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ORIGINAL ARTICLE

Open Access



Earnings attainment in the three main cities of Southeastern Brazil: social networks and communities of worship

Silvio Segundo Salej Higgins^{1*} , Jorge Alexandre Barbosa Neves¹  and Luciano Mattar¹ 

Abstract

Following the field of insertion into the labor market, we tested the classic hypothesis of the strength of weak ties in the three largest cities in the Southeast Region of Brazil, with a focus on communities of religious worship. A survey was carried out in 2021 with 900 questionnaires divided equally among the three cities, weighted considering the size of the population and the distribution of religious affiliation. We investigated: (1) whether the strength of ties leverages the labor insertion of adults; (2) whether religious cult communities operate as mechanisms for the circulation of opportunities in the labor market. The data were analyzed with Heckman's two-stage correction models to mitigate possible censoring biases. Controlling by seniority in the position and participation of three sampled cities in gross national product, inter alia, the results show that strong ties, as predicted by the strength of ties theory, are associated with lower earnings. At the same time, obtaining a paid job through another cult member is negatively associated with earnings. However, when testing our main hypothesis, we found that in the three largest cities in the Southeast Region of Brazil the religious embeddedness, composed of strong ties, high worship attendance and religious motivations coming from maternal ties, operate plausibly in labor market as favorable screen mechanism associated with higher earnings.

Keywords Earnings attainment, Strength of ties, Communities of worship, Religious embeddedness

JEL Classification J69

1 Introduction

Given the goal of understanding the impact of social networks on the access to the labor market in three large Brazilian urban settings, this article assumes the weak ties hypothesis (Granovetter 1974) as a useful theoretical tool for exploring the understanding of such a market in a developing country. It presents two innovations in relation to the vast body of evidence already compiled in the literature. First, we test the hypothesis in the labor markets of the three main cities of Southeastern Brazil (São Paulo, Rio de Janeiro and Belo Horizonte), distinguishing

this study from most of the previous research on proximity structures, which has been mostly conducted in the United States of America and Canada. Second, we ask how personal contact networks operate in the new context of a society undergoing an accelerated process of religious change. Brazil continues to be the country with the largest Catholic population on the planet (Segreteria di Stato Vaticano 2022), but this profile is changing into a multi-religious society, with a rapid mass conversion to Pentecostal evangelism being highlighted.

With the current growth of Pentecostal religion in Brazil, and their more pronounced growth notably among the lower-income populations of large cities and metropolitan regions, the dynamics of the labor market among Pentecostals should be included as an explanatory factor in the discussion about access to the labor market for

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the poorest population strata. According to Granovetter's canonical approach, labor markets are embedded in social networks that define success in accessing job vacancies. Thus, the community component of religious affiliation should also be treated as an explanatory variable in terms of social network mechanisms. It is not new to consider Pentecostalism, as an individual attribute, as an explanatory variable in traditional approaches to the labor market, however, Pentecostalism had not yet been incorporated as relational mechanism in explanatory models of job market access.

The article consists of seven parts. In the first, the history of the application of the weak ties hypothesis to the labor market is reviewed and concluded with particular attention to mechanisms of labor insertion among communities with a marked ethnic and religious identity. In the second, the main results of recent research conducted in Brazil are presented, focusing on the interaction mechanisms that allow access to the labor market. We set the backdrop of the demographic transition, rural–urban, under which we can interpret the changing religious profile of the country. In the third section, our working hypothesis is explained. In the fourth, the data collection methodology is described. We have operated with a survey method because it was necessary to build some key variables of interest about network mechanisms that operate in communities of worship. This kind of network data are not collected by the national census. In the fifth, data analysis with chi-square univariate test and Heckman two-step model and their respective results are presented. Finally, in the seventh and final part, we propose some research hypotheses to deepen the understanding of contact mechanisms in religious circles.

2 Trajectory of the application of the weak ties hypothesis to the labor market

Over five decades since its publication, *The Strength of Weak Ties* by Mark Granovetter (1973) introduced a foundational hypothesis for a new approach known as sociology of emerging social processes (Granovetter 1992; Lazega 2001; White 2008; Mohr and White 2008; Padgett and Powell 2012). His seminal conjecture states that the cement of society is not made of intimate, very frequent and affectively intense relationships (strong ties), but rather of infrequent contacts between people over time (weak ties).

Granovetter's hypothesis is usually remembered for the technicality of its sociometric formulation (Friedkin 1980). However, it should not be forgotten that the preliminary version of the article published in 1973, *Alienation Reconsidered: The Strength of Weak Ties*, had a broad theoretical scope regarding the classical discussion on the effects of segmentation on social roles. Granovetter

(1983) rejects Louis Wirth and Ferdinand Tönnies' viewpoint that weak ties generate alienation, understood as social isolation. On the contrary, following the interpretation of Simmel and Durkheim, he considers that exposure to a wide variety of points of view and productive activities, proper to the division of social labor, is a prerequisite for the social construction of individualization, which arises in the plexus of relationships constituted by weak social ties. Only in the "role-set", using the expression coined by Robert K. Merton (1957), that is, in the context of varied social roles, does self-consciousness emerge. In other words, when we activate different courses of expectations in different contexts, the possibility arises of maturing a core of individual identity. Thus, without this pluralism of social circles, we would not be able to develop an awareness of our belonging to the wider social set, nor would we be able to maintain our inner attitudes while conforming to varied expectations.

Now, if the Simmelian theory of socialization postulates that the pluralism of social circles creates the conditions for the emergence of individuality, it is necessary to submit the hypothesis derived by Granovetter to the test of empirical evidence. What, then, is the effect of weak ties on the lives of individuals? From his doctoral thesis, Granovetter (1974) adopted the field of labor market mobility as the main focus in which to identify evidence for or against his weak ties hypothesis. According to this, information about vacancies in the labor market circulates, at the macrosocial level, through weak ties that bridge circles of intimacy which tend to close. The *fordibben triad* axiom supports the hypothetical inference presented above: if A is connected through strong ties (close, reciprocal and frequent) with B and C, then B and C cannot be expected to remain unacquainted.

In addition to labor market mobility, the weak ties hypothesis reveals a mechanism of social cohesion that operates in various spheres of human action: community mobilization and collective action, formal organizations, diffusion of ideas and innovation, formation of cognitive skills, among others (Granovetter 1983). In this article, we will continue on from previous studies on mobility and opportunities in the labor market, highlighting the appropriation of the weak ties hypothesis in the Brazilian context.

The research, which followed the trajectory of Granovetter's pioneering study, confirmed his main findings: in accessing available vacancies in the labor market, personal ties count, and within this universe weak ties are a key factor. However, the frequency of the use of weak ties varies according to the skill level of the occupations. Langlois (1977) compared the frequencies on the use of weak ties to access current employment, resulting in a decreasing distribution among managers, professionals,

semi-professionals and manual workers. Ericksen and Yancey (1980), on the other hand, found a high average in the use of strong ties. However, when the data by occupation were disaggregated, it appeared that the least educated were the ones who most used strong ties to look for work. When the impact of the use of weak ties on labor earnings was investigated using a multiple regression model, effects were found that appeared to be contrary to what the hypothesis predicted. Weak ties had a negative impact, though this was due to an interactive effect between education and weak ties. That is, the less educated who used weak ties had lower labor earnings, while the more educated earned more.

Lin et al. (1981) studied the relationship between the strength of ties and the acquisition of occupational status. Acquaintances and friends of friends were cataloged as weak ties while relatives or neighbors were considered as strong ties. Using a structural equation model, they found that the use of weak ties in order to obtain a job was strongly associated with high occupational status only to the extent that weak ties link the respondent with a well-positioned individual in the occupational structure. Plausibly, this indicates that weak ties are more efficient in reaching high occupational status individuals insofar as these ties are preferred if they are available. Nevertheless, to the extent that only 34% of job vacancies were found through weak ties among those who used social contacts, it appears that many individuals had no choice but to rely on strong ties.

When considered together, the results above point to a dual effectiveness of weak ties in labor market structure. Firstly, in occupational groups the use of weak ties is higher when it comes to bridging ties that connect different social circles. In this sense, managers and professionals mobilize their weak ties more effectively. These would be the cosmopolitans who are more likely to relate to acquaintances in other organizations or sectors of an organization. Secondly, the association between educational level and the strength of ties reveals that, in low socioeconomic strata, weak ties do not often constitute bridges, but rather represent friends or relatives of acquaintances. Thus, these weak ties are unable to transmit useful information. In high strata, on the contrary, weak ties build real bridges between distant sectors of the social structure, allowing access to available vacancies in other social circles. In short, the problem for the poor is that they only know other poor people.

Regarding ethnic and religious communities, Kanaheh and Mendola (2009), based on data from the *Fourth National Survey of Ethnic Minorities* (1993, 1994), collected in the England and Wales, studied the association between the networks of immigrants of various ethnic backgrounds (Caribbean, Pakistani, Indian and

Bangladeshi) and their status in the labor market. Guided by Granovetter's (1985) theoretical insight, they operationalized interaction structures and tie strengths by means of proxy variables. Strong ties designate family relationships between parents and children while weak ties were identified by the link with voluntary organizations. In addition, they operationalized what they called "ethnic networks", consisting of individuals of the same ethnicity, "mixed networks", which involve ethnic and other ties, and finally "non-ethnic" networks. The main findings revealed that strong ties, i.e. family relationships, increase the probability of being self-employed. Weak ties increase the likelihood of paid work. Ethnic networks increase the likelihood of self-employment, while mixed and non-ethnic networks increase the likelihood of wage employment.

3 The use of the weak ties hypothesis in studies on labor markets in Brazil

Thus far, the evidence compiled corresponds to research conducted in the context of labor markets in developed countries. In terms of the developing countries, Guimarães (2009) compared job seeking in the Metropolitan Region of São Paulo with two other capital cities of developed countries: Paris and Tokyo. Using data from the Annual Report of Social Information (RAIS), for the years 2001 and 2004, he inquired about the mechanisms of circulation of vacancies in the labor market. It was expected that intermediary companies, or both public and private employment agencies, would be the bridge for both experienced workers living in informality and those seeking their first formal employment. According to author, on average, job seekers were younger and better educated than the average population, however, not all job seekers knocked on the door of these agencies. It was found that the key to the success of workers in São Paulo to fill a vacancy, unlike in Paris and Tokyo, was the use of personal contacts and not the use of the intermediary services of employment agencies. Later Guimarães (2012), without qualifying the strength of the ties, identified that the contacts who transmitted information about job opportunities were those who lived in the same neighborhood as the newly hired person. Spatial proximity was a condition observed for the effectiveness of personal contact.

More recently, Cadoná et al. (2021) in a study on the labor market integration of poor individuals, who rely on precarious jobs, underemployment, and low wages in impoverished neighborhoods in the state of Rio Grande do Sul (Brazil), found that social networks, particularly family, neighborhood, and friendship, play a significant role. This applies both to accessing job opportunities and to establishing conditions for the realization of their

professional activities. In moments of unemployment and deteriorating financial circumstances, these are the networks that workers turn to for support to address their needs for individual and family sustenance. The prominence of these close networks, which are understood to be formed by strong ties, emerges clearly in the initial experiences in the labor markets. However, as they advance their work experiences, the relevance of social networks can decline following integration into the labor market, yielding space for individual strategies that do not necessarily involve guidance and/or help from another individual alongside the strong ties. Nonetheless, the authors emphasize that the research indicates the continued significance of strong ties, the social bonds established with family, friends, and neighbors, as a strategy for both entering and maintaining a position in the labor markets.

Studies explore how religious affiliation can fluctuate in response to changing economic conditions, employment, and income. The variation in the opportunity cost of religious participation is observed in terms of the decrease in income and consumption during periods of economic recession (Azzi and Ehrenberg 1975; Gruber and Hungerman 2008). Focusing in the Brazilian case, Costa et al. (2022) found notable effects on religious conversions, particularly toward Pentecostalism, associated

with economic liberalization and resultant trade shocks that significantly impacted local labor markets in Brazil. Evidence suggests that regions with higher exposure to tariff reductions experienced worsening economic and living conditions, leading to significant economic downturns that increased the share of Pentecostals among the working-age population between 1991 and 2000. According to the authors, this context of economic distress can lead individuals to seek the social insurance provided by tight-knit religious communities, enhancing existential security and coping mechanisms during difficult times. Pentecostal churches, either directly or indirectly through social networks, foster entrepreneurial attitudes, self-esteem, and trust among church members and facilitate access to economic opportunities.

In order to test the Granovetter’s hypothesis, outside the context of countries with high per capita incomes, we must highlight the accelerated sociodemographic transformations in Brazil and their concomitant impacts on the labor market over the last decades. To summarize, we highlight two major movements of societal transformations in Brazil. On the one hand, there is the increase in national income, albeit concentrated, while on the other, the urban concentration of the population, accompanied by a rapid change in religious profile. Figure 1 show the increase in gross domestic product (GDP) *per capita*,

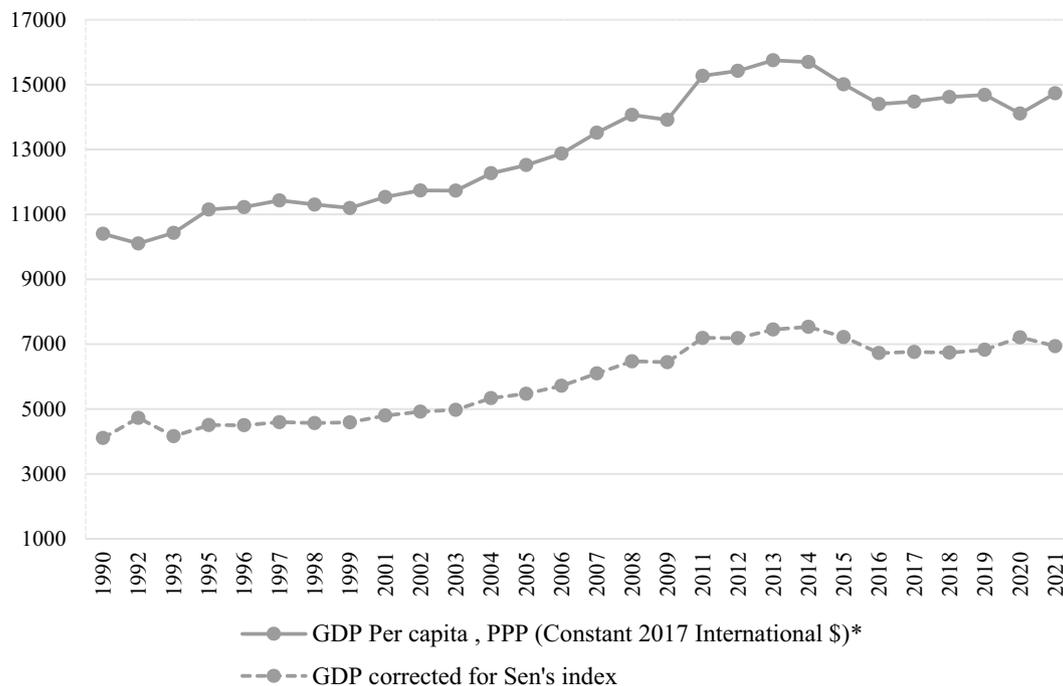


Fig. 1 Brazil: GDP per capita, PPP constant 2017 \$ and inequality-adjusted increase. *"GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States" (World Bank 2021). Source: own elaboration based on World Bank (2024)

both in constant values and in the Sen index, which corrects for inequality. Over the course of twenty-one years, the GDP per capita grew annually, on average, 1.6%, and the GDP corrected for inequality, 2.3%.

Figure 2 shows the sharp increase in the urbanization rate and the concomitant change in Catholic and Evangelical religious affiliation, with the former decreasing and the latter increasing. Accelerated urbanization has been a key factor in this change in religious profile. Alves et al. (2017) showed that there was a decline in traditional Catholicism in both urban and rural areas, while there was an increase in evangelicals and those with no religion. In the 1991 Census, only 16% of municipalities throughout Brazil were predominantly evangelical, while in the 2010 Census the number of predominantly evangelical municipalities increased to 73%. Evangelicals have a greater presence in the peripheries of metropolitan regions, with the southeast region registering half of all Brazilian evangelicals. In this sense, it should be noted that, according to demographic projections, by the year 2040 the Brazilian reality will mirror the state of Rio de Janeiro, in which the percentage of Catholics tends to account for less than 40% of the population (Alves et al. 2017).

Recent work has addressed the relationship between Pentecostal trends and upward social mobility in Brazil. Using data from demographic censuses between 1970 and 2000, Potter et al. (2014) identified a clear association between Pentecostal religious affiliation and wage gains, controlled for race, educational attainment and other demographic factors. In this study, only employed

male Pentecostal were analyzed due to the high variability in female labor market participation rates, which often include long periods of absence due to pregnancy and home care. Earnings were used instead of data on employment rates because they exhibit less variability with age and educational attainment. The most robust result was the close association between men's earnings defined by place, age and education, being pronounced among those with less than five years of schooling. In other words, non-white men (mainly black and brown) with low levels of schooling and Pentecostal Protestant affiliation have greater relative gains in earnings. For example, in the 15–24 age group, up to 4 years of schooling, in conglomerates with 0% up to 30% Pentecostal and 60% non-white population, the increase in relative earning gain is 12%. In the non-white segment close to 0%, the relative gain disappears because the earning level remains stable.

All indications are that, in the labor market, evangelical affiliation operates as a screening device (Arrow 1973; Spence 1973; Stiglitz 1975) for individuals with low education. To put it briefly, and in economic terms, screening involves identifying the quality of a resource or commodity (for example, a worker) based on information available on the market. The devices that help classify commodities are called screening devices. Institutions operate as screening devices to the extent that they label skills and abilities that are recognized in terms of their rarity and productivity. In this sense, the school system labels individuals on their productivity potential, allowing for better wage rewards. In our case, religious socialization could

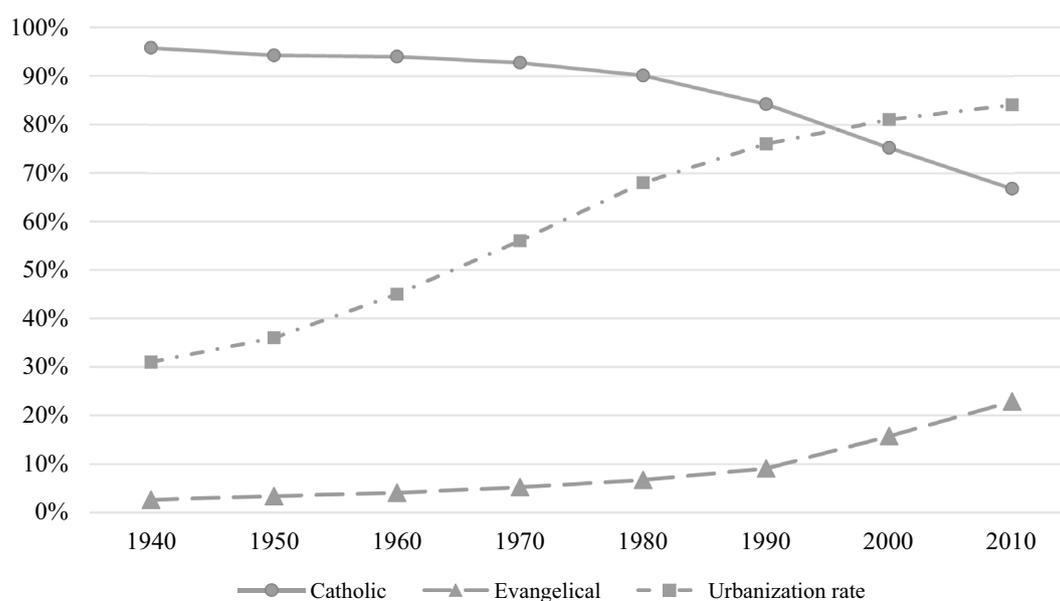


Fig. 2 Brazil: urbanization rate and change in religious affiliation. Source: own elaboration based on demographic census (IBGE, 2024)

also operate as a label of moral discipline and motivation to work.

The above findings allow us to raise new hypotheses regarding the cross-effect of the race variable with religious affiliation. It seems that the structural disadvantage of non-whites vis-à-vis whites in the labor market is compensated for by the attachment to a Pentecostal community, as if religious belief were an antidote to discrimination. According to Potter et al. (2014, p. 147): “Imputed favor is likely to be most important for those without educational credentials, as might be the advantage of a social network acquired through membership in a church in learning about jobs, or being recommended for them”.

4 Research problem and hypothesis

Based on the new religious map of Brazil and the consolidated results in the field of research on interaction networks in the labor market, we propose to investigate:

1. whether the interactive structures of proximity, through the mechanism of weak ties, leverage the labor insertion of Brazilian adults while improving their earnings.
2. whether religious cult communities function as formers of social ties that convey the circulation of opportunities in the labor market while improving earnings.

Schematically, and taking into account Granovetter's (1973) theory, we propose the following specific hypothesis:

In addition to the place of work, evangelical religious circles operate as an effective network of contacts for the diffusion of paid work opportunities.

5 Data collection

Due to budgetary constraints, it was decided to carry out a representative sample for the three largest municipalities in the Southeast region of Brazil, being the most wealthy and populous. A survey was conducted in sixty census districts (Primary Sampling Areas—PSA) drawn by probability proportional to size (PPS), located in Belo Horizonte, Rio de Janeiro and São Paulo, with twenty districts drawn in each municipality in 2021. The sample size was of nine hundred personal household interviews, divided into three hundred for each municipality.

A complex sampling plan was designed, by clusters and stratified, so that the results would allow inferential validity. The unit of collection of the clusters corresponds, as mentioned above, to the Instituto Brasileiro de Geografia e Estatística (IBGE 2010) census districts (Primary Sampling Areas—PSA). The stratification was based on sex, age category, educational level, and religious affiliation.

As afore mentioned, in each city, 20 PSAs were randomly selected by probability proportional to size (PPS), and 15 persons (from 15 different households) were interviewed, after been chosen based on the proportions of the categories of each variable used for stratification. Thus, in each city 300 households were selected and only one person of each household was interviewed. The final selection criterion of respondents was based on a group of variables (the ones used for stratification): sex, age, educational level and religious affiliation. In this sense, were defined proportional quotas for each variable based on the information coming from the Brazilian official organization for census studies (IBGE 2021a), with the exception of religious affiliation. In the case of religious affiliation, given that we wanted to have a special attention to evangelicals, we oversampled them. There was a half and half division between, on the one hand, people who declared participation in evangelical cults and, on the other hand, either people who declared participation in other religious cults or those who declared themselves to be irreligious. This division aimed to ensure a sufficient number of cases with evangelical respondents, which was our population of interest. However, it is not a completely random sample. Therefore, when analyzing the data, we weight them based on two variables:

I-The total population of each city (information coming from projections of IBGE (2021b)), given that we had, originally, 300 observations in each city.

II-The proportion of each religious affiliation in each city. Given that the last measurement available about this from IBGE was dated in 2010, we used the results of the World Value Survey for Brazil of 2017 (Inglehart 2017).

After collection, the data were weighted following to ensure a correct estimation of the religious parameters of the population. In order to correct any possible sample biases, we have implemented a weighting procedure based on a raking post stratification methodology that is better described in the Appendix (Additional file 1).

The collection instrument consisted of a questionnaire with fifty-two questions divided into five blocks: characterization of the interviewee, working conditions, mechanisms for obtaining employment, religious profile and moral profile.

6 Data analysis

In order to achieve the objectives of our research, we analyzed the data in the following sequence: firstly, we showed the descriptive statistics of the sample; secondly, we identified the evidence supporting the preponderance of personal ties in the labor market through chi-square

univariate test; thirdly, we modeled the data via Heckman correction to ask whether membership of cult communities raises earnings and through what mechanisms this advantage operates.

The choice of the two-stage Heckman selectivity bias correction model (1979) to investigate whether the community of worship operates as a structure that leverages labor market opportunities and improves work earnings was necessary to correct the high proportion of respondents that did not report to have a pay job in the reference week, as a consequence of the Covid-19 pandemic. In our questionnaire, respondents were asked whether they had any paid activity in the reference week. If the answer was yes, they were then asked about the amount of their income. This approach, however, means that our dataset is censored because we do not have information on the income of individuals who did not report having a paid job during that week. Consequently, it is imperative to control for this censoring in our analyses to prevent a biased interpretation of the data.

In the first stage, known as the selection equation, the model estimates the probability of an observation being included in the sample through a probit regression that predicts the probability of selection based on the set of variables explaining the sampling bias. The result of the first stage, known as inverse Mills (IMR), captures the selection bias and will be used as an explanatory variable in the second stage, known as the outcome equation. Thus, the second stage adjusts the estimates to ensure that the coefficients are unbiased and consistent, even when the sample selection is biased.

6.1 Descriptive analyses

Table 1 summarizes the main characteristics of the sample for the three capitals. We highlight two contextual constraints of data that should be taken into account when testing the hypothesis of interest. First, more than half of the respondents declared that they had no earnings in the reference week. Let us recall that data collection coincided with one of the most dangerous waves of the coronavirus pandemic. Thus, we consider that we have a picture of the contraction of the labor market of the three cities studied. Second, the average monthly earnings of R\$ 2533.00 Brazilian Reais (US\$ 456,00 on February 2021) is quite close to the average monthly wage of the Southeast region, according to data from the Continuous National Household Sample Survey (PNADC) of IBGE (2021a), with our observation being slightly higher by 10%. On the other hand, the income mass is concentrated, expressively (61.15%), between half and two minimum monthly wages. If we include people who are self-employed, domestic workers and those who work for apps, approximately 50% of people with earnings carry

out their activities in conditions conducive to informality. This highlights the challenge that the labor market is experiencing in Brazil.

Considering the profile of religious affiliation, it is important to note that the *irreligious* category refers to people who do not attend religious worship activities. We chose to inquire about the practical dimension of the interviewee in relation to the rituals and beliefs of a particular faith group, instead of asking abstractly whether or not they believe in a god. In line with the demographic census (IBGE, 2010), and in order to distinguish between Christian denominations, we differentiate between the Protestantism of the Historical Reformation (sixteenth century) and the Pentecostal evangelism of the mission churches that emerged at the beginning of the twentieth century in the United States and that in successive missionary waves made Brazil a mission territory (Freston 1995). Under the heading of evangelism, the Pentecostal movement is perhaps the most expressive and visible face among the numerous doctrinal trends, life ethics and worship practices. It is noteworthy that 53% of respondents report attending worship practices at least once a week, which is an indicator of the intensity with which faith is followed among practitioners of the different religious denominations.

6.2 Univariate analyses

The first analysis aims to identify the characteristics of social contacts that leverage labor market opportunities. To this end, we present the frequency distribution of the variables that capture the mechanisms of circulation of job opportunities. All variables refer to how the respondent became aware of their current paid work activity (see Table 2). A univariate chi-square test of adherence was performed to estimate whether there were statistically significant differences between response categories, contrasting the observed frequencies with uniform random distributions. All variables showed a significant result, with the exception of the variable that asked whether the contact lived in the neighborhood.

Three important findings can be made from the above frequencies:

1. Taking into account the vehicle of information, personal contacts are the most important mechanisms for obtaining key information that leverage labor market opportunities. Over 80% of respondents stated that they had accessed their paid work opportunity 'through someone else' or a personal contact (see Table 2). At the same time, the evidence points to a combination of several characteristics in social ties (Fig. 3).

Table 1 Socio-demographic profile of the sample

Sex	Male	46.6%
	Female	53.4%
Age	18–24	13.8%
	25–34	20.7%
	35–44	20%
	45–59	25.3%
	> 60	20.3%
Race	White	31.2%
	Black	23.4%
	Brown	38%
	Yellow	6.4%
	Indigenous	0.8%
Schooling	Did not attend	4.7%
	Incomplete primary education	24.7%
	Complete primary education	6.8%
	Secondary school incomplete	15.7%
	High school graduates	34.9%
	Higher education incomplete	3.2%
	Complete university degree	9%
	Master incomplete	0.7%
	Master complete	0.3%
Fixed work week reference	Yes	44.6%
	No	54.4%
Income from work	Average	R\$ 2553.00 (R\$ 2916.53*)
Earnings by wage band	Up to ½ minimum monthly wage	3.3%
	From ½ to 2 minimum monthly wages	62.2%
	Above 3 minimum monthly wage	34.5%
Position in the enterprise	Employee	17.8%
	Self employed	20.3%
	Domestic work	1.3%
	Entrepreneur	0.9%
	Government	4.2%
	Working through apps	1%
	Non Governmental Organization	0.1%
	Army	0.1%
	Not applicable to answer	54.4%
Religious affiliation	Irreligious	17.9%
	Catholic	42.5%
	Evangelical	24.2%
	Protestant	0.4%
	African matrix	5.6%
	Spiritist	6.0%
	Other	3.4%
High frequency in worship	More than once a week	18.3%
	Weekly	34.3%
	Fortnightly	8.1%
	Once a month	9.8%
	Once every six months	2.6%
	Once a year	9.2%
	Not applicable to answer	17.9%

Table 1 (continued)

Marital status	Single	51.7%
	Married	33%
	Stable union	4.9%
	Divorced	10.3%
Religion of mother Binarized	Catholic	43,8%
	Non-Catholic	56.2%
Religion of mother Binarized	Evangelical	24%
	Non-evangelical	76%
Formal job	Yes	59.4%
	No	40.6%
Seniority 10 years	Yes	33.3%
	No	66.7%
Seniority > 10 years	Yes	30.4%
	No	69.6%
Service sector	Yes	17.4%
	No	82.6%

Source: own elaboration from survey data

*Standard deviation; N=900

Living close to the informant did not turn out to be relevant in the constitution of social ties that facilitate access to paid activities. The chi-square test did not find a significant difference between living or not living in the neighborhood. Guimaraes' (2012) findings, in which the key informant is someone who lives in the interviewee's neighborhood, were not confirmed.

2. Taking into account the referrals made by the faithful, the cult community appears to be a weak lever of opportunity in the labor market. Only around 25% of respondents said that they had both referred other members of their faith community for a job and had also found a formal or informal way through a coreligionist.

6.3 Multivariate analysis

In order to investigate whether the community of worship operates as a structure that might leverage labor market opportunities and improve earnings, we analyzed the data using two-stage Heckman selectivity bias correction models (1979). Applying the Heckman model was necessary because of the high rate of people that did not report earnings in the reference week as a consequence of the Covid-19 pandemic.

The two functions estimated by the Heckman model in the first stage have the same variables to control the sampling bias, while in the second stage the two models have different variable specifications, as they aim to estimate the difference of the regression coefficients of variables

of mechanisms for the circulation of job opportunities. Below we will describe the variables selected for both models in the first stage and then the variables for both models in the second stage.

The first stage of the Heckman model (Table 3) consists of the selection probit equation, whose response variable corresponds to whether or not one had earnings in the reference week. The explanatory variables included in probit selection equations are: centered age, centered age square, years of schooling (the original variable was transformed into a continuous), be a woman, race as a binary variable with black/brown as the characteristic of interest, catholic and evangelical affiliation, worship years as experience in worship attendance, and a dummy variable having those who are irreligious as the characteristic of interest. We employed the two-stage Heckman procedure using the `heckit` function from the `SampleSelection` R package (Toomet and Henningsen 2008).

In the second stage of the Heckman model (Table 4), known as the outcome equation, we will have four variables already used in the first stage: centered age, centered age square, years of schooling and woman. There are the basic control variables. In addition to these variables, others were included in the second stage to capture the effects of the strength of ties and the mechanism for the circulation of job opportunities. Below we will distinguish the specificities of each of the two outcome models (Table 4).

The first outcome equation can be understood as Granovetter's model because we have tested two interactional dimensions as the main mechanisms in order

Table 2 Characteristics of mechanisms for the circulation of job opportunities

Information vehicle	Through someone else	81.9%*
	Advertisement in newspaper or magazine	6.3%*
	Employment agency	1.4%*
	Radio or TV	0.1%*
	Internet groups: Facebook, WhatsApp and others	10.3%*
Direct contact with the informant	They asked an acquaintance	22.9%*
	An acquaintance, who knew about the search for a job, advised	62.5%*
	An acquaintance, who did not know about the search for a job, advised	6.6%*
	Through a former employer	7.9%*
Mechanism for passing on information	In person face to face	74.5%*
	Telephone	16.3%*
	WhatsApp	8.6%*
	Message through others	0.6%*
Intimacy with the informant	They know them by name only	8.4%*
	Know them a little	8.7%*
	Relative	36.9%*
	Friend	43.9%*
	Boyfriend/Girlfriend	0.8%*
	Spouse	1.3%*
The informant lives in the neighborhood	Yes	51%
	No	49%
Frequency of contact with the informant	More than once a week	71%*
	Once a week	14.8%*
	Once every fortnight	4.6%*
	Once a month	6.3%*
	Once every six months	0.6%*
	Once a year	2.7%*
Job satisfaction	Very satisfied	56.1%*
	Fairly satisfied	38.3%*
	Fairly dissatisfied	4.2%*
	Very dissatisfied	1.4%*
Referred another member of the worshipping community for a job	Yes	25.1%*
	No	74.9%*
They got a job through another member of the worshipping community	Yes, a steady job	14.4%*
	Yes, a temporary job	10.3%*
	No	75.3%*

P-value **/ < 0.05; N = 900

to obtain a job with high earnings: personal ties understood as face to face and the strength of ties. The first dimension was operationalized through two variables: living in the neighborhood and being recommended by a former employer. In this way, we can capture social circles that are key mechanisms for circulating information about job opportunities and test the results of previous research conducted in the Brazilian context (Guimarães 2009). In fact, Granovetter (1973) points out that the workplace is a factory of weak ties and a source of non-redundant information. The second

dimension was operationalized using the strong ties indicator.

Aiming to obtain parsimony, we have binarized two original variables that had been conceived as categorical, including one as the characteristic of interest and everything else as zero: *former employer* (binarized from direct contact with the informant), and *strong ties* (binarized from frequency of contact with the informant, from more than once a week up to once every fortnight).

In the outcome Eq. 2, in addition to the variables of the model 1, we operationalized a set of independent dummy

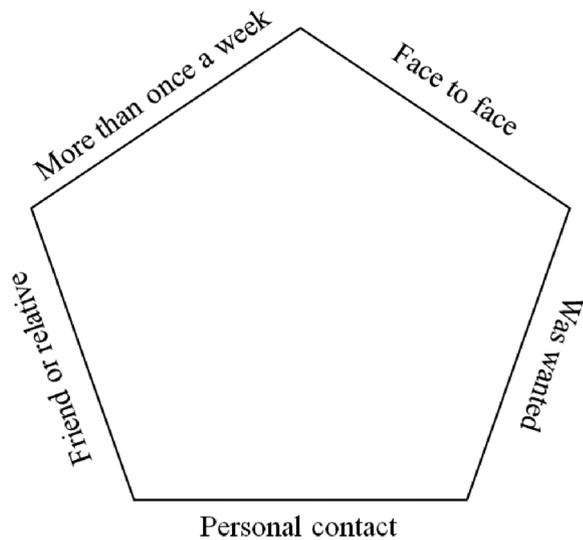


Fig. 3 Characteristics of interpersonal ties that allow access to earnings

Table 3 Probit selection equations for response variable having or not having earnings in the reference week

	Model 1		Model 2	
	Estimate	S. E.	Estimate	S. E.
Constant	-0.320	0.206	-0.345§	0.208
Age centered	-0.022***	0.003	-0.022***	0.003
Centered age squared	-0.001***	0.0002	-0.001***	0.0002
Years of schooling	0.057***	0.012	0.059***	0.013
Woman	-0.499***	0.096	-0.493***	0.096
Black/brown	-0.367***	0.098	-0.372***	0.099
Catholic	0.159	0.144	0.144	0.145
Evangelical	0.188	0.152	0.157	0.153
Irreligious	0.219	0.178	0.219	0.179
Worship years	0.263*	0.120	0.281*	0.121

P-values: **** < 0.001; *** < 0.01; ** < 0.05; § < 0.1

Model 1—846 observations (447 censored and 399 observed). 21 free parameters (df = 826)

Model 2—785 observations (447 censored and 338 observed). 34 free parameters (df = 752)

variables seeking to explore the impact of specific mechanisms over earnings experienced in communities of worship. Two variables, *high frequency in worship* and *job found through church*, stress how organizational dynamics of religious life shape and instrumentalize the social contacts in order to obtain labor advantages. High frequency includes taking part in the worship fortnightly, weekly and more than once a week. The variable referring to the job found means if the respondent has obtained a job through a referral from anybody in the worship

Table 4 Outcome equations for response variable natural logarithm of earnings

	Model 1		Model 2	
	Estimate	S.E	Estimate	S.E
Constant	7.976***	0.326	6.811***	0.276
Age centered	0.0201***	0.004	0.013**	0.004
Centered age squared	-0.0001	0.0003	-0.0002	0.0002
Years of schooling	0.062***	0.013	0.074***	0.012
Woman	-0.327***	0.099	-0.304**	0.094
Lives in the neighborhood	0.022	0.067	0.053	0.066
Former employer	-0.527**	0.164	-0.139	0.161
Strong ties	-0.198	0.128	-0.339**	0.127
Job found through church			-0.188*	0.084
High frequency in worship			0.287***	0.070
Religion of the mother-Catholic			0.267**	0.082
Religion of the mother-Evangelical			0.232**	0.080
Formal job			-0.067	0.063
Seniority 10 years			0.068	0.075
Seniority > 10 years			0.372***	0.099
Hours per week			0.004*	0.002
Service sector			-0.004	0.078
Very satisfied			-0.059	0.238
Reasonably satisfied			-0.183	0.239
Reasonably dissatisfied			-0.427	0.272
Participation in GNP			2.659***	0.977

P-values: **** < 0.001; *** < 0.01; ** < 0.05; § < 0.1

community. In addition, we operationalized two dummy variables on the mother’s declared religion: Catholic and Evangelical, with non-religious mothers being the reference category. One should note that the inclusion of variables related to mothers’ religious affiliation also plays the role of avoiding the ‘family background bias,’ as observed by Lam and Schoeni, who conclude that ‘parental characteristics represent unobservable worker attributes’ (1993, p. 710). While in their article parental education plays the role of controlling for the family background bias, in this paper, for good reasons, parental religion affiliation does the same. In a few words, the second model combines factors from the structure of social interaction and a subjective factor, called by Max Weber (2003) the psychic impulse of religious ethics on economic behaviors.

Considering that career trajectory and macroeconomic setting influence the earning attainment of individuals, it was incorporated a set of control variables also collected by the survey: segmentation of labor market (*formal job*, a binary variable that was obtained from an original categorical variable and that includes the characteristic of interest), seniority in the current position (*ten years and more than ten years*, two dummies variables obtained

from an original categoric variable and that includes the characteristic of interest, being under ten years the omitted characteristic of reference), number of hours worked per week (*hours per week*), a binary variable with tertiary sector as characteristic of interest taking into account that the higher frequency of respondents declared this category (*service sector*), categorical ranking of satisfaction in the job (*very satisfied, reasonably satisfied, reasonably dissatisfied, being very dissatisfied* the reference category), and finally, participation in GNP (the participation of every city, included in the sample, in Gross National Product (GNP), included from IBGE (2021b)).

In general, the results showed in the Table 3 are statistically similar, albeit with small variations between the coefficients of the same variables in the two probit functions estimated:

1. As is well established in the literature (Dziak and Henry 2017; Beltrano et al. 2013), age usually has a quadratic relationship with the probability of being gainfully employed, with the linear coefficient positive and the quadratic coefficient negative. The variable ‘centered age quadratic’ was created from the variable ‘centered age’ in order to be able to model the non-linear or curvilinear relationship between earnings and age, and both were centered to avoid multicollinearity. In our analysis, we found the opposite with the linear coefficient, which must be related precisely to the contraction of the labor market as a consequence of the covid-19 pandemic. As this variable is not central to the article, we will not explore this discussion.
2. As expected, women have fewer opportunities of being in paid employment.
3. Being black or brown reduces the chances of having a paid job. This effect of race was expected as poverty and race are associated in Brazil (Osório 2019).
4. Each year of study increases the chances of having a paid job.
5. Being Catholic, Evangelical or Irreligious was not statistically significant.

6. Experience, measured in years of worship, increases the chances of having paid work.

In the second stage (Table 4), two outcome equations were constructed considering the effect of censored cases on observed cases. In both models, the response variable was the natural logarithm of the amount of earnings declared. As aforementioned, some control variables of the previous selection model were included, namely age centered, centered age squared, years of schooling and being a woman (Table 5).

The main results showed in Table 4 are following:

1. As expected in both outcome models, age, years of schooling and female gender show similar coefficients in the probit equations of the first stage of the Heckman model.
2. Regarding model 1, some structural mechanisms foreseen by the weak ties theory were not confirmed. Neither the coefficient of the dummy variable of living in the neighborhood nor the strong ties were statistically significant. Contrary to what could be expected, those who found opportunities for paid activities through a former employer showed lower earnings. However, when controlled by variables of seniority and macroeconomic setting this unforeseen result disappears.
3. In model 2, strong ties have the result predicted by the theory, i.e. those who found paid activities through people with whom they had weekly or fortnightly interactions, have lower earnings. All other variables of interest in model 2, showed to be associated with earnings. Those who attend worship more often have higher earnings. Having been referred to a paid activity by another church colleague showed to be associated with fewer earnings. On the contrary, having a Catholic or Evangelical mother is associated with better earnings when compared to respondents whose mothers have no religious affiliation.

Table 5 Fit statistics of the outcome equation models

	Model 1			Model 2		
	Estimate	S. E	P value	Estimate	S. E	P value
Inverse Mills Ratio	- 0.173	0.247	0.486	0.185	0.221	0.402
Sigma	0.643			0.576		
Rho	- 0.269			0.321		
Multiple R-Squared	0.198			0.331		
Adjusted R-Squared	0.181			0.286		

7 Discussion

The results above are in line with the basic mechanisms of labor market insertion predicted by Granovetter's theory (1973, 1974). We should emphasize that our evidence shows how religious circles might shape interpersonal networks. As we have seen before, the second outcome model makes clear that personal referrals from church colleagues are effective mechanisms for gaining access to work activities but worsening the earnings. How could we interpret this? If we look at this result together with the strong ties, it is plausible to infer that cult communities operate as factors of strong ties that convey opportunities for lower paid work, in urban contexts where there is a significant presence of black and brown people. This suggests, also, that people with lower earnings are the ones who attend religious worship the most,—something that is confirmed by the historical turn of Pentecostal evangelicalism in Brazil (Spyer 2020). In terms of Granovetter's theory, we could say, specifically, that the strong ties of religion, in poorer strata, produce clusters with redundant contacts that do not favor bridging or weak ties, which are the channels of circulation of information regarding the best job opportunities. As mentioned in the literature review, the problem of people of low-income strata is that they only know other poor people, reflecting a mechanism of segmentation and a barrier for social mobility.

Regarding Guimarães' findings (2009, 2012), our data could not confirm or reject any association between spatial proximity (*living in the neighborhood*) and earnings. Anyway, our results, in the same vein of Guimarães and for three main cities of Southeastern Brazil, are convergent with Granovetter's rationale: personal contacts matter when trying to get a job. In a country of middle range income, such as Brazil, and in the digital era, face-to-face interactions continue to be vital for subsistence of working classes.

In relation to our hypothesis, the main findings are that the bonds woven in communities of worship, combined with the intensity of faith communicated by maternal affiliation, might be effective in obtaining paid activities. These findings, on the one hand and for the three main cities of Southeastern Brazil confirm and extend the results of Potter et al. (2014), but on the other hand, are contrary to the findings of Kanahec and Mendola (2009) in the United Kingdom context.

In the first case, Brazilian census data showed that brown/black men in mostly Pentecostal micro-regions had better relative earnings. In this vein, our results reveal the importance of personal ties as a mechanism that is still effective for entering the world of work among the poorest strata in Brazil. Specifically, we now know that the relationships woven in the cult might constitute

an effective protection network in the job market, while religious embeddedness, the faith shared between mother and child, is a proxy of religious life that might work as a screening device in the labor market.

In the context of England and Wales, Kanahec and Mendola (2009) point out that success in the labor market of individuals of marked ethnic origin (linguistic or national) depends more on the social process, whether it is insertion or isolation in the host society. That is, the way the immigrant activates or builds his relational capital is key. Similarly, the religious ties of migrants do not add anything significant to the social capital that opens doors in the labor market. However, a different situation was found in our study. In the case of a regional labor market such as that of the three main cities of southeastern Brazil, active participation in religious cult communities allows building useful ties that convey opportunities in the world of work. When viewed vis-à-vis, both studies allow us to contrast the potential role of religious ties in contexts of productive insertion into the world of work. In the case of migratory processes, what seems to count is the degree of civic insertion to access paid work and the degree of ethnic insertion, among identity peers, to become an entrepreneur. In labor markets where there is no strong pressure for the insertion of international immigrants, as is the case of the three state capitals studied in Brazil, religious life insinuates itself as an effective mechanism of productive insertion for the poorest layers of the population.

8 Conclusions

In the context of three main cities of Southeastern Brazil, this research has done something unprecedented from a theoretical and methodological point of view in the field of socio-economic research into social networks in the labor market. Using an inferential research design, it operationalized data collection for a set of variables that capture the social interaction mechanisms through which information on paid work opportunities circulates. It was inspired by the seminal work *Getting a Job* (Granovetter 1974) but adapted to the context of the cities surveyed. Other studies had been done, but with comparatively less robust data due to the universe represented, as they were restricted to São Paulo (capital) and a medium-sized city in Rio Grande do Sul. In our case, we have a representation of the three most important capital cities in the southeastern region of Brazil, the richest in the country considering its relative weight in the Gross National Product.

As expected by Granovetter's theory, this research found that face-to-face personal ties, at least in the context of the three largest cities in southeastern Brazil, are an effective mechanism for obtaining paid work

opportunities. The stronger, in terms of frequency, these contacts are, the lower the earnings from the job. In line with this result on strong ties, we found that referrals made within cult communities have a negative effect on earnings. Taking into account the average salary of the universe surveyed, of up to two legal minimum wages, and the majority composition of blacks and browns in evangelical communities, which are part of the poorest strata of the largest cities in southeastern Brazil, it is plausible to say that the strong ties built in worship communities function as a network of solidarity in the world of work, albeit segmented, in which the poor only know the poor, representing a barrier to social mobility. But at the same time, our results show that a deep religious insertion, resulting from maternal religiosity and high church attendance, has positive effects on earnings. In this sense, it is also possible to say that participation in the worship communities functions as a motivational and disciplinary factor for work life and also as a credential for access to better-paid opportunities.

If worship communities are effective tie formers, what can we hypothesize about the association mechanism of tie strength operating in this context? The question that arises for further research is how networks built in communities of worship operate. Jacob and Corwell (2007) provide useful insights by expanding the forbidden triad axiom postulated by Granovetter. If we take into account that the labor market triad is made up of the job seeker, the intermediary, and the employer, it is possible that the *matching* provided by the intermediary between the supply and demand ends operates simultaneously via weak ties and strong ties, depending on the nature and interests of the agents on each side of the market. Thus, the job seeker is usually an individual, but the intermediary may already be an individual or an employment agency, and the employer is usually an organization. This raises an additional distinction that is not in Granovetter's original theory, because the networks in which the three agent-types of the labor market are immersed may belong to different spheres or domains of networks—or *netdoms* in the words of Harrison White (2008). For example, if we see the challenge of an employer who does not have strong direct ties with job seekers, which consists in reducing information asymmetry, it is to be expected (*ceteris paribus*) that they want to take advantage of the strong ties that exist between their employees and the job seekers, in order to detect hidden biases in the *curricula vitae*. In this way, network domains operate simultaneously and with different utilities, since the candidate, on the one hand, may have obtained the information through a wide and sparse network of weak ties among their acquaintances, but on the other hand, the employer

may take advantage of the strong ties within the organization. In other words, the job seeker is a *broker*, at the same time, of two network domains.

This allows us to postulate that communities of worship could operate as a social circle, or *netdom*, that bridges the gap between employers and job seekers of paid work. The fact that a worshiper obtained a job through the referral of a co-religionist, while having an intense faith preceding the primary bond with their mother, suggests a religious *embeddedness*. This combines the structural advantages of networks with the psychic drive of a deep faith that disciplines the believer's life and prepares them for the job market. In this sense, the structural theory of the strength of weak ties needs to be complemented by the process of religious socialization that precedes entry into the labor market. This was demonstrated by the positive effects of the antecedent variables of maternal religion on labor earnings. In summary, we have verified the effectiveness of social contacts, entwined in the common life of religious worship, as an effective mechanism for insertion into the world of work, and, furthermore, we hypothesize that the psychic impulse of faith (Weber 2003), built into the symbiosis of family and worship, operates as the foundation of the ethical credentials recognized by the triangular relationship of the job seeker, intermediary and employer, operating as a reducer of information asymmetries in the labor market. At the same time, the religious *embeddedness* can be seen as evidence of the theoretical predictions of an important article authored by Granovetter (1985), given that our findings support the hypothesis that economic actions are somehow embedded in social relations, in this case, the practice of religion.

There are still some challenges for future research in Brazil and around the world. We must work to ensure that public statistical research institutes incorporate the perspective of social interaction networks operating in the labor market into their periodic household surveys. In this way, we can expand the representativeness to the national level, something we didn't achieve in this study.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12651-024-00388-5>.

Additional file 1.

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Author contributions

Silvio Segundo Salej Higgins: Conceived the theoretical framework of the research project. Searched the financial funds. Revised the successive versions of the manuscript. Wrote the final version of the manuscript. Jorge Alexandre Barbosa Neves: Conceived the sampling design. Identified the best statistical

models to analyze the data. Revised the successive versions of the manuscript. Luciano Mattar: Revised the bibliography of the network theories on job markets. Wrote the R script of the statistical models. Revised the successive versions of the manuscript.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests

The author(s) declare(s) that they have no competing interests.

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