned, I need to instrument only the flow of

It was restricted to the study of a sample of households with Bolivians, Brazilians, Chileans, Paraguayans and Uruguayans (the main source countries of the new immigrants). Each of these communities was surveyed in City of Buenos Aires and "partidos" of Greater Buenos Aires, while the three biggest communities were also surveyed in those jurisdictions were they had a higher representation according to the 2001 census' results. The lack of data at the individual level as well as problems with some of the variables does not allow me to use this database for the analysis.

[10] In Lamarche *et. al* (1998) they compute the Spearman's rho for the ranking in 1980 and 1997 and find that it is -0.05 but not statistically significant. In appendix figure 1 I use Argentinian household survey data on unemployment rates for the month of May and present the dispersion diagram of the years used in Lamarche *et. al* (1998). If the relative situation of the conglomerates over unemployment remained the same, all the points in the graph should fall in the 45° line. A quick visual inspection allows to conclude that the unemployment pattern changed markedly. Given that the data used in this paper is from 2001, I am interested in testing the persistence between the unemployment ranking positions in 1980 and 2001. This is presented in appendix figure 2, where the conclusions are similar to those in figure 1. In this way, I provide evidence of the exogeneity of the instrument with respect to the shock in the model.

immigrants that arrived after 1980 ($\Delta S_{jk,1980,2001}$) since the stock of immigrants from nationality k living in department j in 1980 ($S_{jk,1980}$) can be assumed to be exogenous. Therefore, I use information from the 1980 census, to construct the following instrument for the size of the network in department j of nationality k:

$$S_{jk,1980} + \lambda_{jk,1980} * \Delta S_{k,1980,2001} \tag{4.4}$$

where $\lambda_{jk,1980}$ is the fraction of immigrants from country k in department j, in 1980 and $\Delta S_{k,1980,2001}$ is the flow of immigrants from country k, between 1980 and 1996 (since I include as part of the network those immigrants that arrived until 1996). This instrument essentially gives us the size of the network of nationality k living in department j that we would observe in 2001 if there had not been internal migrations and if the spatial distribution of nationalities among departments were held constant at the 1980's distribution.

In the case of the formality of the network, ideally I would like to construct a variable τ_{kf} that represents the fraction of immigrants from country k that arrived between 1980 and 1996 that were working formally by that time.[11] However, the 1980 census does not include the questions that allow me to infer the formality status of the worker. Therefore, I do not have a a good instrument for the formality share (and as a consequence, neither for the interaction term). As a way to circumvent this problem, given that I do have a good instrument for the size of the network, I consider the formality share of the network as exogenous in the regressions, and instrument the interaction term using the instrument for the size interacted with the formality share. Moreover, as a robustness check, I use the formality share according to the 1991 census of immigrants from nationality k living in department j as an instrument for $\overline{FS}_{jk}$ and use the interaction of the two instruments for the interaction term between the log of the size and the quality.[12]

Before moving to the results, I want to present some expected effects that follow from my hypothesis, which claims that the effect of the networks on the formality of the new immigrant depends on the type of contacts this new immi-

[11] This is similar to what Card does in his 2001 paper, but using formality status instead of different occupations.

[12] In this way I intend to address possible concerns of endogeneity of the formality share due to the selection of immigrants to the department where they live, but also due to a possible reflection problem (Manski (1993)).

grant has. First, contacts working in the formal sector will provide information on job vacancies mainly in this sector. Moreover, they will be more familiar with the procedures or requirements needed to work formally (more important in the case of independent workers). In addition to this, peer pressure or stigma may lead the new immigrant to prefer working in the same sector as his contacts do. Although in practice I am not able to distinguish between the different mechanisms (information channel versus norms channel), the expected effects point to the same direction: higher mean formality of the social network leads to a higher probability of the new immigrant to work in the formal sector. Second, an increase of the size of the network increases the probability that the new immigrant is employed thanks to his contacts. Therefore, I expect a higher transmission of the quality of the network to the formality status of the new immigrant. In other words, the impact of an increase in the contacts' formality will be higher for agents with larger social networks. Finally, I think that the direction of the effect on the probability of being formal, will depend on the new immigrant also. In particular, if the new immigrant looked for a job through other channels different than the network, then his probability of being a formal worker would depend on his individual characteristics, his nationality and the department where he lives. Lets call this probability FO_{ijk}. If FO_{ijk} is lower than $\overline{FS}_{jk}$, then being surrounded by people from his same nationality will be beneficial for this new immigrant because his probability of working formally will be higher. On the flip side, if FO_{ijk} is higher than $\overline{FS}_{jk}$, then the social network will reduce his likelihood of being formal.

5 Results and discussions

5.1 Impact on employment

I first test whether a larger social network is associated with a higher probability of being employed. Although this is not the main focus of this paper and it has already been documented before for other countries, I think it is useful to document this effect for Argentina. I use the same data I will use later to test the impact on the probability of being a formal worker, but include also those immigrants who where unemployed by the time of the census. I estimate a linear probability model similar to the one presented in equation (4.2), but the dependent variable is E_{ijk}, a dummy variable which is equal to one if the new immigrant i

living in department j of nationality k is employed, and zero otherwise. [13]

Table 3 presents the results of the impact on employment. In column (1), I first consider only the size of the network as explanatory variable (besides individual characteristics, nationality and department controls). I find a negative effect of the size of the network on job finding. However, when I instrument it, the effect becomes positive (see column (4)). I think this is consistent with some regions experiencing a boom in the past and receiving a large immigration flow,

Table 3: Impact on the probability of being employed

Dependent variable: E_{ijk}	(1) OLS	(2) OLS	(3) OLS	(4) IV	(5) IV
$ln(S_{jk})$	-0.018**		-0.074**	0.005	-0.107***
	(0.009)		(0.030)	(0.012)	(0.033)
$\overline{ES}_{jk}$		0.127	-0.026		-0.125
		(0.083)	(0.115)		(0.117)
$ln(S_{jk}) * \overline{ES}_{jk}$			0.087**		0.161***
			(0.040)		(0.047)
R-squared	0.125	0.125	0.126	0.123	0.125
$H_o = \alpha = \theta = \psi = 0$	-	-	0.007	-	0.001

a. Robust standard errors in parentheses are clustered on combinations nationality-department (there are 667 clusters).
b. Number of observations in all the regressions: 5,494.
c. *** p<0.01, ** p<0.05, * p<0.1.
d. All the regressions include individual characteristics, department and nationality fixed effects.
e. Individual controls are those displayed in Table 1.
f. Omitted variables: female, single, less than primary completed.
g. The last row shows the p-value of the Wald test of joint significance of the coefficients of the variables related to the network.

but later experiencing bad labor opportunities (as was the case in Argentinian regions). A plausible explanation is that the surge of immigration led to adverse effects through the predominance of the competition effect pointed out by Beaman (2012) (explaining the negative OLS coefficient). Therefore, once I use 1980's distribution, I take out the effect of the boom that could have attracted more immigrants to those departments, and the relationship becomes positive. Given

[13] I estimate $E_{ijk} = ln(S_{jk})\theta + \overline{ES}_{jk}\psi + (ln(S_{jk}) * \overline{ES}_{jk})\alpha + X_i\beta + \gamma_j + \delta_k + \epsilon_{ijk}$.

the small estimated coefficient and the fact that it is not statistically significant, one would be tempted to claim that the social networks have no effect in labor opportunities in Argentina. However, here I adopt a static approach and as noted by Beaman (2012), it may miss the presence of network effects due to the existence of two offsetting effects (the provision of information and the competition effect). Ideally, I would like to adopt a dynamic approach, but given the lack of information about the year of arrival of the immigrants, this is not possible. As an alternative, I include in the regression the employment rate among the network members (as well as its interaction with the size of the network), as a way to capture the competition effect. According to the results presented in columns (3) and (5), the network increases the probability of being employed of the new arrival only if the employment rate among network members is above a threshold. In particular, the size of the network will have a positive impact on job finding if the employment rate of this network is above 0.66 (in the IV regression). This is consistent with the fact that network members will provide job information to the new immigrant only when they are already employed. Otherwise, they will compete with the new arrival for the information on job vacancies (provided by employed members).

5.2 Impact on the probability of being a formal worker

In this section I present the main results of this paper. Table 4 displays the first stage of the IV regression of the complete specification (including individual characteristics, department and nationality fixed effects). As explained before, I use a Card-type instrument for the size of the network, and interact it with the formality share of the network in order to have an instrument for the interaction between the size and the quality of the network. It is important to notice that not all the nationality-department combinations were present in the 1980 census. Hence, the sample is further reduced from 5140 observations (767 clusters) to 3931 observations (541 clusters). The results of the first stage provide evidence of the relevance of the instrument used. Consistent with the immigration pattern mentioned before, a larger number of immigrants from nationality k living in department j according to the 1980 distribution of nationalities among departments, is associated with a larger size of the network. I also find significant coefficients in the first stage for the interaction term.

Now lets proceed to verify the relationship between the network and the probability of working formally. Starting with a preliminary regression in column (1)

Table 4: First stage of the complete specification regression

Dependent variable	$ln(S_{jk})$ (1)	$\overline{FS}_{jk}$ (2)
$ln(Instrument_{jk})$	0.920***	0.055*
	(0.073)	(0.031)
$ln(Instrument_{jk}) * \overline{FS}_{jk}$	-0.583***	0.551***
	(0.135)	(0.071)
R-squared	0.938	0.918

a. Robust standard errors in parentheses are clustered on combinations nationality-department (there are 541 clusters).
b. Number of observations in all the regressions: 3,931.
c. *** p<0.01, ** p<0.05, * p<0.1.
d. This first stage corresponds to the IV regression including individual characteristics, department and nationality fixed effects.
e. Omitted variables: female, single, less than primary completed.
f. $ln(Instrument_{jk})$ represents the log of the Card-type instrument for the size of the network of nationality k in department j.

of Table 5, I find a negative coefficient for the log of the size. However, once I control for nationality and department fixed effects, this coefficient is positive and highly significant (column (4)). Indeed, controlling only for nationality fixed effects I already find a positive coefficient. This responds to the fact that those nationalities with a larger number of immigrants in Argentina, have also a lower formality share.[14] If I do not control for nationality fixed effects, this introduces a negative bias in the estimated coefficient of the size. The IV results confirm the importance of the contacts in the type of job a new immigrant does. A one percentage increase in the size of the network is associated with an increase in 3.9 percentage points in the probability of being a formal worker. Although these results are consistent because I have a credible instrument for the size of the network, the specification including only the size of the network misses the feature I am trying to test: that the relation of the contacts with the probability of being a formal worker depends also on the quality of the network. Therefore, I find it

[14]For example, the formality shares of the two main source countries according to the 2001 census, Paraguay and Bolivia, are 0.13 and 0.14 respectively. These are well below the mean formality for all nationalities, which is 0.45.

more interesting to focus on the regressions including this quality as well.

Regressing the probability of working formally only on the formality share of the network and individual characteristics, in column (2), I find that a larger proportion of formal workers among the contacts implies a larger probability of formality of the new immigrant. Moreover, this impact is increasing in the size of the network, as results from the positive coefficient of the interaction term in column (3). The complete specification in column (5) circumvents many ommited variable biases but suffers from the bias introduced by the selection of immigrants to the departments in Argentina, as explained in previous section. Therefore, I consider that the most important results in this paper are those present in the last column of Table 5, where I make use of the Card-type instrument in the complete specification to solve the endogeneity of the size of the network. As in all the other regressions reported, I include individual characteristics of the new immigrant. These covariates display the expected signs (as can be seen in appendix table 2, where I present the same IV regression as in table 5, but reporting also the coefficients of the covariates). Higher education and being a man increases the probability of being employed formally. Moreover, married immigrants are more likely hold a formal job. Turning to the coefficients related to the network, as expected, a higher formality among the contacts increases the probability of working formally, for any network size. Moreover, the estimated coefficient of the interaction term is positive and statistically significant at $p \leq 0.10$. This suggests that the transmission of the quality of the network to the new immigrant is higher the larger the size of the group of contacts.[15] An increase of the size also has a positive impact, increasing in the mean formality of the network. These results confirm the hypothesis that not only the size of the social network, but also its quality is important when it comes to affecting the formality of new immigrants.

[15] Although the point estimate of ψ is negative, the effect of an increase of $\overline{FS}_{jk}$ is positive for social networks of size above or equal 2.

Table 5: Impact on the probability of being a formal worker

Dependent variable: F_{ijk}	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) IV	(7) IV
$ln(S_{jk})$	-0.028***		-0.068***	0.022**	0.016	0.039***	0.010
	(0.007)		(0.012)	(0.010)	(0.017)	(0.012)	(0.018)
$\overline{FS}_{jk}$		0.491***	0.152**		0.027		-0.048
		(0.052)	(0.077)		(0.084)		(0.080)
$ln(S_{jk}) * \overline{FS}_{jk}$			0.132***		0.016		0.062*
			(0.025)		(0.033)		(0.036)
R-squared	0.128	0.159	0.172	0.266	0.266	0.265	0.266
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nationality fixed effects	No	No	No	Yes	Yes	Yes	Yes
Department fixed effects	No	No	No	Yes	Yes	Yes	Yes
$H_o = \alpha = \theta = \psi = 0$	-	-	0.000	-	0.096	-	0.011

a. Robust standard errors in parentheses are clustered on combinations nationality-department (there are 541 clusters).
b. Number of observations in all the regressions: 3,931.
c. *** p<0.01, ** p<0.05, * p<0.1.
d. Individual characteristics are those displayed in Table 1.
e. Omitted variables: female, single, less than primary completed.
f. The last row shows the p-value of the Wald test of joint significance of the coefficients of the variables related to the network.

5.2.1 Understanding the estimated effects of the social network

In order to better understand the direction and magnitude of the effect of the social network, I consider it is very useful to construct a 3x3 matrix computing the probability of being a formal worker for different sizes and formality shares of the network. In order to do this, I consider the coefficients from column (7) in table 5, and use the percentile 25, 50 and 75 of the distribution of the size and of the quality. [16]

Table 6: Effects of an increase in the size and/or formality of the network

		$\overline{FS}_{jk}$			
		(1)	(2)	(3)	(4)
		0.30	0.37	0.48	(3)-(1)
S_{jk}	33	0.24	0.25	0.27	0.03
	88	0.27	0.29	0.31	0.04
	193	0.29	0.31	0.34	0.05

a. The values 33, 88 and 193 correspond to the 25th, 50th and 75th percentile of the distribution of the size of the network, respectively.
b. The values 0.30, 0.37 and 0.48 correspond to the 25th, 50th and 75th percentile of the distribution of the formality share of the network,respectively.
c. I use the estimated coefficients reported in table 5, column (7).

Moving from left to right, it can be seen the first impact mentioned in the methodology section: an increase in $\overline{FS}_{jk}$ given any size, increases the probability of being a formal worker of the new immigrant. Moreover, comparing the first and last row of column (4), it is possible to appreciate the second effect, since the transmission of the quality of the network to the type of job of the new arrival is higher the larger the size of the network. In particular, an increase in the formality share of the contacts in 0.18 increases the probability of being a formal worker in 3 percentage points in a small network (25th percentile), whereas the same increase raises the formality of the new immigrant in 5 percentage points if the network is large (75th percentile). At this point it is important to remember that the mean formality among those immigrants who declared living abroad five years before the census is 0.20. Then, an increase in 5 percentage points is not insignificant. Finally, an increase in the size, given the proportion of formal members in the network have a positive impact regardless of the formality rate considered. This

[16] In addition to the estimated coefficients of the variables related to the network, I use the constant which is equal to 0.156 in this regression.

may seem strange, but indeed the formality shares considered in the table are high compared to the mean formality of the sample of new immigrants. Therefore, we are probably facing a case where FO_{ijk} is lower than $\overline{FS}_{jk}$, then being surrounded by people from his same nationality is beneficial for this new immigrant.[17]

6 Robustness Checks

In this section I try to address some concerns that may arise in this analysis. The first one is related to the selection into the employed sample. The problem emerges if the network is helping to find jobs disproportionally more to those immigrants more likely to be formal workers. Hence, in column (2) of table 7 I show that the network not only affects the probability of having a formal job conditional on being employed, but also increases the unconditional probability.[18] In order to do this, I use the complete sample of employed and unemployed immigrants and define F_{ijk} as a dummy variable which is equal to one if the new immigrant is employed and formal, and zero if he is employed and informal or unemployed. Moreover, I define $\overline{FS}_{jk}$ as the proportion of formal workers among the EAP.

The second concern is referred to a possible measurement error of the formality share in small social networks, given that I do not have the complete census data, but only a 10% sample. Therefore, as a robustness check, in column (3) I restrict the original sample to those new immigrants with social networks with more than 5 members.

Third, I test whether results are being driven only by a few very large departments. Column (4) displays the results when I drop from the original sample those departments with population above 1500 (90th percentile).

In view of the possible endogeneity of $\overline{FS}_{jk}$ as explanatory variable (due to the selection of immigrants to the departments in Argentina and/or a possible reflection problem), I use the formality share of the network according to the 1991 census as instrument.[19] Results are shown in column (5).

[17] Another way of looking at this issue is taking into account that in this exercise we are computing the probability of being formal of a female immigrant, single and with less than primary education (the ommited dummies in the regression) for different values of the network. Therefore, one could argue that in fact, the probability of being a formal worker, according to her individual characteristics is very low. Hence, once surrounded by countrymen, the mean formality of this network even at the 25th percentile of formality will likely be higher than FO_{ijk}, and her probability of being a formal worker will increase.

[18] In the first column of the table, I repeat the last column of table 5 for ease of comparison.

[19] I do not use this instrument in the main regression due to concerns related to weak-

Table 7: Robustness checks

Dependent variable: F_{ijk}	(1)	(2)	(3)	(4)	(5)
$ln(S_{jk})$	0.010	0.009	-0.021	0.019	0.023
	(0.018)	(0.013)	(0.032)	(0.019)	(0.106)
$\overline{FS}_{jk}$	-0.048	-0.106	-0.305	-0.024	0.190
	(0.080)	(0.082)	(0.278)	(0.081)	(1.299)
$ln(S_{jk}) * \overline{FS}_{jk}$	0.062*	0.089**	0.116	0.053	0.028
	(0.036)	(0.040)	(0.075)	(0.042)	(0.235)
Number of observations	3,931	5,494	3,616	3,341	3,725
Number of clusters	541	667	395	500	463
R-squared	0.266	0.226	0.248	0.287	0.267
$H_o = \alpha = \theta = \psi = 0$	0.011	0.003	0.071	0.120	0.059

a. Robust standard errors in parentheses are clustered on combinations nationality-department.
b. The four columns report IV coefficients. All the regressions include individual characteristics, department and nationality fixed effects.
c. Individual characteristics are those displayed in Table 1.
Column (1) corresponds to the main specification (formal employed vs informal employed).
Column (2) shows the second specification results (formal employed vs informal employed or unemployed).
Column (3) corresponds to the main specification, restricting the sample to those new immigrants with networks above or equal 5.
Column (4) shows main specification results, restricting the sample to departments with population below 1500.
Column (5) reports the results when using instruments for size and formality.
d. *** p<0.01, ** p<0.05, * p<0.1.
e. Omitted variables: female, single, less than primary completed.
f. The last row shows the p-value of the Wald test of joint significance of the coefficients of the variables related to the network.

Finally, in appendix table 3 I report the results of estimating a probit model without fixed effects instead of a linear probability model.[20] The conclusion from all these robustness checks is that the results are qualitatively similar in all the specifications.

7 Conclusions

In this paper I make a contribution to the social network literature by highlighting that the goodness of being surrounded by others from the same nationality may depend on the quality of these contacts. Furthermore, I contribute to the study of the determinants of the informality in the labor market by providing the first empirical evidence of the effect of the social networks over this outcome. By using a Card-type instrument in a linear probability model (controlling for nationality and department fixed effects), I show that new immigrants with more formal social networks are also more likely to obtain a job as formal workers. Moreover, the transmission of the quality of the network to the new immigrant is higher the larger the size of the group of contacts. The results also reveal a differential impact of an increase in the size of the networks, depending on the formality of the social network compared to the predicted formality of the new immigrant in the absence of contacts (which depends on individual characteristics, nationality and department where he lives). Hence, while being surrounded by people from the same origin country may be beneficial for certain immigrants, it may be prejudicial for others. This means that the effect of social networks on the formality of new immigrants could lead to the creation of virtuous or vicious circles within nationality groups and destinations in Argentina. Moreover, the impact of policies designed to reduce informality may be distorted by the presence of networks.

I provide evidence of the validity of the Card-type instrument for the size of the network as a way to circumvent the endogeneity brought by the selection of immigrants to the departments where they migrate. Due to problems related to the data, I do not instrument the formality share of the network. However, I show the robustness of the results, by using the formality share according to the 1991 census as an instrument for $\overline{FS}_{jk}$ as well as changing the specification and the

instruments.

[20] Given that results change when I include the fixed effects, I consider that their inclusion is crucial. Although the probit regressions I present do not have fixed effects, they point in the same direction as those in the linear probability model without fixed effects.

sample used. Also due to limitations of the data, I present a static approach of the social network effect. The availability of the information about year of arrival would allow to analyze the dynamic relationship between formality of the new immigrant and the social network.

8 References

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9 Appendix tables

Appendix table 1: Population living in Argentina according to national censuses

Census	Total		Natives		Immigrants					
	Total		Total		Total		Neighbouring Countries		Other Countries	
	%	Millions	%	Millions	%	Millions	%	Millions	%	Millions
1914	100	7.90	70	5.53	30	2.37	7	0.16	93	2.21
1947	100	15.80	85	13.43	15	2.37	13	0.32	87	2.05
1960	100	20.00	87	17.40	13	2.60	15	0.40	85	2.20
1970	100	23.30	91	21.20	9	2.10	22	0.47	78	1.63
1980	100	27.19	93	25.28	7	1.90	29	0.54	71	1.36
1991	100	32.31	95	30.69	5	1.62	60	0.97	40	0.65
2001	100	36.26	96	34.73	4	1.53	60	0.92	40	0.61

Source: National population censuses

Appendix table 2: Complete specification IV regression

Dependent variable	F_{ijk}
	(1)
$ln(S_{jk})$	0.010
	(0.018)
$\overline{FS}_{jk}$	-0.048
	(0.080)
$ln(S_{jk}) * \overline{FS}_{jk}$	0.062*
	(0.036)
Age	0.002
	(0.003)
Age^2/100	-0.000
	(0.004)
Male	0.061***
	(0.011)
Primary completed	0.027
	(0.018)
Secondary completed	0.051***
	(0.019)
University completed	0.169***
	(0.034)
Married	0.039**
	(0.017)
Separated	-0.009
	(0.034)
Widowed	-0.036
	(0.045)
Constant	0.156
	(0.159)
R-squared	0.266
$H_o = \alpha = \theta = \psi = 0$	0.011

a. Robust standard errors in parentheses are clustered on combinations nationality-department (there are 541 clusters).
b. Number of observations in all the regressions: 3,391.
c. *** p<0.01, ** p<0.05, * p<0.1.
d. The regression includes department and nationality fixed effects.
e. Omitted variables: female, single, less than primary completed.
f. The last row shows the p-value of the Wald test of joint significance of the coefficients of the variables related to the network.

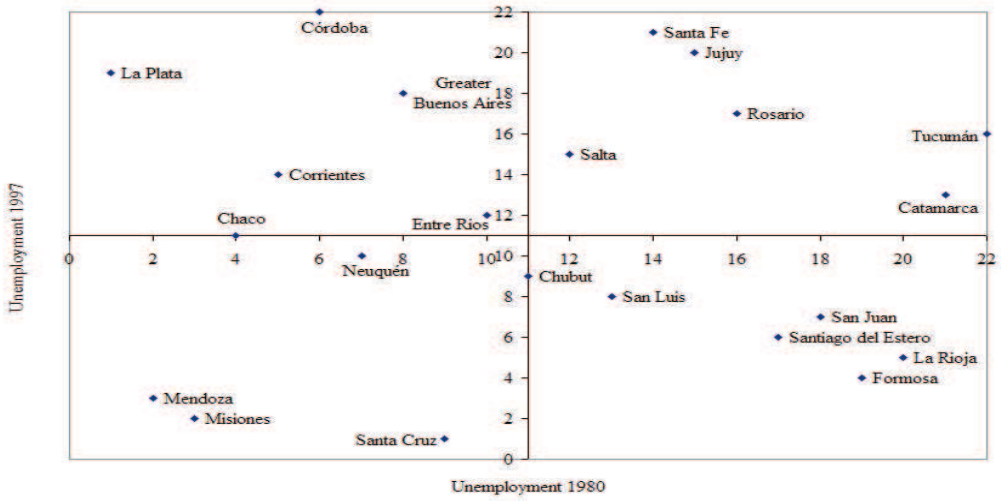
Appendix table 3: Probit regressions

Dependent variable: F_{ijk}	(1) OLS	(2) OLS	(3) OLS	(4) IV	(5) IV
$ln(S_{jk})$	-0.098***		-0.284***	-0.079***	-0.028
	(0.024)		(0.047)	(0.028)	(0.027)
$\overline{FS}_{jk}$		1.653***	0.313		1.568***
		(0.178)	(0.237)		(0.190)
$ln(S_{jk}) * \overline{FS}_{jk}$			0.561***		
			(0.084)		
Pseudo R-squared	0.114	0.142	0.158	-	-
$H_o = \alpha = \theta = \psi = 0$	-	-	0.000	-	0.000

a. Robust standard errors in parentheses are clustered on combinations nationality-department (there are 541 clusters).
b. Number of observations in all the regressions: 3,931.
c. *** p<0.01, ** p<0.05, * p<0.1.
d. All the regressions include the individual characteristics from Table 1.
e. Omitted variables: female, single, less than primary completed.
f. The last row shows the p-value of the Wald test of joint significance of the coefficients of the variables related to the network.

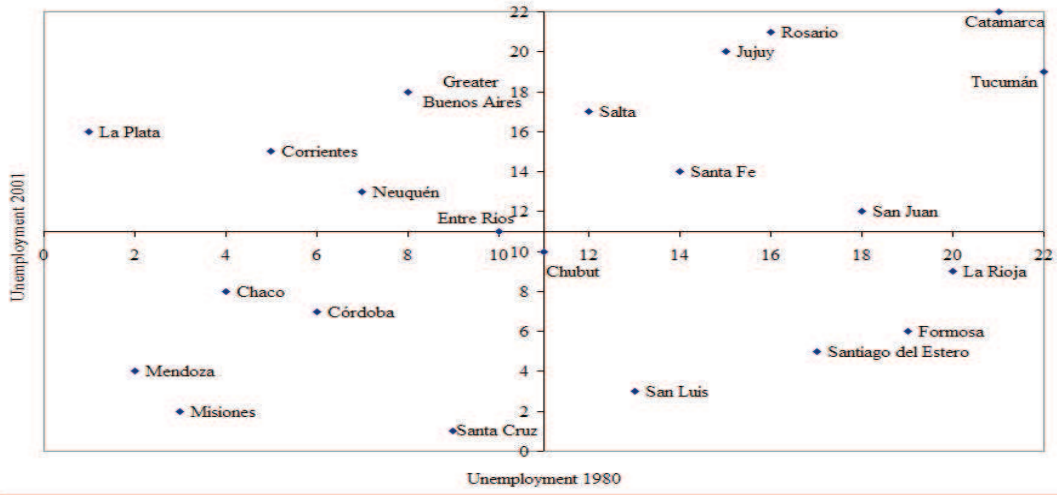
10 Appendix figures

Appendix figure 1: Relative position persistence 1980-1997



a. Constructed using the unemployment rates series computed by INDEC using the Argentinian household survey of May.

Appendix figure 2: Relative position persistence 1980-2001



a. Constructed using the unemployment rates series computed by INDEC using the Argentinian household survey of May.

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