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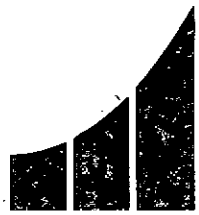

CHARACTERIZATION OF TRAINING IN COLOMBIA: HOUSEHOLD AND FIRMS SURVEYS

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Characterization of Training in Colombia:

Household and Firms surveys

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ABSTRACT

This paper discuses, on one hand, the characteristics of trainees and on the other, the characteristics of firms that are demanding and/or providing training. The data came from two different surveys conducted by Fedesarrollo, the Social Household Survey and the Firms' Perception Survey.

The results from the firm analysis indicate that the size of the firm, when measured as its annual sales, is the main determinant of the training demand. Larger firms tend to be capitally unconstrained and thus have the financial resources provide training. We also observe a positive relationship between the capital intensity of a firm and the demand for training, possibly indicating a complementary between human capital and physical capital. The evidence indicates that firms are providing and / or demanding more training through time.

The household analysis shows that training is not only a substitution to formal education but also serves to improve job conditions. Young women are demanding more training than young men, probably reflecting a higher participation in the labor market form part of this group. In general, the people attending training programs are secondary school graduates and from the young low-income population. However, well educated - 26-45 years old individuals are demanding training as well, validating the idea that training also serves as an upgrading of skills.

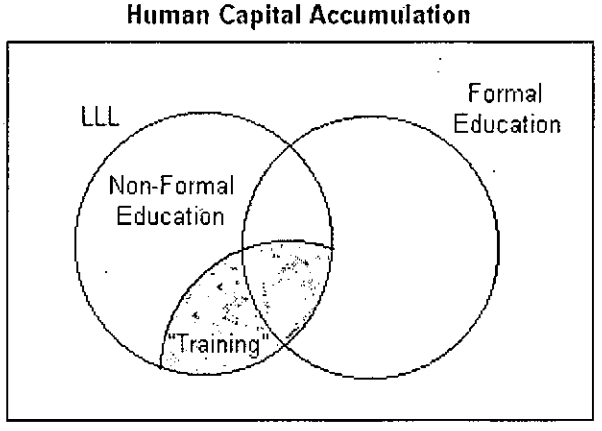
[1] We are very thankful with several people for helping us improving in great manner this paper. We would like to thank Andreas Blom, Pernille Lindberg, Thomas Pave Sohensen and Ximena Peña for their valuable comments. Katja Vinha for comments and suggestions on the first draft, Martin Carnoy and William Experton on their critical suggestions and their very interesting hypotheses, Leon Darío Cardona for valuable information and ideas on the non-formal education and Jesus Cantillo for the processing of the firms survey. Finally, the participants at the Lifelong Learning Workshop at the World Bank made very useful comments.

I. Introduction

Recently the concept of "Lifelong Learning (LLL)" has been the center of attention of several researchers.[2] LLL is a concept that continues and expands the meaning of human capital accumulation. The concept is involves three main characteristics. First, individuals can invest throughout their lives upgrading their skills. Second, it is a concept that goes beyond individual accumulation of knowledge and encompasses the accumulation of social capital. Third, LLL includes learning in all educational environments, ranging from formal to informal sectors, making it a very flexible concept.

This paper centers its analyses only on one part of LLL, that is, the characterization of individuals and firms to receive / demand training. Figure 1 presents a simplification of the different types of education, and the location of LLL and training according to our definition of the activity of capital accumulation in this scheme. Training can be thought of as part of both the formal and non-formal education. Training is similar in one critical characteristic with LLL; it is flexible. Training can be obtained at the work place or outside it; training is an activity that can be carried out throughout one's life; training can be a continuation of formal education or it can be part of human capital accumulation regardless of the educational attainment of the individual. However, the concept of LLL is much broader than just training. For instance, a "learning by doing" activity is part of LLL, but not of training. In this sense, the scope of the paper in terms of analyzing LLL is limited to only one part of the broad concept.

Figure 1.



The Colombian educational system involves three types of education, namely formal, non-formal and informal[3]. The concept of Lifelong learning is present in all three types of education. Part of the "formal" sector offers some

[2] For instance, see World Bank (2003).

[3] In the next section, we describe the system and the main laws in the sector.

technical training for people older than 16-17 years who have already completed basic education. The non-formal and informal education offer short courses in which almost any individual can enroll regardless of their formal educational attainment.

Without pretending to have a complete specified model, we try to get statistical significant relationships between certain characteristic of the unit of observation and the decision of training. For instance, ¿Does larger firms invest more or less in training than smaller ones? or ¿Does secondary educated people invest more in training than college graduates, for example? In short, we will run a statistical model to see the underlying characteristics that influence training decisions from part of the firm and households.

One important issue is the inability, with the data at hand, to separate demand from supply considerations in the decisions of people and firms to acquire. As an example, we can not state that, if we observe a low percentage of people receiving training, it is due thanks to a low supply of training or low demand for it.

Our data come from two different sources. For the household analysis, we use the "Social Household Survey", produced by Fedesarrollo.[4] For firms, we use the "Encuesta de Opinion Empresarial" (Firms' Perception Survey), a survey that covers around 300 firms in the country and is collected by Fedesarrollo as well. Both surveys have included modules on training and, therefore, are suitable for the question at hand.

The article has six sections. In the next one, we present some general characteristics of the educational system in Colombia. That section allows us to present some information on the supply of learning opportunities.[5] We present a brief description of the educational legal framework, and some general information on the formal and non-formal education sectors. The third section describes the demand for training by firms. More specifically the section answers the question: what are the underlying characteristics of the firms that are demanding training? The fourth section presents information on the participation in training programs by individuals. Mainly, the section examines who takes advantage of the various learning opportunities. It includes in the analysis those individuals that have just finished basic education (9 or 11 years of primary and secondary schooling), as well as people who are in the labor market and have decided to upgrade their skills. In the last section we do a cross analysis of the results of the two previous sections (firms and households) and derive some policy implications.

[4] In the first stages the Social Household Survey received support from the World Bank.

[5] A word of precaution before presenting this characterization: the information is quite scattered and scarce, to say the least.

II. The supply of learning opportunities

a. The educational system: legal framework and some facts at the National level

This section is going to turn around four major questions. How is, in general terms, the educational system of Colombia? How is the sector regulated? What is the role of a diploma in the system? How is "training" inserted in the system of education?

Table 1 presents a general picture of the system. The types of education in Colombia are formal, non-formal and informal. The distinction between the first one and the others lie in levels, titles and institutions. Formal education leads to a degree, it has "well" defined levels, and the institutions that impart education have to register in the Ministry of Education. Non-formal education does not lead to a title, and it is basically "free courses". The regulation in this segment of the market is, in practice, non-existent. Informal education is even less formal. Essentially, it is a type of education in which people learn by doing. There is no regulation for this segment of the market.

Formal education has four well-defined levels: kindergarten (which can be three years); primary (5 years of basic education); secondary (4 years); intermediate education (2 years); and higher education ("educación superior"). Universities, technical institutes, technological institutes and university institutions can teach higher education. The differentiation among the last three institutions is highly vague.

Regulation of the sector attains chiefly, as stated above, the formal sector. The other two, non-formal and informal, are very difficult to regulate. The main institution in charge of regulation is the Ministry of Education, and for higher education, the Colombian Institute for the Promotion of Higher Education, ICFES. The ICFES approves the institutions that can provide higher education based on certain standards of curriculum, intensity of studies, and characteristics of the institution (professors, installations, etc.) A newly created institution in charge of approval of institutes, in terms of quality of programs, is the National Service of Accreditation (Servicio Nacional de Acreditación). It is not clear the implications of not been accredited, specially for providers that had the license to operate before the creation of the Service of Accreditation.

The system includes special provisions for education directed towards older individuals and people with handicaps. In terms of "Education for adults", the system is quite open. The aim of the regulation is to open the opportunities for formal education to people that, due to their age, cannot fulfill the requirements to access education.

Table 1. Educational System in Colombia

Type of Education	Characterization	Regulation	Levels	Institutions
Formal	Defined levels, leading to a title.	Ministerio de Educacion and ICFES: curriculum and levels Sistema Nacional de Acreditacion: quality of programs	Kindergarten (3 years) Basic education Primary (5 years) Secondary (4 years) Median education (2 years) Higher ("Educacion Superior")	Schools Schools Schools Universities University institutions Technical institute Technological institute
Non-formal	No defined levels: "free courses"	In practice, no regulation		
Informal	No defined levels: "learning by doing"	No regulation		
Education for adults	Flexibility of requirements to enter formal education	No regulation; each institute of formal education decides.	Optional	Formal institutions

Source: Law 115, 1994; "Informe nacional sobre el desarrollo de la educación en Colombia" (2001)

One of the main differences between formal and informal or non-formal education is the obtaining of a diploma. Clearly, a "diploma" granted by a non-formal course is not legal in the sense that it is not recognized by the state. The titles that higher education can give are college graduated ("universitario"), technical degree, technological degree, specialization, master and doctorate, depending on the institution.

Table 2 presents the evolution of applicants and enrolment for higher education, 1960-2002. A clear message emerges from the numbers: the demand for educations is increasing faster than the supply of education. In 1960, the ratio of enrollment (first year) / applicants (first year) was 78.2%, nowadays it is 53.6%

Table 2.
Higher education: application and enrolment

	Applications first year (1)	Enrolment first year (2)	Enr./App (2)/(1)	Total enrolment (3)
1960	10.691	8.361	78,2%	23.013
1970	38.955	31.308	80,4%	85.560
1980	250.359	107.368	42,9%	271.630
1990	326.061	165.933	50,9%	487.448
2000	490.436	267.950	54,6%	934.085
2002	619.061	332.005	53,6%	981.458

Source: ICFES (2002)

Almost all the enrolment is concentrated in few departments. As stated in the introduction, Bogotá commands the majority of the enrolment (36%), followed by Antioquia with 13.3% (source: ICFES, 2002).

Table 3. Institutions and enrolment
Higher education

	Number of Institutions*			Percentage of Enrolment**		
	Total	Public	Private	Total	Public	Private
Technical Institutions	53	11	42	3,8%	16,0%	84,0%
Technological Institutions	63	20	43	9,7%	22,8%	77,2%
University institutions	71	17	54	19,5%	17,8%	82,2%
Universities	95	40	55	67,1%	37,7%	62,3%
Total	282	88	194	100,0%	31,5%	68,5%

* 2000
**1999
Source: Ministry of Education (2001)

Table 3 shows a number of institutions by type and enrolment. The majority of the institutions that provide higher educations are private. An important

proportion of the institutions are universities (36%), and they capture 67% of the enrolment for higher education. 31% of the total number of institutions are public.

A clear message is that the private sector is the most important provided of higher education, in terms of number of institutions and enrolment. It is also clear that technical and technological education represents close to 25% of the market in terms of population, and 66% of the total number of institutions.

b. Some data of the non-formal educational sector in Bogotá[6]

According to experts, non-formal education presents basically two important characteristics: on one hand, it is an important alternative for high school graduates as it can be inferred from Table 2; on the other, the system is not well articulated within the framework of formal education. Furthermore, the system itself presents a high degree of informality: information about basic characteristics (for instance, the number of institutions or programs) is not available, and almost anyone can provide non-formal education, given that the requirements for registering courses are merely a formality, and can be met by having a curriculum and an "appropriate campus". The curriculum does not need to pass a standard.

There are four categories of courses within non-formal education. Labor oriented courses prepare students towards production industries and services; academic courses with the aim of acquisition of scientific, philosophical and cultural knowledge; validation courses that fulfill knowledge needed to get a high school degree and prepare the student for the ICFES test, the main instrument used by colleges to evaluate prospective students; and civil participation courses, which prepare students for community and civil work.[7] Each one of them gives a different certificate. The labor category issues a certificate called *Certificado de Técnico Laboral*, after 1000 hours of study.

Using a preliminary directory of institutes collected by functionaries of the District shows that almost half of the institutes of Bogotá are located in three out of twenty districts[8]. The bulk of the courses in non-formal education in Bogotá are related with business (mainly accounting and economics courses) with 25.84% of the total number of courses, information technology (19.95%) and arts

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[6] This section is based mainly on interviews and the limited information available for the non-formal sector. Leon Darío Cardona, head of the Higher Education Unit for the District of Bogotá gave us valuable ideas and information about the sector.

[7] Labor, academic and civil participation courses that last less than 160 hours do not require registration in the local education department and only give assistance certifications.

[8] The data corresponds to 800 institutes. The data set, unfortunately, is quite limited. It is, literally, a directory of institutes with the courses they provide. In order to stress the fact that the data in the sector are practically non-existent, these are the best data available.

(12.52%) (Source: SED non-formal education programs preliminary directory). The education category corresponds to those courses that are for the validation of a high school diploma and ICFES test preparation courses.

As a first insight on the match of demand and supply, we can categorize non-formal education programs into "management" and "production"[9] and cross this results with the results from the firm survey, in which we enquire about areas in which training is needed. Table 4 presents the results. Form the firm survey the picture that emerges is the need for production training, and the supply of courses is skewed towards production. Of course, that does not imply that the specific supply of courses satisfies the specific demand for certain skills. Nonetheless, it is significant that the supply of courses follows the same pattern, in terms of percentages, as the demand by firms.

Table 4

	FIRMS		INSTITUTES
	Needs training?		
	Yes	No	Courses
Management	16,6%	83,3%	28,3%
Production	81,9%	18,0%	71,6%

Source: SED non-formal education programs preliminary directory - Fedesarrollo Firm Survey

III. Firms

a. Data

Fedesarrollo surveys monthly the main firms in the country. The survey consists of between 300 and 400 firms, and the sample is representative at the production level. This survey included in 1997 and in 2002 a set of specific questions on training[10].

Given the time component of the data, we split the sample into three groups of firms. Group 1 consists of all the firms that have been sampled either in 1997 or in 2002, Group 2 of those firms that answered in both years of the survey Group

[9] For instance, a course in "Art Management" is classified as management, and "Technician in Production Process for the Food Sector" as production.

[10] The information obtained included information on worker classification in the company; the level of technology used in the firm; the most used type of training (e.g. SENA or private); which area received training (e.g. production process or administration); which occupational levels received training (for example, professionals or technicians); which occupational levels are more difficult to find workers for; and which is the most used way to find the personnel (e.g. newspapers, labor office or SENA). Besides this specific information, it is possible to characterized firms by sales, by the number of workers, by their export status, by sectors (at the 3 CIIU digit level), by their location in the country, and by the type of good produced.

3 of the firms that answered only in one of the years (i.e. firms that answered in 1997 but not in 2002 or firms that answered in 2002 but not in 1997).

One hypothesis about the firms in Group 3 is that the firms that did not answer in 2002 and did it in 1997 "died", and the firms that only answered in 2002 are newly created firms. If this hypothesis is true, we can investigate the differences between firms that shutdown and firms that are newly. However, it may be the case that for some reason, one firm decides not to answer the survey in 1997 but answered in 2002 and thus is not really a new firm. Given the information at hand, it is impossible to assess this and corroborate or reject the hypothesis. In any case, we believe, that Group 3 can yield interesting results. Group 2 is the group of firms that "survived" the crisis of 1999 and is a balanced panel dataset. Group 1 is an unbalance panel dataset incorporating all the observations.

Main statistics are presented in Table 5. The whole sample of firms in 1997 is 413 and in 2002 is 354 (Group 1). The panel of firms (Group 2) comprises 131 firms. The number of firms for year 1997 in Group 3 is 282 and for 2002 is 223.

The survey divides the firms into size groups based on their annual sales. Small firms are those that have sales of less than $5.000 million pesos, medium firms sells between $5.000 and $30.000 million pesos and large firms more than $30.000 million pesos. The survey, however, does not ask the firm about the actual amount of sales (or about size), but instead, the survey asks the firms to place themselves in the three brackets described above. Clearly, this is a limitation of the data, but based on the results of the first surveys of this type to firms, asking about the actual sales was not a good strategy to get responses. Despite this limitation, we tried to match our sample of firms with other sources of information[11] to actually get estimates of sales and assets. More on this issue later in the paper.

In our sample of firms the average sales is larger than the actual average sales in the country. We have an over-sampling of large firms and thus the sample is not representative at the national level in terms of size. This over-sampling is present in both years. In the sample there is a change in the firm size towards bigger firms and small ones between 1997 and 2000. This tendency is independent of the group under analysis.

The majority of the firms produce either consumption goods or raw materials. Across time, there is a tendency toward more firms producing raw materials and fewer producing consumption goods.

[11] *Dinero*, a magazine similar to *Forbes*, reports sales and assets for the most important firms in the country.

In the whole sample, there is a tendency of having more firms exporting. However, for the sample of firms that answered both years (Group 2), there is not such tendency, but the majority of them (close to 65%) export. For the Group 3, the proportion of "new" firms (2002) that export is quite large in comparison with firms that only answered in 1997.

Table 5
Summary statistics

		Group 1 All firms		Group 2 Panel of firms		Group 3 Firms that answered only in 1997 or 2002	
		1997	2002	1997	2002	1997	2002
Number of firms		413	354	131		282	223
SIZE	Large	19.1%	24.6%	31.3%	31.3%	13.5%	20.6%
	Medium	38.0%	29.9%	35.9%	30.5%	39.0%	29.6%
	Small	42.9%	45.5%	32.8%	38.2%	47.5%	49.8%
CUODE	Consumption goods	44.6%	39.0%	39.7%		46.8%	38.6%
	Capital goods	17.4%	18.4%	15.3%		18.4%	20.2%
	Diverse	0.7%	0.3%	0.8%		0.7%	0.0%
	Construction mater.	7.5%	5.1%	6.1%		8.2%	4.5%
	Raw material	29.8%	37.3%	38.2%		25.9%	36.8%
EXPORTS?	YES	47.7%	68.1%	63.4%	66.4%	40.4%	69.1%
	NO	52.3%	31.9%	36.6%	33.6%	59.6%	30.9%
PERSONNEL STRUCTURE	SKILLED	24.66	30.67	25.89	32.52	24.12	29.56
	Std. Error	0.88	1.61	1.59	1.93	1.07	1.27
	UNSKILLED	71.69	66.16	71.11	64.40	71.95	67.22
	Std. Error	0.96	1.13	1.67	1.97	1.18	1.37
AREA TRAINED LAST YEAR (% of firms that train)	PRODUCTION	0.65	0.86	0.77	0.88	0.60	0.84
	Std. Error	0.02	0.02	0.04	0.03	0.03	0.02
	ADMINISTRATION	0.60	0.56	0.69	0.56	0.56	0.55
	Std. Error	0.02	0.03	0.04	0.04	0.03	0.03
	NO TRAINING	0.16	0.08	0.06	0.07	0.20	0.09
	Std. Error	0.02	0.01	0.02	0.02	0.02	0.02
LEVEL OF TRAINEES LAST YEAR (% if firms that train)	SKILLED	0.72	0.78	0.85	0.80	0.67	0.77
	Std. Error	0.02	0.02	0.03	0.03	0.03	0.03
	UNSKILLED	0.68	0.83	0.76	0.82	0.65	0.83
	Std. Error	0.02	0.02	0.04	0.03	0.03	0.02

Source: Fedesarrollo Firms survey – author's calculation

Another important preliminary result of the data is that, for all groups of firms, there is a tendency of increasing skilled personnel through time (we call skilled personnel those who are professionals, technicians and technologists and unskilled those who are qualified and non-qualified workers). For the sample of firms that answered in both periods of time, the increment in skilled personnel, as proportion of all workers in the firm, is of 7 percentage points. In terms of

trained area during the last year, firms are investing more in production personnel than in administrative personnel.

Despite the fact that the data are not representative, the last three initial evidences from the dataset are in line with the claims by several researchers as to the effects of the opening of the economy to more competition: a tendency towards a specialization of the economy in favor of production of raw materials and against the production of consumption goods; a tendency towards more exports and bigger markets; and a deepening in the use of skilled labor.

In terms of training, there is an apparent tendency in the new firms (Group 3 year 2002) towards using more training, in contrast with the old firms (year 1997). As the table shows, 20% of the firms that only answered the survey in 1997 did not provided any training to employees in contrast with only 8% of the firms that answered in 2002 not providing any training. The percentage of the firms that did not provided training in Group 2 (firms that answered in both years) is stable and low.

Table 6 presents some statistics regarding the need of training.

Table 9
Training needs

		Group 1 All firms		Group 2 Panel of firms		Group 3 Firms answered Only in 1997 or 2002	
		1997	2002	1997	2002	1997	2002
NEED TRAINING IN THE PRODUCTION AREA (% of firms)	Professional	9.0%	5.4%	13.0%	5.3%	7.1%	5.4%
	Technician	37.0%	33.3%	43.5%	35.9%	34.0%	31.8%
	Technologist	22.3%	24.9%	27.5%	22.1%	19.9%	26.5%
	Qualified worker	50.8%	48.3%	58.0%	45.0%	47.5%	50.2%
	Non-qualified worker	55.9%	60.7%	62.6%	60.3%	52.8%	61.0%
	Other	0.2%	0.6%	0.0%	0.8%	0.4%	0.4%
NEED TRAINING IN THE ADMINISTRATIVE AREA (% of firms)	Professional	40.9%	41.2%	40.5%	42.0%	41.1%	40.8%
	Technician	10.2%	15.0%	10.7%	11.5%	9.9%	17.0%
	Technologist	10.9%	10.5%	10.7%	10.7%	11.0%	10.3%
	Qualified worker	9.0%	4.8%	9.2%	5.3%	8.9%	4.5%
	Non-qualified worker	1.9%	1.4%	2.3%	1.5%	1.8%	1.3%
	Other	0.5%	0.8%	0.0%	1.5%	0.7%	0.4%
PROBLEMS SEEKING PRODUCTION PERSONNEL (% firms)	Professional	8.7%	8.2%	10.7%	7.6%	7.8%	8.5%
	Technician	26.2%	20.6%	31.3%	17.6%	23.8%	22.4%
	Technologist	15.3%	12.1%	17.6%	12.2%	14.2%	12.1%
	Qualified worker	42.6%	37.0%	41.2%	32.1%	43.3%	39.9%
	Non-qualified worker	19.9%	14.7%	14.5%	16.0%	22.3%	13.9%
	Other	0.0%	0.6%	0.0%	0.8%	0.0%	0.4%
PROBLEMS SEEKING MANAGEMENT	Professional	16.0%	13.6%	19.1%	16.0%	14.5%	12.1%
	Technician	4.8%	4.8%	4.6%	4.6%	5.0%	4.9%

PERSONNEL (% firms)	Technologist	3.4%	4.2%	4.6%	3.8%	2.8%	4.5%
	Qualified worker	1.9%	1.7%	0.8%	2.3%	2.5%	1.3%
	Non-qualified worker	0.2%	0.3%	0.0%	0.0%	0.4%	0.4%
	Other	0.7%	1.7%	0.8%	2.3%	0.7%	1.3%
PLACE OF TRAINING (% of firms)	Supplier	24.2%	32.5%	20.6%	30.5%	25.9%	33.6%
	At work place	60.8%	82.5%	64.1%	80.2%	59.2%	83.9%
	SENA	35.1%	34.5%	36.6%	35.9%	34.4%	33.6%
	Private institute	34.9%	19.8%	41.2%	22.1%	31.9%	18.4%
	Other	4.4%	3.7%	1.5%	3.1%	5.7%	4.0%

Source: Fedesarrollo Firms survey - author's calculation

As expected, in the production area firms need more training of qualified and non-qualified workers than of other types of personnel. Moreover, the percentage of firms that answered that they need training for qualified and non-qualified workers in the production area is quite high (between 45% and 60%). However, there is an apparent reduction in the need for training for qualified workers for firms that answered in both years of the survey (the number decreases from 58% to 45%). In the administrative area, the need for training is concentrated in professional workers.

One striking result is the apparent reduction in the difficulty to find personnel, with the exception of finding non-qualified workers. For the Group 2 (the 131 firms that answered in both years of the survey), the percentage of firms reporting "problems to find production personnel" decrease between 1997 and 2002. For instance, in 1997 37% of the firms claimed to have problems finding technicians, whereas only 17.6% claimed the same in 2002. In contrast, the percentages for "problems finding management personnel" are stable across years, and lower in comparison with "problems finding production personnel".

Finally, with respect to the place or the institution that provides training, the majority of the firms train their personal in the same place of work, and there is an apparent increase of the use of this option through time. In the sample of firms that answered both questionnaires, the increment is in almost 20 percentage points. This fact opens space for a hypothesis: institutes like SENA are not coping with the demand for training. In a recent survey conducted by Fedesarrollo on training (Fedesarrollo, 2003), there is evidence in favor this hypothesis. 61.4% of firms believed that the supply of trained personnel is low, against 36.6% of firms believing that the supply is high. However, the survey shows that the majority of firms considered that the main problem is not in the quantity, but in terms of the quality of workers.

b. Model and Results

The statistical model used to analyze training decisions is a probit model. The target is to estimate the probability of a firm providing training to its personnel based on certain characteristics of the firm. In more concrete terms, we set up a probability model in which training is a dichotomous decision,

$$P(D = 1/Z_i) = f(\beta Z_i) \qquad (1)$$

where D is a dummy variable indicating if the firm provided training or not, Z represents a vector of characteristics of the firm, and 'β' is a vector of the parameters of interest. We estimate β by maximum likelihood techniques.

The independent variables we used to estimate equation (1) are the following. In the first place, we include a size indicator (1 for large firms, 2 for medium and 3 for small); percentage of unskilled workers; production profile dummies, which is 1 if the production is mainly labor intensive, 2 is mechanic production, 3 is semi-automated, 4 is fully automated, and 5 is computerized; an indicator of exports; and the year. We control by sector (CUODE) fixed effects. We run the model for Groups 1, 2 and 3. Results are presented in Table7.

Table 7. Probit estimates
Dependent variable: D=0 if no training, D=1 if training

Variable	Group 1 Total firms	Group 2 Constant Firms	Group 3 Firms with only One year info.
Size	-0.647	-1.105	-0.483
Std. Error	(0.137)	(0.39644)	(0.1563352)
Unskilled	0.004	-0.013	0.045
Std. Error	(0.0026035)	(0.01081)	(0.00298)
PP2	0.255	-0.795	0.311
Std. Error	(0.18)	(0.5637231)	(0.2143427)
PP3	0.333	-0.320	0.304
Std. Error	(0.28499)	(0.8518)	(0.3294)
PP4	0.929	Na	1.024
Std. Error	(0.54105)		(0.5721)
PP5	0.314	-0.964	0.449
Std. Error	(0.3133)	(0.9842)	(0.362235)
Export	0.211	0.572	0.147
Std. Error	(0.1524)	(0.4678)	(0.1762)
Year	0.086	0.006	0.116
Std. Error	(0.03077)	(0.073)	(0.03798)
Constant	-170.915	-6.889	-230.393
Std. Error	(61.43861)	(145.75)	(75.84611)

The first set of results (Group 1) indicates that the probability of training increases with the size of the firm, and across time. (Both variables are significant at 90% level of confidence). In comparison with labor-intensive industries, industry 4 is more likely to provided training. It is interesting to notice that the proportion of unskilled labor force does not increase the probability of training.

Once we reduce the sample to only firms that responded in both periods the survey (Group 2), only size influence the probability of training (it is the only significant variable).

The results using Group 3 shows that, again, size is important in explaining training; that in comparison with labor-intensive industries, industry 4 invests more in training; and that there is an increment in the probability of training for newly created firms, captured by the time variable.

The most robust result is that the size of the firm increases the likelihood of training. There are two potential explanations for this. First, it is possible that large firms have the capital to invest in training; in comparison small firms have low levels of liquidity and capital. Second, it is possible that large firms are involved in more complex operations, making it indispensable to train the workers. In any case, this is the only significant underlying characteristic of the firms that is robust to the specification of the Groups used in the estimation.

Also the result about the time variable is significant. Established firms (Group 2) did not change the pattern of training, and as we presented in the summary statistics, the percentage of firms training their employees is high. Furthermore, new firms are training more than firms that went out of the survey. Notice that variables such as export do not explain demand for training by firms in any of the three models run.

The fact that that the more capital intensive industries provided more training, compared with labor intensive industries, may lead to two hypothesis. First, firms that use capital more intensively need more training in order to maximized the use of the capital. Second, it may be that it is a scale effect: more capital-intensive firms are bigger firms and they can provided more training because they are not capitally constrained.

Table 8 presents the cross tabulation of firm size and type of productive process. Three facts emerge from this table. First, big firms make up the majority of the capital-intensive sector. Second, small firms are the dominant in the labor-intensive sector. And third, medium sized firms are producing in all type of processes. This table present a first indication that, probably, the second hypothesis on the scale effects predominates.

Table 8: Size versus productive process

	Productive Process					
Size	1	2	3	4	5	Total
Big	3	85	37	21	20	166
	2,46%	18,76%	37,00%	53,85%	37,74%	21,64%
Medium	36	160	36	11	20	263
	29,51%	35,32%	36,00%	28,21%	37,74%	34,29%
Small	83	208	27	7	13	338
	68,03%	45,92%	27,00%	17,95%	24,53%	44,07%
Total	122	453	100	39	53	767

In order to test formally the two hypotheses, we tried to get a measure of assets (or sales) that capture in a more precise way the size of the firm and interact this variable with the variable of productive process. We took the list of firms in the magazine *Dinero* (from the section on "The Most Important Firms in Colombia", several issues) and we merge the information with our sample. Unfortunately, the number of firms that we were able to link with our sample was very small (54), and we run out very fast of degrees of freedom[12].

IV. Household demand for training

a. Data

The Social Household Survey is representative both at the level of the cities surveyed and at the level of national economic status. It covers approximately 4.000 households in the four main cities, and around 13.000 people. In this survey there is a set of questions on training, among then whether or not each person in the household has received training; place of training, hours of training, and such. Besides this set of questions, the survey provides information on a big array of socio-economic variables such as income, household expenditure, formal education, etc.

Table 9 presents main summary statistics. The training module of the Fedesarrollo Household Survey shows that nearly 20 percent of the total population has at some point in their life received a training course.

[12] We tried another approach, which is the interaction of the variable of size with the variable of production process. It is important to note that several variables on the right hand side of the equation are dummies or discrete variables, which induce a problem of perfect linear combination between several of these interactions. Therefore, the results following this strategy are not robust because of perfect collinearity.

Table 9
Summary statistics, Household survey

		TRAINING		RECEIVED TRAINING
		YES	NO	
TOTAL		17,6%	82,4%	17,6%
GENDER	Male	19,2%	80,8%	50,3%
	Female	16,2%	83,8%	49,7%
AGE RANGES	12-18 years	2,8%	97,2%	2,9%
	19-25 years	16,8%	83,2%	16,8%
	26-35 years	23,7%	76,3%	27,3%
	36-45 years	24,8%	75,3%	26,1%
	46-55 years	24,3%	75,7%	15,6%
	55 years or more	13,5%	86,5%	11,4%
EDUCATION	None	2,2%	97,8%	0,4%
	Pre School	0%	100%	0%
	Primary	8,7%	91,4%	13,6%
	Secondary	17,5%	82,5%	52,3%
	Beginning college	34,3%	65,7%	22,2%
	Late and finish college	37,7%	62,3%	9,0%
	Graduate	48,8%	51,2%	2,6%
STRATUM	1	8,9%	91,1%	7,5%
	2	15,4%	84,7%	27,8%
	3	19,2%	80,8%	43,1%
	4	23,9%	76,1%	8,6%
	5	29,6%	70,4%	9,3%
	6	31,1%	68,9%	3,7%
CITY	Bogotá	22,46%	77,54%	27,67%
	Medellín	15,53%	84,47%	20,40%
	Cali	23,96%	76,04%	31,38%
	Barranquilla	13,59%	86,41%	20,55%

Source: Fedesarrollo Household Survey - author's calculation

Even though the percentage of men trained is larger than the percentage of women trained, we cannot reject equality in training between men and women. Among the trained sub sample, the largest group is between 26 and 35 years of age. As expected, very few minors (12-18 years old) and elderly (more than 55 years old) are in training programs. However, a significant 11% of the population of the last group receives training (Table 9).

Table 9 presents as well training by educational level. People with high educational levels receive proportionally more training, and there exists a high concentration of people with secondary education in training programs. Those individuals with no education at all are rarely trained.

It seems, given the data at hand, that training is replacing formal education for some people. The description of the non-formal education system in Colombia (Part II) gives some indications that this is true: there is an imbalance between the places offered in the formal sector and the number of high schools graduates. Apparently, the people that do not have a place in the formal sector seek education in the non-formal sector.

This can raise two hypotheses: first, the supply of formal education is low; second, people actually demand non-formal education because it is optimal to do so. As discussed above, Table 2 presents some support for the first hypothesis: the ratio of enrollment to applications for higher education declined steadily from a 78.2 in 1960 to 53.6 in 2002, and the driving force behind the numbers is an important increment in application and a slow increase in places.

According to Table 9, the peak of training is in the thirties. This opens the possibility that also the second hypothesis is true: for people who are in the labor market, and not just finishing high school, it is optimal to invest in training. In order to explore more this issue, Table 10 presents data on people who have received training by their education level and age.

Table 10

Education and ages among trainees

	Job Integration			Job Performance				Elderly	Total
	12-18 years	19-25 years	Total	26-35 years	36-45 years	46-55 years	Total	56 years or more	
None	0%	0,02%	*0,02%*	0,02%	0,04%	0,18%	*0,2%*	0,16%	**0,4%**
Primary	0,1%	0,5%	*0,7%*	1,9%	3,4%	3,3%	*8,6%*	4,4%	**13,6%**
Secondary	2,2%	9,3%	*11,5%*	15,0%	13,6%	7,6%	*36,2%*	4,6%	**52,3%**
Beginning college	0,2%	4,3%	*4,6%*	6,7%	5,5%	3,1%	*15,3%*	2,3%	**22,2%**
Late and finish college	0%	0,1%	*0,1%*	0,5%	0,9%	0,8%	*2,1%*	0,3%	**2,6%**
Graduate	0,2%	2,1%	*2,3%*	2,6%	2,1%	1,5%	*6,1%*	0,5%	**9,0%**
Total	**2,8%**	**16,4%**	*19,2%*	**26,7%**	**25,5%**	**16,4%**	*68,6%*	**12,2%**	**100%**
Total population	17,3%	17,2%	*34,5%*	19,8%	18,1%	12,0%	*49,9%*	15,6%	100%

We defined job integration ages as the age range between 12 and 25 years, job performance ages as the range of ages between 26 and 55 years and elderly people who are older than 55 years. The table shows that the largest group among trained people is composed of those people who have secondary education and are between 26 and 35 years old (15%). Training in the job performance age range accounts for nearly 70 percent of the trained population, in comparison with 50 percent of the total population. According to this, it is very likely that training courses are taken as an element for improving job performance, as an alternative to formal superior education.

In sum, there is evidence that the individual demand for training occurs for two reasons: as a complement to formal education and as an improvement in job conditions.

The Social Survey gives an indicator of income strata, which is given by the way the survey is conducted.[13] Persons in higher strata are more likely to receive training, even though there also exists a large concentration in low-middle strata (2 and 3). In other words, the majority of people who receive training come from low strata; but, for each level of strata, the percentage of people who receive training is higher for higher level of income. From the four cities in the sample (Bogotá, Medellín, Cali and Barranquilla), even though the distribution among them can be considered even, Cali is the one with more persons trained and Barranquilla the one with less.

Table 11. Decision of training courses					
	Family	Firm	Scholarship	Free courses	Him/Herself
SENA	8,9%	16,9%	20,8%	51,2%	10,4%
RAS /1	0,3%	0,2%	0,0%	0,6%	0,1%
Public institute	24,0%	5,9%	12,5%	14,3%	16,3%
Caja de compensación	3,7%	2,1%	2,1%	2,6%	5,4%
Workplace	0,9%	43,8%	2,1%	8,1%	2,6%
At workplace by SENA	0,0%	3,3%	2,1%	0,2%	0,1%
At workplace by other	0,6%	13,2%	2,1%	2,1%	1,8%
College	8,6%	3,1%	20,8%	7,5%	9,5%
Private institute	49,7%	10,8%	37,5%	12,1%	51,1%
Other	3,4%	0,8%	0,0%	1,5%	2,8%
TOTAL	100%	100%	100%	100%	100%

Source: Fedesarrollo Household Survey - author's calculation
/1 RAS: Red de Apoyo Social.

Regarding the supply of training courses (Table 11), usually people receive training by private institutes, by SENA and by their workplace. In contrast with the firm survey, in which the working place represent the majority of training, SENA is the principal supplier of training, as well as other public institutes and the Red de Apoyo Social (RAS), for households[14]. It is also clear that universities are not a significant provider of training courses. Surprisingly, courses taken at workplace provided by SENA and others different from the firm are not significant in number. When the decision of training comes from the firm (i.e. the firm pays for the courses), the second preferred place for training is SENA, in contrast when the training is personal decision (i.e. him/herself paid for the training courses), in which case the preferred places to receive the training are private institutes. The principal provider of free training is SENA, including free courses and scholarships, above the levels provided by other public institutions.

[13] The collection of data aims to have a representative survey at the income strata. Therefore, the survey was conducted in different place of the city to have representation of the different stratum (low, medium and high income) groups.
[14] Still, SENA may provide training in the working place.

More than half of the training courses taken were longer than 6 months (long term courses), and nearly 85 percent of them were half time courses (20 hours per week or less, Table 12). The principal provider of short "updating" courses (less than 3 months) is at workplace, and of long courses is SENA; for short courses there is no one clear main provider, but it is between SENA and private institutes. Mainly, the financing of training courses comes from the firms, followed by the use of personal resources (such as funds from family or the trainee him/herself). Nearly 25 percent of all training is financing through scholarships and free courses. Women are more likely to pay for their training or to win a scholarship, while men tend to be trained by the workplace. In general, the trainees perceive the level of the training to be good.

Table 15
Training

Places of training	
SENA	22,6%
RAS	0,3%
Public institute	12,7%
Caja de compensación	3,2%
Own firm	19,4%
At workplace by SENA	1,4%
At workplace by other	6,0%
University	6,6%
Private institute	26,1%
Other	1,8%
Length of course taken	
Update (up to 3 months)	23,6%
Short (3 to 6 months)	21,1%
Long (more than 6 months)	55,3%
Time intensity	
Half time (20 hours/week or less)	86%
Full time (more than 20 hours/week)	14,0%
Who paid the courses (part or all)	
Family	10,2%
Firm	38,1%
Scholarship	1,4%
Free courses	23,9%
Him/Herself	25,9%
Other	0,4%
Perceived quality of the courses	
Good	95,8%
Fair	3,9%
Poor	0,3%

Source: Fedesarrollo Household Survey - author's calculation

b. Model and results

The model follows closely the model used to analyze the firm level decisions.

$$P(D = 1/X_i) = f(\beta X_i) \qquad (2)$$

In this case, we investigate the probability of receiving training as a function of intrinsic characteristics of individuals, X. The characteristics included in the maximum likelihood estimation are a dummy that captures whether or not the individual is a high school graduate (sec); years of formal education (añosedu) and squared years of education (añosedu2); the age of the individual and its square (edad and edad2) and two fixed effects by stratum (all strata compared to stratum 1) and by city (Medellin, Cali and Barranquilla with respect to Bogotá).

We run model (2) for the whole sample, and for sub-samples based on the ages of individuals (less than 25 years old, between 26 and 35 years old; between 35 and 45 years old; more than 46 years old) with the idea to capture changes through generations. Table 13 presents the results.

For the aggregate data the model says that exists a positive and marginally decreasing relationship between years of formal education and training, even controlling for high school completion. This result indicates two facts: on the first hand, people that have up to secondary are more likely to go into training; on the other, it is true that the likelihood to receive training increases with education, but the effect vanishes the more formal education the person has. This ratifies the idea that training replaces formal education for some people.

The same result applies to the first two brackets of ages, but not for the last ones. The results for the 35/45 and 46+ ages can be driven by the fact that the older population has, on average, a lower level of education. In other words, having finished secondary education for the older generations is less probable than for younger generations. For all the age brackets the years of education is a concave function with respect to training.

For the whole sample, the same pattern shows up with respect to age. There is a concave relationship between age and training. The peak of training appears in the thirties. Statistically, men are more likely to receive training than women. Compared to Bogotá, Cali has more trained persons, and Medellín and Barranquilla have fewer. Also, training seems to be concentrated in the low-middle classes, represented by income strata 2 and 3.

However, the same pattern does not hold within age groups. For the 26/35, 36/45 and 46+ groups, age is not significant in explaining training choices. Only for the younger brackets, age increments the probability of training. This can be

evidence for the argument stressed before that training is recent high school graduates.

In terms of gender, the results are quite interesting: for the whole sample, being male increases the probability of training. However, that is not true for the younger generations. Despite the fact that the coefficient is significant only at the 85% level of significance, for the range of 12/25 years old females are more likely to acquire training. One explanation for this is the fact of an increasing labor supply of women, specially triggered by the 1999 recession.

Table 13. Probit estimates by age ranges - mg changes

Variable	All sample	Std. Error	12-25 years	Std. Error	26-35 years	Std. Error	36-45 years	Std. Error	>46 years	Std. Error
Sec	0,020	0,0056	0,019	0,0059	0,025	0,0150	-0,018	0,0157	-0,021	0,0110
Añosedu	0,029	0,0026	0,014	0,0041	0,050	0,0090	0,049	0,0078	0,032	0,0038
Añosedu2	0,000	0,0001	0,000	0,0002	-0,001	0,0004	-0,001	0,0004	0,000	0,0002
Edad	0,019	0,0006	0,043	0,0077	-0,003	0,0461	0,098	0,0667	0,006	0,0047
edad2	0,000	0,0000	-0,001	0,0002	0,000	0,0008	-0,001	0,0008	0,000	0,0000
Sexo	0,025	0,0042	-0,006	0,0041	0,030	0,0113	0,037	0,0122	0,064	0,0084
Cali	0,066	0,0066	0,031	0,0070	0,077	0,0172	0,072	0,0182	0,088	0,0129
Medellin	-0,011	0,0057	0,000	0,0060	-0,011	0,0154	-0,012	0,0162	-0,029	0,0107
Bquilla	-0,039	0,0051	-0,009	0,0053	-0,040	0,0146	-0,065	0,0151	-0,059	0,0096
strat1	-0,031	0,0133	0,030	0,0242	-0,096	0,0355	-0,006	0,0457	-0,072	0,0185
strat2	0,009	0,0141	0,067	0,0242	-0,057	0,0399	0,053	0,0449	-0,047	0,0209
strat3	-0,006	0,0134	0,057	0,0223	-0,063	0,0399	0,034	0,0427	-0,061	0,0211
strat4	-0,010	0,0143	0,052	0,0310	-0,050	0,0393	0,044	0,0504	-0,046	0,0196
strat5	-0,010	0,0143	0,040	0,0291	-0,049	0,0402	0,075	0,0527	-0,047	0,0190

The results regarding cities can be very important. Compared to Bogotá, which is a city with an strong market for training services (it is the major supplier of SENA services), the likelihood of a person having received training is higher in Cali. This can be due to the fact that Cali is an industrial city, which is consistent with the result from the firm survey. The result is consistent across age brackets.

The results by strata are also quite interesting. First, for the whole sample, strata 1 in comparison with strata 6 receive less training. With respect to the other strata, the data show no other significant coefficients. The picture is different across age brackets. For the 12-25 range, all strata are receiving more training than strata 6 (the dummy for strata 1 and 5 presents, however, a low significance level; the rest are significant and positive). For the age range 26-35, all the strata receive less training than the strata 6 (strata 1 and 2 are significant and negative). For the 36-45 range the dummies are not significant. Finally, for the range 46+, all the coefficient of dummies are negative and significant.

This result can be the product of the dynamics of the education system. For younger generations the option of training can be a way to replace formal education, as is argued in several parts of this paper. Formal education is predominant among high-income strata, and non-formal education is predominant in the lower part of the income distribution. Between 1966 and 1978, training was a new option, and SENA was a recently created institute (the creation of SENA was in 1957). As a hypothesis, people who initially used the services of this type of institutions were the people who had more information and could take advantage of them, that is, mainly the high-income people. As the formal sector expanded, high-income families had more options for education, and therefore, created room for other income groups to use the services of training.

Another potential explanation for the result is that we are capturing with training for the age bracket (26-35) is that the training is more an upgrade of skills, rather than training to get employment. For example, several top executives can take some training in management (upgrading of skills), whereas young, recently high school graduates are getting training for some specific job activity, like electronics (training to get employment).

We performed two more regressions of the same type (Equation 2), but with different dependent variables. First, we ran two separate probit regressions, with the length of the course as dependent variable (short and long courses). Second, we ran a multinomial logit, with a variable indicating place of study: SENA, private institutes and others.

Table 14 shows the probit model with the length of course as the dependent variable. According to the data, there exist several differences in the

determination of the choice for the length of the course taken. First, finishing secondary education increases the probability of taking a long course, but is not a significant factor for short courses. A potential explanation is that long courses actually require the completion of secondary school, whereas short courses are more flexible with respect to this requirement. Another important determinant for the length of the course is the gender of the individual. There is a tendency for females to take long courses, in contrast with the tendency of males to take short ones. The potential explanation for this result is that the non-formal education can replace formal education for women, as argued before. Finally, there are clear differences in length of courses across cities. Medellín and Barranquilla provide, in comparison with Bogotá, more long-term courses. This could be due to the fact that the supply of formal education is larger in Bogotá than in Medellín or Barranquilla, and therefore, in these last two cities long courses in the non-formal sector replace formal education.

Table 14. Probit estimates - mg changes

Variable	Short course /1	Std. Error	Long course /1	Std. Error
sec	0,0003	0,0027	0,0061	0,0032
añosedu	0,0050	0,0013	0,0151	0,0015
añosedu2	0,0001	0,0001	-0,0004	0,0001
edad	0,0049	0,0003	0,0061	0,0004
edad2	-0,0001	0,0004	-0,0001	0,0004
sexo	0,0120	0,0021	-0,0032	0,0023
cali	0,0311	0,0038	0,0493	0,0047
medellin	-0,0015	0,0030	0,0334	0,0044
bquilla	0,0027	0,0029	0,0086	0,0036
strat2	0,0200	0,0047	0,0155	0,0050
strat3	0,0107	0,0042	0,0167	0,0048
strat4	0,0039	0,0059	0,0197	0,0077
strat5	0,0130	0,0068	0,0083	0,0072
strat6	0,0376	0,0119	0,0259	0,0115

/1 This is the dependent variable

Table 15 presents the results of the multinomial logit. Three main characteristics emerge from the analysis. First, the secondary school variable is negative, and significant for the "Other" category. Presumably, since the comparison group is training at the work place, this category leads the overall result of the probit regression: finishing secondary school increases the probability of receiving training at the work place; the same is not true for other place of training. Second, the probability of receiving training in private institutions decreases with the age of the individual. Again, given the comparison group, and the overall result from the probit regression of training, apparently training at the work place increases with age. Probably investing in training for people who have some experience in the firm drives this result. That is, firms invest resources in training on the work place only for those individuals who are "stable" in the

company. Finally, being female increases the probability of training in private institutions, whereas being male increases the probability of training at the work place.

Table 15. Multinomial logit estimates

	Coeffs					
Variable	SENA	St. Error	Est. Priv.	St. Error	Others	St. Error
Sec	-0,0084	0,1053	-0,1630	0,1136	-0,3580	0,1103
añosedu	0,2065	0,0626	0,0922	0,0640	-0,0773	0,0575
Añosedu2	-0,0129	0,0030	-0,0060	0,0030	0,0045	0,0027
Edad	0,0138	0,0162	-0,0454	0,0161	-0,0653	0,0152
Edad2	-0,0001	0,0002	0,0005	0,0002	0,0007	0,0002
Sexo	-0,0435	0,0837	-0,7424	0,0884	-0,7345	0,0829
Cali	0,4162	0,1131	1,4376	0,1091	0,6813	0,1085
medellin	0,2504	0,1146	-0,1057	0,1415	0,3663	0,1153
Bquilla	0,6453	0,1181	0,6267	0,1312	0,1915	0,1254
Strat2	-0,1372	0,1696	-0,5581	0,1776	-0,3112	0,1789
Strat3	0,0102	0,1685	-0,1772	0,1737	-0,0682	0,1762
Strat4	-0,1005	0,2189	-0,0375	0,2238	0,0113	0,2195
Strat5	-0,5537	0,2334	-0,3320	0,2269	-0,0731	0,2154
Strat6	-0,7094	0,3075	-0,1460	0,2699	-0,4682	0,2710
constant	-1,0937	0,4750	0,7022	0,4840	1,9192	0,4545

/1 At worplace is the comparison group

V. Some cross results and policy implications

The cross of result between the two surveys has not been an easy task. We focus mainly in terms of the match (or mismatch) of demand and supply of training. The first observation is an apparent contradiction between two pieces of information on hand. In the second part of this paper, we found that the proportion of institutes that provided training in "production" (in contraposition to training in "management") match the demand for training of firms, which is mainly in production. However, comparing the firm survey versus the household one, we find the perception that there is an excess demand for training from firms, and that only a small proportion of people acquire training. Moreover, we have some indication that there exists a mismatch in terms of the "quality" of training. Table 16 presents data on the mismatch by cities.

Table 16
Cross results firms/household surveys

FIRM SURVEY			HOUSEHOLD SURVEY		
	Need more training?			Received training?	
	Yes	No		Yes	No
Bogotá	98,57%	1,43%	Bogotá	22,46%	77,54%
Medellín	90,59%	9,41%	Medellín	15,53%	84,47%
Cali	95,65%	4,35%	Cali	23,96%	76,04%
Atlantic coast	100%	0%	Barranquilla	13,59%	86,41%
Professionals	67,80%	32,20%	None	2,17%	97,83%
Technicians	61,86%	38,14%	Pre School	0%	100%
Technologists	42,94%	57,06%	Primary	8,65%	91,35%
Qualified workers	62,99%	37,01%	Secondary	17,54%	82,46%
Unqualified workers	80,50%	19,50%	Beginning college	34,34%	65,66%
			Late and finish college	37,69%	62,31%
			Graduate	48,84%	51,16%

In terms of location, an inverse correlation between firms needing trained personnel and trained population is expected, but Table 16 shows that this only applies to Barranquilla. Cali, city with the largest trained population, has not the least number of firms needing trained personnel; in Bogotá and Medellín this correlation is inverse. These trends seem to indicate a mismatch between where the trainees are and where the firms needing trainees are.

In order to compare the formal education level of the supply and demand of trainees, the personnel scale is used as a proxy. We assume that the higher levels in the scale correspond to higher levels of formal education. Meanwhile the household survey shows a direct relationship between formal education and training, the firm survey shows an important percentage of firms needing trained personnel with low education levels. Clearly, this is not an indication of mismatch per se: firms may need training for "blue collar" workers because the workers with higher education levels are well prepared.

Large firms are more likely to provide training to their employees. Some of the evidence presented is leading to a natural result, which is that requirements for training increase as the complexity of the production process increases. Usually the firms that have more complex processes are large firms. The policy implication of the result is difficult to grasp, based on one piece of information that we do not have: why small firms provided less training? Are they capitally constrained? Or, is their production process "simple enough" that they do not need training?

If the credit market is constrained, and that is the reason for low levels of training in small firms, it will be efficient for the society to invest more in

training for small firms. However, if the production process of small firms does not need the workers to be further trained, it will be more efficient to invest in training for large firms. In the before mentioned survey of Fedesarrollo (2003), one question inquired to the factors affecting the ability of the firm to compete. The answers do not differ significant with the size of the firm: access to or cost of capital is not one of the major impediments. Moreover, the major impediment lies in governmental institutions such as high level of taxation. Based on our work, the debate is still open: probably, the best solution in terms of policy implication is the investment of resources on training that are "size-neutral."

Training is reaching the young low-income population and secondary school graduates according to the household survey. Initially, when the state started acting in the market for training, one of the objectives was to give options to people who did not have access to formal education once they finished secondary school. The evidence shows that, apparently, that objective is being met in Colombia.[15] Training is reaching the population that is more credit constrained, and therefore, we have some data indicating that the investment is increasing efficiency of the society. With respect to older individuals, high-income individuals are acquiring training. This is important because it is imperative to focalize the resources such that people in the middle aged and elderly low-income groups can have access to training. Based on our results, that is not the case.

The place of non-formal education within the context of the whole system of education is a critical aspect. We have some evidence that there is a need for training at several levels: not only the high school graduates are demanding training, but also people who are already working are demanding training. In other words, training seems to be a critical aspect in the acquisition of human capital, not only as a mechanism to enroll the job market but also as an enhancement of job opportunities. This is in strong contrast with the current position of non-formal education in the educational scheme. Currently non-formal education is very unorganized, and unregulated part of the system. Moreover, there are no clear guidelines on the assessment of the quality in the sector. Clearly, this suggests the need for better regulation of the system. For instance, some minimal inspection of quality of curriculums is needed.

[15] However, there is still some part of the population that has a lower likelihood of acquiring training, such as females and people in cities like Barranquilla.

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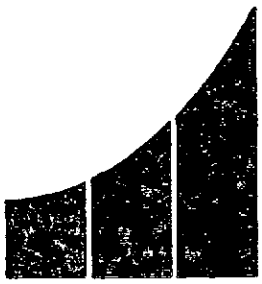

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