This paper estimates the role of social capital in individual labor incomes in Brazil. It starts discussing the concept and the measurement of social capital, so that a procedure that identifies a group of individuals in society that has a negligible social capital can be built. As a consequence, the role of social capital in individual labor income can be estimated through a Mincerian type equation. Results indicate that this role reaches 63%, on average. This means that weak institutions have throw the Brazilian economy to a high dependence on social capital for the search processes in labor market and for the ability to generate trust on economic relationships. Therefore, public policies should always be concerned with their consequences for social capital formation and there should exist particular policies to increase trust and reduce the costs of search so that the role of social capital in individual incomes falls.

Key words: Social Capital; Social Networks; Mincerian Equation; Migration.
puede introducir una forma de identificación de un grupo de individuos que haya perdido todo su capital social, de otro grupo que lo mantiene. Por consiguiente, esta separación permite que, en la estimación de una ecuación Minceriana, sea identificado el papel del capital social medio en la determinación del rendimiento individual. Los resultados indican que este impacto es elevado, alcanzando 63%. Esto significa que las políticas públicas de desarrollo local en Brasil deben siempre tener en consideración sus consecuencias en la formación del capital social. Además, la construcción de mecanismos para la difusión de informaciones y las garantías individuales a los acuerdos (formales o informales) deben ser objetos explícitos de las políticas que busquen la reducción del papel del capital social en la economía brasileña.

Palabras-clave: Capital Social; Red de Relaciones Sociales; Ecucación Minceriana; Migración.

1 INTRODUCTION

There is a recent literature emphasizing the role of social capital for individual incomes and aggregated development and growth. This literature started with Loury (1977), gained a widespread relevance in social sciences through the seminal study by Coleman (1988) and became important to explain growth and development as a consequence of the work by Putnam, Leonardi and Nanetti (1993), who stressed the role of social networks in Italy to explain relative economic performance.

There are several different definitions of social capital,1 which have generated some confusion on the literature involving this subject. This has reached a level that has led some researchers to propose the abandonment of this concept (see ARROW, 2000). Nevertheless, it is possible to identify two major approaches

1. Several studies point this problem. See, for example, Durlauf and Fafchamps (2006), Arrow (2000) and Paldam (2000).

to social capital. The first one stresses the community level of trust.\textsuperscript{2} Under this approach a general definition could state that social capital “is the propensity to play the cooperative solution even if it is not the (Nash) equilibrium” (PALDAM, 2000).

The second approach stresses individual social relationships.\textsuperscript{3} This paper is concerned with this one. Nevertheless, even under this individualistic standpoint, there are researches that focus on the trust individuals have on others and those whose focal point is on networks and trust someone can get from others. This paper stands to this latter position. Therefore, it is possible to use as a general concept of social capital here the one presented by Glaeser, Laibson and Sacerdote (2000, p. 4): “Social capital is a person’s social characteristics—including social skills, charisma and the size of his Rolodex—which enables him to reap market and non-market returns from interactions with others”.

In spite of the recent upsurge in the literature on social capital, its relevance in Brazil still was not object of analysis. This paper aims to overcome, at least partially, such shortcoming. It is necessary to have an idea of its role in the local economy so that governments can be concerned with policies for its promotion.

More precisely the aim of the paper is to measure the impact of social capital in individual labor income in Brazil. An empirical method for such was developed and it is applied for Brazilian data from the 2005 Pesquisa Nacional por Amostra de Domicílios (Pnad). Although the method developed cannot measure the aggregate macroeconomic impact of social capital, at least it can give an idea of its relevance in the national economy. As there is no such measure, most development ideas in Brazil still despise the role of social capital. Therefore, this paper can contribute to alert for its potential role on development.

The paper is organized as following. Next section discusses the measurement of social capital, as it is important to understand the method to estimate its role on individual labor incomes. Section 3 details the empirical method to proceed to the relevant estimation and section 4 brings the empirical results. Section 5 gathers the major conclusions and some additional comments on policy consequences of the findings.

2 [*NOTES ON MEASUREMENT OF SOCIAL CAPITAL*]

As a consequence of the many concepts of social capital, there is also several measures and proxies proposed in the literature. Nevertheless, most of the instruments to measure social capital rely on some pooling built measure of trust, networks and voluntary organizations existing in the community. There is no national wide pool that provides answers to direct questions that can be used to identify trust and networks individuals can get in their communities, although...
the national census and household pools (Pnad) have some data on voluntary organizations enrollments. As a consequence of these shortcomings, this paper starts with a careful discussion of a measurement of social capital, so that a way to capture its impact on individual labor income is understood.

As mentioned before, when social capital is defined as an individual attribute, it still can be conceptualized in two different ways. Firstly, it can be seen as the level of trust an individual can get in the society. The second one stresses the size of the social network the individuals have. These two concepts are strongly correlated. Nevertheless, they are not exactly the same. A more rigorous definition of social capital can highlight their differences, while it also stresses the sources of their strong correlation.

There are several attributes that can generate “market and non-market returns to individuals”. They can be classified into two groups. The first one is the set of attributes which give access to other people. They are called here access attributes. The major ones in this category are sympathy, beauty, family background, social charisma, participation in associations and school background. The second group includes non-technical productive skills and they will be called as such here. The major ones in this category are leadership, honesty, ability to mobilize other people around any project, on-the-job charisma, reputation of professional competence, interpersonal relationship abilities, initiative, and innovational abilities.

Let us define a specific society, with many individuals, so that there is a set $\Omega$ that contains all these individuals. Define $h_i$ as the $i$’th individual in this society, so that $i \in I$, where $I$ is the set of positive integers, and $i < \infty$, so that it is a finite number. This means that the number of individuals in this society is finite. Furthermore, $h_i \in \Omega$ by definition.

Each attribute $j$ among those that can generate market and non-market returns to individuals defines a set $X_j$ of potential states of that attribute that any individual may have. There is an infinity number of potential states of that attribute $X_j$. By assumption, each individual $h_i$ creates an ordering of the image they have of these potential states about all other individuals $h_j$, so that $s \neq i$, creating a one-to-one function of each $X_j$ to the set of positive Real numbers, $R^+$. Therefore, for each $X_j$, it is possible to define many potential $X^s_{ij}$ that define the subjective evaluation individual $j$ has on individual $s$ with respect to attribute $X_i$. In these sets $j \in I$, and $s \in I$. This means that all ordering of $X^s_{ij}$, for fixed $i$ and $j$ and varying $s$, are subjectives, so that it is made according to values and believes of its author ($j$) for each attribute ($i$).

Therefore, it is possible to create an array $n \times n$ for each attribute $X_j$ in which each row brings the psychological evaluation individual $i$ makes of individual $j$. Let us call this array by $A$. If a specific individual does not have any information...
about another one, the evaluation of his/her performance on that (and all other) attribute is nil. If person $i$ knows person $j$, his/her evaluation will be the best guess, even if he/she does not have much information on that particular person. Therefore, it is reasonable to suppose that when the information set of person $i$ with respect to $j$ increases, the evaluation he/she has will converge to its correct value, which is the one that would exist if agent $i$ had full information.\footnote{This convergence is supposed to be smooth, so that the function defined is twice differentiable in all points.}

It is worth to limit the possible values of $X_{ij}$ to an interval between zero and one, so that the valuations have some standard. As these values are subjective, it is reasonable to think about them as normalized values so that each individual $j$ has the same means and the same standard deviation for all subjective evaluations they have on the sets $X_{ij}$, for all $i$ and $s$.

It is also possible to create another $n \times n$ array with the level of knowledge each individual $i$ has about individual $j$. This array has as measure the share of knowledge with respect to maximum knowledge possible (full information). Let us call this array by $B$.\footnote{It is worth noting that all $b_{ij}$ are such that $0 \leq b_{ij} \leq 1.$} Therefore, it is possible to define the social evaluation of an individual as the measure:

$$X_{sj} = \sum_{j=1}^{n} A_{ij} B_{ij}$$

where $X_{sj}$ is the measure individual $j$ has on the attribute $v$. This measure is defined as the sum of evaluations of all individuals of that society about individual $j$ in that particular attribute, weighted by the knowledge each individual has on that one. Given these concepts, it is possible to define social capital of individual $j$ as a weighted sum of his evaluation on all relevant attributes.\footnote{Lin (2001) in his concept included weights for level of social importance of individuals. This was left out in this concept as a consequence of the imprecision to measure such importance.} If there are $V$ relevant attributes, the social capital of individual $j$, represented by $S_j$, could be defined as:

$$S_j = \sum_{v=1}^{V} X_{sv} \Phi_v$$

The weighting of the many relevant attributes to define the social capital, made by the many $\Phi_v$, is not arbitrary. It is defined by their social relevance on measuring the productive impact of social capital. It is possible to understand the
way this weighting is defined starting from an expanded Mincerian type equation for each individual. This equation may be represented as:

$$\ln w_i = \sum_{s=0}^{m} \beta_s P_s + e_i$$  \hspace{1cm} (3)$$

where $\ln w_i$ is the natural logarithm of the labor income of individual $i$, $P_s$ is the measure of attribute $s$ for individual $i$, $\beta_s$ are parameters and $e_i$ is a random error. Among attributes $P_s$, there are the natural logarithms of each $X_{sj}$ for the many individuals. The weights $\phi_s$ could be defined as the coefficients of equation (3) for the many attributes normalized for their sum to be equal to one. In this way, their relative role on total social capital of each $X_{sj}$ is made to be determined by its social average role on labor income determination.

According to previous definitions, there are at least 14 attributes $X_s$, six that are access attributes and eight that are non-technical productive skills. Although definitions above allow the precise determination of individual social capital, it is very difficult to measure it concretely. It will not be the goal here to measure it through this precise concept. The idea in this section was only to show that it is possible to have a precise concept that has a scientific meaning and it is the starting point of the analysis pursued in this paper.

As mentioned before, social capital often is presented as a community attribute. The measurement just presented is for individual social capital. Normalizations made to eliminate some perverse effects of combinations of subjective evaluations rule out the possibility of summing up individual social capitals to generate a measure for the whole society in the concept just presented. Furthermore, some concepts that stress the propensity to act cooperatively in non-cooperative games also is not well represented in this concept. A subset of a society can have limited knowledge among its individuals and these could have also a poor level of knowledge by other individuals, but this subset still could have a cooperative culture and as such its individuals would reach high levels of social capital within this concept, although they would perform poorly within the concept presented in this section. Therefore, the concept presented here is rigorous, but it is adequate for a specific concept of social capital, which stresses the role of knowledge and credibility individuals have in a society.

3 EMPIRICAL METHOD

The empirical investigation on the impact of social capital pursued here is for the individual social capital, not for this variable at community level. Furthermore, it is not a choice built on a hierarchy of importance, but only as a consequence
of model design and data availability. Nevertheless, the method developed here can work as a basis for a community level analysis, but with a slightly different dataset, which should be pursued in another research.

Measurement of individual social capital is quite complicated, given the concept presented before. It is necessary to have many subjective evaluations of all individuals in the community to calculate its value for each of them. As a consequence, the empirical investigation pursued next sections relied on a different way to identify the level of individual social capital.

The idea here is to use the fact that a reasonable share of individual social capital is destroyed when someone is forced to migrate from his/her original city to another one, if this migration is not motivated originally by income generating opportunities. This occurs with those persons, such as young people or spouses who migrate led by their parents or spouses, who had a better income generating opportunity.

A simple look at the attributes that compose the social capital, listed in section 2 indicates that most of them are not destroyed when someone moves out from his/her community. The immigrant still will have most of these attributes. Nevertheless, they only will be known by a negligible fraction of other individuals in his/her new community. Therefore, the array in the matrix $B$ representing the knowledge of his/her attributes by others collapses when there is such migration. The variables $B_{ij}$ in equation (1) collapses to near zero, so that the total value of $X_{ij}$ falls substantially.

This fact creates an opportunity to estimate the impact of social capital on individual labor income by the negative impact non-economic motivated migration has on this variable. This can be done through estimation of a Mincerian type equation with the form:

$$\ln w = \alpha_0 + rS + \sum_{i=1}^{n} \alpha_i X_i + \epsilon$$

where $\ln w$ is the natural logarithm of labor income, $S$ is years of schooling, $r$ is the return to education and $\alpha_0$ is a parameter. The variables $X_i$ are as defined in table 1 and the parameters $\alpha_i$, for $i = 1, 2, \ldots, n$, are fixed and finite.

Two variables included in this equation are relevant to capture the impact of social capital on the individual labor income. They are the dummy for migration and the mathematical transformation of years of migration. More precisely, the following function was used to define the relationship of migration with social capital:
\[ K_S = \beta_1 D_M + \beta_2 \left(1 - \frac{1}{A_M + 1}\right) \]  

where \( K_S \) is the measure of social capital, \( D_M \) is a dummy for migration, \( A_M \) is the 

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**TABLE 1**  
**Variables included in equation (4)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comments</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Dummy for migrant in the last nine years (migrant = 1).</td>
<td>This dummy identifies all individuals who are non-economic led migrants in the last nine years.</td>
<td>Negative</td>
</tr>
<tr>
<td>Function of years of migration defined in equation (5).</td>
<td>This function allows for recovering of social capital loss along integration in the new community.</td>
<td>Positive</td>
</tr>
<tr>
<td>Natural logarithms of monthly average hours of work.</td>
<td>Individuals working longer hours tend to earn more.</td>
<td>Positive</td>
</tr>
<tr>
<td>Schooling years.</td>
<td>Standard relationship of Mincer’s equation.</td>
<td>Positive</td>
</tr>
<tr>
<td>Family built human capital.</td>
<td>This variable is calculated from the labor market performance of major income earners in the same household, as described in the text.</td>
<td>Positive</td>
</tr>
<tr>
<td>Dummy for sex (male = 1).</td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Number of individuals living in the same household.</td>
<td>This variable has been identified as affecting individual performance in the labor market. (^a)</td>
<td>Negative</td>
</tr>
<tr>
<td>Inverse Mills ratio (λ).</td>
<td>This variable aims to solve the selection bias problem.</td>
<td>-</td>
</tr>
<tr>
<td>Natural logarithm of experience.</td>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Natural logarithm of population living in the same city, if it is a metropolitan area, zero otherwise.</td>
<td>This variable corrects for differences in cost of living, as this tends to increase with the size of the city.</td>
<td>Positive</td>
</tr>
<tr>
<td>Dummy for residents in Northeast region (zero otherwise).</td>
<td>These dummies capture the impact of regional diversity in Brazil, which determines lifestyle and cost of living. The region North was considered the standard.</td>
<td>Negative</td>
</tr>
<tr>
<td>Dummy for residents in Southeast region (zero otherwise).</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Dummy for residents in South region (zero otherwise).</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Dummy for residents in Center-West region (zero otherwise).</td>
<td>Positive</td>
<td></td>
</tr>
<tr>
<td>Dummy for those engaged in unions (zero otherwise).</td>
<td>This dummy captures the organization level of the sector workers are engaged, possibly, capturing the incidence of efficiency wages.</td>
<td>Positive</td>
</tr>
</tbody>
</table>

\(^a\) See text for details.
time of migration, and $\beta_1$ and $\beta_2$ are fixed parameters, so that $\beta_1 < 0$ and $\beta_2 > 0$. This function of migration can generate the dynamic profile for the measure of social capital $K_S$ that appear in figure 1. Whenever someone migrates by non-economic reasons, his/her individual social capital is destroyed. Nevertheless, while time progresses, this person starts to know and to be known by other individuals in the new community and his/her social capital starts to increase. Eventually, it will reach the level of a native and the initial loss will be eliminated.

If normalization of the absolute values of the variable $K_S$ is made so that the parameter that defines its relationship with $(\ln w)$ becomes one, the dynamic path of $K_S$ in figure 1 also could represent its impact on the natural logarithm of labor income. This relationship implies that whenever there is a non-economic led migration and the individual social capital falls to a negligible level, its measure falls from $K_{S0}$ to $K_{S1}$, so that if the impact of $K_S$ on $(\ln w)$ is one, this variable falls by $\Delta \ln w = (K_{S1} - K_{S0})$. Nevertheless, while this migrant live in the new community, his/her social capital keeps improving. Eventually, it reaches the level of the social capital of a native and the labor income is fully recovered.

It is possible that the new level of labor income to which there is long term convergence when time passes is higher than the initial expected labor income before

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comments</th>
<th>Expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dummy for residents in urban areas (zero otherwise).</td>
<td>This also captures differences in cost of living and lifestyle.</td>
<td>Positive</td>
</tr>
<tr>
<td>Racial dummy for whites (zero otherwise). Racial dummy for blacks (zero otherwise). Racial dummy for Asian descendents (zero otherwise). Racial dummy for mixed individuals (zero otherwise).</td>
<td>These dummies capture the impact of other non-schooling determinant of labor income, in line with arguments by Arrow (1998). Indigenous population was the standard.</td>
<td>Positive Negative Positive</td>
</tr>
<tr>
<td>Dummy for individuals self-employed (zero otherwise).</td>
<td>Other costs and benefits than wages are different for these workers, so that this dummy captures such differences.</td>
<td>Positive</td>
</tr>
<tr>
<td>Dummy for non-registered workers (zero otherwise).</td>
<td>Non-wage costs and benefits are different for these workers. This dummy captures such differences.</td>
<td>Negative</td>
</tr>
<tr>
<td>Other non-labor income (retirement and pension).</td>
<td>This tends to affect individual efforts and consequently labor income, as stressed by Akerlof and Yellen (1990).</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Source: Developed by the authors.

migration. A simple argument to justify this is that migrants can spend a higher labor effort when they start to work, as they have lower wages. This result would be in line with findings by Fehr and Goette (2007), the hypothesis of loss aversion forwarded in Goette, Huffman and Fehr (2004) and the one of strategic reaction when individuals think they are victim of unfairness, as pointed by Akerlof (2007). As a consequence of this higher effort level, migrants would build a good image with potential employers. Therefore, when they overcome the initial shortcoming imposed by their lack of social reference and norm obligations, what lead to a fall in the perception of risk employers have about their employment, their image entitle them to a higher labor income.

Therefore, the method of this paper to estimate the impact of individual social capital on labor income is to estimate equation (4) and to calculate the dynamic impact of its impact on labor income, relying on equation (5). The initial impact when the period of migration is nil is the impact of social capital on individual labor income.

There is one variable in equation (4) that is not frequently included in these Mincerian type equations. It is the family built human capital. This variable actually captures three relevant impacts on individual labor income. They are firstly the impact of a domestic intellectually rich environment. This is why the variable was named as family built human capital. Someone who lives in a domestic environment that demands a more rigorous and elaborated thinking and/or focus a larger share of family companionship on conversation of culturally enriching subjects tends to perform better in the labor market, as interviews and other selective instruments of labor hiring tend to capture these effects. Therefore, these individuals tend to

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7. Statistical analysis of Sacerdote (2007) with Korean American adoptees also gives support to this hypothesis.
take the best positions in the labor market as they are drawn firstly by the most attractive firms in terms of wages and other labor conditions.

The second impact measured by the *family built human capital* is the inherited social capital. Those people who belong to families with a higher social capital tend to inherited part of these family originated social relationships, as the family tends to be a very important unit of social interaction in Brazil and most other countries. Consequently, they also tend to have a higher level of what was called here as family built human capital.

In what concerns the method used here, it is worth noting that this variables also captures the impact of previous family networks on the destiny after migration. The existence of such ties between migrants and some individuals at the recipient region is stressed by the literature on migration and social capital.\(^8\) According to it, the social capital after migration is not nil, as the migration is already promoted by such network. Nevertheless, this variable captures such network, as normally they exist through the adults of the family and the migration determinant, who normally is the major income earner in the household. The higher such networks, the higher tend to be the income of the major income earner of the household, so that this variable also captures such effect.

Many recent studies also have emphasized a third source of family related determinant of individual performance in the labor market, which is the existence of a role for genetic background.\(^9\) This variable also captures at least part of this effect, as the genetic background of parents is transmitted to their descendants and the part of their performance in the labor market that is not explained by economic variables is also correlated with their genetic background.

Although these three individual attributes captured by the same variable, *family built human capital*, are very different from each other, they will be included in estimations of equation (4) together, within the same variables, as it is not easy to disentangle these three variables through the method used to calculate them and it is not the concern of this paper to identify their individual role in individual labor income determination.

### 3.1 Econometric procedures

Estimation of equation (4) demands some prior estimation. The *family built human capital* is also not straight observable and it is not included in any labor market dataset, so that it is built indirectly, from a previous estimation. More precisely, it is obtained from estimation of equation (4) with inclusion in the sample of

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8. See for example Portes and Sensenbrenner (1993).

household major income earners only. The *family built human capital* in this model is excluded from the set of explanatory variables. Therefore, the error term of this estimated equation is positive correlated with the family human capital of each of these major income earners of the many households. This qualifies this error to be considered a proxy for *family human capital* of these individuals. As *family built human capital* is a variable that is strongly correlated for all individuals in the same household, this estimated error term can also be seen as a proxy for the *family built human capital* of the other family members. This prior estimation with all the major income earners of households was made by ordinary least square.

Another variable that is not standard in most estimations of Mincerian type equations is the inverse Mills ratio. This variable was included to avoid the problem arising from the selection bias in the labor market. The introduction of this variable may be justified by developments in Heckman (1979). Therefore, this probability was estimated through a probit in which the probability to be employed is the dependent variable and the vector of independent variables includes those of the major equation, with the exception of this probability itself. Obviously, the sample in this case included individuals who satisfy the conditions specified for the major sample, but does not exclude those people who are not employed.

Estimation of equation (4) was made by Least Absolute Deviations.\(^\text{10}\) This method has the advantage of not been excessively influenced by outliers. Brazilian data on labor market often have such outliers. As estimation by Least Absolute Deviations also are unbiased and can generate the instruments for hypothesis testing, the option for it would be more appropriate.

After estimation, the relevant parameters were substituted in equation (5) to obtain the dynamic impact of individual social capital on labor income and the number of years in which the loss of social capital due to migration is fully eliminated. When the dynamic impact is calculated, the immediate impact on the time of migration is obviously estimated. As at this period the social capital of those non-economic led migrant is negligible, this impact is the one of social capital on labor income.

Estimation of equation (4) is made only with a dataset containing workers that are employed and that are not major income earners in their family. Actually, even a more restrictive dataset was used. Only individuals who have the position in the household of sons and daughters were included. The data was from Pnad in year 2005.

4 EMPIRICAL RESULTS

Table 2 brings the results of the major estimation, which is the one of equation (4). As said before, this estimation was made by Least Absolute Deviations and

\(^{10}\) Reliance on this method restricted the use of more standard procedures to correct for selection bias.
The role of social capital on individual labor incomes in Brazil

The data came from the 2005 Pnad. The sample size had 10,965 individuals and there were 368 migrants. Only individuals that were classified as sons or daughters as their position in the households and did not have the higher income in the household were included, so that they were really non-income led migrants. Only workers with or without registration in the national social security system and self employed were included in the sample, so that public employees and those engaged in the army, as well as employers, were left out of the sample.

TABLE 2
Estimation results for equation (4), which has natural logarithm of labor income as the dependent variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std error</th>
<th>T-Statistics</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2,2839</td>
<td>0,1808</td>
<td>12,6316</td>
<td>0,0000</td>
</tr>
<tr>
<td>Dummy for migration in the last nine years (migrant = 1)</td>
<td>-0,9960</td>
<td>0,4876</td>
<td>-2,0427</td>
<td>0,0411</td>
</tr>
<tr>
<td>Function of years of migration defined in equation (5)</td>
<td>1,1778</td>
<td>0,5708</td>
<td>2,0632</td>
<td>0,0391</td>
</tr>
<tr>
<td>Natural logarithms of monthly average hours of work</td>
<td>0,4419</td>
<td>0,0119</td>
<td>37,0086</td>
<td>0,0000</td>
</tr>
<tr>
<td>Schooling years</td>
<td>0,0930</td>
<td>0,0082</td>
<td>11,3628</td>
<td>0,0000</td>
</tr>
<tr>
<td>Family built human capital</td>
<td>0,1507</td>
<td>0,0097</td>
<td>15,4695</td>
<td>0,0000</td>
</tr>
<tr>
<td>Dummy for sex (male = 1)</td>
<td>0,2388</td>
<td>0,0206</td>
<td>11,5961</td>
<td>0,0000</td>
</tr>
<tr>
<td>Number of individuals living in the same household</td>
<td>-0,0087</td>
<td>0,0027</td>
<td>-3,2466</td>
<td>0,0012</td>
</tr>
<tr>
<td>Inverse Mills ratio</td>
<td>-0,4265</td>
<td>0,1338</td>
<td>-3,1884</td>
<td>0,0014</td>
</tr>
<tr>
<td>Natural logarithm of experience</td>
<td>0,1183</td>
<td>0,0119</td>
<td>9,9053</td>
<td>0,0000</td>
</tr>
<tr>
<td>Natural logarithm of population living in the same city, if it is a metropolitan area, zero otherwise</td>
<td>0,0089</td>
<td>0,0007</td>
<td>11,9634</td>
<td>0,0000</td>
</tr>
<tr>
<td>Dummy for residents in Northeast region (zero otherwise)</td>
<td>-0,1184</td>
<td>0,0202</td>
<td>-5,8607</td>
<td>0,0000</td>
</tr>
<tr>
<td>Dummy for residents in Southeast region (zero otherwise)</td>
<td>0,0647</td>
<td>0,0206</td>
<td>3,1314</td>
<td>0,0017</td>
</tr>
<tr>
<td>Dummy for residents in South region (zero otherwise)</td>
<td>0,1324</td>
<td>0,0230</td>
<td>5,7684</td>
<td>0,0000</td>
</tr>
<tr>
<td>Dummy for residents in Center-West region (zero otherwise)</td>
<td>0,0933</td>
<td>0,0281</td>
<td>3,3163</td>
<td>0,0009</td>
</tr>
<tr>
<td>Dummy for those to engaged in unions (zero otherwise)</td>
<td>0,1847</td>
<td>0,0179</td>
<td>10,3171</td>
<td>0,0000</td>
</tr>
<tr>
<td>Dummy for residents in urban areas (zero otherwise)</td>
<td>0,4382</td>
<td>0,1051</td>
<td>4,1692</td>
<td>0,0000</td>
</tr>
<tr>
<td>Racial dummy for whites (zero otherwise)</td>
<td>0,1245</td>
<td>0,1363</td>
<td>0,9134</td>
<td>0,3611</td>
</tr>
<tr>
<td>Racial dummy for blacks (zero otherwise)</td>
<td>-0,0193</td>
<td>0,1373</td>
<td>-0,1407</td>
<td>0,8881</td>
</tr>
<tr>
<td>Racial dummy for Asian descendents (zero otherwise)</td>
<td>0,3101</td>
<td>0,1599</td>
<td>1,9394</td>
<td>0,0525</td>
</tr>
<tr>
<td>Racial dummy for mixed individuals (zero otherwise)</td>
<td>0,0127</td>
<td>0,1361</td>
<td>0,0936</td>
<td>0,9255</td>
</tr>
<tr>
<td>Dummy for individuals self-employed (zero otherwise)</td>
<td>-0,2123</td>
<td>0,0183</td>
<td>-11,5809</td>
<td>0,0000</td>
</tr>
<tr>
<td>Dummy for non-registered workers (zero otherwise)</td>
<td>-0,2536</td>
<td>0,0125</td>
<td>-20,3574</td>
<td>0,0000</td>
</tr>
<tr>
<td>Other non-labor income (retirement and pension)</td>
<td>-0,0000</td>
<td>0,0001</td>
<td>-0,2903</td>
<td>0,7716</td>
</tr>
</tbody>
</table>

Source: Developed by the authors.
The results confirm most of the expected signs of the coefficients. Only the coefficient for self-employed workers was reversed, as the instability of such activities should force an equilibrium in the labor market with a risk premium for them. Nevertheless, in Brazil there are a lot of these self-employed workers who actually are under-employed. They rely on these sources of income only while they do not get an appropriate employment, as they often do not qualify for having unemployment benefit. The high share of these workers on the total of self-employed can justify the negative coefficient found.

Most of the estimated parameters are significantly different from zero at standard p-values. Only those for some racial dummies and other non-labor income are not statistically significant. The instability of results for the former group could be justified by theory, as racial discrimination in the labor market would create arbitrage opportunities that could lead to its erosion. The non-significance of the coefficient for non-labor income could be justified only as a consequence of the small size of this impact and consequent difficulty to capture it.

The estimated parameters related to the variables that can be used to measure social capital, dummy for migrant and the function of years of migration, both have the expected signs for their coefficients. Nevertheless, the reasonability of their values is difficult to grasp from the estimated values only. Therefore, figure 2 shows the value of the impact for the average value for each independent variable in the model. The dependent variable, labor income, was made equal to 100 for the period before migration. At the time of migration it falls and then starts to increase afterwards.

**FIGURE 2**

Dynamic impact of non-income led migration on labor income
(Initial labor income equal to 100)

![Graph](image)

Source: Developed by the authors.

It can be seen that the loss of labor income due to the destruction of social capital is high, reaching 63%. Nevertheless, in the second year after migration it already falls by almost half, reaching 33.4% only. This loss has a 95% of chance to be between 3.95% and 85.8% of the income of non-migrant. In 5.5 years it is fully offset and labor income of migrants reaches its prior migration level. After 5.5 years, the higher effort of these migrants within this period of lower income yields them a bonus and their income tend to stabilize at around 15% above those of non-migrants in the same conditions.

These results discussed arise from point-estimation of equation (4) and presented in table 2. Nevertheless, two major hypotheses from the discussions above can be tested within this model. They are:

\( a \) there is a negative impact on labor income generated by non-economic led migration, which is attributed to the loss of social capital; and

\( b \) the new level to which the labor income converges after the re-composition of individual social capital is higher than the level it would be if there was not migration.

The test of the first hypothesis can be made through the test that the immediate impact of migration is nil. It is straightforward as it has as null hypothesis that the dummy for migration is zero, against the alternative that it is negative. The result is already in table 2. The non-effect hypothesis is rejected at a p-value of 5%. This result supports the hypothesis that social capital has an important impact in individual income and that its loss can damage individual income.

The second hypothesis demands that \( A_{M_0} \), the number of years necessary to have the impact of non-economic led migration equal to zero, is sufficiently small to be reached in an individual’s life and the derivative of the function \( K_s \), appearing in equation (5), at the interval \( [A_{M_0}, A_{M}], v \in \mathbb{R} \), is non-negative. From equation (5), it is possible to see that the impact of a non-economic led migration will vanish \( (K_s = 0) \) when:

\[
A_{M_0} = \frac{-\beta_1}{\beta_2 + \beta_1}
\]  

(6)

if \( \beta_1 < 0 \) and \( \beta_2 > -\beta_1 \), this relationship expressed in equation (6) will be positive and finite, so that a given finite number of years will make the impact of a non-economic led migration to be nil. Furthermore, if \( \beta_2 > 0 \), the derivative of \( K_s \) with respect to \( A_M \) is always positive for \( A_M > 0 \). Therefore, if \( \beta_2 \in [0, -\beta_1] \) there is no \( A_M \) such that \( 0 < A_{M_0} < +\infty \). No full recovery of labor income after migration will happen for \( \beta_2 \) within that interval.
The hypothesis that $\beta_2 \leq 0$ is rejected at a $p$-value of 5% in table 2. Nevertheless, a stronger hypothesis is necessary to test if there is any $A_{\alpha_0}$ that is positive, finite and falling in the interval of a person’s life. As $\beta_2 > -\beta_1$ in the empirical results presented in table 2, the null hypothesis that will be tested here is that $\beta_2 = -\beta_1$, as if this is rejected the empirical conclusion is that $\beta_2 > -\beta_1$ and consequently $\beta_2 \notin [0, -\beta_1]$. If $H_0$ is not rejected, it is plausible to assume that the empirical results did not reject the hypothesis that no full recovery of labor income exists and the second hypothesis that after some years labor income overcome its original level before migration does not have empirical support from this model.

The statistical test for the restrictive hypothesis $\beta_2 = -\beta_1$ has an $F(1;10,941)$ distribution. The calculated statistics is $F(1;10,941) = 3.900150$ and the null hypothesis that the restriction is correct is rejected at a $p$-value of 4.83%. Therefore, the hypothesis that the level reached by the labor income after some time never overcome the level without migration is rejected at a 5% level.

5 CONCLUSIONS

This paper estimated the average impact of individual social capital on individual labor income in Brazil. The estimation is made for sons and daughters who live at households with at least one parent. The results indicate that this impact is not negligible. It reaches 63% of total labor income and it has a chance of 95% to be between 3.95% and 85.8% of total labor income.

The paper also estimated the time necessary for someone to recompose his/her social capital so that the loss is fully offset, either by building new social relationships and/or by undertaking an extra effort at work so that he/she gets a good working reputation. The estimated time for such recovery is 5.5 years.

Estimations were made through a method developed in this paper, which relied on the formal concept of individual social capital, which was rigorously forwarded in section 2. This method relies on information about the performance in the labor market of migrants that are not attracted for their new community by economic incentives. That is why sons and daughters who are not the major income earners in the household are the public included in the dataset.

Two hypotheses were tested more formally. The first one is if the loss of individual social capital has a negative impact on labor income. Test of this hypothesis rejected at 5% the null, which is that there is no such impact. Therefore, the results are in line with theoretical conclusions that social capital is relevant to explain individual labor income in Brazil. The second hypothesis is that the new level to which the labor income converges after the re-composition of individual social capital is higher than the level it would be if there was not the original loss.
The null hypothesis in this case is that this re-composition does not reach the previous level and it is also rejected at 5%.

The conclusions reached here indicate that individual social capital is an important variable to explain individual labor income in Brazil. Therefore, the low level of trust among agents in this country\textsuperscript{12} and the weakness of local institutions lead to a strong role for social capital to define employment and hiring relationships. Such result leads to two major policy conclusions:

\textit{a}) It is necessary to have policies designed to help building social capital, even if they do not have this purpose as its major target. Regional policies in Brazil, for example, should have a concern with contributing to build social capital, instead of ignoring its role on regional income, as they are designed nowadays. Most social policies have local committees to define community strategies. Nevertheless, the way they are built reduces their ability to really contribute to social capital formation. Therefore, they should gain more autonomy from local governments and help build social capital.

\textit{b}) Policies for the labor market which helps spread information about individuals and reduce risks associated to recruiting non-appropriated employees are necessary to be a concern in Brazil. An important policy on this line could emerge from the use of the positive cadastre by employers, when it is available and organized.

The method in this paper is not able to estimate the impact of social capital in economic development. Nevertheless, as there is a substantial loss of labor income as a consequence of a fall in social capital, probably there are a lot of productive efforts directed to control for the lack of trust. This reduces the social efficiency. Furthermore, results indicate that probably many individuals are misallocated in the labor market as a consequence of their lack of social capital. Therefore, there is also some loss of economic efficiency because of this.

Further research is necessary to dimension the macroeconomic impact on growth of an increase of the average social capital. This paper can call attention to the potential role it has on individual labor incomes, but the method developed does not give any hint on the aggregated relevance of this variable to macroeconomic growth in Brazil. Therefore, this should be object of further research so that cost-benefit analysis of policies to promote it can be pursued.

\textsuperscript{12} The influential survey reported in Inglehart, Basanez and Moreno (1998) identified this low level of trust among Brazilians relatively to what is found in other countries. See also Knack and Keefer (1997).
REFERENCES


**APPENDIX**

This appendix brings a brief description of the variables used in estimation of equation (4).

Experience: This variable was calculated by subtracting the age in which the individual started to work from his age.

Dummy for migrant and non migrant: This variable considers individuals with a migration period of between one and nine years and whose period of migration is at least one year longer than the period of experience. Such restriction is necessary to assure that the sample will contain only individuals whose main reason to migrate was not the monetary incentive but the fact that his household migrated, a move probably determined by the head of his household. In such cases, the son or daughter of the household are led to migrate for reasons other than work. The sample, thus, excludes individuals whose migration and experience periods are the same or they difference is negative.

Migration period: This variable accounts for migration periods of between one and nine years. Migration periods which equal zero means that the individual did not migrate.

Labor income: This variable captures monthly income, in monetary unit, of the main source of income at the week of reference. In Pnad 2005, the week of reference comprehends September 18th to September 24th of the same year.

Hours effectively worked in the month: This variable was obtained by multiplying by 4.2 the variable available in Pnad which accounts for the number of hours worked per week in the work which is the individual’s main source of income.

Schooling years: This variable is extracted directly from Pnad. When the variable is zero it means that the individual has less than one schooling year, in which case the individual is considered without illiterate. The highest value allowed for this variable is 15, meaning that the individual has 15 schooling years or more.

Family human capital: This variable was discussed in the text.

Dummy of sex: This variable is taken directly from Pnad. Male equals one and zero is female.
Number of individuals in household: This variable is taken directly from Pnad and represents the total number of individuals in a household.

Inverse Mills ratio: It was obtained from a probit as described in the main text.

Estimated population of the metropolitan area: This variable is taken from Instituto Brasileiro de Geografia e Estatística (IBGE).

Regional dummies: This variable is taken directly from Pnad and indicates in which region the individual lives. Five regions are considered: Northeast, North, South, Southeast and Center-West.

Institutional dummy: This variable was obtained from Pnad. It assumes value one for individuals who declared some union membership in the month of reference of the research.

Dummy for urban residence: This variable was taken from Pnad. It is one when the individual lives in the urban area and zero otherwise.

Race dummy: This variable is from Pnad, where race is classified as white, black, Asian descendant, Latin American native or mixed.

Dummy for self employed workers: This variable is from Pnad. It includes registered and unregistered workers as well as self employed workers. It excludes militaries, public servants and employers.

Non labor income: This variable is from Pnad. It considers two types of non labour income: retirement income and pension income, on the one hand, and income from rent, donation, interests from personal savings and other financial applications.