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Youth informality in Brazil: an analysis of school-to-work transitions

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Abstract: This paper provides evidence that an individual's educational attainment level is important in determining one's participation in the labor market. These empirical results are obtained through an analysis of school-to-work transitions using competing risks regression. In this model, individuals transition from school into three different categories: formal job, informal job, or unemployed. This analysis draws on data from the Monthly Employment Survey (PME) from January 2008 to December 2013. The findings in this paper suggest that educational attainment level is a significant factor in determining youths' choice between pursuing formal and informal labor opportunities.

Keywords: education; Brazil; informality; competing risks regression

Acronyms

CIF	Cumulative incidence function
ISCED	International Standard Classification of Education
ILO	International Labor Organization
NEET	Not currently engaged in education, employment, or training
OECD	Organization for Economic Cooperation and Development
PME	Monthly Employment Survey (Pesquisa Mensal de Emprego), Brazil
PNAD	National Household Survey (Pesquisa Nacional por Amostra de Domicílios), Brazil
UFSC	Universidade Federal de Santa Catarina
UNESCO	United Nations Educational, Scientific and Cultural Organization

1. Introduction

In 1999, the International Labor Organization (ILO) introduced for the first time the concept of "decent work." Decent work involves work opportunities that provide a fair income, security in the workplace, social protection for families, improved prospects for worker development, social integration and equality, as well as the equal treatment of both men and women.

The informal sector of an economy is of central concern to the question of decent work, as participants in the informal economy are often not recognized, registered, or counted in national statistics. Moreover, when informal workers are registered, they may still not have access to certain social services or protective measures in the workplace. In the majority of cases, informal workers are unorganized, and owing to this and other factors, they are often unable to articulate their rights. They may work in unsafe workplace environments that present serious and even deadly health hazards. The informal economy is often characterized by conditions of marginalization. These include limited access to productive financial, legal, technological, and market resources, and informal workers have limited qualifications, education, and access to information.

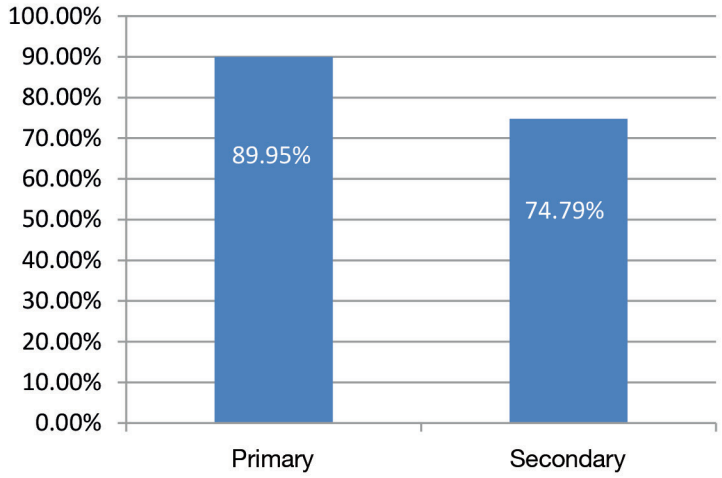
One ILO objective regarding informality is to support transitions to formality by bringing the informal economy progressively into formal channels of protection and support (ILO, 2013).

An interesting aspect of informality in Brazil is the labor market's absorption of new workers coming out of school. An individual's first job is important, given that the status of their first job will have a direct effect on the occupational status of their subsequent jobs. The process of transitioning from economic inactivity into the labor market is an important milestone for entry into the adult world, as it enables young people to become financially independent, opening up the possibility of leaving their parents' homes and forming their own independent household. A significant portion of Brazilian youth face serious obstacles when attempting to access the labor market. This access is often marked by instability, making it difficult to establish pathways to decent work. Social exclusion, poor integration into the labor market, and difficulties in accessing decent work not only impede the full exercise of citizenship rights of a sizeable number of young Brazilians, but also affect their future prospects.

A person's level of educational attainment plays a fundamental role in their ability to gain entry into the labor market. In general, the earlier one enters the labor market, the more informal their labor tends to be and the greater the person's loss of educational training, which ultimately, contributes to the reproduction of poverty (Costanzi, 2009).

As a country, Brazil has a problem with students' early exit from school, particularly at the high school (secondary) level. Figure 1, based on information from Monthly Employment Survey (PME) database used in this paper, shows Brazil's low net school enrolment at both primary and secondary levels. Net school enrollment is the proportion of official primary or secondary school-aged children who actually attend school out of the official overall school-aged population for both levels.

Figure 1
Net school enrollment, metropolitan regions of Río de Janeiro, São Paulo, Porto Alegre, Belo Horizonte, Recife, and Salvador, Brazil,[1] 2008-2013. (In percentages)



Source: PME (2008-2013), compiled by author.

Figure 1 shows that approximately 10% of primary school age children and 25% of high school age children are not attending school.

This paper provides evidence that an individual's educational level is an important factor in determining their entrance into the labor market. The objective is to propose ideas for policies that aim to minimize the gap between the knowledge and capacity that workers have when they leave school and when they enter the labor market. The data presented here were obtained through an analysis of school-to-work transition using a competing risks regression. For the purpose of this analysis, I use data from the Monthly Employment Survey (PME) from January 2008 to

1 In all cases, the figures and tables presented in this article refer to these locations and periods.

December 2013. In this model, individuals can transition from school into three different work situations: formal job, informal job or unemployment.

In this study, only one-directional transitions from school to the job market are considered. However, reverse transitions (that is, going back to school), as well as simultaneous situations (i.e., persons who work while attending school, or who have more than one job at the same time) are also likely to occur. The school to work transition must be seen as a life-long process within which various other transitions occur. It is important to point out the process-oriented nature of work transitions because they have become increasingly complex in recent years, with the labor market increasingly marked by more long-term unemployment, more occupational changes, and labor disparities (Allen and Velden 2007). As Cunningham and Salvagno (2011) suggest in their study on Argentina, Brazil, and Mexico, a worker's success in the labor market could also be a variable that changes over their life cycle. As to typical youth labor transitions, these authors find that young workers tend to go from school to a brief spell in the informal sector, following which they enter the formal market and then later become self-employed.

The paper is divided into five sections. The following section offers a literature review of previous research on the informal job sector and the school-to-work transition in general. The third section explains the empirical methodology used in this paper, describes the database utilized and presents statistics on school-to-work transition. The fourth provides the results of the competing risks regression and comments on school-to-work transition over two time periods. Lastly, section five offers final conclusions.

2. Literature review

Cardoso (2008) explains that the social division of labor in the labor market must reconcile the needs of firms with the preferences, aspirations, and qualifications of individuals, and how these are shaped by the educational system. According to her analysis, the demands of the labor market are not perfectly anticipated by young people and their families. This is because business decisions are influenced by the pursuit of profit, which do not align well with typical family dynamics, such as the time required for pregnancy, childbirth, and raising children, as well as the educational system more broadly. There is little reason to believe that these different business, family, and educational logics will produce market efficiency or generate employment for all. Similarly, it is doubtful that, even with employment available for all who seek it, individuals will find the jobs they desire or those for which they are most qualified.

Moreover, in Brazil there are certain structural problems related to the educational system that reduce market efficiency in the labor market. In the last few decades, the increase in young people's readiness for work has been not sufficient enough to reduce the educational gap, nor was it accompanied by students' improved transition into the labor market. The deterioration of the conditions of youth employment and the poor quality of public education are serious obstacles to upward mobility and to increased equality of opportunity. Cardoso (2008) classified the school-to-work transition pattern in Brazil as **developmentalist**, referring to the economic development model that the country adopted between 1940 and 1980. This pattern is opposed to the Fordist model employed by advanced capitalist countries in the post-WWII period, in which sustaining full employment through Keynesian macroeconomic policies allowed welfare states to guarantee their adult citizens a more predictable work trajectory. Thus, the completion of compulsory education was generally followed by formal employment in industry for most young people (Wolbers, 2003).

Meanwhile, the theory of human capital posits that workers possess capital (or value) that can be increased through education. According to this theory, a worker's education level and experience can yield increases in the income derived from their labor, since these added inputs lead to productivity gains. The skills acquired by a worker (i.e., human capital) should be understood as sources of marginal productivity gains and higher yields, and thus improved prospects of finding work.

The theory of credentialism, developed by Berg (1970) and Thurow (1975), interprets education as a credential necessary for the job market, that is to say, as an indirect measure of the cost associated with hiring and training. For these researchers, school education serves as a way of selecting employees and reducing costs of future employee training. However, these authors do not consider schooling as a means to measure productivity or to obtain necessary qualifications, since these aspects are acquired and measured in the workplace.

According Hasenbalg (2003), researching the transition from school to the labor market in Brazil is complicated by two factors: early market entry and what is known as "conciliation," or overlapping of work and study. This pattern deviates from what is often considered the purest form of transition: directly from school to employment. Regardless, the inadequate living conditions of many individuals compels a significant number to join the labor market early.

Castro Claudio (1994) argues that one of the consequences of students' slow progression through the school system (for instance, taking eight years

to complete a five year cycle) is a high dropout rate. Those who do not advance end up being absorbed by the labor market in poorly remunerated and insecure positions. According to the author, another factor that contributes to early withdrawal from the school system is the unsatisfactory coverage ratio at the secondary level. Data from the National Sample Survey ((Pesquisa Nacional por Amostra de Domicílios, PNAD) show that, in 2011, 51% of adolescents between the ages of 15 and 17 were enrolled in high school.

Arruda (2004), Camarano, Mello, Pasinato, and Kanso (2004) and Mello and Camarano (2006), analyze the timeframe of events that are normally employed to demarcate the transition to adulthood, and conclude that over time this transition has become increasingly delayed, indicating a prolongation of youth. The authors emphasize the multiplicity of situations in which the transitions to adulthood may occur. Camarano *et al*. (2004) identify various gender-determined patterns, especially with regard to leaving the parental home, unlike Arruda (2004) who finds that being male or female has no significant bearing on the median age when a youth leaves their parents' home. Camarano *et al.* (2004) point out that, besides the variables applicable to both sexes, the insertion in the labor market for women is also affected by marriage and fertility.

In their study, Menezes Filho, Lee, and Komatsu (2013), attempt to identify the determinants of early exit from school in favor of full-time labor market employment. The older a person is, which in this case can be seen as a measure of the age-grade gap, the less likely they are to attend school and the more likely they are to enter the labor force. These effects are independent of completing secondary school, which can be explained by the fact that older individuals are more attractive to the market, reflected in higher salaries and better employment offers.

As expected, the completion of elementary education contributes positively to the probability of school attendance. Conversely, completion of secondary school reduces the probability of school attendance by 26 percentage points, while it increases the probability of working by almost 10 percentage points, indicating that the completion of a secondary education constitutes a transition towards other activities, especially the labor market.

Another area of literature focuses on the characteristics of those who work in the informal sector. Cacciamali and José-Silva (2003) demonstrate that a unique feature of the Brazilian labor market is the unequal distribution of unemployment and precarious occupations, with a disproportionately high share of young and female workers in both categories.

Meanwhile, there is a consensus in the Brazilian literature (Barros, Mello & Pero 1993; Cacciamali & Fernandes 1993; Neri 2002; Tannuri-Pianto & Pianto 2002; Soares 2004) that informal workers have completed fewer years of formal education on average than the formally employed. In relation to this, Carneiro and Henley (2001) find that rates of return to high school and university educated workers in the formal sector are substantially larger, compared to those observed for workers in the informal sector.

A second important consensus reached in the literature concerns the likelihood of an individual worker operating without a formal employment contract. Carneiro and Henley (2001) and Tannuri-Pianto and Pianto (2002) show that white, female workers employed by major firms in urban areas are the least likely to resort to the informal labor market. Furthermore, Fernandes (1996) and Tannuri-Pianto and Pianto (2002) conclude that the probability of being employed in the informal sector decreases with years of study and is U-shaped with respect to age.

3. Empirical methodology and database

3.1 Competing risks regression

The analytical method used in this paper is competing risks regression. A competing risks method is useful when the individuals studied can experience one of *m* endpoints, and for each individual, the time to failure and the type of failure are observed. This method is necessary when it is not possible to assume the independence of the probability of progression at different endpoints. Thus, competing risks regression can be seen as a variation of standard survival analysis, which is only concerned with one endpoint. Competing risks occur when it is not possible to observe the time from a defined starting point until an event of interest, due to the occurrence of another event (known as the competing event).

Instead of focusing on the survival function for the event of interest, *P(T > t and event type 1)*, in the case of competing risks, the axis lies in the failure function, *P(T ≤ t and event type 1)*, also known as the cumulative incidence function (CIF) (Beyersman & Schumacher 2008).

For this reason, it is helpful to consider the situation in which each individual can pass from a "live" state to one of several endpoints.

The probability of passing to endpoint *j* before time *t*, given that the individual was in the state 0 at time 0 with the value X_0 of the covariate vector, is

$$P_{0j}(0,t \mid X_0) = \Pr(T \leq t, \delta = j \mid X_0)$$

which is known as the CIP.

The distribution probability avoiding all events until time t with a given value until time t with a given value X_0 of the covariate vector is

$$P_{00}\,(0,t \mid X_0) = \Pr(T>t \mid X_0)$$

which is known as the overall survival function.

To each $P_{0j}(0,t)$ corresponds a transition hazard (λ_j):

$$\lambda_j\,(t,X) = \lambda_{j0}\,(t)\exp(\beta^T X^T)\; j = 1,2,\ldots,K,$$

where X is the basic covariate vector, X^j is the cause-specific covariate and β is the unknown vector of the regression parameters.

The model's parameters are calculated based on the sample (T_1,δ_1,X_1), $\ldots,(T_n,\delta_n,X_n)$ of n observations (Kudus & Ibrahim, 2005).

Finally, it is necessary to introduce the case of covariates that vary over time. On occasion there is a need to use variables of the form $z\,(t) = zg\,(t)$, that vary over time, such that

$$\lambda_j\,(t,X) = \lambda_{j0}\,(t)\exp\,\{(\beta^T X^T) + g\,(t)\;(\gamma^T z^T)\},$$

where $(z_1, \ldots,z_T)$ are the time-varying covariates. Using this model we can calculate the regression coefficients γ^T, for the covariates $g(t)z^T$.

The classical approach, in the presence of covariables, models the function of cause-specific failure for different causes of failure under the assumption of proportional hazards. However, it has been observed that, for a given cause of failure, a specific covariate may have different effects on the cause-specific failure rate function. This limitation of the classical approach has motivated efforts to model CIFs directly. These efforts led to the Fine-Gray regression model (Fine & Gray 1999). After this model was proposed, several extensions followed. One of these, proposed by Scheike and Zhang (2008), adapts to situations in which it is not necessary to assume risk proportionality, which implies that it is possible to accommodate covariates in the model with varying effects over time (time-dependent effects).

3.2 Database and variables

The database used in this study is the Monthly Employment Survey (PME) for the period January 2008 to December 2013, conducted by the Brazilian Institute of Geography and Statistics (IBGE).

The PME is compiled from a probability sample of approximately 40,000 households located in the metropolitan regions of Rio de Janeiro, São Paulo, Porto Alegre, Belo Horizonte, Recife, and Salvador. This survey takes in to account demographic and educational characteristics in order

to better understand the employment characteristics in Brazil (Perez Ribas & Dillon Soares 2008).

The PME seeks to produce monthly indicators of the labor force so as to evaluate medium and long term labor market fluctuations and trends in the short and medium term in the abovementioned areas of coverage. It is an ongoing household survey utilized to provide rapid indicators on how current economic conditions affect the labor market; it also serves as a socioeconomic planning tool for the country in the longer term. Socio-demographic information is collected for all residents interviewed, while those questions related to education and work are only gathered for individuals aged 10 or older. The PME is conducted through a random sample of households, a design meant to ensure that the results are representative of each geographical area.

The structure of the survey allows for formulation of panel data, since it is possible to follow a single person for eight months within a total period of 16 months. In fact, each sample household is interviewed for four consecutive months, then is excluded from the sample for eight consecutive months, and reinserted in the sample for another period of four consecutive interviews. Thereafter, the household will not be included in any further samples.

Another characteristic of the PME database is that the household is the basic unit of measurement in the sample; however, for the purposes of this study, data on the individual level is required. To this end, it is common to use certain individual characteristics reported in the survey in order to identify a single person across two or more interviews. To this end, this study uses a pairing algorithm outlined in Perez Ribas and Dillon Soares (2008). Also, this research only takes into account labor formality and informality in the case of workers, not of "entrepreneurs."[2] In other words, formal workers are included only when they are subject to formal employment contracts, which is to say that those employed without such contracts are considered informal. The study only takes into account individuals up to the age of 30 in order to confine the analysis to young adults of school-to-work age.

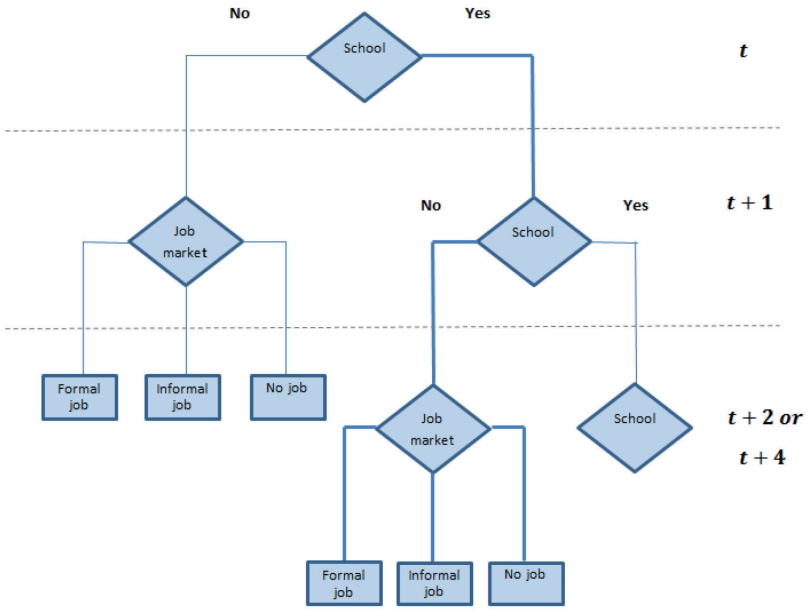
Furthermore, the analysis does not take into account individuals that attend school and work at the same time, nor individuals that have transitioned from school to work and then returned to school. The simultaneous work/study group includes individuals that may have different behaviors compared to those people who only attend school; consequently, for the work/study individuals, how and when they transition from school to work

2 In this paper, the term "worker" is used to indicate a person who works for another person or firm. The word "entrepreneur" indicates a person who owns their own business.

is not clear. The group of individuals that have moved into the workforce only to return to school includes those who may undergo different school-to-work transitions during the period of analysis, which could skew this study.

Figure 2 describes how the transition variable is constructed. I selected individuals who attended school in month t and who left school in the month $t + 1$. Subsequently, I observed the situation in which these individuals found themselves in month $t + 2$ and in month $t + 4$: employed in the formal sector, employed in the informal sector, and unemployed (this category includes both those actively seeking employment and those who are not). I used two periods ($t + 2$ and $t + 4$) because I wanted to observe the employment situation of each individual immediately after leaving school, as well as a few months later. This reflects the possibility that one's entry into the job market may occur a number of months after exiting school.

Figure 2
Possibilities of school-work transition



Source: compiled by author.

The transition variable is constructed to give the value of 1 to individuals employed in the formal sector, 2 to individuals employed in the informal sector, 3 to the unemployed, and 0 to those who do not go through a school-to-work transition.

However, the fact that I selected only individuals attending school (right side of Figure 2) leads to the problem of selection bias, given that I am studying only a select portion of a total population. This bias arises from a systematic difference between the selected sample and the total population. It could be caused by researcher selection, a differential motivation among those surveyed to respond to certain questions, or because the studied characteristic only being found in a specific group of the population.

This problem may be addressed by using the Heckman correction (1979), including the inverse Mills ratio as an additional explanatory variable in the competing risks regression.

Regarding the characteristics of workers, the following attributes for school-to-work transitions were selected for analysis: sex, ethnicity, age, schooling, and residence in a metropolitan area. Moreover, the education variable was defined using the International Standard Classification of Education (ISCED) developed in 1997 by UNESCO. In this study, primary school includes education levels ISCED 1 and ISCED 2; secondary, ISCED 3; and tertiary or higher, ISCED 5 (type A) and ISCED 6 (see Table A1 in appendix)

Table A2 in appendix gives a description of the independent variables selected.

3.3 Descriptive statistics

Table 1 shows the total number of observations in the PME database in absolute terms, the total number of observations contained in this sample, and the number of observations used in this analysis.

Table 1
Sample observations in absolute terms: sex, ethnicity, and city, 2008-2013

Total number of observations in the sample	4,399,954
Number of observations used in the analysis	1,470,311
Male	811,044
Female	659,267
Black	765,193
White	705,118
Recife	178,945
São Paulo	351,551
Salvador	174,781
Belo Horizonte	309,560
Río de Janeiro	233,387
Porto Alegre	222,087

Source: PME (2008-2013); compiled by author.

Table 2 shows the percentage of male/female and white/black/*pardo* people who attended school at the three different levels: primary school (ISCED 1 or ISCED 2); secondary school (ISCED 3); and tertiary education or more (ISCED 5-type A or ISCED 6).

Table 2
Individuals who attend school, by levels, according to sex and ethnicity, 2008-2013
(in percentages)

Sex and ethnicity	Primary education	Secondary education	Tertiary education or higher
Male	55.02	44.32	36.91
Female	44.98	55.68	63.09
White	35.22	44.29	66.15
Black/*pardo*	64.78	55.71	33.85

Source: PME (2008-2013); compiled by author.

The data indicate that males attend primary school in higher proportions than females, but this situation is reversed at the secondary and the tertiary education higher levels. In the latter case, women account for 63.09% of the total. However, across all other levels of education, the share of men and women is broadly similar. The reduced presence of males at higher education levels suggest that they are more inclined than females to leave school after finishing primary and secondary schools.

As to ethnicity, it can be seen that black and *pardo* individuals accounted for the majority at primary and secondary levels, with just a slight variation at the secondary level. However, these proportions change at the tertiary level, where white students predominate. The decrease in the presence of black and *pardo* persons at the tertiary level may be due to greater post-primary and -secondary dropout among students of color in comparison with their white counterparts.

The data in Table 3 shows the percentage of students who leave school at each age, in relation to the overall number of students aged between 10 and 30. The relative percentage of those who drop out of school was obtained on the basis of the number of persons who attended at time t and who no longer do so at $t + 1$ (see Figure 2).

Table 3
Students who drop out of school, by age, 2008-2013 (in percentages)

Age in years	Leave school		Total	
	Percentage	Accumulated	Percentage	Accumulated
10	0.25	0.25	4.30	4.30
11	0.23	0.48	4.53	8.82
12	0.36	0.85	4.72	13.55
13	0.74	1.59	4.76	18.31
14	1.24	2.83	4.79	23.10
15	2.42	5.25	4.75	27.84
16	3.75	9.00	4.70	32.54
17	11.87	20.87	4.61	37.16
18	19.47	40.35	4.58	41.74
19	14.06	54.41	4.53	46.26
20	9.69	64.10	4.70	50.96
21	6.25	70.35	4.71	55.67
22	5.74	76.09	4.82	60.50
23	4.36	80.44	4.87	65.37
24	4.09	84.54	4.83	70.20
25	3.31	87.85	4.91	75.11
26	3.29	91.14	4.92	80.03
27	2.70	93.84	4.94	84.97
28	2.22	96.06	4.95	89.92
29	1.98	98.04	4.89	94.81
30	1.96	100	5.19	100

Source: PME (2008-2013); compiled by author.

A significant number of school-work transactions occur between the ages of 17 and 20, the age range within which students usually complete secondary. According to the overall percentages, 9% of students between the ages of ten and 30 drop out of school before turning 17. The overall percentage increases greatly in the years immediately following this latter age, to exceed 90% for 26-year-olds.

Table 4 shows the percentage of students exiting school according to sex and age.

Table 4
Students who drop out of school, by age and sex, 2008-2013 (in percentages)

Age in years	Leave school		Total	
	Females	Males	Females	Males
10	22.22	77.78	49.24	50.76
11	36.00	64.00	49.80	50.20
12	41.03	58.97	49.58	50.42
13	49.37	50.63	49.77	50.23
14	52.63	47.37	49.87	50.13
15	46.92	53.08	50.04	49.96
16	44.78	55.22	49.56	50.44
17	52.95	47.05	49.48	50.52
18	52.30	47.70	49.71	50.29
19	51.66	48.34	50.21	49.79
20	51.78	48.22	50.56	49.44
21	53.73	46.27	50.48	49.52
22	57.56	42.44	50.86	49.14
23	63.81	36.19	51.26	48.74
24	58.31	41.69	50.92	49.08
25	68.17	31.83	51.60	48.40
26	61.76	38.24	51.68	48.32
27	65.52	34.48	51.89	48.11
28	68.91	31.09	52.56	47.44
29	72.64	27.36	52.62	47.38
30	71.43	28.57	52.96	47.04

Source: PME (2008-2013); compiled by author.

Males exit school at a higher rate than females up until the age of 16. After this age, the percentage of females leaving school exceeds that of males, and continues to rise with age. Between the ages of 17 and 20, when overall student exit from school is higher, the percentage of females leaving is higher than that of males. Table 4 also shows that ages at either extreme are subject to higher values: at one end of the age spectrum, the ages of 10 and 11 constitute the highest values for males; and at the other, the ages of 29 and 30 are the highest for females.

Based on the information presented in tables 2 and 4, it would seem that males tend to leave school early while females do so at a later stage, in terms of both education level and age.

Table 5 shows the percentage of students exiting school according to ethnicity and age.

Table 5
Students who drop out of school, by age and ethnicity, 2008-2013 (in percentages)

Age in years	Leave school		Total	
	Black	White	Black	White
10	85.19	14.81	56.30	43.70
11	68.00	32.00	56.42	43.58
12	58.97	41.03	56.38	43.62
13	65.82	34.18	56.60	43.40
14	59.40	40.60	56.95	43.05
15	61.15	38.85	56.84	43.16
16	58.21	41.79	56.11	43.89
17	57.74	42.26	55.70	44.30
18	55.99	44.01	55.62	44.38
19	60.15	39.85	54.52	45.48
20	62.46	37.54	53.60	46.40
21	60.90	39.10	53.25	46.75
22	61.79	38.21	52.30	47.70
23	53.96	46.04	52.54	47.46
24	55.81	44.19	52.41	47.59
25	52.11	47.89	52.27	47.73
26	54.67	45.33	51.08	48.92
27	51.03	48.97	51.12	48.88
28	47.90	52.10	51.26	48.74
29	52.83	47.17	51.14	48.86
30	50.00	50.00	51.33	48.67

Source: PME (2008-2013); compiled by author.

Table 5 shows that at each age, according to the ranges considered, a greater percentage of black and *pardo* students leave school compared with whites. The highest percentage of black and *pardo* students leave school at the earliest (10 to 30) and mid (19 to 22) stages of the age spectrum. In the

case of the oldest ages examined, black/*pardo* and white students present similar dropout rates.

Table 6 illustrates the transition from school to work at time $t + 2$. The columns show the data for each school level that the individuals attended at time t, while the rows contain the data referring to the employment situation of these ex-students at time $t + 2$.

Table 6
Transition from school to work (t +2), 2008-2013 (in percentages)

Type of work	Primary education	Secondary education	Tertiary education or higher
Formal	27.14	36.13	45.75
Informal	32.86	18.80	16.15
Unemployed	40.00	45.06	38.10

Source: PME (2008-2013); compiled by author.

Employment in the formal sector is correlated to a person's level of education; that is, the higher their level of education, the more likely they are to transition to the formal sector: 27.14% of individuals who attended primary school, 36.13% of those who went to secondary, and 45.75% of persons educated to the tertiary or higher level made the transition to formal employment. As is to be expected, the opposite is true in the case of informal work, where the less educated the person, the more likely it is that their transition will be to the informal sector.

These percentages remain almost constant regardless of education in the case of individuals who are unemployed: they go from 40% in the case of transition from primary school, to 45.06% from secondary school, and finally to 38.10% from tertiary or higher education. Therefore, it appears that in time $t + 2$, the level of schooling obtained could play a role in shaping students' transitions between school and formal and informal jobs, while it may have no effect on the number of individuals that remain outside labor market.

Table 7, the last in this section, provides data for time $t + 4$. The columns show the school level that individuals attend at point t, while the rows present their employment status at $t + 4$.

Table 7
Transition from school to work (t + 4), 2008-2013 (in percentages)

Type of work	Primary education	Secondary education	Tertiary education or higher
Formal	25.51	41.49	67.37
Informal	15.03	13.40	11.22
Unemployed	59.46	45.11	21.41

Source: PME (2008-2013); compiled by author.

In this case, the school level attended appears to affect the percentage of ex-students working in the formal sector. There is also a significant increase from the primary to the secondary level in the percentage of ex-students who make the transition to the formal sector, and an even steeper increase from the secondary to the tertiary or higher level. Table 7 differs markedly from Table 6 in that in this case the transition to work in the informal sector seems not to be influenced by level of education. Indeed, the percentage of ex-students employed in the informal sector drops only slightly between the primary, secondary, and tertiary or higher stages.

Another difference of time t + 4 in relation to time t + 2, is the fact that percentage of individuals outside the labor market is no more constant: attending a higher level of school appears to result in fewer transitions to unemployment. Thus, it might be inferred that at time t + 4, education level could play a role in allowing ex-students to distinguish between formal work and unemployment; and at the same time, it may have no effect on the number of persons employed in the informal sector. Finally, it should be kept in mind that these descriptive statistics only take into account those individuals who, on the one hand, study and do not work; and on the other, already left school and did not go back during the period of analysis. Likewise, they do not factor in those who dropped out of school after this period.

4. Results

This section sets out the results of the competing risks regression at time t + 2 and time t + 4.

To begin, it is necessary to remember that these results were obtained by including the inverse Mills ratio in the regression to account for the selection bias due to use of data pertaining only to individuals currently in school. Heckman James (1979) proposed a two stage estimation procedure using the inverse Mills ratio to account for selection bias.

In the first stage, a regression for observing a positive outcome of the dependent variable is modeled with a probit model. In our case, the dependent variable of the probit model is a dummy variable that describes the situation of attending a school or not. The independent variables are a dummy variable that identifies if the individual has the condition of son/daughter in the household, a variable that includes the rate of unemployment in each metropolitan city, and a dummy variable that indicates if the individual is attending a professional course instead of a "traditional" school. The estimated parameters of probit regression are used to calculate the inverse Mills ratio, which is then included as an additional independent variable in the calculation.

In the second stage, the variable related to the unemployment rate included in the probit regression also plays an important role since it can be considered a control variable in the competing risk regression. In fact, it is important to control for the level of unemployment because it may influence the school-to-work transition, since it affects the opportunity cost of education.

Third, the variable "age" enters the model as a time varying covariate, that is, it varies continuously with respect to time, as explained in Section 3.3.1.

The results relative to time $t + 2$ are provided in Table 8.

Table 8
Results for time $t + 2$ (hazard ratios)

Variable	Formal work	Informal work	Unemployment
Males	1.295***	1.644***	0.902*
White persons	1.000	0.996	0.888*
Primary education	Reference	Reference	Reference
Secondary education	1.935***	0.769***	1.620***
Tertiary education and higher	2.153***	0.700***	1.206*
Recife	Reference	Reference	Reference
São Paulo	1.146	1.038	1.198**
Salvador	0.702***	0.794*	0.882
Belo Horizonte	1.734***	1.192	0.929
Río de Janeiro	1.180	0.779**	0.767***
Porto Alegre	2.175***	1.303**	1.075
Age	1.002***	1.000	1.002***

Note: significance levels: * 10%; ** 5%; *** 1%.
Source: compiled by author.

The first independent variable, "male," has more than one significant hazard ratio when the regressions are considered in relation to formal and

informal work. The level of significance is 1%. On the face of it, being male increases the possibility of transitioning from school to formal work by 29.5%, and to informal work by 64.4%, in comparison to being female. The hazard ratio is lower than 1 in the case of the unemployment ratio; that is, a male has lower prospects of making the transition from school to work, but the level of significance level is just 10%.

This result is corroborated by the data on Brazilian youth unemployment by gender: 23.5% for females and 13.9% for males. Moreover, when females were asked about the reasons why they had turned down a job, they answered with more frequency than males that the location was not convenient, that the hours were too long, and that their family did not appreciate the job offer, stressing the role of the woman in the family and in childcare. When it comes to inactive young persons, the percentage of those not working, seeking work, or studying is 56.0%, in comparison with 30.3% in the case of males. A recent study about Brazilian transitions from school to work helps shed light on women's motivations for not working. The study finds that the main motivation for not accepting job opportunities outside the home were family responsibilities, which were cited by 38.9% of those surveyed (Venturi & Torini, 2014).

The variable "white" is significant in the case of the transition to unemployment, but the level of significance is 10%. We find that a white person is 11.2% less likely to make the transition from school to unemployment than a black/*pardo* person.

The next group of variables is related to the educational attainments of students before making the transition to the labor market. They also have a high level of significance: 1% for each variable, except that of the tertiary and higher level in the case of unemployment. The results were in line with expectations for the transition to formal and informal work. Students who attend secondary school and transition to the labor market are 93.5% more likely to progress to formal employment in comparison with those who attend primary school. The same is true of students at the tertiary level or higher, who are 115.3% more likely to attain formal work in comparison with secondary students.

In the case of the transition to informal work, we find that a higher level of educational accomplishment reduces the probability of passing to such a situation in comparison with the transition from the primary level, the reference category. However, the results obtained in the case of the transition to unemployment went against the expectation that a higher level of education would facilitate the transition to work. This result may be because the time

frame used is too short for those with a high level of education to find work, since such persons may be more selective and discerning in their search.

The literature provides evidence on those who leave school and end up unemployed. Menezes Filho, Cabanas, and Komatsu (2013) find that the average period in which individuals are not currently engaged in education, employment, or training (NEET) is relatively brief in comparison with other situations. In general, over the course of one year, the number of persons who leave this situation is greater than those who remain in it. For these reasons, my analysis also takes into account time $t + 4$.

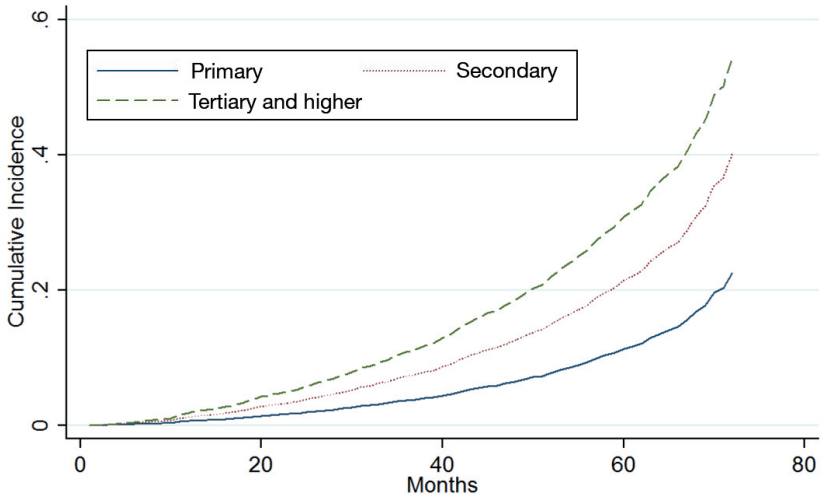
The results from the regression confirm the conclusion inferred from Table 6: it would seem that at time $t + 2$ education level could play a role, influencing students' transitions between formal and informal jobs.

The group of covariates related to metropolitan cities has a secondary role in explaining the school-to-work transition. In fact, hazard ratios for these variables are not always significant and display different levels of significance. Moreover, in the case of São Paulo, Salvador, and Porto Alegre, hazard ratios all point in the same direction across the three regressions.

The final variable, age, is significant in the case of formal work and unemployment, but the apparent effect is very low.

Figure 3 shows the CIFs of the transition to formal jobs by educational level at time $t + 2$.

Figure 3
CIF of the transition to formal work (time $t + 2$), in months



Source: compiled by author.

In the single-endpoint survival analysis, the focus is on the survival function, which indicates the probability of surviving beyond a given moment in a given situation. In the competing risks regression, the focus is on the CIF, which indicates the probability of an event of interest occurring before a given moment. In this case, the event of interest is the transition to a formal job, which competes with transition to an informal job and transition to unemployment. It can be seen that the probability of transition from secondary school is higher than from lower education levels, and that this difference increases over time. The same is true, in turn, of the probability of transition from tertiary education or higher, which is higher than from the secondary level and, thus, higher than from lower levels of education.

Table 9 displays the results of the competing risks regression at the time $t + 4$.

Table 9
Results for time $t + 4$ (hazard ratios)

Variable	Formal work	Informal work	Unemployment
Male	1.388***	1.668***	0.759***
White	0.882	1.191	1.117*
Primary education	Reference	Reference	Reference
Secondary education	1.913***	0.729***	0.690***
Tertiary education and higher	2.400***	0.776	0.387***
Recife	Reference	Reference	Reference
São Paulo	1.362***	1.287	0.860***
Salvador	0.669***	0.677*	1.167**
Belo Horizonte	1.917***	1.292*	0.738***
Río de Janeiro	1.080	0.907	0.942
Porto Alegre	2.092***	1.280	0.832**
Age	1.002***	1.000	1.001***

Note: Significance levels: *10%, **5%, ***1%.
Source: compiled by author.

Moreover, being male is a characteristic that increases the probability of making the transition from school to work, in the case of both informal and informal jobs, and reduces the possibility of unemployment. In the results pertaining to the unemployed, the assumed affect increases with respect to the regression at time $t + 2$, and is now significant at 1%.

The covariate "white" remains insignificant for formal and informal employment, and significant at 1% for the unemployed. However, it would appear that in this case a white student is more likely to become unemployed than a black/*pardo* counterpart.

The next group of coviariates is related to education level prior to transition. In this case, studying at the secondary or tertiary level increases the possibility of progressing to formal employment and decreases that of going into informal work, just like at time $t + 2$. However, tertiary education and higher is not significant in the informal work regression.

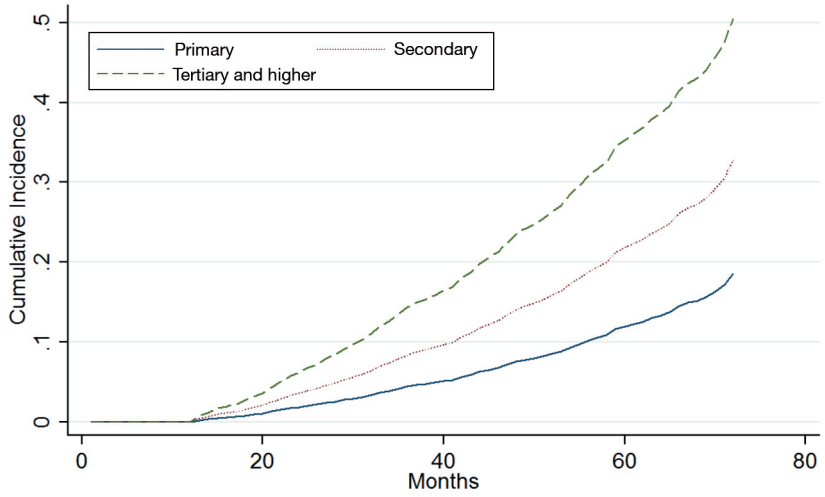
Nevertheless, at time $t + 4$ the assumed affect of education level in reducing the transition to unemployment can be seen in the hazard ratios. In comparison with a student who only went to primary school, an ex-student who attended secondary is 31% less likely to be unemployed, while the chances of a person educated to the tertiary level or higher being out of work are reduced by 61.3%.

The next group of variables is related to metropolitan cities. There is evidence that Río de Janeiro exhibits all hazard ratios without significance, and that those who live in São Paulo, Belo Horizonte, and Porto Alegre are more likely to make the transition to work (both formal and informal), and are less likely to be unemployed, than those in Recife (reference city). In the case of Salvador, the opposite is true. This hazard ratio of less than 1 may be explained with reference to Table 1, which demonstrates that Salvador has the lowest number of observations of all cities. Thus, the presence of omitted observations could be the cause of Salvador going in the opposite direction from the other cities.

It would seem that, at time $t + 4$, this group of variables has a greater effect on work and unemployment than on formal and informal work. "Age," the final variable, remains significant in the case of having formal employment and not having it, and exhibits low hazard ratios.

Figure 4 shows the CIFs for the transition to formal work by educational attainment at time $t + 4$.

Figure 4
CIF of the transition to formal work (time $t + 4$), in months



Source: compiled by author.

At time $t + 4$ the same affirmations can be made regarding Figure 4 as for $t + 2$. In this case, there is also an evident difference between an individual's education level and their probability of transitioning to formal work. The higher their level of educational attainment, the greater their probability of making the transition to formal employment.

5. Conclusions

This paper reveals certain factors that may influence youth school-to-work transition using a competing risks regression.

The first of these is sex: it would seem that males, in comparison with females, are generally more likely to transition to employment, and less likely to proceed to unemployment.

On the other hand, ethnicity is a characteristic that does not seem to influence the transition from school to work. In this case, the hazard ratios are insignificant or significant at a very low level both at time $t + 2$ and at time $t + 4$.

The variables referring to metropolitan cities are very often not significant. However, they would seem to have some effect at the level of transition to work and unemployment, and not at the level of the transition to formal and informal work.

The likely effect of age on the transition is very small and therefore not worthy of mention.

The focal point of this article is the effect that educational achievement has on transition to the labor market. The analysis indicates a high probability (91-94%) of those who completed secondary school progressing to formal work, in comparison with those who only went to primary school; while those educated to the tertiary level or higher have a still-higher probability (115-140% of) of transitioning to formal work than individuals who only received primary schooling. Moreover, a higher level of educational attainment reduces the probability of transitioning to an informal job and to unemployment (only at $t + 4$).

These results may be explained by the fact that the labor market demands higher educational levels and constant updating of skills in order to keep pace with technological change.

A recent study by Barbosa Filho and De Moura (2012) confirms the importance of education in reducing levels of informal labor. According to their study, the composition effect of the variable "education" can explain 60% of the drop in labor informality that occurred between 2003 and 2011. Thus, public policies must raise the awareness of employers, employees, and social organizations about how important it is for young persons to have access to decent and productive employment through improvement in education and increased school attendance.

Public policies are needed to tackle child labor, particularly in its worst forms. Moreover, actions are required to give young people equal access to adequate educational opportunities. Together, these measures would play a key role in protecting the rights of children, adolescents, and young persons, and would also contribute to alleviating poverty. Moreover, the provision of quality, universal education and effective policies to combat school absenteeism and high dropout rates are all measures that would make positive impacts on students' access to formal work.

Appendices

Table 1A
Correspondence between ISCED 1997 and Brazilian levels of education

ISCED 1997 levels	Brazilian levels
ISCED 0 (pre-primary)	Pre-school Initial (from the age of 3)
ISCED 1 (pre-primary)	Fundamental education (first to fifth grade or equivalent)
ISCED 2 (lower secondary)	Fundamental education (sixth to ninth grade or equivalent)
ISCED 3 (upper secondary)	Secondary education
ISCED 4 (post-secondary non-tertiary)	(Not applicable to Brazil)
ISCED 5 (first stage of tertiary education)	Type B tertiary education (higher technical education) Type A tertiary education (undergraduate, master's degree)
ISCED 6 (second stage of tertiary education, leading to the award of an advanced research qualification, doctoral or postdoctoral)	Doctorate Doctoral and post-doctoral qualification

Source: Organization for Economic Cooperation and Development, OECD (2011).

Table 2A
Description of the variables selected

Variable	Description	Observation
Male	1 = male; 0 = female	
White	1 = white; 0 = black/*pardo*	Does not include East Asian or Amerindian individuals
Primary education	1 = at ISCED 1 or ISDCED 2; 0 = other	Reference category
Secondary education	1 = at ISDCED; 0 = other	
Tertiary education and higher	1 = at ISCED 5 (Type A) or ISCED 6; 0 = other	
Recife	1 = lives in the metropolitan area; 0 = other	Reference category
São Paulo	1 = lives in the metropolitan area; 0 = other	
Salvador	1 = lives in the metropolitan area; 0 = other	
Belo Horizonte	1 = lives in the metropolitan area; 0 = other	
Río de Janeiro	1 = lives in the metropolitan area; 0 = other	
Porto Alegre	1 = lives in the metropolitan area; 0 = other	
Age	Age of individuals in years	Variable that changes over time

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