The Impact of SENAI's vocational training program on employment, wages, and mobility in Brazil: What are the lessons for Sub Saharan Africa?

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Abstract

The paper investigates to what extent the Brazilian National Service for Industrial Training (SENAI) could be a role model for easing the substantial challenges African countries face to tackle rising urbanization, high youth unemployment, and a skills gap. We show that the SENAI offers opportunities to further training across the educational and race distributions, it promotes employability for all groups and improves productivity, especially for young males. The same effects are much lower or even not observed amongst older workers and women. Finally, differently to other training institutions, SENAI graduates experience higher degree of regional labour mobility.

Keywords: Labour markets, vocational training, school to work transition, Brazil, Africa.

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1 Introduction

Job creation in the non-agricultural sector has become crucial for policy-makers as Africa continues to urbanize. This transition is occurring in the context of a strong demographic expansion (youth bulge), only modest per-capita economic growth, huge levels of informality, and a continually dominant agricultural sector (Biavaschi et al., 2012).[1] In many Sub-Saharan countries the lack of skills aggravates the situation of many young people without a post-secondary qualification. Large portions of the rural population either remain trapped in the declining traditional sector or migrate to urban areas experiencing poor labour market prospects, resulting in unemployment, poor standards of living, informality, and rising criminality (Hove et al., 2013). This not only hurts the affected young people, but also the economy as a whole as skilled workers are needed to improve the country's productivity and international competitiveness.

One of the main challenges for African policymakers in the upcoming decades will therefore be to improve the school-to-work transition. The promotion of diversified skills for the dynamic and growing non-agricultural sectors is likely to play an important role where previously vocational training has only played a negligible role in the development of skills (DFID, 2007; Oketch, 2007).[2]

With reference to this massive challenge facing Sub-Saharan African countries, the main contribution of this paper is to investigate whether and to what extent the Brazilian system of vocational training (SENAI or, more broadly, S-System) can provide lessons for African countries. As there are already some pilot programs of this Brazilian program operating in some African countries (and more are contemplating similar systems, See Vazquez and Carillo, 2014), this can indeed be of considerable relevance as African policy-makers consider various approaches to vocational training. More specifically, the paper will characterize the participants of Brazil's vocational training S-system (mainly the SENAI) as well as to provide an impact evaluation of S-system training on improving the school-to-work transition.[3]

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[1] The so-called "youth bulge" (term coined by Assad and Roudi-Fahimi in 2007) is a term used to reflect the fact that the labour demand is unable to absorb a demography-driven massive supply of unskilled labour.

[2] In Africa, the difficulties associated with promoting vocational training are mainly related to the general preference for general education, high shares of informality and limited institutional support (Oketch 2007; Atchoarena and Delluc, 2001; Biavaschi et al., 2012).

[3] The S-system is a collection of nine separate initiatives created progressively over the years aiming to prepare workers through supplying them with the skills needed in the industry and other sectors. It consists of the National Service of Industrial Learning (SENAI), the Social Service of Industry (SESI), the National

The next section provides an historical overview of the institutional aspects of the SENAI. It includes descriptions of the financing schema of the institution and the currently available impact evaluations. Section 3 assesses the determinant of vocational training participation. Section 4 is devoted to our impact evaluation of training on a variety of labour market outcomes based on household survey data. The consequences of vocational education on labour mobility are presented in Section 5. Section 6 concludes.

2 Institutional aspects of the SENAI

In the early 1940s, Brazil launched a big effort to industrialize the economy in order to reduce its dependence on the trade with the crisis-prone Northern hemisphere. At that time, the country relied almost entirely on the imports of industrial goods, and the substitution of imports was constrained by the lack of skills. This generated the necessity of a vocational education system, where the questions were who was going to administer the model and what the model's characteristics would be. Who would administrate the model was particularly controversial since historically policymakers have valued vocational education and the schooling system differently.

Given the poor performance of the government in promoting and improving the schooling system, it was not surprising that the private sector aspired to operate the nascent vocational education system. After an unsuccessful public initiative, the government finally decided to create the SENAI during the term of Getulio Vargas in January 1942.[4] It followed the German and Swiss apprentice-training models (Wilson, 2006). It was organized at the national and state levels as a private, non-profit organization, financed, managed and led by the industry (Wilson, 2006; IDG, 1970).[5] Originally, the SENAI provided training in institutes and firms (on-the-job). However, this component lost momentum over time due to difficulties in finding firms willing to offer training positions. Schwartzman and de Moura Castro (2013)

Service of Business Learning (SENAC), the Social Service of Trade (SESC), the National Service of Rural Learning (SENAR), the National Service of Learning in Transports (SENAT), the Social Service of Transports (SEST), the Brazilian Service of Support to Small and Medium-sized Companies (SEBRAE) and the National Service of Learning of Cooperatives (SESCOOP).

[4] The SENAI is considered to be among the best and oldest national training systems in the world (Wilson, 1993), having benefited more than 52 million people since 1942 (SENAI-DN 2012).

[5] Previous to the creation of the SENAI, the Law of Industrial Education allowed the Ministry of Education to create and provide vocational education in the "Liceu Nacional no Rio de Janeiro" with support from Swiss teachers. This initiative was unsuccessful and therefore cancelled (Schwartzman et al. 2000; Schwartzman and Christophe (2005).

argues that the legislation overregulated the apprenticeship process making it unattractive to many companies. In fact, during the 1970s, only a third of all needed training vacancies were available (SENAI-DR/RJ, 1979).[6] Consequently, the SENAI developed as an institution providing training as a stand-alone operation not linked to a particular job in a firm, necessitating graduates to then find employment upon graduation.

During the post-war years, stagnating real wages and increasing profits in the industry inevitably encouraged antagonistic labour relations that created an unfavourable environment for fostering manufacturing quality standards and the demand for industrial training (see Colistete, 2010). The stagnation of the SENAI ended in 1956, a year in which the number of new enrolments began to grow exponentially due to a state-led industrialization effort known as "Post Import Industrialisation" that had long run consequences (Baer, 2007).[7]

Then, in 1973, the oil crisis precipitated the end of the economic miracle (1967-1973) causing significant transformations within the industrial sector. New employment possibilities shifted towards the service sector to highly remunerated occupations as well as to low-productivity activities. Meanwhile, SENAI graduates were unable to find jobs and as a result, the reputation of the institution was eroded and became vulnerable to pressures from the outside (de Moura Castro and Verdisco, 1998). All of these dynamics shaped the so-called "Lost-Decade" of the 1980s. Stagnation, increasing income inequality, unbalanced public accounts, high unemployment, and three and four digits inflation up until 1994 characterized this period of Brazilian history (Amman, 2011; Kingstone, 2012; Kniivilä, 2007).

During the lost-decade, the SENAI, as well as other vocational training institutions in South America, could not adapt to the economic downturn and the labour-saving industrial shift ended up reducing employment in the formal sector, increasing self-employment and expanding the informal sector (de Moura Castro and Verdisco, 1998).[8]

The introduction of trade liberalization policies during the 1990s shifted the economy towards the service sector as well as the middle and high-tech industry sectors, some of which have been highly subsidized by the government (Ferreira and Facchini, 2005; Kniivilä, 2007). The structural change increased the demand for workers with higher levels of qualification

[6] Between 1946 and 1960, the number of workers who completed some type of apprenticeship or on-the-job programme provided by the SENAI never reached two percent of the total industrial workforce in the state of São Paulo, by far the main industrial centre in Brazil (Colistete, 2010).

[7] The number of training centres doubled during the period 1964-1968, reaching about 200 units (IDG, 1970).

[8] The difficulty in training the informal sector lies on the fact that there is not a single way to proceed, it is costly in term of prestige, and training for low-skilled occupations is, in most cases, not profitable (De Moura Castro and Verdisco, 1998).

(CNI, 2007).[9] Since the mid 1990s, SENAI has sought to adapt its programs to actively match the labour demand of the industry, improving its reputation.

This new orientation has apparently paid off. During the crisis period of 2008-2010, the employment rate of the SENAI graduates did not collapse as it did in the past (SENAI-DN, 2011)[10] and the demand for training in the institution has continued to grow. In 2011, about 2.5 million people were enrolled in the SENAI in a variety of vocational training modalities (SENAI-DN, 2012). However, the performance of the SENAI graduates throughout the crisis is also possibly a consequence of changes in the selection process into the training courses. It is likely that over the past two decades the ex-ante education and family background composition of recent graduates have improved as SENAI strengthens its reputation. Consequently, the good performance by SENAI graduates might reflect the ex-ante positive selection into training and not necessarily the true impact of training on graduates' labour market outcomes.

The financing model of the training institutions is of critical importance. This is because, differently from the schooling system, financing schemes are much more dependent on economic and political fluctuations. From the beginning, the SENAI has had stable incomes since all industrial companies have to pay a tax of one per cent on all payrolls that serves as the basis to the social security system contribution.[11]

Nevertheless, a fully levy-based financing model can be inadequate in encouraging further developments to the training system. Gasskov (1994) argues that it tends to generate a monopoly in the training market by binding enterprises to the training institution. Consequently, there is no incentive for employers to provide on-the-job training and the lack of competition in the training market seems to be a natural outcome of the funding schema. Moreover, the lack of competition tends to standardize technical programs, offering reduced opportunities for shop-floor workers and informal workers.

During the 1990s, the primacy of the levy-based income in the financing structure started to reverse with the implementation of training agreements. Under this modality, the SENAI began to supervise employer-funded training rather than provide it directly (Gasskov,

[9] During the mid-2000s, more than 85 per cent of new recruits in the oil, machinery, and electronic equipment sectors had at least a secondary education. (CNI, 2007).

[10] According to SENAI-DN (2011), SENAI's employability rates from 2008 to 2010 were 48 per cent for graduates from learning and qualification courses and 75 per cent for graduates from technical courses.

[11] The payment is exempt from federal taxes and is collected by the National Institute of Social Security. (IDG 1970; Receita Federal, 2008). The ordinance nº 4.048/42 indicates that companies with more than 500 employees contribute 1.2 per cent on all payrolls (SENAI –DR/RJ, 1979; Receita Federal, 2008).

1994; CEDEFOP 1998). Consequently, revenues associated with the sale of training services to enterprises grew rapidly.[12]

The current mixed financing structure has some advantages worth considering. On the one hand, the levy-based income goes directly to the SENAI, its value is protected against inflation and it provides a secure and relatively stable funding source (Gasskov, 1994). On the other hand, the specialization in the sale of training services encourages the offer of ad-hoc training courses at an affordable cost and thus to compensate the tendency towards the standardization associated with the levy-based financing model. The flexibility associated with this financing mixture is crucial in the context of high informality, increasing interdependency between sectors, incorporating other agents (universities, technical schools, consultants) and training modalities such as distance education.

2.1 Existing evaluations

Only recently have evaluations of vocational training programs in general and SENAI graduates in particular become more available in Brazil. IDG (1970) reports that during the second half of the 1960s, a significant amount of SENAI graduates faced problematic school-to-work transitions and a relative stagnation of labour earnings.[13]

During the next decade, the difficulties that SENAI faced in finding apprenticeship vacancies were well documented in SENAI-DR/RJ (1979). This report also indicates that SENAI graduates were already positively selected on observed characteristics and, in spite of low real wages, they were satisfied with their job situation. De Moura Castro (1979) reports high estimates of social rates of return, at above 20 per cent of SENAI graduates after secondary school. At the end of the “lost decade”, Arriagada and Ziderman (1992) find a significant "training" premium. In particular, they find that trainees and school students obtain comparable earnings when the former are employed in occupations unrelated to their field of study. Nonetheless, when trainees are engaged in occupations related to their field of study, their earnings are significantly higher than those from the formal education system. Nowadays, Fresneda (2012) finds that graduates from a vocational technical education obtain a significant wage premium of about 30 percent, are less vulnerable to unemployment and

[12] For instance, in Guanabara (nowadays Rio de Janeiro) the share of the compulsory contribution went from 97 percent in 1968 to 60.52% percent in 2013 (IDG, 1970; Sistema Firjan, 2013).

[13] As far as we know, this is the first attempt to perform a systematic evaluation of the SENAI. The study lacks clear definitions and evaluation criteria, and the sample does not allow one to make inferences about the universe of SENAI graduates even in Guanabara (nowadays Rio de Janeiro). The 64 and 47 per cent of workers aged less than 18 and adults respectively, were not working in their field of training in 1970.

informality, and are more likely to enrol in a college education than those who at the most completed a secondary education. Nevertheless, in the same line with SENAI-DR/RJ (1979), this study raises concerns regarding the selectivity associated with this type of complementary education since participants in the public system are mostly selected from middle-income households. In another evaluation, Vasconcellos et al. (2010) find a wage premium of 12%, controlling for the observables of the whole sample of individuals with completed secondary education and a return of about 37% per cent for a restricted sample of children after controlling for parents' occupation as an instrument for unobservables.

Despite these evaluations, as far as we know there is no assessment of the consequences of vocational education in Brazil that accounts for multiple labour market outcomes as well as for the differential impact that training may have on different population sub-groups. Based on the Brazilian household survey PNAD 2007, we aim to fill the knowledge gap by evaluating the effect of training on a rich vector of labour market outcomes for successively restricted population subgroups with the purpose of reducing the underlying heterogeneity of the vector of estimates.[14] Thus, the impacts are calculated for all individuals aged 10 or more (sample 1), individuals aged 15-29 (sample 2), individuals aged 15-29 living in urban areas (sample 3), and for women aged 15-29 living in urban areas (sample 4).[15] Additionally, we disaggregate our results to capture different behavioural responses to training related to the role that the individual plays within the household (head, children and others household members). Then, we further split our results according to who is providing the training, whether it is the S-system or the remaining training institutions, and the type of training received, either professional qualification (secondary equivalent) or at the technical-technological levels (tertiary equivalent).

[14] The vector consist of monthly labour earnings, monthly working hours, hourly labour earnings, employment probabilities, formality levels, and the probability of working in the same area of training and workers inter-state mobility.

[15] The estimation based on samples 1-4 provides richer information and more accurate estimates on the school-to-work transition by reducing the confounding effects coming from older cohorts, the geographic distribution of institutions supplying vocational training as well as the systematic differences by gender.

3 Determinants of participation in vocational training

The characterization of the eligible individuals in the appendix Tables A.1 and A.2 shows that enrolment in the S-system represents 14 percent of all vocational training offers in Brazil, while amongst workers, the share of S-system graduates is higher, about 18 percent of all those with vocational training. This information suggests that the S-system seems to be associated with disproportionate employment opportunities.

Both tables also show that there are systematic differences in the socioeconomic characteristics of trainees that depend on the type of institution and the type of training received. In general, S-system trainees are disproportionately male, non-enrolled in the schooling system, heads of household, with bi-parental families living in the northern and southern parts of the country. Moreover, workers' affiliation to a union is relatively more frequent amongst those enrolled in the S-system when compared to those enrolled in other training institutions. Finally, compared to other institutions, S-system trainees are disproportionately selected from workers in the production (reparation and maintenance) of goods and services as well as from the transformation industry (*indústria de transformacão*).[16]

3.1 Model of participation

In order to avoid endogeneity bias in our conditional analysis of participation in training, we consider only those individuals eligible for vocational training without a migration background. This is only a fraction of the population, representing approximately 55 percent of those eligible individuals described in the appendix Table A.1. We estimate survey design-adjusted probit models for the probability of current participation in a vocational training course for samples 1 to 3. As explanatory variables, we include the age of the potential trainee, their level of education, gender and racial background. Family education indicators are also included in order to control, for unobservables.[17] Additionally, the model includes the

[16] This section includes those activities that involve the physical, chemical and biological substances, materials and components in order to obtain new products. The materials, substances or components transformed are raw materials produced in the agricultural, forestry, mining, fishery products and other industrial activities.

[17] The controls for unobservables consist of an index of tertiary educated father for children and the average household education, excluding the potential trainee.

individual's position within the household (head of household, spouse, children and others), the nuclear condition of the family, the interaction between females and children under the age of five, the household size, regional dummies, as well as the current enrolment in the schooling system and the employment status. Furthermore, we include interactions related to the labour market situation of the employed individuals. The interactions include: currently working in the formal sector, union membership, hours worked during the past month as well as controls for the economic sector and occupation.[18] Table 1 shows the results of the probability model by sample and type of institution, while tables A.3 and A.4 (in the appendix) show results by type of training (professional qualification and technical-technological courses).

Trainees tend to be younger and the ones in the S-system tend to be older than their counterparts in other training institutions. This age effect is stronger for young cohorts (sample 1 versus sample 2) while the rural location seems to be uncorrelated to the age-enrolment profiles (sample 2 versus sample 3).

We find an inverse U-shaped relationship between the education level and the enrolment probability. The inflection point is found at the level of completed secondary education. Our results confirm the positive self-selection into training already reported by SENAI-DR/RJ (1979) and more recently by Fresneda (2012). Moreover, those in school-to-work transition belong to families with higher human capital endowments. Thus, it is true that vocational education in Brazil does not particularly attend to the needs of less skilled populations, and therefore, the SENAI and other vocational training institutions could do more enhance the social mobility of the disadvantaged.

[18] Formal workers are defined as those contributing to the social security system in their principal or secondary occupation, those with formal working contracts, military, public servants, and employers with more than five employees in non-agricultural activities.

Table 1: Probability model for the enrolment in vocational training, 2007

Population	Sample 1				Sample 2				Sample 3			
	S-system		Other institutions		S-system		Other institutions		S-system		Other institutions	
Variables / institutions	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect
Age	-0.007***	-0.000***	-0.013***	-0.001***	-0.029***	-0.000***	-0.032***	-0.003***	-0.030***	-0.001***	-0.032***	-0.003***
Incomplete basic	0.260**	0.002*	0.369***	0.021***	0.200	0.003	0.368***	0.039***	0.141	0.003	0.416***	0.053***
Complete basic	0.747***	0.016***	0.746***	0.072***	0.501**	0.013*	0.717***	0.101***	0.452**	0.013	0.730***	0.117***
Incomplete secondary	0.911***	0.025***	0.921***	0.104***	0.777***	0.025**	0.903***	0.136***	0.716***	0.025**	0.891***	0.148***
Complete secondary	0.940***	0.021***	1.036***	0.105***	0.861***	0.024***	1.102***	0.156***	0.799***	0.024**	1.055***	0.159***
Incomplete tertiary	0.490***	0.008**	0.569***	0.050***	0.353*	0.008	0.594***	0.082***	0.279	0.007	0.594***	0.092***
Complete tertiary	0.611***	0.012**	0.802***	0.084***	0.331	0.008	0.873***	0.149***	0.272	0.007	0.837***	0.154***
Children x father's educ. (T)	-0.320***	-0.002***	-0.110**	-0.005**	-0.397***	-0.004***	-0.196***	-0.015***	-0.399***	-0.005***	-0.198***	-0.018***
Avg. household education	0.016**	0.000**	0.012***	0.001***	0.022**	0.000**	0.006	0.001	0.008	0.000	-0.002	0.000
Female	-0.203***	-0.002***	0.073***	0.004***	-0.308***	-0.005***	0.029	0.003	-0.324***	-0.006***	0.020	0.002
Ethnic I (white)	-0.035	0.000	-0.037	-0.002	-0.066	-0.001	-0.036	-0.003	-0.052	-0.001	-0.043	-0.005
Ethnic II (mulatto)	-0.003	0.000	-0.024	-0.001	0.010	0.000	0.003	0.000	0.018	0.000	0.01	0.001
Bi-parental household	0.096**	0.001***	0.024	0.001	0.132***	0.002***	0.045*	0.004*	0.143***	0.002***	0.061**	0.006**
Spouse	-0.085	-0.001*	-0.051*	-0.003*	-0.140	-0.002	-0.05	-0.004	-0.115	-0.002	-0.055	-0.006
Children	0.050	0.000	0.077***	0.004***	-0.028	0.000	0.054	0.005	0.005	0.000	0.066	0.007
Other household member	-0.028	0.000	0.021	0.001	-0.120	-0.002	-0.011	-0.001	-0.088	-0.002	-0.017	-0.002
Household size	-0.035***	-0.000***	-0.037***	-0.002***	-0.048***	-0.001***	-0.034***	-0.003***	-0.044***	-0.001***	-0.030***	-0.003***
Female x children under 5	0.058	0.001	-0.099***	-0.005***	0.083	0.001	-0.115**	-0.010***	0.020	0.000	-0.112**	-0.011**
Northeast	-0.050	0.000	0.053	0.003	0.005	0.000	0.047	0.004	0.012	0.000	0.058	0.006
Southeast	0.041	0.000	0.207***	0.011***	0.122	0.002	0.168***	0.016***	0.103	0.002	0.166***	0.018***
South	0.163	0.002	0.232***	0.015***	0.184*	0.003	0.175***	0.018***	0.182	0.004	0.170***	0.020***
Midwest	0.055	0.001	0.075	0.004	0.106	0.002	0.048	0.005	0.038	0.001	0.016	0.002
Enrolled in school system	0.060	0.001	0.288***	0.017***	0.043	0.001	0.245***	0.023***	0.020	0.000	0.215***	0.024***
Employed	0.137	0.001	-0.293***	-0.015***	0.111	0.002	-0.477***	-0.044***	0.071	0.001	-0.575***	-0.064***
Interactions with employed												
Formal	0.133***	0.001***	-0.081***	-0.004***	0.224***	0.004***	-0.073**	-0.006**	0.245***	0.005***	-0.066*	-0.007**
Union membership	0.037	0.000	0.117***	0.007***	0.072	0.001	0.147***	0.015***	0.071	0.001	0.159***	0.019***
Hours of work	-0.002***	-0.000***	-0.001***	-0.000***	-0.003***	-0.000***	-0.001***	-0.000***	-0.004***	-0.000***	-0.001***	-0.000***
Industrial activities	0.033	0.000	0.309***	0.022***	-0.003	0.000	0.555***	0.079***	-0.190	-0.003	0.566***	0.092***
Manufacturing	0.107**	0.001*	0.129***	0.008***	0.068	0.001	0.114***	0.011**	0.064	0.001	0.111***	0.013**
Public administration	-0.025	0.000	0.078*	0.004*	-0.105	-0.001	0.039	0.004	-0.096	-0.002	0.012	0.001
Education and health	0.061	0.001	0.154***	0.009***	-0.07	-0.001	0.130***	0.013**	-0.043	-0.001	0.115**	0.013**
Other Services	0.172**	0.002*	0.150***	0.009***	0.008	0.000	0.117*	0.012*	0.018	0.000	0.131**	0.015*
Managers	0.078	0.001	0.387***	0.030***	0.18	0.003	0.403***	0.051**	0.264	0.007	0.495***	0.075*
Professionals	0.027	0.000	0.441***	0.035***	0.248	0.005	0.601***	0.086***	0.323	0.009	0.688***	0.117***
Technicians	0.168	0.002	0.538***	0.046***	0.431**	0.011*	0.652***	0.096***	0.514*	0.017	0.730***	0.126***
Craftsman	0.120	0.001	0.423***	0.033***	0.289*	0.006	0.593***	0.081***	0.369	0.01	0.671***	0.108** *
Service workers	0.196**	0.002*	0.459***	0.035***	0.339**	0.007	0.610***	0.084***	0.413	0.012	0.660***	0.104***
Trade workers	0.243**	0.003*	0.433***	0.034***	0.484***	0.013**	0.570***	0.078***	0.549**	0.019	0.630***	0.101***
Goods, services producers	0.275***	0.003**	0.318***	0.022***	0.360**	0.008*	0.416***	0.050***	0.425	0.012	0.466***	0.065**
Constant	-2.985***	-	-2.318***	-	-2.316***	-	-1.810***	-	-2.137***	-	-2.137***	-
Observations	174872		180305		67046		70351		54798		57747	
Population	83282219		85990337		31161384		32768719		25145643		26567877	
Design df	5455		5403		4999		5040		4658		4691	
F-statistic	18.276		82.74		10.278		40.617		8.717		27.284	
p-value	0.000		0.000		0.000		0.000		0.000		0.000	
Number of Strata	637		699		627		649		592		592	
Number of PSU	6092		6192		5626		5689		5250		5283	

Excluded Categories: No education, Male, other ethnic groups, heads of household and northern region, non-enrolled, unemployed. Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. All treatment effects are significant at least at the 5% level.* Not significant at the 10% level. Source: Author's calculation based on PNAD 2007 data.

Our assessment of the determinants of training enrolment shows that participation in the S-system is strongly biased against women. Here, the questions whether women's relative difficulties in accessing the S-system are basically explained by demand factors (including women's preferences) or by discrimination, are crucial. Unfortunately, this cannot be investigated with the information at hand.

The ethnicity of the potential trainee does not play any role in explaining enrolment. Individuals from nuclear families are more likely to enrol in vocational training and particularly more in the S-system. Different from the enrolment in the S-system, we find that women with children under the age of five are less likely to enrol in other training institutions. This result is important since it implies that the cost of child rearing (associated with enrolment in the S-system) is spread across women of all ages and is not attached exclusively to woman at the reproductive age. However, the general gender bias in the S-system remains a serious problem.[19]

Significant coefficients by regions can be interpreted as regional distortions in the supply of vocational education relative to the mass of workers. We find that the S-system slightly over-supplies the population in the south of the country (*Paraná, Santa Catarina* and *Rio Grande do Sul*) while the other institutions over-supply the same regions and the south-eastern region to a greater extent (*Espírito Santo, Minas Gerais, Río de Janeiro* and *São Paulo*).

While being a student in the school system does not affect the probability of enrolment in the S-system, it does strongly increase the likelihood of training in other institutions. This asymmetry could reflect the fact that being enrolled in the S-system is more associated with subsequent training (after complete secondary) while enrolment in other training institutions is biased towards integrated (simultaneous) modalities. This idea is reinforced by our results as they suggest a higher relative prevalence of employment amongst S-system trainees compared with trainees from other training institutions.

Amongst the employed population, workers in the formal sector are more likely to enrol in the S-system, while their counterparts in the informal sectors are more likely be enrolled in other training institutions.[20] Finally, workers in the service and trade sector as well as in the production (reparation and maintenance) of goods and services have a higher

[19] Further research is needed in order to understand the enrolment mechanisms of the S-system that avoid women with responsibilities, causing them to become disadvantaged when compared to women without small children.

[20] The high correlation between union membership and formality may explain why union status appears to be uncorrelated with training in the S-system.

probability of enrolling in the S-system, while agricultural workers are clearly less likely to enrol in other (private and public) training institutions.

The results above could suggest that human capital investments in the S-system have higher expected returns to training, compared to other training initiatives.[21] In the next section, we partially investigate this hypothesis, particularly whether S-system graduates in the school-to-work transition age obtain systematically higher labour earnings than those trained in other institutions as well as non-trained individuals.

4 Vocational training graduates and labour market outcomes

In this section, we investigate whether past vocational training episodes have any impact on monthly labour earnings, monthly hours of work, hourly labour earnings (as an indicator of productivity) and the probability of being employed in the formal sector. Our estimations are based on valid observations of employed individuals that reported labour earnings. Results are extendable to the whole working population and not only to the treated (trained) population. Most of these individuals have never been enrolled in any vocational training and are consequently considered as a control group. Based on the eligible population for vocational training, we estimate the impact of vocational training on the employment probability.

All models are estimated across samples 1 to 4, as well as by individual's position within the household. This strategy is to account for the behavioural differences amongst trained individuals according to their age profile, residence, gender and household position. Finally, by further restricting the sample to graduates of all institutions, we estimate the differential impact of S-system training on the probability of working in the same training area.

[21] See Villalobos Barría and Klasen (2014) for differences in the selectivity process into the S-system compared with other training institutions.

4.1 Methodology

In order to estimate the average treatment effect (ATE) on the labour market outcomes caused by a previous training experience, we rely on inverse probability weighting (IPW) estimators.[22] The methodology was chosen taking into consideration the dynamic nature of the enrolment decision, especially, its discrete time setting where the intervention could begin at any point in time in the past. Vikström (2014) suggests that the IPW estimator is suitable and even preferred to other matching estimators in such a context.

Consider outcome y (for example, labour earnings) and a binary treatment variable $t \in \{0,1\}$, the graduation from a vocational training course provided, for example, by the S-system (or alternatively by another institution). Additionally, assume that the potential outcomes y_0 and y_1 depend on the treatment (training). It is then necessary to obtain the mean labour earnings for trained individuals $t = 1, E(y_1)$ which is observed when $t = 1$ and unobserved when $t = 0$.[23] The treatment effect estimation problem is thus no different from a missing-data problem.

An IPW estimator for $E(y_1)$ is :

$$\frac{1}{N}\sum_{i=1}^{N} y_t t_i \Big/ p(X_i)$$

where $p(X_i)$ is the probability that $t_i = 1$ (to be trained or graduated), which is a function of the observable determinants X_i. The IPW estimator weighs asymmetrically on those observed outcomes event though the observation was not probable.

In order to properly estimate the effect of S-system training as well as the effect of training by other institutions, a probit model is estimated based on the Brazilian household survey (PNAD 2007). The dependent variable takes the value of one if the individual was trained at some point in the past and zero if he/she did not have any training experience. The vector X_i of determinants contains only exogenous variables. That is, only variables that cannot be affected by the current outcome (for example, labour earnings), as well as variables

[22] IPW dates back to Horvitz and Thompson (1952). Since then, researchers have been actively trying to extend this approach to deal with modern treatment effect estimation problems in the field of biostatistics and econometrics (see Robins and Rotnitzky, 1995; Robins, Rotnitzky, and Zhao, 1994 and 1995; Wooldridge 2002, 2007 and 2010; Hirano, Imbens, and Ridder, 2003).

[23] The observed data ($y_i t_i$) corresponds to y_{1i} for trained individuals and is missing for their non-trained counterparts.

that may have changed between the training event and the current outcome (for example, to getting married). Thus, the selection of variables determining the probability of enrolment is difficult since the temporal dimension of the training event is missing and important information prior to the training event is also neglected. Additionally, propensity score methodologies rely on the assumption that unobservables play no or at least only a small role in determining participation (see Dehejia, 2005; Zhao, 2004). For this reason, the evaluation literature is abundant in recommendations about the inclusion of instruments for talent, motivation and other non-observable characteristics. Nevertheless, even when the availability of instruments is reduced, at least for children, we instrumented those unobservables by using the education achievements of their parents.

The vector X_i consists of the age and its square, parental education (in the case of those in a child's position within the household)[24], gender, ethnic background (white, mulatto or others), rural area, federative unit and educational level. To avoid endogeneity issues and make our estimation more reliable, we exclude currently enrolled individuals (school or training) as well as those with an inter-municipal migration background since they could move after training and therefore bias the estimated impacts.

Table 2, and appendix Tables A.5 and A.6 refer to the impacts of all vocational training, professional qualification courses and technical/technological courses, respectively. The tables show the IPW estimated impacts on all variables of interest by institution and sample.

[24] In the case of those in a child's position within the household, observations of children from non-nuclear households were dropped from the calculations.

Table 2: Average treatment effect of vocational training on selected variables, 2007

Vocational training (All courses)											
	Monthly earnings		Monthly working hours		Hourly labour earnings		Formality		Employment		Employment in same area
	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system
Absolute effect of training (units)											
Sample 1	68	109	0.4	1.7	0.30	0.60	0.09	0.08	0.10	0.10	0.08
Sample 2	168	63	-1.1	2.0	0.86	0.35	0.09	0.09	0.07	0.09	0.11
Sample 3	87	54	-0.4	1.6	0.26	0.25	0.06	0.08	0.07	0.06	0.12
Sample 4	0	16	-0.2	2.0	-0.23	-0.02	-0.03	0.04	0.09	0.09	0.12
Predicted outcome mean without training (units)											
Sample 1	859	892	180	180	5.50	5.73	0.57	0.59	0.56	0.57	0.50
Sample 2	593	607	182	182	3.74	3.85	0.54	0.56	0.58	0.59	0.37
Sample 3	637	645	183	183	4.03	4.12	0.58	0.60	0.62	0.63	0.38
Sample 4	595	600	170	171	4.24	4.26	0.59	0.61	0.49	0.51	0.35
Relative effect (percentage)											
Sample 1	7.9	12.2	0.2	0.9	5.5	10.5	16.0	13.2	17.3	18.1	15.9
Sample 2	28.3	10.4	-0.6	1.1	23.1	9.0	16.1	16.6	12.3	14.7	30.8
Sample 3	13.7	8.4	-0.2	0.9	6.5	6.0	9.9	13.4	10.5	10.0	32.0
Sample 4	0.0*	2.7	-0.1	1.2	-5.5	-0.5	6.0	6.0	17.6	17.6	33.2
Heckit model (percentage) – (Villalobos Barría and Klasen, 2014)											
Sample 1	9.3	-	-	-	-	-	-	-	7.7	-	-
Sample 2	8.8	-	-	-	-	-	-	-	7.2	-	-
Sample 3	10.6	-	-	-	-	-	-	-	6.5	-	-
Sample 4	6.1	-	-	-	-	-	-	-	7.3	-	-

Source: Authors calculations based on PNAD 2007.
Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3). All treatment effects are significant at least at the 5% level.* Not significant at the 10% level.

For robustness purposes, the bottom rows in Table 2 display the results reported by Villalobos Barría and Klasen (2014) based on the Heckit approach.[25] A disaggregated view (by individual's position within the household) of the impacts can be found in the Appendix Tables A.7 to A.12.

4.2 Results

Table 2 shows that amongst those aged 15-29 (sample 2), the S-system yields a considerably higher trainings premium than those trained in other institutions (28.3% versus 10.4%). This result supports the idea that human capital investments in the S-system yield relatively higher returns.[26] The fact that the impact decreases in sample 3 (only urban areas for the same young cohort) indicates that the S-system has an even greater premium in rural areas. Contrary to this, the relatively low premium in sample 1 indicates that older cohorts do

[25] It is worth mentioning that the Heckit estimates on the impact of S-system training on monthly labour earnings and employability in Table 2 are consistent with the IPW estimated effects (see Villalobos Barría and Klasen, 2014).

[26] In general, our results are within the range of Fresneda (2012) and Vasconcellos et al. (2010).

not obtain a significant labour earnings premium and even probably suffer income losses. This might either relate to lower productivity gains of SENAI during the past decades or that these effects dissipate over time; as we are using cross-sectional data, we are unable to differentiate between the two hypotheses.[27]

Training increases monthly labour earnings by improving hourly pay rather than by increasing the monthly hours of work.[28] The positive impact of the S-system training earnings is much more accentuated for those with upper level training.

In general, vocational training induces higher levels of formality and employability with no big difference existing between the S-system and other institutions. However, significant differences are observed depending on the type of training (professional qualification or upper level training). Amongst the trained population aged 15-29, S-system graduates are about 30 percent more likely to work in an occupation related to their training areas, independent from whether it is a rural or urban job and whether women or men perform it. This evidence supports the demand orientation of the SENAI. Thus, the skills provided by this institution are relatively more likely to be used in productive ways.

4.3 Gender issue

The estimation based on successively restricted population subgroups allows us to investigate the gender dimension of training. Results for sample 4 in Tables 2 and A.5 and A.6 in the appendix, all referring to urban women aged 15-29, suggest that the results in the previous section can be considered lower-bound estimates of the true impact of training on the vector of labour market outcomes for young men.[29] (Table A.5 and Table A.6).

The fact that, on average, young urban women do not obtain any training premium (Table 2) conceals the fact that women with professional qualification training slightly reduce their work intensity, pay rates and monthly labour earnings (-2.9% in Table A.5), while women with upper level training compensate a decline in hourly labour earnings by increasing the number of working hours, resulting in a substantial improvement in monthly labour income (17.8%). Thus, women are not worse off per se, but because they tend to concentrate

[27] On the contrary, other training institutions exhibit higher returns for older cohorts and a smaller rural-urban gap.

[28] Our results show that this holds for graduates of professional qualification and technical-technological training courses.

[29] Sample 3 consists of urban women and men in school-to-work age and sample 4 consist of only urban women in the same age.

in low-skilled occupations the training does not have any positive impact on productivity according to our results.

Although training has a positive impact on formality and employment amongst women, it is important to note that this positive outcome is occurring in the context of extremely low enrolment chances for women relative to men (sample 3 versus sample 4). On the one hand, female S-system graduates from courses of professional qualifications are more likely to have a job and for it to be in the same area of training. The price for this is that they are also less likely to work in the formal sector. On the other hand, S-system graduates from upper level courses are more likely to formalise, but with less success in terms of employability and permanence in the training area. This information suggests that while women with a professional qualification training seem to stagnate in low prestige occupations, their counterparts who received upper level training (technical and technological) seem to experience higher mobility levels.

4.4 Rural-Urban and Gender gaps

Given the heterogeneity in the impacts of the S-system across geographic areas (rural-urban as the differential between estimates based on samples 2 and 3) as well as across gender (samples 3 and 4), there are enough reasons to believe that the impacts of S-system training on the labour income distribution could be disequalizing since the earnings premium appears to configure a sloping ladder. The subsidiary hypothesis is that the S-system promotes, in this order, young heads of household, children, and then (presumably after other household members) women. For example, Table A.7 in the Appendix shows that heads of household between the ages of 15 and 29 trained in the S-system (in all levels) obtain an average premium in 2007 *reais* of 110 per month in urban areas (14.9%). Children do obtain a small return of almost 24 *reais* per month (3.8%) while women seem on average, to obtain no premium at all.

Since the returns on the accumulation of human capital are not homogeneously distributed amongst groups (by gender and urban-rural areas), labour income inequality levels depend on the earning-gap dynamics between these dimensions. In order to investigate this issue, we use quantile regressions to assess the size of the S-system premium across labour income distributions by gender and by urban-rural area (see Koenker and Bassett, 1978 and 1982; Rogers, 1992).

Figure 1 shows that across the whole income distribution, the S-system trainings premium is higher for men than for women. Moreover, the pay gap widens progressively

across skills. Thus, the S-system training contributes to the widening of the labour income distribution through its enhancing impact on the gender pay gap. Contrary to this, the S-system premium contributes to closing the rural-urban labour earnings gap. Figure 2 shows that across the whole income distribution, that is, quantile by quantile, there is an extra premium for S-system graduates working in rural areas. This information is also confirmed in Table 2 by comparing the impact of the S-system on labour earnings in samples 2 and 3. Thus, regarding the contribution of the S-system to labour income inequality changes, the geographic and gender dimensions work in opposite directions causing the impact of the S-system on labour income inequality to be rather ambiguous.

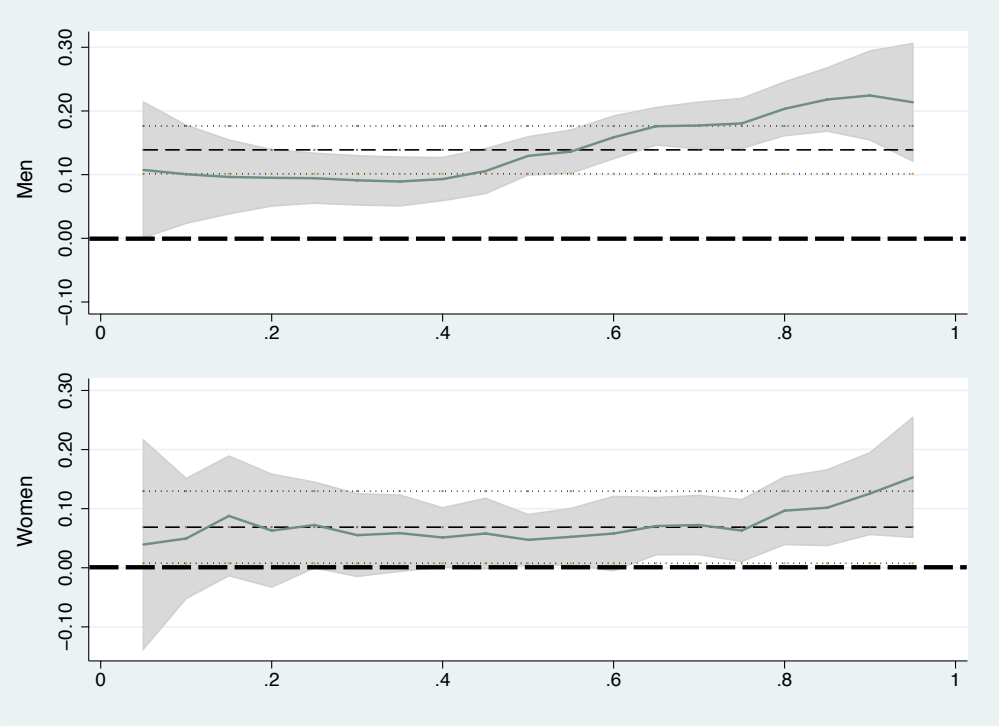

Figure 1: S-system graduates' premium across quantiles of labour earnings, by gender in 2007 (Source: Authors calculations based on PNAD 2007)

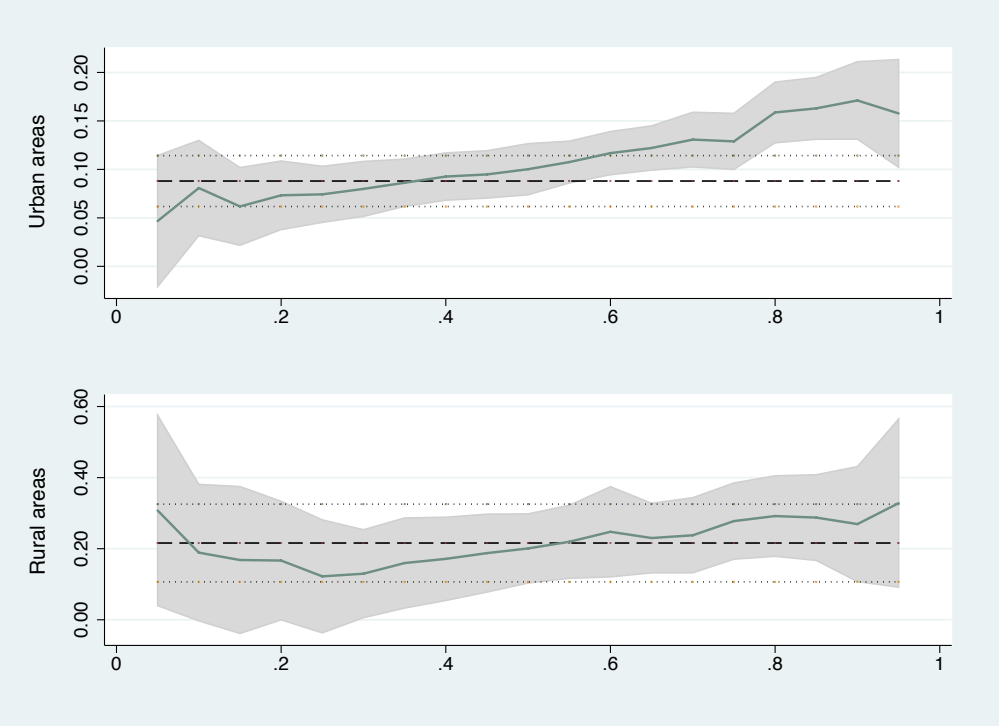

Figure 2: S-system graduates' premium across quantiles of labour earnings, by areas in 2007 (Source: Authors calculations based on PNAD 2007)

5 Regional Mobility and the S-system

The possibility that vocational training could negatively affect social mobility by discouraging the continuation of studies is one of the most recurrent arguments against the expansion of this type of education.[30] However, there is a gap in the literature regarding the positive effects that training may have on labour migration. In order to address this lack of knowledge, we implement a methodology to see whether graduates of the S-system were more likely to move to other states besides their non-trained counterparts. If this is so, losses coming from the occupational segmentation could be partially compensated through gains in geographic mobility.

Empirically, we adopt a similar approach to the one used by Brücker and Trübswetter (2007), Villalobos Barría (2012) and Giulietti et al. (2012). See Villalobos Barría and Klasen (2014) for details on the estimation procedure, which relies on a switching regression model by Goldfeld and Quandt (1973) with endogenous switching (Maddala and Nelson, 1975; Maddala, 1983). This model of migration accounts for unobservables and allows for the costs of moving to be inversely related to the amounts of human capital (workers' heterogeneity).

We employ a three-step strategy to obtain consistent and efficient estimates of the individual probability to migrate and its determinants.[31] In the first step, a probit reduced-form model for migration serves as the starting point for the estimation, where selectivity corrected wage equations (second step) for migrants and stayers account for the role of unobservables. Finally, in the third step, a structural probability model (which properly accounts for earning differentials) explores the structural determinants of migration and distinguishes their influence by working through earnings differentials and other mechanism uncorrelated to it.

Using this framework, it is possible to assess the relationship between the S-system and the wage differential as well as the likelihood that such a vocational training encourages inter-state migration, thus enhancing the mobility prospects of its beneficiaries. We define migrants as individuals who moved anytime within the last four years from one state to another.

The first step model includes as explanatory variables the level of education of the potential migrant, the potential experience and its square, gender, the number of children older than five in the household (born before the migration time span), indigenous status, and

[30] See Goldthorpe and Erikson (1992), Müller and Pollak (2005), Shavit and Müller (1998), Breen and Jonsson (2007), Müller and Gangl (2003), Buchmann and Park (2009).

[31] In this study, we avoid the underestimation of the coefficient's standard deviations, in all models, by accounting for the complex survey design of the PNAD 2007 household survey.

controls for the regions at origin. All variables in the reduced form are expected to proxy the characteristics of interest at origin (ex-ante). Based on PNAD 2003, state-level unemployment rates at origin are also included to reflect the hypothesis that unemployment encourages migration outflows. The log of the population at origin aims to control for the availability of public goods.

The unbiased and non-endogenous labour earnings differential calculated in step 2 is included (in logs) together with its square (to allow for nonlinearities) in the structural estimation of the migration probabilities (third steep). As explanatory variables, besides the potential wage differential, the structural equation includes the state unemployment rates at origin, the log of the population at origin and the age of the potential migrant as the migration propensity decreases with age (Greenwood 1993). As discussed earlier, of interest is the inclusion of a variable indicating if someone received training in the S-system. Lastly, controls for the number of children in the household, the ethnic origin (white, mulatto or others) as well as dummies for the states of origin are also considered.

The estimation is based on employed individuals between the ages of 30 and 40 (age bracket adjacent to the one used to study the school-to-work transition), neither enrolled in any schooling nor training activity, who have lived in the country since at least 2002, and without children under the age of five. The age restrictions as well as the non-enrolment conditions are expected to reduce the possibility that someone could migrate in order to enhance the available educational chances as well as to avoid the confounding non-causal correlation that arises from children born after migration. Consequently, it is more likely that the correlation between graduation in the S-system and migration reflects a non-endogenous causality.

Table 3 shows the results of the reduced-form and structural probability models (first and third steps).[32] Even though there are many interesting results of the structural model, in this study we focus on the impact of SENAI's training as well as other institutions' trainings on inter-state migration.

Note that the impact of being an S-system graduate does not disappear (although its impact slightly increases) after controlling for its contribution to the earnings gap (reduced form versus structural probit estimates). This result suggest that the impact of the S-system on migration is not driven by the earnings gap due to differential returns of training in the states of origin and destination, but because its contribution to enhancing non-observables such as

[32] Selectivity corrected wage equations, the distribution of the non-endogenous potential wage differential as well as estimations allowing for unemployment are available by the authors upon request.

information, cultural endowments (networks) and the cumulative causation amongst S-system graduates (S-system graduates share specific information that encourages additional migration flows) that strongly determines migration (see Tilly and Brown, 1967; Lomnitz, 1977; Massey, 1990). Our results show that, training in other institutions does not encourage young workers mobility. Consequently, S-system graduates are, on average, more likely to move towards other federal units than their non-trained counterparts and those trained in other institutions.

Table 3: Probit model: determinants of inter-state Migration (Reduced form and structural)

Survey: Probit regression	*Dependent variable: recent inter-state migration (Five years time span)*	
	Aged 30-40	
Variables / Model	Reduced	Structural
Earnings differential	-	0.074
	-	(0.109)
Earnings differential - squared	-	-0.136
	-	(0.155)
Training in S-system	0.142*	0.144*
	(0.076)	(0.077)
Training in other institutions	0.066	0.061
	(0.049)	(0.049)
Age	-0.010*	-0.010*
	(0.006)	(0.006)
Incomplete basic education	0.018	0.013
	(0.088)	(0.087)
Complete basic education	-0.072	-0.081
	(0.099)	(0.099)
Incomplete secondary education	-0.131	-0.161
	(0.124)	(0.126)
Complete secondary education	-0.126	-0.133
	(0.097)	(0.096)
Incomplete secondary education	-0.050	-0.044
	(0.144)	(0.144)
Complete secondary education	0.070	0.033
	(0.101)	(0.107)
Average household education	0.006	0.009
	(0.009)	(0.009)
Female	-0.115***	-0.086**
	(0.037)	(0.043)
Children over 5	-0.133***	-0.136***
	(0.021)	(0.021)
Ethnicity 1 (*white*)	0.022	0.034
	(0.071)	(0.072)
Ethnicity 2 (*mulatto*)	0.074	0.083
	(0.068)	(0.068)
Unemployment rates at origin (state level)	-0.022*	0.023***
	(0.012)	(0.006)
Log of the state population at origin	-0.034	-0.121***
	(0.027)	(0.031)
Constant	-0.570	-0.308
	(0.614)	(0.545)
Federal unit controls at origin	Yes	Yes
Observations	29871	29871
Population size	13962307	13962307
F	5.768	5.578
Prob > F	0.000	0.0000

Note: standard deviations in parenthesis. Excluded categories: no education, agriculture, managing directors and CEOs, men, other ethnic backgrounds.
Source: Own calculations based on PNAD 2007.

At the country level and based on the same highly restricted non-enrolled employed population (those between the ages of 30 and 40, without children younger than 5 years old),

the S-system explains, holding everything else constant, the additional migration flow of 99,000 individuals between states which is significant at the 10 percent level. If we allow for unemployment, the "S-system" migration flow rises up to 125,000 individuals. Assuming that vocational training may generate losses coming from the occupational segmentation, it is also true that such losses are at least partially compensated through gains in geographic mobility.

6. Conclusion

With the challenges of skills shortages, substantial youth unemployment, and a demographic bulge in Sub-Saharan African countries in mind, the main purpose of this paper has been to understand the determinants of participation in Brazil's S-system (mainly SENAI) as well as a thorough examination of the measurable consequences of S-system participation on facilitating the school-to-work transition.

This study has provided an overview of the potential and limitations of the S-system of vocational training system in Brazil. Our impact evaluation suggests that the weaknesses of the S-system originate from the same source that makes it effective. . The search for matching supply and demand and its decentralised framework determines the outcome that the institution can be as good as the local employers' associations are.

Our analysis, based on five different models, sheds some light on the dimensions that need to be taken into consideration when evaluating such a complex and decentralised institution. All of these dimensions are important and worth considering (without a hierarchic order) in Africa independently of the country-specific context.

In the racial dimension, policymakers have to ensure that any intervention to create or modify the vocational training system is oriented around offering each ethnic group the same development chances. In the financing dimension, the focus should be on finding the proper structure that avoids fluctuations and uncertainties. In the productivity dimension, the emphasis has to be on improving labour market outcomes. In the social mobility dimension, the set of interventions has to be oriented around reducing the segmentation in occupations, in particular towards low-skilled activities and in promoting opportunities of internal migration. In the gender dimension, efforts have to be devoted to fighting discrimination and promoting disadvantaged groups. Finally, in the geographic dimension, the system has to cover the whole country, promoting a reduction in the speed of urbanization and the formation of overpopulated cities surrounded by violence and low standards of living.

The sustainability of the S-system and of the SENAI lies in its good performance in most dimensions. In this study we did not find any sign of ethnic inequality caused by the S-system. The financing scheme proved to balance a market driven component supplemented with stable levy-based funding. Regarding the geographic dimension, the S-system is present in all 27 states of the country, and the region of residence almost has no affect on the enrolment probability. Moreover, training in the S-system encourages labour mobility facilitating their school-to-work transition.

The gender and social mobility dimensions are the spaces where the S-system and the SENAI in particular could have done more over the past decades. It is not clear that the male bias of the S-system is exclusively a demand driven issue. In the same way, although the S-system encourages geographical mobility, this is not sufficient to meeting the needs of the poor or to encourage the social mobility of the disadvantaged. It will probably be argued that such challenges are not specific to the S-system; however, the worldwide leadership of the system imposes the responsibility to innovate in both dimensions as the system represents the model that could be followed in Africa.

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APPENDIX

Table A.1: Individual and household related characteristics of vocational training eligible (Sample1).

	Non-enrolled	Enrolled in Vocational Training					
Characteristics for Sample 1 (Aged >10)	-	Professional Qualification		Technical and Technological		Total	
		S-System	Other institutions	S-System	Other institutions	S-System	Other institutions
Observations	320,629	1,430	8,303	255	1,984	1,685	10,287
Populations	151,223,159	691,690	4,100,807	140,673	993,127	832,363	5,093,934
Enrolment in vocational Training (%)	-	11.7	69.2	2.4	16.8	14.0	86.0
Individual Characteristics (% or years)							
Average Age	36.5	31.5	25.9	26.8	27.3	30.7	26.2
Female	51.4	41.0	58.2	28.9	53.6	39.0	57.3
Years of education	7.8	10.3	9.8	11.9	11.9	10.5	10.2
Without education	10.6	1.4	1.2	0.0	0.0	1.2	0.9
Incomplete basic	43.9	20.0	30.9	0.0	0.0	16.6	24.9
Complete basic	9.7	14.7	12.0	5.5	6.8	13.1	11.0
Incomplete secondary	6.5	15.0	15.2	20.0	19.5	15.9	16.0
Complete secondary	19.0	39.4	29.1	62.4	57.6	43.3	34.6
Incomplete tertiary	3.7	4.0	3.9	5.6	10.4	4.3	5.2
Complete tertiary	6.6	5.4	7.8	6.5	5.7	5.6	7.4
Children's father- tertiary ed.	1.9	2.3	2.8	1.1	2.9	2.1	2.8
Avg. household education	4.7	5.3	5.3	6.0	6.0	5.4	5.4
Enrolled	23.5	25.2	46.6	29.0	40.3	25.8	45.4
Ethnic I (white)	49.5	52.6	52.8	67.0	59.2	55.0	54.0
Ethnic II (mulatto)	41.8	40.0	39.0	25.0	31.7	37.5	37.6
Ethnic II (others)	8.8	7.5	8.2	8.0	9.0	7.6	8.3
Vocational training in the past	-	29.0	26.0	25.6	29.4	28.5	26.7
Household related variables (percent.)							
Bi-parental household	74.2	78.3	74.1	77	73	78.1	73.8
Household size	4.1	3.9	4.1	3.7	3.9	3.9	4
Head of household	36.0	35.8	19.3	22.6	22.1	33.6	19.9
Spouse	23.9	18.6	17.1	11.3	14.6	17.4	16.6
Children	31.4	38.7	54.6	59.0	56.5	42.2	55.0
Others	8.7	6.9	9.0	7.0	6.8	6.9	8.6
Female with children under 5	6.6	5.3	5.7	4.7	5.2	5.2	5.7
Geographic region (percentages)							
North	7.8	6.8	5.9	4.8	5.6	6.4	5.8
Northeast	27.5	20.2	22.3	8.8	16.9	18.3	21.2
Southeast	42.9	43.4	49.2	59.1	53.7	46.1	50.1
South	14.6	21.4	15.6	19.9	19.3	21.2	16.3
Midwest	7.3	8.2	7.1	7.3	4.5	8.0	6.6

Source: own calculations based on PNAD 2007.

Table A.2: Labour market related characteristics of vocational training eligible (employed).

	Never enrolled	Enrolled in Vocational education					
Characteristics for Sample 1 (Aged >10)	-	Professional Qualification		Technical and Technological		Total	
		S-System	Other institutions	S-System	Other institutions	S-System	Other institutions
Observations	160,353	911	3,718	169	1,176	1,080	4,894
Population (with labour earnings)	75,623,882	444,438	1,854,157	94,779	595,005	539,217	2,449,162
Enrolment in voc. Training (%)		14.9	62.0	3.2	19.9	18.0	82.0
Labour markets statistics							
Labour earnings (*Reais* 2007)	955	929	953	1,021	960	945	955
Working hours (weekly)	39.5	39.7	37.1	40.5	38.5	39.8	37.4
Union membership (%)	16.9	19.3	16.6	19.3	18.2	19.3	16.9
Formality (%)	32.2	47.4	29.9	56	45.7	49	33.1
Recent migrant (%)	7.7	8.7	8.3	8.6	9.1	8.7	8.5
Occupations (percentage)							
C.E.Os and Managers	4.7	5.1	4.9	4.2	4.9	4.9	4.9
Professionals	6.5	4.6	9.6	3.6	8.4	4.4	9.3
Technicians	7.2	9.4	12.4	16.1	21.4	10.5	14.5
Administrative workers	8.5	11.1	14.0	14.6	20.9	11.7	15.6
Service workers	20.7	18.4	22.9	10.9	14.9	17.1	21.0
Tradesman	10.0	10.9	12.4	10.1	10.5	10.8	11.9
Agriculture workers	18.8	5.9	5.1	2.5	2.6	5.3	4.5
Goods, services producers	23.1	33.2	18.0	36.9	15.5	33.8	17.5
Military	0.6	1.6	0.7	1.1	0.8	1.5	0.7
Others	0.0	0.0	0.1	0.0	0.1	0.0	0.1
Sectors (percentage)							
Agriculture	18.8	6.2	5.3	2.5	2.6	5.6	4.6
Other industrial activities	0.8	0.7	1.0	2.9	2.3	1.1	1.3
Transformation industry	14.1	23.0	16.1	36.2	18.6	25.3	16.7
Construction	6.9	6.1	3.4	2.5	3.2	5.5	3.4
Commerce	17.8	22.6	20.7	24.0	20.8	22.9	20.7
Hotels and Restaurants	3.9	4.3	4.7	2.5	2.1	4.0	4.1
Transport and telecommunication	4.7	6.1	3.5	1.8	4.6	5.4	3.7
Public administration	4.8	5.6	6.1	3.4	7.3	5.2	6.4
Education, health and social serv.	8.8	6.8	15.1	11.0	19.9	7.5	16.2
Domestic services	8.1	4.2	7.1	1.5	4.0	3.8	6.3
Other collective and social serv.	3.9	6.5	7.2	3.3	4.5	5.9	6.6
Other activities	7.5	7.9	10.0	8.4	10.1	7.9	10.0

Source: own calculations based on PNAD 2007.

Note: Formality is defined as individuals contributing to social security system, contract, public servants, military and employees with more than five workers in non-agricultural activities.

Table A.3: Probability model for the enrolment in a professional qualification training course, 2007

Population	Sample 1				Sample 2				Sample 3			
	S-system		Other institutions		S-system		Other institutions		S-system		Other institutions	
Variables / institutions	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect
Age	-0.004***	-0.000***	-0.012***	-0.000***	-0.026***	-0.000***	-0.034***	-0.003***	-0.030***	-0.000***	-0.034***	-0.003***
Incomplete basic	0.248***	0.002***	0.323***	0.015***	0.198	0.003	0.291***	0.025***	0.139	0.002	0.351***	0.035***
Complete basic	0.615***	0.012***	0.621***	0.045***	0.493***	0.011**	0.616***	0.070***	0.428**	0.010*	0.643***	0.082***
Incomplete secondary	0.745***	0.018***	0.737***	0.061***	0.681***	0.018**	0.740***	0.089***	0.611***	0.017**	0.746***	0.098***
Complete secondary	0.733***	0.014***	0.791***	0.058***	0.778***	0.018***	0.890***	0.099***	0.716***	0.017***	0.869***	0.102***
Incomplete tertiary	0.465***	0.008***	0.330***	0.019***	0.399**	0.008	0.398***	0.041***	0.337*	0.008	0.411***	0.047***
Complete tertiary	0.446***	0.007***	0.702***	0.057***	0.436**	0.010	0.863***	0.127***	0.395*	0.010	0.855***	0.135***
Children x father's educ. (T)	-0.018	0.000	-0.042	-0.002	-0.199	-0.002**	-0.132**	-0.009**	-0.186	-0.002*	-0.135**	-0.010**
Avg. household education	0.014***	0.000***	0.006**	0.000**	0.023***	0.000***	-0.006	0.000	0.009	0.000	-0.014***	-0.001***
Female	-0.103***	-0.001***	0.103***	0.004***	-0.196***	-0.003***	0.061***	0.005***	-0.203***	-0.003***	0.059***	0.005***
Ethnic I (white)	0.003	0.000	-0.020	-0.001	0.012	0.000	-0.007	-0.001	0.014	0.000	-0.008	-0.001
Ethnic II (mulatto)	0.060	0.001	-0.006	0.000	0.110*	0.001*	0.019	0.001	0.119*	0.002*	0.030	0.003
Bi-parental household	0.051*	0.000*	0.016	0.001	0.091**	0.001**	0.028	0.002	0.095**	0.001**	0.048**	0.004**
Spouse	-0.051	0.000	-0.038*	-0.002*	-0.201**	-0.002***	-0.027	-0.002	-0.177**	-0.002**	-0.018	-0.002
Children	-0.025	0.000	0.058***	0.003***	-0.098	-0.001	0.038	0.003	-0.060	-0.001	0.047	0.004
Other household member	-0.085*	-0.001*	0.014	0.001	-0.166**	-0.002**	-0.019	-0.001	-0.159*	-0.002**	-0.017	-0.001
Household size	-0.015**	-0.000*	-0.027***	-0.001***	-0.020*	-0.000*	-0.021***	-0.002***	-0.015	0.000	-0.020***	-0.002***
Female x children under 5	-0.045	0.000	-0.092***	-0.004***	0.009	0.000	-0.104***	-0.007***	-0.025	0.000	-0.116***	-0.009***
Northeast	-0.015	0.000	0.066*	0.003*	0.014	0.000	0.090**	0.007**	0.027	0.000	0.075**	0.007**
Southeast	0.011	0.000	0.195***	0.009***	0.072	0.001	0.178***	0.014***	0.052	0.001	0.155***	0.013***
South	0.173**	0.002**	0.189***	0.009***	0.173**	0.003*	0.153***	0.013***	0.184**	0.003*	0.126***	0.012***
Midwest	0.077	0.001	0.122***	0.006***	0.086	0.001	0.142***	0.012***	0.045	0.001	0.101**	0.009**
Enrolled in school system	0.025	0.000	0.275***	0.014***	0.023	0.000	0.221***	0.018***	0.005	0.000	0.196***	0.018***
Employed	0.047	0.000	-0.161***	-0.007***	0.052	0.001	-0.348***	-0.027***	0.030	0.000	-0.351**	-0.031**
Interactions with employed												
Formal	0.102***	0.001***	-0.044**	-0.002**	0.177***	0.003***	-0.064**	-0.005**	0.200***	0.003***	-0.054*	-0.005*
Union membership	0.061*	0.001	0.093***	0.004***	0.063	0.001	0.075*	0.006*	0.078	0.001	0.089**	0.008**
Hours of work	-0.001***	-0.000***	-0.001***	-0.000***	-0.003***	-0.000***	-0.001***	-0.000***	-0.003***	-0.000***	-0.001***	-0.000***
Industrial activities	-0.152	-0.001	0.200**	0.010**	0.246	0.005	0.195	0.017	-0.057	-0.001	0.242*	0.025
Manufacturing	0.083**	0.001*	0.100***	0.005***	0.032	0.000	0.045	0.004	0.038	0.001	0.045	0.004
Public administration	0.000	0.000	0.117***	0.006***	0.007	0.000	0.089	0.007	0.02	0.000	0.096*	0.009
Education and health	-0.077	-0.001	0.142***	0.007***	-0.274***	-0.003***	0.103**	0.008**	-0.258**	-0.003***	0.096**	0.009*
Other Services	0.238***	0.003***	0.210***	0.011***	-0.053	-0.001	0.126**	0.011**	-0.034	-0.001	0.142***	0.014**
Managers	0.082	0.001	0.315***	0.018***	0.225	0.004	0.381***	0.040***	0.271	0.006	0.358**	0.041*
Professionals	0.067	0.001	0.275***	0.015***	0.086	0.001	0.418***	0.044***	0.123	0.002	0.396***	0.046**
Technicians	0.091	0.001	0.347***	0.021***	0.351***	0.007*	0.473***	0.052***	0.396**	0.010	0.468***	0.057**
Craftsman	0.044	0.000	0.235***	0.013***	0.247**	0.004	0.370***	0.037***	0.288	0.006	0.339**	0.037**
Service workers	0.133*	0.001*	0.326***	0.018***	0.310***	0.006*	0.463***	0.048***	0.335*	0.007	0.422***	0.047**
Trade workers	0.138*	0.002	0.307***	0.017***	0.387***	0.008**	0.409***	0.042***	0.401**	0.010	0.377***	0.042**
Goods, services producers	0.232***	0.003***	0.214***	0.011***	0.340***	0.006**	0.308***	0.028***	0.353*	0.008	0.268**	0.027*
Constant	-3.043***	-	-2.306***	-	-2.501***	-	-1.755***	-	-2.304***	-	-1.680***	-
Observations	322059		328932		101208		104889		83768		87052	
Population	151914849		155323966		46621182		48394307		38100357		39677564	
Design df	6035		6044		5427		5453		5021		5047	
F-statistic	19.08		97.25		10.01		42.57		8.28		30.30	
p-value	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
Number of Strata	753		754		695		695		628		628	
Number of PSU	6788		6798		6122		6148		5649		5675	

Excluded Categories: No education, Male, other ethnic groups, heads of household and northern region, non-enrolled, unemployed. Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. All treatment effects are significant at least at the 5% level.* Not significant at the 10% level. Source: Author's calculation based on PNAD 2007 data.

Table A.4: Probability model for the enrolment in a technical or technological training course, 2007

Population	Sample 1				Sample 2				Sample 3			
	S-system		Other institutions		S-system		Other institutions		S-system		Other institutions	
Variables / institutions	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect	Coefficient	Mg. effect
Age	-0.014***	-0.000***	-0.014***	-0.000***	-0.039***	-0.000***	-0.023***	-0.001***	-0.037***	-0.000***	-0.023***	-0.001***
Years of schooling	0.094***	0.000***	0.116***	0.001***	0.085***	0.000***	0.082***	0.002***	0.081***	0.000***	0.072***	0.002***
Children x father's educ. (T)	-0.466**	-0.000***	-0.245***	-0.001	-0.743**	-0.001***	-0.243***	-0.004***	-0.716**	-0.001***	-0.225***	-0.005***
Avg. household education	0.019*	0.000*	0.016***	0.000***	0.011	0.000	0.031***	0.001***	-0.001	0.000	0.028***	0.001***
Female	-0.297***	-0.000***	0.009	0.000	-0.366***	-0.001***	0.007	0.000	-0.339***	-0.001***	0.000	0.000
Ethnic I (white)	-0.004	0.000	-0.108***	-0.001***	-0.006	0.000	-0.101**	-0.002**	-0.011	0.000	-0.095**	-0.003**
Ethnic II (mulatto)	-0.088	0.000	-0.068*	-0.000*	-0.038	0.000	-0.082*	-0.002*	-0.045	0.000	-0.076	-0.002
Bi-parental household	0.093	0.000	-0.012	0.000	0.101	0.000	0.007	0.000	0.158**	0.000**	0.017	0.000
Spouse	0.003	0.000	-0.076**	-0.000**	0.178	0.001	-0.037	-0.001	0.163	0.001	-0.053	-0.001
Children	0.260***	0.000**	0.106***	0.001***	0.321***	0.001***	0.171***	0.004***	0.353***	0.001***	0.175***	0.005***
Other household member	0.167	0.000	-0.046	0.000	0.142	0.000	0.002	0.000	0.198	0.001	0.005	0.000
Household size	-0.071***	-0.000***	-0.026***	-0.000***	-0.087***	-0.000***	-0.042***	-0.001***	-0.095***	-0.000***	-0.047***	-0.001***
Female x children under 5	0.186	0.000	-0.017	0.000	0.195	0.001	-0.077	-0.002	0.204	0.001	-0.048	-0.001
Northeast	-0.182	-0.000*	-0.019	0.000	-0.112	0.000	0.016	0.000	0.037	0.000	0.058	0.002
Southeast	0.068	0.000	0.127***	0.001***	0.201	0.001	0.195***	0.005***	0.306**	0.001**	0.216***	0.006***
South	0.069	0.000	0.188***	0.001***	0.174	0.001	0.251***	0.007***	0.271**	0.001	0.258***	0.009***
Midwest	0.054	0.000	-0.114**	-0.001**	0.152	0.000	-0.147**	-0.003***	0.21	0.001	-0.124*	-0.003**
Enrolled in school system	-0.084	0.000	0.147***	0.001***	-0.082	0.000	0.062*	0.001*	-0.075	0.000	0.059*	0.002
Employed	-0.023	0.000	-0.345***	-0.002**	0.132	0.000	-0.605***	-0.015**	-0.052	0.000	-0.580*	-0.019
Interactions with employed												
Formal	0.137**	0.000**	-0.011	0.000	0.255***	0.001**	0.033	0.001	0.284***	0.001**	0.043	0.001
Union membership	-0.043	0.000	0.018	0.000	0.064	0.000	0.001	0.000	0.048	0.000	0.021	0.001
Hours of work	-0.001	0.000	0.000	0.000	-0.003***	-0.000***	0.000	0.000	-0.003***	-0.000***	0.000	0.000
Industrial activities	0.454**	0.001	0.473***	0.005***	-	-	0.604***	0.028***	-	-	0.577***	0.031**
Manufacturing	0.259***	0.000**	0.184***	0.001***	0.334***	0.001**	0.185***	0.005***	0.295***	0.001**	0.160***	0.005***
Public administration	-0.049	0.000	0.099*	0.001*	-0.279	-0.000*	0.102	0.003	-0.338	-0.001**	0.069	0.002
Education and health	0.177	0.000	0.163***	0.001***	0.243	0.001	0.200***	0.006***	-	-	0.164**	0.005**
Other Services	0.104	0.000	0.038	0.000	0.105	0.000	0.053	0.001	-	-	0.041	0.001
Managers	-0.142	0.000	0.162	0.001	-0.147	0.000	0.364	0.013	-	-	0.343	0.014
Professionals	-0.443*	-0.000***	-0.047	0.000	-0.348	-0.001*	0.242	0.007	-	-	0.242	0.009
Technicians	0.078	0.000	0.496***	0.006**	-0.001	0.000	0.669***	0.032*	0.314	0.002	0.622*	0.033
Craftsman	-0.001	0.000	0.391***	0.004**	-0.011	0.000	0.624***	0.027*	0.235	0.001	0.614*	0.031
Service workers	0.123	0.000	0.419***	0.004**	0.096	0.000	0.560***	0.022*	0.349*	0.002	0.526*	0.024
Trade workers	0.073	0.000	0.307**	0.003	0.205	0.001	0.473**	0.018	0.419**	0.003	0.397	0.017
Goods, services producers	0.223	0.000	0.284**	0.002*	0.199	0.001	0.463**	0.016	0.438**	0.003	0.425	0.017
Constant	-3.565***	-	-3.297***	-	-2.940***	-	-2.714***	-	-2.897***	-	-2.578***	-
Observations	320884		322613		100313		101868		82985		84368	
Population	151363832		152216286		46216520		46971071		37747149		38412456	
Design df	6032		6032		5422		5430		5017		5025	
F-statistic	35.195		130.67		16.29		50.00		12.729		34.919	
p-value	0.000		0.0000		0.0000		0.0000		0.0000		0.0000	
Number of Strata	754		753		697		695		629		628	
Number of PSU	6786		6785		6119		6125		5646		5653	

Excluded Categories: No education, Male, other ethnic groups, heads of household and northern region, non-enrolled, unemployed. Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. All treatment effects are significant at least at the 5% level.* Not significant at the 10% level. Source: Author's calculation based on PNAD 2007 data.

Table A.5: Average treatment effect of professional qualification training on selected variables, 2007

Professional Qualification											
	Monthly earnings		Monthly working hours		Hourly labour earnings		Formality		Employment		Employment in same area
	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system
Absolute effect of training (units)											
Sample 1	68	117	0.6	2.4	0.34	0.59	0.09	0.08	0.10	0.10	0.07
Sample 2	157	52	-1.1	2.9	0.84	0.24	0.09	0.10	0.07	0.09	0.12
Sample 3	84	40	-1.3	2.5	0.28	0.11	0.06	0.08	0.07	0.06	0.13
Sample 4	-17	16	-2.3	2.7	-0.22	-0.01	-0.05	0.03	0.10	0.09	0.13
Predicted outcome mean without training (units)											
Sample 1	856	864	180	180	5.47	5.55	0.57	0.58	0.56	0.57	0.51
Sample 2	591	596	182	182	3.73	3.77	0.54	0.55	0.58	0.59	0.35
Sample 3	634	634	183	183	4.03	4.04	0.58	0.59	0.62	0.62	0.36
Sample 4	595	591	170	170	4.23	4.20	0.59	0.60	0.49	0.50	0.33
Relative effect (percentage)											
Sample 1	8.0	13.6	0.6	2.4	6.3	10.6	16.2	13.4	17.3	17.3	13.4
Sample 2	26.5	8.7	-1.1	2.9	22.4	6.3	16.1	17.4	12.3	14.6	34.8
Sample 3	13.2	6.3	-1.3	2.5	7.1	2.7	9.6	13.9	11.2	9.4	36.5
Sample 4	-2.9	2.6	-2.3	2.7	-5.2	-0.3	-8.1	4.4	20.4	17.1	40.0

Source: Authors calculations based on PNAD 2007.
Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3). All treatment effects are significant at least at the 5% level.

Table A.6: Average treatment effect of technical and technological training on selected variables, 2007

Technical and Technological level											
	Monthly earnings		Monthly working hours		Hourly labour earnings		Formality		Employment		Employment in same area
	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system	Other inst.	S-system
Absolute effect of training (units)											
Sample 1	65	86	-1.3	-0.3	0.02	0.64	0.08	0.08	0.10	0.12	0.12
Sample 2	235	105	-0.8	-1.2	1.01	0.77	0.09	0.08	0.07	0.09	0.09
Sample 3	104	106	4.6	-1.5	0.14	0.75	0.07	0.07	0.04	0.08	0.09
Sample 4	106	18	12.7	-0.3	-0.34	-0.05	0.09	0.07	0.02	0.10	-0.05
Predicted outcome mean without training (units)											
Sample 1	880	970	181	180	5.66	6.24	0.58	0.62	0.57	0.58	0.53
Sample 2	605	649	182	182	3.79	4.14	0.55	0.60	0.59	0.61	0.48
Sample 3	654	686	183	182	4.08	4.40	0.59	0.63	0.63	0.64	0.49
Sample 4	595	631	170	171	4.28	4.47	0.60	0.64	0.60	0.53	0.46
Relative effect (percentage)											
Sample 1	7.4	8.9	-0.7	-0.2	0.3	10.2	14.4	12.5	16.9	20.0	23.2
Sample 2	38.8	16.1	-0.4	-0.7	26.6	18.5	16.5	13.7	12.2	15.5	18.1
Sample 3	15.9	15.4	2.5	-0.8	3.4	17.1	11.4	11.6	7.0	12.1	18.2
Sample 4	17.8	2.8	7.5	-0.2	-7.8	-1.0	14.1	11.2	3.1	19.0	-11.3

Source: Authors calculations based on PNAD 2007.
Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3). All treatment effects are significant at least at the 5% level.

Table A.7: IPW average treatment effects of vocational training on labour monthly earnings by institution, household position and aggregation samples (1-4), Reais of 2007 and percentages over non-trained individuals.

		Whole		Heads		Children	
Professional qualification	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	68	117	99	179	32	67
	Sample 2	157	52	257	50	23	60
	Sample 3	84	40	120	47	0	37
	Sample 4	-17	16	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	8.0	13.6	9.8	17.5	4.9	10.2
	Sample 2	26.5	8.7	38.2	7.3	4.0	10.3
	Sample 3	13.2	6.3	16.3	6.4	0.0	5.9
	Sample 4	-2.9	2.6	-	-	-	-
Technical and Technological levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	65	86	148	71	158	116
	Sample 2	235	105	303	160	126	83
	Sample 3	104	106	40	175	143	77
	Sample 4	106	18	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	7.4	8.9	13.9	6.0	23.7	16.4
	Sample 2	38.8	16.1	44.0	20.9	21.5	13.3
	Sample 3	15.9	15.4	5.3	21.1	22.7	11.7
	Sample 4	17.8	2.8	-	-	-	-
All levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	68	109	104	149	52	79
	Sample 2	168	63	262	72	40	65
	Sample 3	87	54	110	73	24	46
	Sample 4	0	16	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	7.9	12.2	10.3	13.9	7.9	11.8
	Sample 2	28.3	10.4	38.9	10.3	6.9	11.0
	Sample 3	13.7	8.4	14.9	9.7	3.8	7.3
	Sample 4	0.0	2.7	-	-	-	-

Source: Authors calculations based on PNAD 2007.

Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3).

Table A.8: IPW average treatment effects of vocational training on monthly working hours by institution, household position and aggregation samples (1-4), hours and percentages over non-trained individuals.

		Whole		Heads		Children	
Professional qualification	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.6	2.4	2.6	4.4	1.0	3.6
	Sample 2	-1.1	2.9	-3.6	2.9	2.7	3.5
	Sample 3	-1.3	2.5	-2.7	0.9	-2.8	2.8
	Sample 4	-2.3	2.7	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.3	1.3	1.4	2.3	0.5	1.9
	Sample 2	-0.6	1.6	-1.9	1.5	1.5	1.9
	Sample 3	-0.7	1.4	-1.4	0.5	-1.5	1.5
	Sample 4	-1.4	1.6	-	-	-	-
Technical and Technological levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	-1.3	-0.3	2.6	1.7	3.1	-2.4
	Sample 2	-0.8	-1.2	-5.3	0.0	-0.9	-0.4
	Sample 3	4.6	-1.5	-5.4	-2.0	4.7	0.1
	Sample 4	12.7	-0.3	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	-0.7	-0.2	1.4	0.9	1.7	-1.3
	Sample 2	-0.4	-0.7	-2.7	0.0	-0.5	-0.2
	Sample 3	2.5	-0.8	-2.8	-1.1	2.6	0.0
	Sample 4	7.5	-0.2	-	-	-	-
All levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.4	1.7	2.6	3.6	1.2	2.0
	Sample 2	-1.1	2.0	-3.8	2.3	2.1	2.6
	Sample 3	-0.4	1.6	-3.0	0.3	-1.5	2.2
	Sample 4	-0.2	2.0	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.2	0.9	1.4	1.9	0.7	1.1
	Sample 2	-0.6	1.1	-2.0	1.2	1.2	1.4
	Sample 3	-0.2	0.9	-1.6	0.2	-0.8	1.2
	Sample 4	-0.1	1.2	-	-	-	-

Source: Authors calculations based on PNAD 2007.

Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3).

Table A.9: IPW average treatment effects of vocational training on hourly wages by institution, household position and aggregation samples (1-4), Reais of 2007 and percentages over non-trained individuals.

		Whole		Heads		Children	
Professional qualification	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.34	0.59	0.46	0.73	0.45	0.25
	Sample 2	0.84	0.24	1.59	0.20	-0.22	0.21
	Sample 3	0.28	0.11	0.69	0.22	-0.34	-0.02
	Sample 4	-0.22	-0.01	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	6.3	10.6	7.4	11.4	10.6	5.7
	Sample 2	22.4	6.3	41.4	5.1	-5.8	5.4
	Sample 3	7.1	2.7	16.4	5.3	-8.4	-0.5
	Sample 4	-5.2	-0.3	-	-	-	-
Technical and Technological levels		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.02	0.64	0.47	0.17	1.09	1.30
	Sample 2	1.01	0.77	1.68	1.67	0.54	0.54
	Sample 3	0.14	0.75	0.18	1.97	0.38	0.48
	Sample 4	-0.34	-0.05	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.3	10.2	7.1	2.3	25.3	28.0
	Sample 2	26.6	18.5	42.9	38.3	14.2	13.0
	Sample 3	3.4	17.1	4.1	41.8	9.1	10.8
	Sample 4	-7.8	-1.0	-	-	-	-
All levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.30	0.60	0.46	0.57	0.45	0.51
	Sample 2	0.86	0.35	1.60	0.49	-0.09	0.28
	Sample 3	0.26	0.25	0.62	0.58	-0.22	0.09
	Sample 4	-0.23	-0.02	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	5.5	10.5	7.3	8.5	13.0	11.6
	Sample 2	23.1	9.0	41.6	12.4	-2.4	7.1
	Sample 3	6.5	6.0	14.8	13.4	-5.4	2.1
	Sample 4	-5.5	-0.5	-	-	-	-

Source: Authors calculations based on PNAD 2007.

Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3).

Table A.10: IPW average treatment effects of vocational training on formality likelihood by institution, household position and aggregation samples (1-4), percentage points and percentages over non-trained individuals.

		Whole		Heads		Children	
Professional qualification	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.09	0.08	0.10	0.07	0.09	0.12
	Sample 2	0.09	0.10	0.06	0.10	0.09	0.12
	Sample 3	0.06	0.08	0.03	0.10	0.08	0.09
	Sample 4	-0.05	0.03	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	16.2	13.4	17.6	12.4	16.8	20.8
	Sample 2	16.1	17.4	11.3	17.7	17.6	22.0
	Sample 3	9.6	13.9	4.9	17.6	13.4	15.7
	Sample 4	-8.1	4.4	-	-	-	-
Technical and Technological levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.08	0.08	0.12	0.07	0.06	0.11
	Sample 2	0.09	0.08	0.07	0.09	0.08	0.10
	Sample 3	0.07	0.07	0.04	0.10	0.14	0.08
	Sample 4	0.56	0.07	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	14.4	12.5	19.5	11.0	10.5	18.9
	Sample 2	16.5	13.7	13.3	15.1	15.2	15.9
	Sample 3	11.4	11.6	6.1	15.7	23.0	-4.9
	Sample 4	76.8	11.2	-	-	-	-
All levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.09	0.08	0.10	0.07	0.09	0.12
	Sample 2	0.09	0.09	0.06	0.10	0.09	0.12
	Sample 3	0.06	0.08	0.03	0.10	0.09	0.09
	Sample 4	-0.03	0.04	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	16.0	13.2	17.8	12.0	15.8	20.3
	Sample 2	16.1	16.6	11.6	17.2	17.2	20.6
	Sample 3	9.9	13.4	5.1	17.2	15.0	15.1
	Sample 4	6.0	6.0	-	-	-	-

Source: Authors calculations based on PNAD 2007.

Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3).

Table A.11: IPW average treatment effects of vocational training on employment probability by institution, household position and aggregation samples (1-4), percentage points and percentages over non-trained individuals.

		Whole		Heads		Children	
Professional qualification	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.10	0.10	0.07	0.04	0.03	0.08
	Sample 2	0.07	0.09	0.03	0.02	0.01	0.07
	Sample 3	0.07	0.06	0.01	0.02	0.07	0.05
	Sample 4	0.10	0.09	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	17.3	17.3	10.2	5.3	4.6	13.5
	Sample 2	12.3	14.6	3.2	2.5	1.9	12.1
	Sample 3	11.2	9.4	1.0	2.5	11.4	7.4
	Sample 4	20.4	17.1	-	-	-	-
Technical and Technological levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.10	0.12	0.09	0.05	0.08	0.08
	Sample 2	0.07	0.09	0.03	0.02	0.04	0.09
	Sample 3	0.04	0.08	-0.02	0.02	0.04	0.07
	Sample 4	0.02	0.10	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	16.9	20.0	12.9	6.8	13.8	13.8
	Sample 2	12.2	15.5	3.0	2.8	6.4	14.3
	Sample 3	7.0	12.1	-2.1	2.2	7.0	-3.7
	Sample 4	3.1	19.0	-	-	-	-
All levels		Whole		Heads		Children	
	Absolute effect	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	0.10	0.10	0.07	0.04	0.03	0.08
	Sample 2	0.07	0.09	0.03	0.02	0.02	0.07
	Sample 3	0.07	0.06	0.01	0.02	0.07	0.05
	Sample 4	0.09	0.09	-	-	-	-
		Whole		Heads		Children	
	Relative effect (%)	S-system	Other institutions	S-system	Other institutions	S-system	Other institutions
	Sample 1	17.3	18.1	10.5	5.7	6.1	13.6
	Sample 2	12.3	14.7	3.2	2.5	2.7	12.6
	Sample 3	10.5	10.0	0.6	2.4	10.7	8.3
	Sample 4	17.6	17.6	-	-	-	-

Source: Authors calculations based on PNAD 2007.

Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3).

Table A.12: IPW average treatment effects of S-system vocational training on the probability of being employment in the same area of training, by household position and aggregation samples (1-4), percentage points and percentages over trained individuals in other institutions.

Professional qualification		Whole	Heads	Children
	Absolute effect	S-system over other vocational training institutions		
	Sample 1	0.07	0.04	0.10
	Sample 2	0.12	0.09	0.12
	Sample 3	0.13	0.09	0.12
	Sample 4	0.13	-	-
		Whole	Heads	Children
	Relative effect (%)	S-system over other vocational training institutions		
	Sample 1	13.4	6.8	28.0
	Sample 2	34.8	18.3	35.6
	Sample 3	36.5	18.0	36.6
	Sample 4	40.0	-	-
Technical and Technological levels		Whole	Heads	Children
	Absolute effect	S-system over other vocational training institutions		
	Sample 1	0.12	0.07	0.10
	Sample 2	0.09	-0.08	0.07
	Sample 3	0.09	-0.06	0.06
	Sample 4	-0.05	-	-
		Whole	Heads	Children
	Relative effect (%)	S-system over other vocational training institutions		
	Sample 1	23.2	12.4	20.7
	Sample 2	18.1	-14.9	14.6
	Sample 3	18.2	-11.9	12.8
	Sample 4	-11.3	-	-
All levels		Whole	Heads	Children
	Absolute effect	S-system over other vocational training institutions		
	Sample 1	0.08	0.07	0.10
	Sample 2	0.11	0.07	0.10
	Sample 3	0.12	0.07	0.10
	Sample 4	0.12	-	-
		Whole	Heads	Children
	Relative effect (%)	S-system over other vocational training institutions		
	Sample 1	15.9	11.3	25.1
	Sample 2	30.8	15.2	28.7
	Sample 3	32.0	15.4	29.1
	Sample 4	33.2	-	-

Source: Authors calculations based on PNAD 2007.

Note: Samples (1) consist of individuals aged + 10. Sample (2) is (1) aged between 15 and 29. Sample (3) is sample (2) in urban areas. Sample (4) corresponds to women of (3).