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DEMAND FOR CHILD CARE AND FEMALE EMPLOYMENT IN COLOMBIA

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Abstract

Due to the increase in labor force attachment of mothers of young children in the last decade, child care policies have a renewed importance. This paper uses Colombian data to perform a characterization of the child care market, generating stylized facts to inform the debate. The main trends are: highly informal market, high participation and employment rates of mothers of young children, relatively little "unmet need" for child care services and the poor facing constraints to access the market for child care, both in quantity and price. This study analyzes how Colombian families make their child care decisions, simultaneously choosing whether the mother works, whether to pay for care and what mode to use. The estimations performed suggest that there is a strong positive effect of child care choice on the mother's working decision, and that this effect is much higher for low-income families. As children grow the availability of formal care modes becomes determinant to enable the mother's labor force attachment.

Keywords: childcare; labor market participation

JEL classification: J13, J22

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DEMANDA POR CUIDADO INFANTIL Y EMPLEO FEMENINO EN COLOMBIA

Resumen

Dado el aumento en la participación en el mercado laboral de madres con hijos pequeños, es pertinente dar una nueva mirada a los programas de cuidado infantil –child care-. El presente estudio caracteriza el mercado de cuidado infantil para el caso Colombiano, generando hechos estilizados con el objetivo de informar el debate. Los rasgos más prominentes son: (i) el mercado de cuidado infantil es altamente informal; (ii) se observan altas tasas de participación en el mercado laboral, y de empleo, de las madres de niños pequeños; (iii) hay poca evidencia de "demanda insatisfecha" por servicios de cuidado de niños; y (iv) las familias pobres enfrentan restricciones importantes, tanto en cantidad como en precio, en el acceso a dichos servicios. Se modelaron las decisiones simultáneas de las familias Colombianas en cuanto a elección de alternativa de cuidado de niños, si pagar o no por dicho cuidado y si la madre trabaja o no. Las estimaciones sugieren que existe un efecto positivo y significativo de la elección del tipo de cuidado de los niños sobre la decisión de trabajar de la madre y que este efecto es, además, mucho más alto para las familias de bajos ingresos. A medida que los niños crecen, la disponibilidad de alternativas formales de cuidado infantil resulta ser determinante en la decisión de las madres de participar en el mercado laboral.

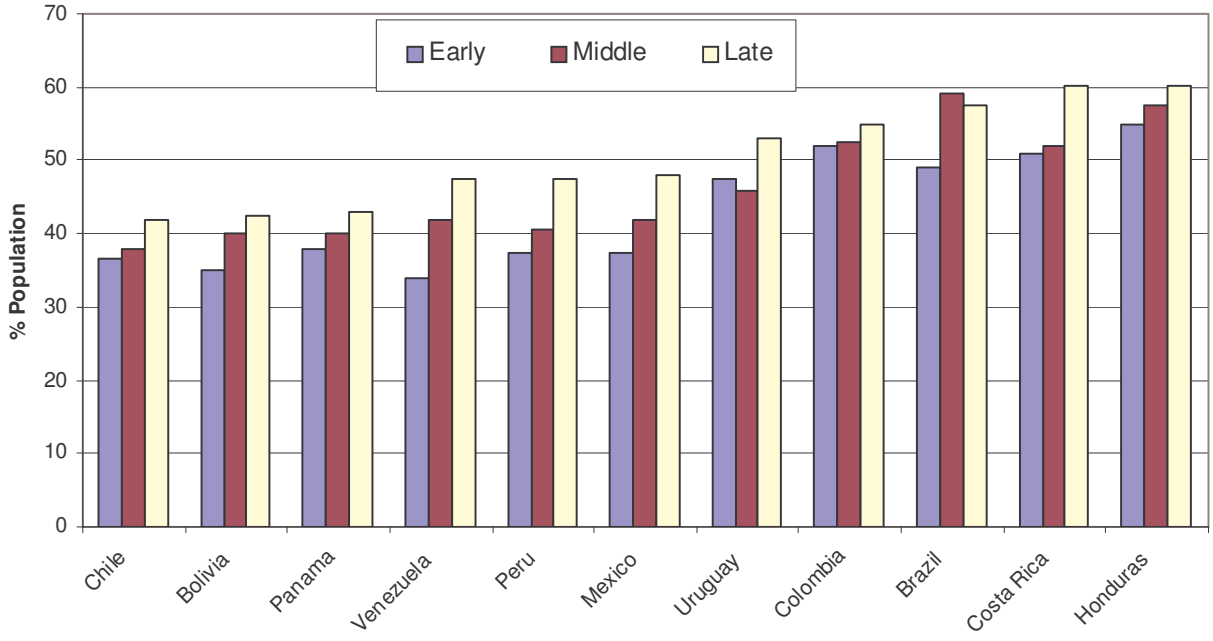
Palabras clave: cuidado infantil; participación laboral

Clasificación JEL: J13, J22

I. Introduction

Child care is especially interesting today because of the tremendous growth in the labor force participation of females. In fact, one of the defining trends in Latin American labor markets is the increase in the female participation rate; the average participation rate increase in the region during the 90's is 7.1% (Duryea, Jaramillo and Pagés, 2001). Figure 1 shows the evolution of female participation rates for Latin American countries. Colombia has one of the highest female participation rates among the Latin American countries, only surpassed by Brazil, Costa Rica and Honduras.

Figure 1. Evolution of Participation during the nineties: Women 15 to 65



Source: Duryea, Jaramillo and Pagés (2001)

Today, it is much more common for the mother of a young child to be employed. Thus, child care, especially for infants and toddlers (ages 0-2), is a much more prominent and important need. Employment of mothers with young children has grown over the last few decades outpacing the growth of any other large demographic group (Anderson and Levine, 1999). The participation rate of females with children between 0-5 in the USA in 1998 was 63.7% (Blau, 2001). For the Colombian case, the participation rate of the same group was 58% in 2003 (Table 2).

Poor women display significantly lower participation and employment rates than their wealthier counterpart, despite a tendency toward closing of the gap during the last few years. The variation in labor market participation across income quintiles is high, ranging from 46 for the first, and increasing to peak at 76% for the wealthiest quintile. Employment displays a similar trend, but with slightly lower rates. Employment of

women in the first two quintiles is significantly lower than their wealthier counterparts: the employment rate of mothers from the fifth quintile is around twice the employment rate of women in the first two quintiles.

Table 2. Participation and Employment Rates of Mothers (Children < 5 years)

	Per Capita Income Quintile					
	1	2	3	4	5	Total
Participation Rate	46%	45%	56%	63%	76%	58%
Employment Rate	33%	35%	45%	55%	68%	48%

Source: ECV 2003, Author's calculations

An inadequate supply of child care, due to lack of quantity and/or quality, has diverse negative effects on a society. For instance, it endangers the well-being of children due to the lack of early stimulation. "Extensive research in child care and early childhood education… shows that higher levels of quality are associated with enhanced social skills, reduced behavior problems, increased cooperation and improved language in children."[3] It also causes financial hardship and stress for families, prevents females from continuing their labor market attachments and makes it next to impossible for low income families to work their way above the poverty line. Thus, the public policies efforts devoted to this issue are widely felt across the community, because of the diversity of the effects it generates for families.

For policy design, there is a trade-off between the two main objectives of child care: enhancing the development and well-being of children and facilitating the employment of parents. Since high quality child care is expensive and requires high degrees of parent participation, and is frequently provided for shorter hours, then this form of care which greatly benefits the children is not necessarily the best for working parents. On the other hand, care with mediocre quality but longer hours frees up more parental time, but does not provide the necessary level of child stimulation. Therefore, there are several possible quantity-quality combinations that can be provided in the market, balancing the tension between them.

The obstacle imposed by child care costs is not the same for all women. The availability of affordable and high quality child care enables women to continue productive careers in the labor force. However, high-skilled women with high potential market wages can better access different quantity-quality child care alternatives than low-skilled ones. Hence, there could be differential responses to child care costs across levels of skill. An analysis of the existing public policy programs in this respect should analyze also the differential impacts on income groups. An example of this could be how responsive is the demand for child care and labor supply decisions to the cost of care.

Child care availability and the public policies behind it are one of the factors contributing to the relative female success in the Colombian labor market. Understanding this market is therefore important due to its high impact of family welfare, the implications for public policy design and redistributive potential, as well as the possibility of helping poor families overcome the care hurdle. However, there are no good characterizations of the

[3] Love, Schochet and Mackstroth (1996) quoted in Blau (2001).

market. The most critical aspect is the supply side, since an important percentage of the market is informal (private providers and informal arrangements) and it has not been captured in any survey. The available information from the publicly provided care is at a very aggregate level, hindering the development of many of the most interesting analysis.

In this paper, we will characterize the market for child care based on the information provided by the Encuesta de Calidad de Vida 2003 (ECV), and develop and estimate a model that analyzes the mother's employment decision, the decision to pay for care and mode choice, abstracting from quality. This enables us to understand Colombian family's decisions regarding child care, and how each variable contributes to such decisions. The results from the estimations are used to quantify effect of child care provision on female employment status.

In Section II we summarize the Institutional Background of the Colombian Institute for family Welfare (ICBF for its name in Spanish), while Section III presents a review of the relevant Colombian literature. Section IV describes de data and characterizes the market for child care, Section V discusses the theoretical model and Section VI describes the data. Section VII presents the results while Section VIII develops the policy questions and concludes.

II. Institutional Background

The Colombian Institute of Family Welfare –ICBF - was founded in 1967. Its objective is to strengthen the processes of family development and integration, protect children and guarantee their rights. To protect children under 5 years of age through the improvement of their nutritional conditions, the ICBF currently operates two major modalities of child care – the HCB and the Centro de Atención Infantil Preescolar (CAIP). Benefit incidence estimates show that coverage[4] is low as a percentage of the objective population in both cases, but that the HCB modality is moderately progressive in its distribution as will be shown below. CAIP, on the other hand, show significantly higher budget allocations, some evidence of better quality but are highly regressive in terms of the distribution of benefits (Fedesarrollo, 2000).

ICBF's main source of financing is a 3% payroll tax, which has been close to 0.6% of the GDP during the last few years. Other sources of income are *ad hoc* co-payment or parents or the community in which the services operate makes in-kind payments. In the past decade there was a shift inside ICBF away from the CAIP model and more towards the HCB mode. This has implied increased resource allocation towards HCB, amounting to approximately 40% of the ICBF budget in 2001-2.

According to the Information System for Governance[5] (SIGOB for its name in Spanish), Hogares de Bienestar[6] covered 956.061 children in 2002, 952.016 in 2003 and 950.175

[4] Defined as service use.
[5] This is an information system intended to improve the central government's functioning through the monitoring the performance and goal achievement, as well as improve transparency and public monitoring.

in June 2004. However, according to the ECV 2003, the ICBF coverage of the same programs is only 865.248[7]. The discrepancy between the figures could be due to several factors. For instance, ICBF coverage is calculated, for example, by multiplying the number of HCB by 15 (their maximum capacity). However, past studies suggest that, on average there are less than 14 children in each Hogar. The difference can also be due to particular characteristics of the ECV sample.

Using the ECV information, 20% of the objective population currently attends some form of ICBF child care, which has traditionally been interpreted as a low coverage. However, as will be further discussed ahead, this might be an indication of family's preferences of other types of care over ICBF, rather than unmet demand. Regarding individual programs, it is difficult to find coverage data discriminated by program. However, the main tendencies regarding numbers have been preserved during the last few years. Table 3 presents some figures for 1998.

Table 3. ICBF Interventions

Program	Description	Characteristics	Coverage*
Centro de Atención Infantil Preescolar (CAIP)	a) Traditional: child care centers run by professional staff b) Non-conventional: run by trained community personnel	a) Day care, supplemental feeding, health care and pre-school education for children under 7 b) Similar, to traditional but operates in more flexible hours	130.892 4.444
Hogares Comunitarios de Bienestar (HCB)	Day care center run by a "community mother", with completed 9th grade who is given minor training in child care and nutrition by ICBF	Distribute "Bienestarina" (80% of daily nutritional requirements), up to 15 children per hogar, heavily involves the community. Bulk of funds come from ICBF, and parents are required to pay monthly fee of 25% of a minimum daily minimum salary.	900.000
Jardines Comunitarios	Day care center headed by a professional educator, and supervised by "community mothers" and volunteer parents.	Targets children between 2 and 5, who have at least 1 parent with little or no labor attachment. Heavy community involvement. 120 children divided into 2 groups that come every other day.	4.607

Source: Perotti (2000). * ICBF Data for 1998

The problems faced by ICBF are manyfold: i) revenue shortage; ii) procyclical financing; iii) inefficient use of resources; iv) poor targeting; v) inefficient delivery system; vi) private sector without regulation and accreditation; and vii) poor contracting systems.

Despite its drawbacks, there are high potential benefits of the programs operated by ICBF. First, given that malnutrition and health problems in are at higher risk in developing countries, improving child nutrition is an investment in the country's human capital. Second, the programs may foster personal development of a child through early stimulation, generating improved academic performance in the future. Third, by

[6] The category Hogares de Bienestar includes HCB, Hogares Infantiles, Lactantes and Kindergarten and Jardines Infantiles.
[7] ICBF includes HCB, CAIP, Jaridnes Infantiles and Comunitarios, as well as City of Bogotá Care.

providing care, they free up valuable parental time that enables them to participate in the work force. Finally, ICBF programs provide an implicit subsidy to poor families via the nutrition component.

III. Colombian Literature Review

There are several previous papers on ICBF, ranging from budgetary and organizational analyses, to effects on the beneficiaries. However, there is no disaggregated data. This has circumscribed the aspects analyzed by scholars and policy-makers. In addition, despite these efforts, particularly from within the ICBF, little is known about the impact of ICBF programs on the nutritional status and/or well-being of the objective population. This is partly due to information restrictions, since there had not been a database that contained the necessary information for both control and treatment groups.

In 1997 the ICBF financed an evaluation of the Hogar Comunitario de Bienestar (HCB) program, which aimed at quantifying the impacts on users, as well as studying the internal organization and structure. Their main results were: i) HCB are attaining their objectives regarding targeting and protecting the poor; ii) HCB do not fulfill ICBF quality standards; iii) Hogares have a limited impact on child welfare, measured via nutrition, psycho-social development and health; and v) child history, family behavior and household characteristics have greater impact on such indicators.

Given the lack of a control group and econometric problems, the causality between the intervention and its effects, for example regarding nutrition, cannot be determined. Therefore, the study cannot be classified as an “impact” evaluation.

Vergara (1999) addresses two main issues. First, the necessary steps in the reform process towards a National Family Welfare System. Second, she studied the required elements to improve the quality of child care provided by the institution. This was attained by designing new child care programs, given an analysis of the available modes, to improve on the existing alternatives and include joint management and financing with regional levels. Her work was based on working sessions within ICBF.

Perotti (2001) studies Colombian public spending on social protection. In addition to the characterization of the trends and objectives of the Colombia program supply, the author suggests improvements to ensure effectiveness of social expenditure, such as enhanced targeting. Regarding child care he attempts a comparison between the two main ICBF programs, HCB and CAIP, based on secondary evidence on relative costs and usage. He concludes that HCB seem to have little impact on the psychological and cultural development of children in rural areas, and that both HCB and CAIP do not seem to have an important role in freeing up working time for mothers. His proposal, “based on (admittedly tentative) evidence” is that ICBF should move back to the CAIP model and away from HCB.

Fedesarrollo (2001) performed an analysis of the ICBF geared towards the design and implementation of the Colombian “Safety Net”, to ensure appropriate targeting, coverage and effectiveness. This included Institutional design, program description, cost structure, coverage and impacts. They find that given the weak information system, the

cost structure cannot be established for each ICBF program. HCB, CAIP and Restaurantes Escolares are the most significant programs, with HCB displaying the best targeting towards the poor. They propose to use Sisben to improve targeting and prioritize resource allocation, both in the HCB and CAIP. Another of their conclusions is that "Perhaps the most pressing need of ICBF child care programs are impact evaluations… (The programs) should adopt the recommendations derived from the existing evaluations".

Currently, several evaluations of ICBF programs are on the way. First, one of the original objectives of the Impact Evaluation of *Familias en Acción*[8], was to compare the effects this program has with the impact of Hogares in order to assess which intervention is most cost effective in improving child well-being. Hence, the hired evaluation Consortium was to produce a quantification and comparison of their impacts. However, given data problems and methodological issues, it was decided instead to perform an evaluation of HCB given the available data. Preliminary results suggest that exposure to Hogares significantly increases height per age. In addition, female labor supply seems to increase with the program. Second, as part of the institutionalization of impact evaluation as a decision making and policy-design tool, there will be an evaluation of HCB in order to generate needed information on which to improve the quality of service provided. It is expected that the evaluation will occur in 2005.

Finally the present paper focuses on the effect of child care choice on the mother's labor market participation. There are several new aspects to this work that should be high lighted. First, as opposed to the other evaluations, this one does not focus solely on Hogares but rather on all alternative care arrangements. This approach complements the other evaluations, by providing a broader view of the market to better understand the impacts of the interventions. Second, since the participation rate of the mothers of young children has increased dramatically, it is important to focus specifically on this aspect to understand the decision-making process that has led to this behavior, and uncover the potential effect public policies can have in this area. Third, it uses extensively the information contained in the ECV2003, and the child care mode in particular that has seldom been used before. The three studies together will provide valuable information to determine the relative success of the intervention.

IV. Market Characterization

In 2003 the National Statistics Department –DANE- collected the Quality of Life Survey - ECV 2003- with national coverage. Its main objective was to measure the present socio-economic characteristics of the Colombian population and to allow for a description and analysis of the social structure. Its design follows the methodology promoted by the World Bank and IDB through the MECOVI initiative for this type of surveys. The sampling is probabilistic, stratified, uses conglomerates and several stages, and the

[8] *Familias en Acción* is a welfare program aimed at the accumulation of human capital in rural Colombia. The program consists on cash transfers to poor families (Sisben 1) with children under 7 years of age, conditional on the fulfillment of health and education conditions. It started in 2001 as part of the program package designed by the Colombian government, together with the IDB and World Bank, to counteract the negative effects of the economic contraction on the human capital levels of the most vulnerable segments of the population.

expected estimation error is under 5% at a country level. The sample is 24.090 households, and the information collection was conducted between March and July 2003 through direct interview to all the members of the household of age 18 or older.

In addition to the usual household-level information, the information relevant to the present study includes demographic variables, poverty, literacy, schooling, labor market, social security and a module on child care for children under 5.

The information on which to base either the debate or potential policy changes is scarce, in spite of the availability of a detailed module on child care use and payments in the 1997 and 2003 versions of the ECV. There is little published on payments for child care services or factors affecting their demand. This fact is due to both an under-utilization of the ECV information as well as the lack of supply-side information to fully characterize providers, especially of the informal mode. In particular, there is no systematic information about the operators in the market, including the ICBF. Such characterization is of particular importance since one of the most commonly cited problems of child care in the international policy debate is low quality of care[9].

Notice that the papers referenced in the previous section all deal with ICBF. There are no papers characterizing or studying the private providers in the child care market. This is because there is little information available on non-ICBF modalities beyond price and characteristics of the beneficiaries (which come from the different versions of the ECV). Therefore, to better understand the market, and to be able to match user information with supply data, a survey should be conducted among providers to be able to better characterize the situation. This is the only way to generate quality data, to improve estimations and guide public policy decisions.

i. Use of child care services

Given the nature of the main research questions, for most of the analyses the types of care have been bundled into 4 main groups. The first comprises all the programs provided by ICBF, including HCB, CAIP and City of Bogotá services, since the institution finances it. Other centers includes other public and private institutions, Non-parental care includes baby-sitters, friend and family. Finally, parental care includes children cared for by parents at home and at work[10]. The first two will be considered formal care in our analysis while the latter two will be considered informal. Notice that this choice, driven by the survey's design, implies that we are bundling together child care and pre-school: we're not comparing pure-care options. An example of this is ICBF since we combine HCB with kindergartens such as the one provided by the City of Bogotá[11]. The same is true for the Center category, since other public and private kindergartens are included and it is impossible to discriminate between attendee to

[9] The only information regarding quality comes from an evaluation performed by the ICBF of their own programs in 1997. They find that HCB do not meet their own quality criteria.
[10] Since less than 2% of the children between 0-5 are taken care of by their parents at work, despite the inherent interest in this type of care arrangement, it is not possible to perform separate analysis.
[11] Bogotá publicly provided child care represents only 1.5% of the total number of children attending formal modes of care.

either. The decision was made to keep the pre-school options to avoid introducing selection bias in latter estimation stages.

Several key tendencies are apparent when studying the market demand characteristics. First, there has been an important growth in the Colombian market for child care, and a tendency towards formal types of care, as shown in Table 4[12]. In 1997 a little over 18% of children used formal modes as their main type of care, whereas this figure doubled in 2003. The increased usage of center-based care seems to correspond to the increase in the participation rate of females due to the 1997-9 recession, since there was clearly a substitution between parental and formal care. The main recipient of the additional children was ICBF, which covered 20.5% of the children in 2003 versus a 9.5% in 1997, stressing the increased relevance of the service.

However, despite its growth and tendency towards formal modes of care, as well as the diversity in qualities and prices of the current supply (as will be partially reported below), the child care market remains largely informal. In 2003 65% of the children attend informal modes of care.

Table 4. Child Care Usage for children less than 5 years old

	2003		1997	
Child Care Mode	**Percentage**	**Frequency**	**Percentage**	**Frequency**
ICBF	20.5%	865,248	9.5%	565,889
Center	14.1%	597,247	8.8%	321,138
Non-Parental	11.5%	485,230	11.7%	498,174
Parents	53.9%	2,278,919	70.0%	2,890,970
Total	100%	4,226,644	100%	4,276,171

Source: ECV 1997 2003. Author's calculations

These levels of use of formal child care are comparable to countries like the USA. The United States' child care market has expanded and has increasingly moved away from informal home-based care and toward formal arrangements. Blau (2001) reports that "in 1994 about two thirds of child care took place at home, and the child care market remains predominantly home-based to this day"[13]. Thus, the fact that the market is largely informal in Colombia does not necessarily suggest "unmet demand". It can also be expressing preferences and/or opportunities from agents to use alternative modes of care; that is, families might prefer to leave child care to the mother or a close member of the family if possible. However, given the increasing tendency in the female labor

[12] There are differences between the ECV 1997 and 2003 questionnaires. The data reported correspond to the arrangement used for the most hours during the day, or question 1 in both questionnaires. This is due to the fact that the emphasis of this paper is on the main child care arrangement. In ECV 1997 there was another question: Apart from this alternative, where else do you send your children? This secondary arrangement will add to the reported beneficiaries of ICBF an extra 150.217 children, and to Center 81.871. This accounts for some of the difference with previous coverage estimations. Bear in mind, also, that this paper focuses on children less than 5 years old, whereas other research has chosen children between 0 and 7 years old. An example of this are calculation by Misión Social who find using ECV 1997 that ICBF has 820.668 beneficiaries for the latter age group. Núñez and Lasso (forthcoming) report using ECV that there are 913 thousand children between 0 and 7 years old attending ICBF.

[13] Pg 21.

market participation, we could expect greater demand in the future. This point will be further developed later in this section.

Since the type of attention required by an infant or toddler is very different that the treatment required by a 4-year-old, we study the difference in care usage across age groups. As expected for infants, the parental care use is very high: 85% (See Table 5). However, as children get older, the parental care is rapidly substituted for ICBF (2 and 3 years old) and Center (3 and 4 years). The Non-Parental mode remains relatively constant across child ages, displaying a slight decrease particularly at 4 years. Since the use of this type of care is highly dependent on the availability of a care provider (member of the family, friend or neighbor), the fact that it remains constant might suggest restrictions in availability.

Table 5. Use of Child Care Mode by Age

Care Mode	0	1	2	3	4	Total
ICBF	14,873	84,377	222,813	288,298	254,887	865,248
	2%	10%	26%	33%	29%	100%
	2%	11%	27%	32%	27%	20%
Center	841	6,250	70,557	171,250	348,349	597,247
	0%	1%	12%	29%	58%	100%
	0%	1%	8%	19%	37%	14%
Non-Parental	100,248	127,484	109,354	88,116	60,028	485,230
	21%	26%	23%	18%	12%	100%
	13%	16%	13%	10%	6%	11%
Parents	644,203	560,298	437,649	361,126	275,643	2,278,919
	28%	25%	19%	16%	12%	100%
	85%	72%	52%	40%	29%	54%
Total	760,165	778,409	840,373	908,790	938,907	4,226,644
	18%	18%	20%	22%	22%	100%
	100%	100%	100%	100%	100%	100%

Frequency, Row Percentage, Column Percentage

Source: ECV 2003, author's calculations

Table 6 shows the usage of formal modes of care by age groups. The most frequently used mode for infants and toddlers is HCB, which accounts for 64% of the children between 0 -2 years. Also, 81% of the same age group attends some form of ICBF program. This implies that the services provided by this institution are crucial for this particular age group. However, at this point it is difficult to determine whether families choose ICBF because they consider the type of care provided as appropriate, for example due to the nutrition or psycho-social component, or whether this might be signaling that freeing up the parent's time to work is very important for such families.

For the 3-4 age group, the number of children attending formal care more than doubles. The importance of other public institutions and private kindergartens increases, accounting for 50% of the children. The number of children that attend the two modes in the 3-4 group is similar, 543,185 for ICBF and 519,599 for Center. The number of children attending ICBF increases

70% comparing the two age groups, but for Centers the number of children between 3-4 years old is nearly 7 times more than of the 0 – 2 age group. One possible explanation is that poor families send their children to ICBF, due to restriction in access to other types of care, while better off families can afford to use parental care for longer time, to then turn to the private centers. Hence, when analyzing the family's simultaneous care mode and labor market participation decision, it is important to perform the analysis also by age groups.

Table 6. Use of Child Care Center by Child Age

	Age of Children		
Mode of Child Care	**0 - 2 years**	**3 - 4 years**	**Total**
Hogar Comunitario de Bienestar Familiar	255,821	395,841	651,662
	39%	61%	100%
	64%	37%	45%
Guarderia, hogar infantil or *Jardin* de Bienestar Familiar	60,211	130,456	190,667
	32%	68%	100%
	15%	12%	13%
City of Bogotá services	6,031	16,888	22,919
	26%	74%	100%
	2%	2%	2%
Other public preschool or *jardin*	12,140	202,623	214,763
	6%	94%	100%
	3%	19%	15%
Private pre-school or *jardin*	65,508	316,976	382,484
	17%	83%	100%
	16%	30%	26%
Total	399,711	1,062,784	1,462,495
	27%	73%	100%
	100%	100%	100%

Frequency, Row Percentage, Column Percentage

Source: ECV 2003, author's calculations

Regarding the gender patterns of service use, we see that in all the formal care modes we have a female participation between 52 and 53%. However, for the case of HCB 57% the female share amount only to 43%. This is surprising, and hard to interpret.

ii. Targeting

Before discussing care targeting, lets summarize what recent studies such as Velez (2002) and Santamaría (2004) have concluded about the evolution of poverty in Colombia,: i) the 1997-9 economic crisis considerably increased the poverty levels, regardless of the way we measure poverty; ii) there is preliminary evidence that recent economic growth is positively affecting poverty; iii) poverty levels decreased in 2003 for every measure and every region; iv) the decrease in extreme poverty is greater than the decrease in poverty; v) poverty in rural areas has decreased more in urban ones; vi)

despite increases in the per capita income, the increase in inequality did not allow poverty levels to drop faster.

As measured by average per capita income, poorer families choose either ICBF or parental care, whereas better off families use either center or non-parental modes (Table 7). The average income in Center care is over twice the mean for ICBF of parental modes.

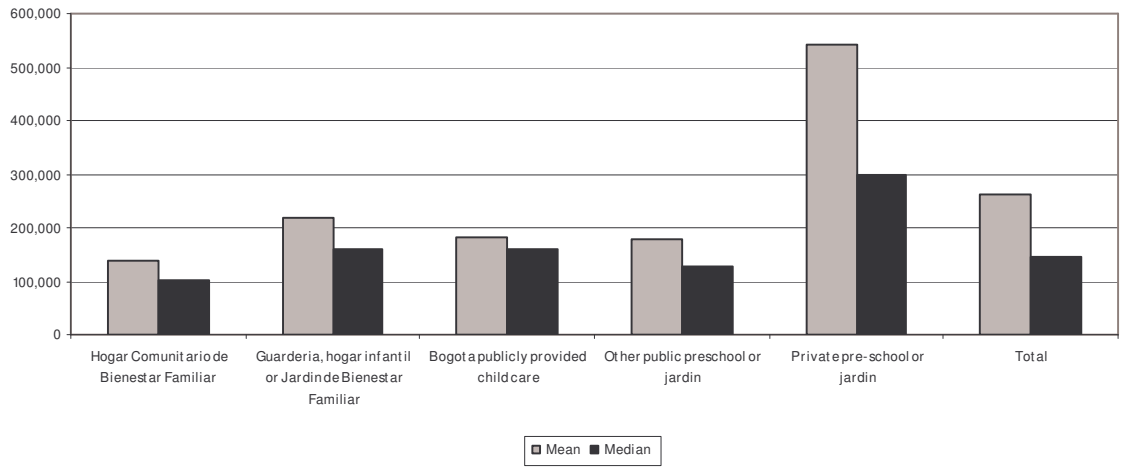
Table 7. Monthly Per Capita Income (COP$2003)

	Mean	Median	Std. Dev.
ICBF	156,751	113,417	260,840
Center	411,741	228,222	648,421
Non-Parental	249,948	160,958	355,069
Parents	157,219	107,500	203,381
Total	203,629	123,200	343,396

Source: ECV 2003. Author's calculations

According to the information contained in ECV 2003, Hogares' beneficiaries have the lowest mean and median per capita income of all the formal modes, followed by Bogotá public care and Guardería, Hogar Infantil or Kindergarten (Figure 1). The average income of a family using a private pre-school or kindergarten is almost 4 times higher than HCB, and its standard deviation of is at least twice as high as the deviation each of the other categories. This might suggest that the wealthier choose private care.

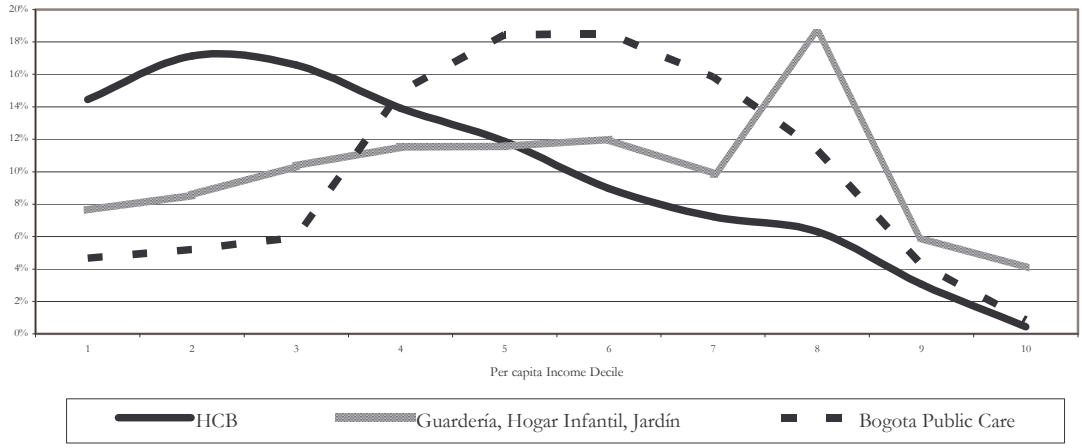
Figure 1. Monthly Per Capita Income by Formal Care Mode
COP$2003



Taking a closer look at the ICBF programs, we confirm that many users belong to the lowest deciles of income distribution. However, as shown in Figure 2, only HCB has clearly progressive targeting. Hogares has the best targeting of the three programs, with a right-tailed distribution. 74% of its users belong to the bottom half of the income distribution. Guardería, Hogar Infantil, Jardín focuses mostly on deciles 4-8 and Bogotá public care has a relatively flat coverage across deciles 1-7 and has a peak on the 8th income decile.

Núñez and Lasso (forthcoming) measure the progressivity or reggressivity of the Colombian public expenditure using Gini and concentration coefficients[14]. They find that the most progressive subsidy is ICBF, with a concentration coefficient of –0.264. Within ICBF programs, the one with the best targeting in HCB, confirming the previous analysis.

Figure 2. Targeting of ICBF: Composition of beneficiaries



Source: ECV2003. Author's calculations

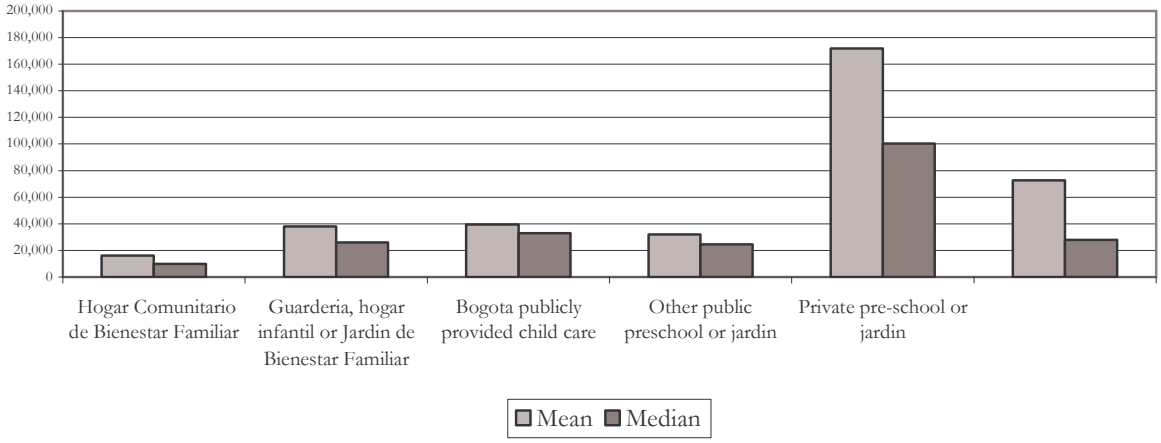
According to the information from ECV 2003, 48% of HCB beneficiaries come from the lowest 3 income deciles. Calculations made by the Social Mission based on ECV 1997 and reported by Fedesarrollo (2001) suggest that in that year, 42% of the HCB users came from the first three income deciles. Thus, the targeting of HCB seems to have improved over time.

iii. Fees[15]

Calculations of the average fees paid by care users in formal modes show that HCB charges the lowest fees, which are roughly half of those charged in the other ICBF modalities. Private care fees are almost 8 times higher than HCB. This implies that while HCB focalizes through geographic location and low prices. Hogares has attained very good targeting. However, other studies suggest that targeting outcomes have been achieved at the expense of quality of care (Fedesarrollo, 2001). On the other hand, private supply targets through price to the top income quintiles. Given this variation in prices, a key matter to address would be a comparison regarding quality of care. However, as discussed earlier, this is not possible due to the lack of information.

[14] The first one grows between 0 and 1 where 1 mean maximum income concentration, while the second ranges between –1 and 1 with negative values denoting subsidy progressivity and positive the opposite.
[15] Fees are taken to be the sum of matrícula and pensión, and does not take into account other possible expenses incurred by the families, given the extremely low reports in the other categories.

Figure 3. Monthly Fees by Type of Formal Care
(COP$2003)



Source: ECV2003. Author's calculations.

The average monthly fee for HCB was $16.081 and for Guardería, Hogar Infantil or Jardín de Bienestar it was $38,037. According to Misión Social calculations using ECV 1997, the fees were $3.590 for Hogares and $8.751 for CAIP[16]. ICBF estimates suggest that on average HCB charged $2.548 and $2.955 for 1998 and 1999, respectively. The latter are somewhat lower than what calculations with both shifts of ECV suggest.

When classifying paid monthly fees by a poverty measure, it is apparent that child care costs could potentially be a hurdle for low income families. Only 85% of the formal care users reported the actual fees paid. Those who did not report are concentrated in the first two income quintiles. Hence, it is impossible to ascertain whether they actually don't pay or whether they just didn't report. Thus, to see how important child care expenditure for families is across quintiles, we calculated fees as a percentage of the per capita income, both excluding and including those families who reported no expenditure. When including only strictly positive fees payment, for the first quintile paid fees correspond to 55% of income, whereas for the other quintiles it ranges between 21 and 27% (Table 8). On absolute terms, the average fee paid by family from the second quintile is less than what the families from the first quintile pay. Also, notice that the fees paid by the top income quintile are over 4 times higher than the fees paid by the other groups. When considering all beneficiaries, the main trend is preserved: people from the first quintile still pay a significantly higher percentage of their income in care (35%), as compared to the rest of the families. Hence the cost of child care might be a hurdle, especially for very low income families.

[16] The differences may be driven by a methodological choice. Of those children who attend formal care, 85% report paying strictly positive fees. Since it is impossible distinguish between those who do not pay and those who did not repot payment, the analysis presented was performed including only those families who reported fee payment. However, this excludes families that indeed don't pay for formal child care; possibly many people from the low quintiles don't pay and are excluded from the sample.

Table 8. Average Monthly Fees and Per Capita Income (COP$2003)

	Strictly Positive Fees			All Values of Fees		
Income Quintile	Fees	Per Capita	Fees as percentage of Per Capita	Fees	Per Capita	Fees as percentage of Per Capita
1	27,803	50,196	55%	17,728	49,403	35%
2	21,112	100,104	21%	14,793	99,819	15%
3	38,728	161,376	24%	30,408	159,767	19%
4	62,523	263,803	24%	59,763	263,823	23%
5	222,451	946,473	27%	215,942	931,591	26%

Source: ECV 2003. Author's calculations

Since a big percentage of HCB's beneficiary population belongs to the bottom income quintiles, we wanted to study whether their fees are regressive, despite the progressivity of the targeting. Additional calculations show that the fees paid by families from the first quintile amount to 0.23 of their per capita income. Hence, HCB's charged fees are progressive. What drives the surprising 55% from Table 8 is the fact that fees charged by City of Bogotá care and Private Pre-school or Kindergarten are roughly twice the per capita income (2.07 and 1.91, respectively). It is surprising that City of Bogotá care charges quintile 1 beneficiaries more than the private sector, which is commonly perceived as serving the high end of the income distribution. To better understand the desegregated behavior of care providers regarding fees, Table 9. presents the mean monthly fees paid by income quintiles.

Table 9. Average Fees by Per Capita Income Quintile (COP$2003)

	Income Quintile					
Care Mode	1	2	3	4	5	Total
Hogar Comunitario	10,286	12,367	16,410	22,844	46,359	16,081
Guardería, hogar infantil or *Jardín* de Bienestar Familiar	15,787	23,323	29,386	47,367	76,890	38,037
City of Bogotá care	53,949	29,916	40,335	37,035	58,439	39,458
Other public preschool or *jardín*	23,307	25,032	28,370	40,270	54,278	32,202
Private pre-school or *jardín*	125,846	55,807	97,984	100,248	283,323	171,860

Source: ECV 1997 2003. Author's calculations

This desegregation shows that HCB, ICBF Kindergartens and other public pre-schools display a progressive fee structure. Private kindergartens seem to charge an extremely high fee to people from the first income quintile, but have otherwise a progressive scale. City of Bogotá care has an unexpected structure, since the amount charged varies across quintiles, charging the odd quintiles particularly high rates. The pricing behavior of Private kindergartens and City of Bogotá care are the driving forces behind the high share of per capita income paid by people in quintile 1 for child care. These calculations include only families who report positive fee payment. Also, since income is traditionally very sensitive to misreporting, these results must be interpreted with some caution. However, they are a good indication of the tendency in fee payment.

iv. Quality

As mentioned above, there is no information about the quality of child care offered in the market. In the ECV users are asked to state their perceptions regarding the quality of the services used. This is not a very good measure of the true quality, but it does reflect how parents perceive their choices. Table 10 shows that in general 92% of families consider their child care choices to be either good or very good.

Table 10. Perceived Quality by Type of Formal Child Care

Type of Child Care	Very good	Good	Average	Bad	Very bad	Total
Hogar Comunitario de Bienestar Familiar	156,615	432,191	59,778	358	2,720	651,662
	24%	66%	9%	0%	0%	100%
	39%	46%	52%	8%	100%	45%
Guarderia, hogar infantil or *Jardin* de Bienestar Familiar	43,716	128,146	18,152	653	0	190,667
	23%	67%	10%	0%	0%	100%
	11%	14%	16%	15%	0%	13%
Bogota publicly provided child care	9,381	12,713	825	0	0	22,919
	41%	55%	4%	0%	0%	100%
	2%	1%	1%	0%	0%	2%
Other public preschool or *jardin*	43,130	144,796	25,474	1,363	0	214,763
	20%	67%	12%	1%	0%	100%
	11%	15%	22%	31%	0%	15%
Private pre-school or *jardin*	145,087	224,863	10,445	2,089	0	382,484
	38%	59%	3%	1%	0%	100%
	36%	24%	9%	47%	0%	26%
Total	397,929	942,709	114,674	4,463	2,720	1,462,495
	27%	64%	8%	0%	0%	100%
	100%	100%	100%	100%	100%	100%

Frequency, Row Percentage, Column Percentage
Source: ECV 2003, Author's calculations

However, there is some variation across alternatives. While 41% and 38% of families consider Bogotá publicly provided care and private institutions, respectively, to be very good, only 24% of parents state the same of HCB and 20% for other public jardín. This finding is in line with Fedesarrollo (2001): "HCB has attained very effective targeting strategies and community participation. However, this seems to have been attained partly at the expense of quality and a limited impact on the welfare of the beneficiaries."

v. Labor Market Attachment and Education

As mentioned in the introduction, the increase in the participation rates of women with young children is one of the most prominent features of the modern labor markets. As shown in Table 11, both the participation and employment rates vary widely across child care modes. The highest rates correspond to families who use non-parental care, with 90% and 87% participation and employment rates, respectively. The lowest figures, as expected, correspond to families choosing the parental mode, since mothers are

frequently the care providers. In addition, notice that the participation and employment rates for center are significantly higher than for ICBF programs.

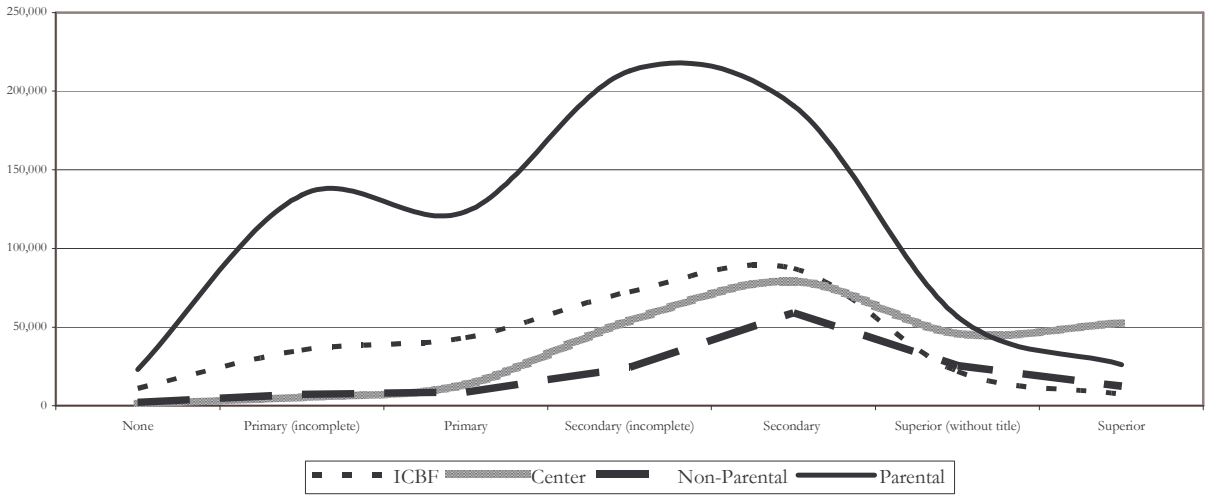
Table 11. Participation and Employment Rates of Mothers

	Participation Rate	Employment Rate
ICBF	63%	53%
Center	72%	62%
Non-Parental	90%	87%
Parents	43%	32%
Total	58%	48%

Source: ECV 2003, Author's calculations

Figure 4 shows the educational attainment of mothers. ICBF services are used mostly by families whose mothers have completed Secondary or less. Center care use increases with educational attainment; even though it peaks at secondary education, it has the highest coverage for mothers with superior education. Non-Parental care has low usage, except for families where the mother completed secondary. Finally, Parental education has the highest frequency, except for highly educated mothers, who seem to prefer Center based care.

Figure 4. Mother's Educational Attainment by Care Mode



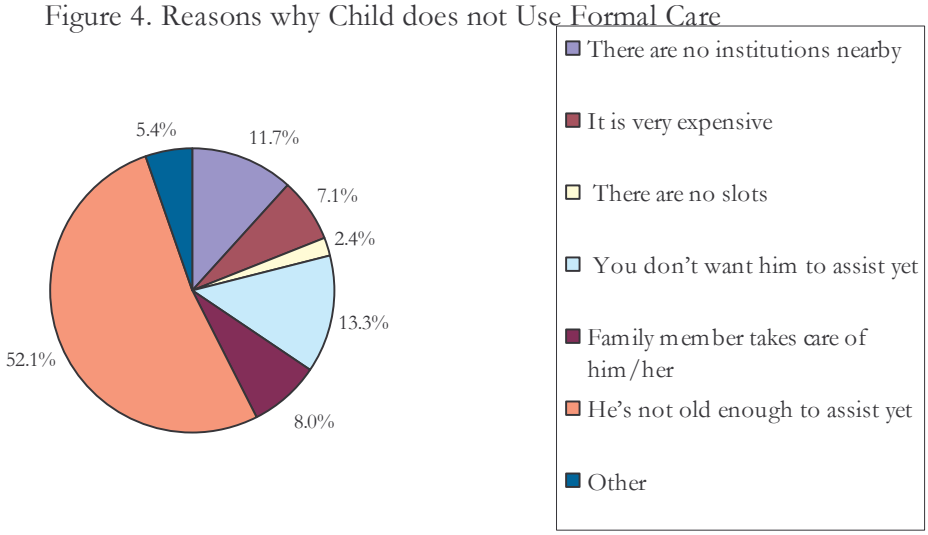
Source: ECV2003. Author's calculations.

vi. Restrictions to Access

The questionnaire includes a question for those children using informal modalities of care, asking for the reason why they did not use formal care. The first three reasons (no institutions nearby, expensive and no slots) are directly related to constraints faced by families, who on the absence of such constraints potentially would have chosen formal care. The next three categories can be interpreted as expressing preferences. Figure 4

shows that over half the children don't attend because their families believe they're not old enough yet. In general, if we accept the previous classification of constraints versus preferences, then 21% of children seem to face constraints, whereas 73% seem to prefer not to use formal care.

Figure 4. Reasons why Child does not Use Formal Care



Source: ECV2003. Author's calculations.

Attanasio and Vera (forthcoming) study the reasons of non-attendance among the poor for the particular case of HCB (see Table 12). They find that for children between 0-1 the main reason is the availability of a caregiver at home. For the other age groups, this reason is no longer as strong. As children get older, the availability of care provider at home decreases its importance and other factors become more prominent. In particular, non listed reasons captured by "other" explain half of the non- attendance to Hogares. However, the lack of a nearby Hogar affects roughly one fifth of children, which suggests that this is an important constraint.

Table 12. Why do children not attend *Hogares Comunitarios*?

	Age: 0-1	Age:2-4	Age:5-6
Available caregiver at home	71%	38%	21%
No *Hogar* or too far away	16%	27%	19%
Cannot afford fee	7%	10%	5%
Does not like food	2%	6%	5%
Other	4%	18%	50%

Source: Attanasio & Vera-Hernandez (2004)

When analyzing the restrictions faced by families from different income levels, we see from Table 13. that across the lowest SISBEN levels, the main difference is given by the lack of institutions nearby; 28% of those in Sisben 1 feel that is the main reason, whereas only 17% and 12% of families Sisben 2 and 3 feel constrained by that, respectively. On the other hand, a smaller percentage of people from Sisben 1 feel it is very expensive than people from the other portrayed levels, which is surprising. Again, about half of the

children don't assist because they're not old enough yet. 36% of Sisben 1 and 29% of Sisben 2 are constrained.

Table 13. Main reason not to attend formal care by (old) SISBEN level

	1	2	Total
There are no institutions nearby	73,184	100,047	173,231
	28%	17%	20%
It is very expensive	12,991	53,638	66,629
	5%	9%	8%
There are no slots	8,033	16,459	24,492
	3%	3%	3%
Don't want him to assist yet	26,556	76,448	103,004
	10%	13%	12%
Family member takes care of him/her	4,047	41,055	45,102
	2%	7%	5%
Not old enough to assist yet	128,901	273,574	402,475
	49%	46%	47%
Other	8,151	30,629	38,780
	3%	5%	5%
Total	261,863	591,850	853,713
	100%	100%	100%

Frequency, Column Percentage
Source: ECV 2003. Author's calculations

When examining the main reasons for not attending formal care by per capita income quintiles (Table 14), the first striking result is that how expensive care is increases in importance to 11 and 7% for quintiles 1 and 2, respectively. Lack of institutions nearby sharply decreases its relevance as a constraint for families, being around 15 for the first two quintiles. Finally, 29% of quintile 1 and 24% of quintile 2 are constrained.

The analysis of restrictions versus preferences by measures of poverty suggests that the degree of informality of the market for child care greatly reflects the preferences of the families. However, the restrictions seem to affect the poor to a greater extent. The fact that a quarter of those considered poor (Sisben 1 and 2) feel constrained suggests that despite the government's efforts to provide affordable care, and the good targeting displayed by ICBF programs, further efforts should be exerted to try to reach those vulnerable families that are still constrained by the lack of child care.

Table 14. Main reason for child not to attend care by income quintile

	1	2	Total
There are no institutions nearby	138,959	88,460	227,419
	16%	13%	15%
It is very expensive	93,920	44,331	138,251
	11%	7%	9%
There are no slots	17,701	25,952	43,653
	2%	4%	3%
You don't want him to assist yet	106,237	86,666	192,903
	12%	13%	13%
Family member takes care of him/her	45,592	59,199	104,791
	5%	9%	7%
He's not old enough to assist yet	402,894	343,401	746,295
	47%	51%	49%
Other	46,088	24,903	70,991
	5%	4%	5%
Total	851,391	672,912	1,524,303
	100%	100%	100%

Frequency, Column Percentage
Source: ECV 2003. Author's calculations

V. Model

Following Blau and Hagy (1998) we develop and estimate a model that analyzes the mother's employment decision, the demand for quality in child care, the decision to pay for care and mode choice. However, unlike the referenced paper, we will not estimate the demand for quality of child care. This is due to the described lack of data, particularly for private and informal providers. Therefore, we need to account for the omitted decision in the estimation, as will be described shortly.

To make the model tractable, we'll assume that the employment decisions of family members other than the mother are taken as given. The household utility function is:

$$U = U (L, G, B, I; X, \eta) \qquad [1]$$

Where is L is leisure, G consumption of goods and the state I, X is a vector of observed exogenous variables and η captures unobserved preferences. Note that the utility is state dependent. The state is a categorical variable, defined as combinations of employments status, payment status and mode (i.e: employed mother, pays for child

care, uses center care). There are 14 states, cross-classifying the 4 modes [17], 2 employment states and 2 child care expenditure states.

The budget constraint is given by:

$$G + E = G + FC_{il} = WH + Y \qquad [2]$$

E is expenditure in child care, C_{il} price of an hour of non-parental care in state *i* and market *I*, W the mother's hourly wage rate, H the hours worked and Y the non-labor income (which includes the income from other household members). Notice that we can't use a quality-adjusted measure, as suggested by Blau and Hagy. The limitations proposed by this fact are discussed ahead.

The mother and child's time constraints:

$$H + L + T = F + T = 1 \qquad [3]$$

The household optimizes their decision problem and by substituting the mother's labor supply, demand for child care and goods into the utility function we can obtain the state-specific indirect utility function. The state yielding the highest utility is optimal (very a la McFadden). We specify a linear approximation to the indirect utility for each state:

$$V_i = X\beta_i + C_{il}\alpha_{1i} + W\alpha_{2i} + \varepsilon_i \qquad i=1,\ldots,S \qquad [4]$$

Where V is utility and X observed exogenous variables, including now non-labor income.

Also, we estimate a linear specification of the probability that the household chooses state i.

$$\begin{aligned} Pr(i) &= Pr\,(Vi > Vj\ \forall j\neq i) \\ &= Pr[\varepsilon_i - \varepsilon_i > X(\beta_i - \beta_j) + (C_{jl}\alpha_{1j} + W\alpha_{2j}) - (C_{il}\alpha_{1i} + W\alpha_{2i})\ \forall j\neq i] \end{aligned} \qquad [5]$$

Under the independent extreme value assumption, we use the multinomial logit and thus:

$$Pr(i) = e^{v1} / \sum_j e^{vj} \qquad [5']$$

Finally, we approximate the available choices:

$$Y_k = \gamma_{0k} + X\gamma_k + C_1\pi_1 + W\pi_2 + \xi_k \qquad \text{for } k=1,\ldots,K \text{ and } i = 1,\ldots,S \qquad [6]$$

Where Y_k is the vector of choice variables (ie: care mode, etc) and ξ_k is a disturbance with mean zero. K is the number of relevant choice variables.

[17] ICBF comprises all the programs provided by this institution, Formal included public and private institutions, Informal care includes baby-sitters, friend and family.

The model is based on a restrictive assumption regarding the availability of alternatives to families. In particular, each family's choice set must include arrangements with all possible combinations of choice variables, i.e. employment, mode and payment status. If the assumption holds, then the observed distribution of choices can be interpreted as outcomes of parental decisions. If it doesn't, the generated results are a useful description of joint distributions, but are not evidence of consumer behavior.

Given the previous analysis of constraints faced by care users, it is reasonable to believe that most agents have access to arrangements in any of the states. An exception could be low income families, as mentioned earlier. About one quarter of poor families are constrained in their use of child care, as suggested by Tables 13 and 14. Thus, results for poor families should be interpreted more as a description of the current situation rather than as a free decision on behalf of the agents.

VI. Data

From the ECV 2003 we chose families in which the youngest member was less than 5 years old, which account for 30% of Colombian families (3,373,761 families). Over 78.4% of the households with children have only one child, 18.3% have two and the remaining 3.3% is split between 3 and 5 children with less than 5 years of age. Despite the availability of information on child care practices for all children in the household, the analysis will focus on the care arrangements for the youngest child in the household. This is because the youngest child represents the most stringent constraint in the family's decision, since it requires closer attention. Also, given the existing scale economies in the child care market, most families choose the same care mode for all their children in the relevant age group. However, there is still a portion of families that choose different arrangements for children (especially when there are different mother for the children). In those cases, we have a problem of cell size: to capture the effect of different care modes chosen in the same household, we need to expand our mode alternatives into smaller cells to allow for more alternatives. Hence, we chose to focus on the care arrangements for the youngest child.

Many similar studies for other countries estimate the demand for quality in the child care market, as measured for example by the ration of children and care providers, or the educational level of care providers. This information usually comes from special surveys aimed directly at characterizing the supply for child care. However, for the Colombian case there is no information on the proxies of quality of child care. This implies that the present analysis does not include any quality-related aspects. As will be discussed later, posterior stages of the analysis should deal with the issue and try to estimate the distribution of quality related attributes econometrically. The lack of quality information limits the ability to interpret the results since, for instance, when modeling the decision for child care mode, we would like to control for their quality. Also, it would be interesting to estimate the willingness to pay for quality, to determine the potential fee structure to accompany an increase in quality of publicly provided care.

An additional issue is that there is no information on hours of care, since the questionnaire does not include the question. One alternative was to approximate hours

of care by hours worked by the mother, plus transportation time to and from work. However, data for this is only available for working mothers, which is less that half our sample given that we're interested in modeling the mother's working decision. Hence, hours of care were not included in the estimations. This implies that we couldn't exploit the amount paid for care per family since; by not controlling for hours or quality; family's expenditures on care are not comparable in a strict sense. This implies that some interesting questions, such as the price elasticity of care mode or employment cannot be calculated. This restricts the possibility of performing simulations of changes in prices on the probability of choices.

From the ECV2003, household in which the youngest child is less than 5 years old were selected. We eliminated observations with missing data in any of the dependent variables. Table 15 shows the Frequency Distributions of the Discrete Outcomes, characterizing the sample.

Table 15. A. Frequency Distributions of the Discrete Outcomes

Works	Pay for Child Care	Mode	Cell Size	Percentage of Total	Percentage of Mode
Yes 46.8%	Yes 20.7%	ICBF	135,165	9.7%	49.1%
		Center	154,556	11.0%	62.5%
		Non-Parental	576	0.0%	0.4%
		Parental	0	0.0%	0.0%
	No 26.1%	ICBF	13,544	1.0%	4.9%
		Center	844	0.1%	0.3%
		Non-Parental	123,036	8.8%	89.5%
		Parental	228,206	16.3%	30.8%
No 53.2%	Yes 14.7%	ICBF	113,140	8.1%	41.1%
		Center	92,085	6.6%	37.2%
		Non-Parental	43	0.0%	0.0%
		Parental	0	0.0%	0.0%
	No 38.5%	ICBF	13,437	1.0%	4.9%
		Center	0	0.0%	0.0%
		Non-Parental	13,838	1.0%	10.1%
		Parental	511,786	36.5%	69.2%

B. Frequency Distributions of Modes of Child Care

Mode	Percentage Who Work	Percentage Who Pay	Count	Percentage of Total
ICBF	54.1%	90.2%	275,286	19.7%
Center	62.8%	99.7%	247,485	17.7%
Non-Parental	89.9%	0.0%	137,493	9.8%
Parental	30.9%	0.0%	739,992	52.8%

Source: ECV 2003. Auhtor's Calculations.

When the first two care modes are chosen, there are a high percentage of mothers working. However, for the case of non-parental care, the highest percentage of mothers is employed: 89.9%. Obviously, when parental care is chosen, a small percentage is

employed since almost by definition they are themselves the care providers. Notice that if paid care is chosen, then families choose between ICBF and Center. Since by definition families don't pay for Parental care, and the sample information suggests they don't pay for Non-Parental either, the when choosing to pay for care they choose formal care. This is going to drive some results in the estimation of this decision.

Table 16 describes the dependent variables. The omitted categories of the categorical variables were chosen to be the most prevalent group, to have a good and significant counterfactual to compare our results.

Table 16. Explanatory Variables (N = 1.400.256)

Variable	Variable	Variable
Mother's Wage Rate ($/hour)	Marital Status¥	Non-Wage Income
Education§	Living Together	Mother's Age
No education	Married	Number of Children (-youngest)
Primary Incomplete	Widowed	Number of Adults
Primary	Divorced	ZoneΨ
Seconday Incomplete	Single	Rural
Secondary	RegionΛ	Urban
Superior without title	Atlantic Coast	SisbenΘ
Superior	Central-Eastern Region	Level 1
Age of Youngest Childφ	Coffee Region	Level 2
0 years	South-Western Region	Level 3
1 years	Antioquia	Level 4
2 years	Valle del Cauca	Level 5
3 years	San Andrés and Providence	Level 6
4 years	Eastern Plains	
§ Ommitted Secondary	¥ Ommitted Living Together	Ψ Ommitted Urban
φ Ommitted 0 years	Λ Ommitted Bogotá	Θ Ommitted Level 3

The mother's wage rate is the average hourly earnings per pay period. This information is only available for employed mothers. Hence, we need to generate a wage rate for non-employed mothers to estimate the discrete part of the model. To do this, we predict a wage rate for non-employed mothers from a standard wage equation, corrected for sample selection (see details of estimation in Annex 1). The non-wage income is the total household income minus the mother's labor income.

In all the estimations we control for whether the family lives in a rural or urban area as well as the region in within the country. These variables may be associated with availability of alternative modes of care as well as parental preferences.

VII. Estimation and Results

The estimation will be carried out by stages, due to the level of complexity. The first stages will provide intuition as to how Colombian families make decisions. Latter stages will be carried out at a posterior date, remaining econometric problems will be solved,

and more sophisticated techniques will be employed to try to characterize the quality of the different care modes by estimating its distribution. Given the amount of work required to address the full estimation strategy and the data restrictions, the present study will focus on the first estimation stages providing a clear picture of the driving forces behind family decisions, and the effect of the main variables. This will set the ground for more elaborate future analysis.

i. Estimation of Individual Equations

There are several decisions of interest regarding the problem at hand, as mentioned earlier. The first stage in the estimation is to get an idea as to what variables are significant when modeling the decisions. Hence, despite potential endogeneity problems, we first estimate the decisions individually.

A. Work Decision

The decision to participate in the labor market depends on individual characteristics, as developed in the model. Mothers make a marginal cost-benefit analysis of the impact on earnings of working versus the entailed costs of devoting a significant number of hours to work outside the home, given the presence of young children. The working decision can be seen as a dichotomous random variable taking the value of 1 if the mother Works and 0 if she doesn't. The marginal benefit is assumed to depend linearly on individual characteristics. Thus, the problem boils down to finding the probability of occurrence of these two events conditional on observed individual characteristics. Assuming that the random variable follows a logistic cumulative distribution, we maximize the likelihood that the sample is generated by the distribution and hence calculate the parameters using a logit specification. Namely,

$$\text{Logit}(p) = \log(p / (1-p)) = \alpha + \beta X' + e_i \qquad [7]$$

The variables included in the X vector are: chosen child care mode and whether the family pays for care (since these aspects are key to the focus of the paper). The mother's wage is included to capture the marginal benefit of working. Variables like education, age and age squared are included to account for the effect of skills and work experience. Other included variables are Non-Wage income, Child's age, Number of children younger than 5, other than the youngest and Marital status.

Estimations were made both for the whole sample, and also only for those who belong to the lowest income quintile, to see the differences in impact the variables have on the poor. The results are presented in Table 17. The coefficient from the logit estimations cannot be directly interpreted as in the case of OLS. Hence, the marginal effects are also reported, to better compare results[18]. The marginals tell us how the probability of an event changes as X changes:

[18] In the following sections only the marginal effects will be discussed, given that they allow for a direct interpretation.

$$\frac{\partial\ Prob(y=1|X)}{\partial\ x_k} = \frac{\partial\ \Lambda(\beta X)}{\partial\ x_k} = \frac{\exp(X\ \beta)}{(1+\exp(X\ \beta))^2}\ \beta_k = p(1-p)\beta_k \qquad [8]$$

where

$$p = \frac{\exp(X\ \beta)}{1+\exp(X\ \beta)}$$

Since many of the included explanatory variables are dummies, and hence there is an excluded category, the coefficients are interpreted in the usual way: the additional effect with respect to the excluded category. Also, the marginal for dummies is evaluated at the point where the variable makes the discrete change from 0 to 1.

Results in Table 17 show that with respect to parental care (the excluded category), the use of other modes increases significantly the probability of mother's employment. The use of ICBF, Center and Non-Parental increases the probability of being employed by 20%, 23% and 50%, respectively. This was to be expected, since frequently mothers are the care providers. However, there is an interesting pattern in the differences of contribution to the probability of employment. The use of formal modes has an important effect, but Non-Parental's effect is twice that of the others. This implies that the availability of a care provider in the family is what most increases the probability of the mother working. For low-income families, the same trend is preserved. However, the magnitude of the effects is much higher. Again with respect to Parental care, the use of ICBF, Center and Non-Parental significantly increases the probability of the mother being employed by 33%, 45% and 69%, respectively. Since the impact of the availability of choices on the employment status of the mother is much higher in poor families, especial emphasis should be put in the pertinent public policies to ensure that low-income families can attain their potential by removing the child care obstacle.

The wage displays a negative and significant impact on both estimations. We would expect this variable to have the opposite sign. A possible explanation is that since we are already controlling for household income and capturing the income effect, the negative sign on wage might be capturing the substitution effect. The decision to pay for care increases the probability of employment by 3% for the whole sample, and it decreases it by 20% for the families who belong to the first quintile. Neither of these coefficients is significant at traditional levels of confidence. This might be due to the fact that the number of families from the first quintile who pay is very little and hence there is not enough variation.

The probability of employment for the whole sample decreases with all educational levels, except for Superior and Superior without title, with respect to women with secondary education. This implies that the more educated the women, the more likely it is that they are employed. For the case of low-income families, all the marginal effects of education are negative: as compared to women with secondary, having any other educational level decreases the probability of being employed. Marital Status is important in the decision to work for the whole sample (except for Married), relative to living together, but it looses its statistical significance when restricting the sample to low-income families.

Table 17. Mother's Employment Decision -All, Quintile 1-

	Work All- Logit					Work Quintile 1- Logit				
	Logit			Marginal Eff@		Logit			Marginal Eff@	
	Coef.	Std. Err.		Coef.	Std. Err.	Coef.	Std. Err.		Coef.	Std. Err.
Intercept	1.16	0.06				1.16	0.06	**		
ICBF	0.83	0.01	***	0.20	0.00	0.83	0.01	**	0.33	0.04
Center	0.94	0.01	***	0.23	0.00	0.94	0.01	**	0.45	0.01
Non-Parental	2.70	0.01	***	0.50	0.00	2.70	0.01	***	0.69	0.06
Pays for Care	0.13	0.01		0.03	0.00	0.13	0.01		-0.20	0.06
Log Hourly Wage	-1.22	0.01	***	-0.31	0.00	-1.22	0.01	**	-0.60	0.16
Education										
No education	-0.22	0.01		-0.05	0.00	-0.22	0.01	**	-0.22	0.08
Primary Incomplete	-0.51	0.01	***	-0.13	0.00	-0.51	0.01	**	-0.27	0.09
Primary	-0.76	0.01	***	-0.18	0.00	-0.76	0.01	**	-0.28	0.10
Seconday Incomplete	-0.48	0.01	***	-0.12	0.00	-0.48	0.01	*	-0.23	0.07
Superior without title	0.63	0.01	***	0.15	0.00	0.63	0.01		-0.04	0.02
Superior	2.20	0.01	***	0.43	0.00	2.20	0.01		-0.33	0.00
Age	0.23	0.00	***	0.06	0.00	0.23	0.00		0.03	0.01
Age Squared	0.00	0.00	***	0.00	0.00	0.00	0.00		0.00	0.00
Non-Wage Income	0.24	0.00	***	0.06	0.00	0.24	0.00		0.00	0.00
Child's Age										
1 year	0.08	0.01		0.02	0.00	0.08	0.01		-0.02	0.01
2 years	-0.06	0.01		-0.01	0.00	-0.06	0.01		-0.07	0.02
3 years	-0.22	0.01		-0.05	0.00	-0.22	0.01		0.09	0.02
4 years	-0.09	0.01		-0.02	0.00	-0.09	0.01		0.09	0.02
Number of children	-0.32	0.00	***	-0.08	0.00	-0.32	0.00		-0.09	0.02
Marital Status										
Married	0.00	0.01		0.00	0.00	0.00	0.01		-0.06	0.02
Widowed	1.76	0.03	***	0.36	0.00	1.76	0.03		0.51	0.03
Divorced	0.64	0.01	***	0.16	0.00	0.64	0.01		-0.03	0.01
Single	0.30	0.01	**	0.08	0.00	0.30	0.01		0.04	0.01
Rural	-0.02	0.01		-0.01	0.00	-0.02	0.01		0.03	0.01
Region										
Atlantic Coast	-0.77	0.01	***	-0.19	0.00	-0.77	0.01	*	-0.28	0.08
Central-Eastern Region	0.11	0.01		0.03	0.00	0.11	0.01		-0.12	0.04
Coffee Region	-0.30	0.01		-0.07	0.00	-0.30	0.01		-0.20	0.07
South-Western Region	0.39	0.01	*	0.10	0.00	0.39	0.01		-0.17	0.06
Antioquia	-0.86	0.01	***	-0.20	0.00	-0.86	0.01	***	-0.38	0.13
Valle del Cauca	-0.22	0.01		-0.05	0.00	-0.22	0.01		-0.18	0.07
San Andrés, Providence	-0.52	0.07		-0.13	0.01	-0.52	0.07			
Eastern Plains	-0.45	0.02		-0.11	0.01	-0.45	0.02	**	-0.03	0.02
Sample size	2,644					2,644				
Pseudo R2	0.22					0.33				
y = Pr(decision) =				0.48					0.29	

Note @: Evaluated at mean of independent variables

Note: * significant at 90%, ** 95%, ***99%.

Similar exercises were performed for different age groups of the youngest child, since the effect on the labor market participation decision of the mother might differs greatly depending on this variable (see Annex 2). The results suggest that with respect to Parental mode, the use of ICBF, Center and Non-Parental increases the probability of female employment 15%, 31% and 56% respectively for children between 0-1 and for children between 2-4 years the effects are 33%, 33% and 45%, respectively. Hence, for very young children the availability of an alternative care provider is key to mother's employment, whereas as children grow, the impact of formal care modes increases significantly, and the effect of Non-Parental care decreases. Thus, as children age, formal modes such as ICBF and Center become more important.

B. Decision to Pay for Care

When estimating the logit model for the decision to pay for care, the variables included in the X vector are Child care Mode, whether the mother works, Wage, Education, Non-Wage Income, number of Children, Number of Adults in the Household, Sisben level, Marital Status, Zone, Region and an interaction between number of children in the household and marital status to capture the structure of the household. Results are shown in Table 18.

Very few variables appear significant on this estimation, but the results are very close to what intuition suggests. The effects of child care mode are as expected. Since the control group is Parental care, the probability of paying for care increases by 100% if formal modes of care are chosen. The number of children younger than 5 decreases by 2% the probability of choosing to pay for care. Regarding Marital Status, the only category, which appears statistically significant, is Married. When compared to Living Together, being Married increases by 5% the probability of paying for care. This might be suggesting further income pooling when parents are married than when they choose other family arrangements. Finally, the interaction term is frequently significant and has a small negative effect on the decision to pay for care.

Surprisingly, whether the mother works, her wage and non-wage income are not significant. Finally, the Pseudo-R^2 is quite high.

Table 18. Decision to Pay for Child Care

	Pay - Logit			Marginal Effects@	
Variables	**Coef.**	**Std. Err.**		**Coef.**	**Std. Err.**
Intercept	-7.78	0.21			
ICBF	12.98	0.07	***	1.00	0.00
Center	15.95	0.08	***	1.00	0.00
Non-Parental	-2.11	0.17		-0.02	0.00
Works	0.18	0.02		0.00	0.00
Log Hourly Wage	-0.47	0.02		-0.01	0.00
Education					
No education	-0.91	0.04		-0.01	0.00
Primary Incomplete	-0.99	0.03		-0.01	0.00
Primary	-1.45	0.03	**	-0.02	0.00
Seconday Incomplete	-0.98	0.03		-0.01	0.00
Superior without title	1.28	0.05		0.04	0.00
Superior	-1.03	0.06		-0.01	0.00
Non-Wage Income	0.34	0.01		0.01	0.00
Number of children	4.13	0.06	***	0.07	0.00
Number of adults	-0.08	0.01		0.00	0.00
Sisben					
Level 1	-0.59	0.03		-0.01	0.00
Level 2	-0.89	0.03		-0.01	0.00
Level 4	-1.37	0.05		-0.01	0.00
Level 5	0.62	0.07		0.01	0.00
Level 6	0.58	0.18		0.01	0.01
Marital Status					
Married	1.80	0.04	*	0.05	0.00
Widowed	2.76	0.15		0.20	0.02
Divorced	-0.92	0.03		-0.01	0.00
Single	-0.41	0.03		-0.01	0.00
Rural	-1.09	0.02	**	-0.02	0.00
Region					
Atlantic Coast	-2.54	0.05	**	-0.03	0.00
Central-Eastern Region	-0.71	0.05		-0.01	0.00
Coffee Region	-0.69	0.05		-0.01	0.00
South-Western Region	-2.93	0.05	***	-0.02	0.00
Antioquia	-1.10	0.05		-0.01	0.00
Valle del Cauca	-2.82	0.05	**	-0.02	0.00
San Andrés and Providence	-0.23	0.45		0.00	0.01
Eastern Plains	0.53	0.24		0.01	0.01
Interaction (number children*marital status)					
1	-4.17	0.06	***	-0.03	0.00
2	-7.37	0.10	***	-0.03	0.00
4	-3.88	0.07	**	-0.02	0.00
5	-4.81	0.07	***	-0.02	0.00
6	-6.03	1.39		-0.02	0.00
10	-2.03	1.85		-0.02	0.00
12	-6.80	0.91		-0.02	0.00
Sample size	1,397,391		y = Pr(pay) = 0.021		
Pseudo R2	0.92				

Note @: Evaluated at mean of independent variables
Note: * significant at 90%, ** 95%, ***99%.

C. Child Care Mode

Since there is not a natural ordering of the child care modes, the selected estimation procedure is multinomial logit. The multinomial logit model is defined as the model where the probability of each outcome j is:

$$P(y = j \mid x) = \frac{\exp(x\beta_j)}{\sum_{h=1}^{J} \exp(x\beta_h)} \qquad [9]$$

As usual with this model, we can only identify the difference in these parameters. We need to choose some category as the "base" group and standardize the coefficients for that group to be zero, to attain identification. In this case the default option is Parental Care since it is the most prevalent category. This implies that the presented results in Table 19, which are Relative Risk Ratios –RRR- in should be read as the increase/decrease in probability with respect to this base category, that is, the relative probability of alternative x with respect to the parental care is the relative risk ratio for a one unit change in the corresponding variable[19].

The variables included in the X vector are: Decision to Work, Decision to Pay, Wage, Education, Non-Wage Income, Child's Age, Number of Children, Number of Adults, Sisben level and Marital Status. In the present section we are interested in knowing how the decision to work, pay, education, race and marital status affect the probability of choosing one child care mode relative to the others.

The decision to pay or not, despite being included in the estimation, is not reported. The estimated marginal effects are extremely high, due to the fact that once the families choose to pay for care, the probability of attending parental care, the comparison group, are close to zero. Hence, since when families don't pay for care children attend informal modes, the effect on the probability of attendance to ICBF or Center when the family decides to pay is very high.

Regarding the decision to work, working significantly increases the risk using ICBF, Center and Non-Parental as compared to Parental Care. However, it increases the risk of using Non-Parental care relative to the risk of using the formal care modes. This is very important since it stresses the relationship between the work decision and the choice of care mode. This is also suggestive of preferences, since mothers who choose to work want someone close to them (Non-Parental) to take care of their children, especially for toddlers despite the availability of formal modes.

[19] RRR in multinomial logit should be interpreted as odds ratios are for logit.

Table 19. Child Care Choice

Multinomial Logit	ICBF - RRR@			Center - RRR@			Non-Parent-RRR@		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
Work	1.94	0.03	*	2.00	0.03	*	16.96	0.17	***
Log Hourly Wage	2.31	0.04	*	4.42	0.09	***	0.62	0.00	***
Education									
No education	1.67	0.06		0.49	0.02		0.35	0.01	
Primary Incomplete	2.29	0.06		1.11	0.04		0.28	0.00	***
Primary	3.86	0.10	**	3.94	0.12	**	0.35	0.01	***
Seconday Incomplete	2.47	0.06		2.98	0.08	*	0.32	0.00	***
Superior without title	0.29	0.02		0.57	0.03		0.97	0.01	
Superior	0.68	0.04		1.12	0.06		1.37	0.02	
Non-Wage Income	0.86	0.01		0.90	0.01		1.28	0.01	**
Child's Age									
1 year	1.05	0.02		3.50	0.09	**	1.39	0.01	
2 years	1.83	0.04		6.03	0.15	***	1.66	0.02	**
3 years	1.78	0.05		8.22	0.25	***	1.82	0.02	**
4 years	5.88	0.15	***	63.76	1.91	***	1.29	0.02	
Number of children	3.45	0.04	***	9.32	0.14	***	1.07	0.01	
Number of adults	0.86	0.01		0.73	0.01	**	0.96	0.00	
Sisben									
Level 1	2.49	0.06		0.51	0.01		0.74	0.01	
Level 2	2.11	0.05		0.69	0.02		0.58	0.01	***
Level 4	2.75	0.12		4.68	0.21		1.74	0.03	
Level 5	1.13	0.15		3.68	0.48		0.16	0.01	**
Level 6	0.01	0.01		1.76	0.81		0.59	0.02	
Marital Status									
Married	0.73	0.02		0.97	0.03		0.87	0.01	***
Widowed	0.18	0.02		0.14	0.02		9.61	0.29	***
Divorced	1.74	0.04		2.20	0.05		1.39	0.02	***
Single	4.86	0.10	***	5.00	0.12	***	2.74	0.03	***
Rural	2.04	0.03	*	1.09	0.02		0.53	0.01	**
Region									
Atlantic Coast	25.32	1.18	***	61.83	2.97	***	0.60	0.01	*
Central-Eastern Region	0.72	0.04		1.58	0.09		0.71	0.01	
Coffee Region	1.88	0.10	**	1.53	0.08		0.43	0.01	***
South-Western Region	23.98	1.13		27.51	1.39	***	0.72	0.01	
Antioquia	1.77	0.09		3.12	0.17		0.95	0.01	
Valle del Cauca	10.21	0.49	***	11.11	0.55	**	0.75	0.01	
San Andrés and Providence	2.75	1.70		1.28	0.80		1.90	0.16	
Eastern Plains	0.17	0.07		4.61	1.76		0.86	0.03	
Sample size	1,400,256	Note @: Relative Risk Ratios - Comparison Group Parental							
Pseudo R2	0.64	Note: * significant at 90%, ** 95%, ***99%.							

As the mother's wage increases, the relative risk of using all other care modes increases, especially formal ones. Non-Wage income is only important for the use of Non-Parental care; the risk of using non-parental vs. parental increases by 128% for a one-unit change in the non-wage income. Education does not seem to affect significantly child care choice, except for Non-Parental mode. In this case, the risk of choosing Non-Parental as compared to Parental increases for low educational categories relative to Secondary education. That is, in households where the mother has low educational attainment, it is very likely that they choose No-Parental care.

The age of the youngest child is only significant for Center Care. As the child gets older, the relative risk of using Center care versus Parental increase; when children turn 4 years old, the "risk" of using for Center Care increases by over six thousand percent. Give the inability to differentiate pure child care from pre-school, this might be capturing the normal age at which children are first sent to pre-school. Also, the number of children in the household has a significant impact on attendance of formal care modes as compared to Parental care.

The number of adults in the household is only significant for the choice of Center care, but not for Non-Parental care. In addition, our measure of structural poverty does not seem to affect significantly the mode decision, except for some categories in Non-Parental care. Regarding Marital Status, only being single is consistently important and increases the relative risk of using other forms of care versus Parental, in particular formal ones. For the case of Non-Parental, relative to living together, all other marital Status categories increase the relative risk of using Non-Parental when compared to Parental, particularly Widowed. Again the overall significance of the estimation, as measured by the Pseudo- R^2 is high.

Summarizing, child care arrangements other than Parental seem to be complementary to being employed, since the use of such services is closely related to mother's employment, particularly Non-Parental. Educational level has an important effect on whether the mother works, but not in the other modeled decisions. The Child's Age is important only for the choice of Center mode as compared to Parental care, and has no significant influence on the use of other modes or on the decision to pay for care. Marital Status significantly affects the decision to work for the whole sample (and not for the low-income families), the decision to pay for care in the case of Married couples as compared to the base category, and the choice of Non-Parental mode as compared to Parental care. Non-Wage income is only important in the decision to work for the whole sample. The level of structural poverty as measured by Sisben doesn't appear to be significant in the decisions to pay for care or in the mode choice.

ii. System of Equations

We use Three-Stage Least Squares (3SLS) to estimate the system of simultaneous equations[20]. This approach provides a first look at the simultaneous decision and should be considered as suggestive of the main tendencies. Since the child care mode variable had 4 different outcomes, this type of estimation does not capture the effect of the independent variables on each mode. Care mode was reduced to two categories: formal and informal. Thus, results should be read in terms of this new categorization,

[20] This is equivalent to apply the liner probability model to the decisions, which is not as good an approximation as the logits used in the previous section fro three main reasons: i) the predicted probabilities can be greater than one or less than zero; ii) the marginal effects are constant throughout the range of the variables and the reported coefficients are already the marginal effects; and iii) it may be is heteroskedastic. The third problem directly conflicts with one of the assumptions behind 3SLS; since it is a special case of multiple-equation GMM, it requires the assumption of conditional homoskedasticity. However, given that the main trends of the individual equation estimations are preserved under 3SLS, the expected bias in the coefficients is small.

and are presented in Table 20. Note that to achieve identification some assumptions about exclusions are necessary, as will be evident from the results.

The working decision estimation behaves in a similar manner to the previous estimation, both in the signs of the coefficients and their magnitude: education is statistically significant, and as compared to the base category (Secondary), lower educational levels decrease the probability of being employed while higher schooling attainment increases it. The wage variable again has a negative coefficient, and hence the same explanation provided in the individual estimation of work decision applies here. Age, Age Squared and Non-Wage Income are again highly significant, and have very similar coefficients. Child's Age now becomes significant in the decision to work. As compared to children with less than 1 year, as children get older the probability that the mother works increases, especially when the child reaches 4 years of age, which is consistent with previous results.

When choosing whether to pay for care and care mode, the work decision looses its significance. Otherwise, the results are very similar to what was described in previous sections. One interesting difference, however, is the fact that our structural poverty measure is significant in both. Belonging to Sisben levels 1 and 2, when compared to the base category Sisben 3, decreases the probability of paying for care but increases the probability of choosing formal care (as opposed to informal). These finding are interesting, since the first suggests that the poor have a lower probability of paying for care and hence care costs might be a hurdle for these families. The second, that the poorest families have a higher probability to choose formal modes of care than an intermediate level, might be indicative of the important role played by ICBF for low-income families.

Finally, Marital Status has some relevance for the Pay and Mode decisions; when comparing to Living Together, being Divorced or Single decreases the probability of paying for care and at the same time increases he probability of using formal care. This is reasonable since these are the categories where there is no income pooling with the partner and is likely to be a single parent home.

Table 20. Simultaneous Decisions: Work, Pay for Care and Care Mode

3SLS	Work			Pay			Mode		
	Coef.	Std. Err.		Coef.	Std. Err.		Coef.	Std. Err.	
Constant	0.34	0.20	*	-0.01	0.04		0.01	0.05	
Works				0.00	0.01		0.00	0.01	
Mode2				0.98	0.00	***			
Pays for Care							1.01	0.00	***
Log Hourly Wage	-0.17	0.02	***	0.00	0.00		0.00	0.00	
Education									
No education	-0.11	0.06	*				0.00	0.01	
Primary Incomplete	-0.15	0.03	***				0.00	0.00	
Primary	-0.18	0.03	***				0.00	0.00	
Seconday Incomplete	-0.11	0.03	***				0.00	0.00	
Superior without title	0.11	0.03	***				0.00	0.00	
Superior	0.34	0.04	***				0.00	0.00	
Age	0.05	0.01	***						
Age Squared	0.00	0.00	***						
Non-Wage Income	0.04	0.01	***	0.00	0.00		0.00	0.00	
Child's Age									
1 year	0.04	0.03	*				0.00	0.00	
2 years	0.04	0.03					0.00	0.00	
3 years	0.05	0.03	*				0.00	0.00	
4 years	0.10	0.03	***				0.00	0.00	
Number of children	-0.01	0.02		0.00	0.00				
Number of adults				0.00	0.00		0.00	0.00	
Sisben									
Level 1				-0.01	0.01	*	0.01	0.01	*
Level 2				-0.02	0.01	**	0.02	0.01	**
Level 4				0.00	0.01		0.00	0.01	
Level 5				-0.01	0.02		0.01	0.02	
Level 6				0.01	0.02		-0.01	0.02	
Marital Status									
Married				0.00	0.01		0.00	0.01	
Widowed				0.01	0.03		-0.01	0.03	
Divorced				-0.02	0.01	**	0.02	0.01	**
Single				-0.02	0.01	**	0.02	0.01	**
Rural	-0.04	0.02	*	-0.04	0.01	***	0.04	0.01	***
Region									
Atlantic Coast	-0.11	0.03	***	-0.02	0.01	**	0.03	0.01	***
Central-Eastern Region	0.01	0.03		0.01	0.01		-0.01	0.01	
Coffee Region	-0.06	0.03	*	0.01	0.01		-0.01	0.01	
South-Western Region	0.12	0.04	***	-0.07	0.01	***	0.07	0.01	***
Antioquia	-0.16	0.04	***	0.01	0.01		-0.01	0.01	
Valle del Cauca	-0.03	0.04		-0.01	0.01		0.01	0.01	
San Andrés, Providence	0.00	0.29		0.00	0.09		0.00	0.09	
Eastern Plains	-0.04	0.11		0.01	0.03		-0.01	0.03	
Sample size	2,644			2,644			2,644		
Pseudo R2	0.16			0.92			0.92		

Note: * significant at 90%, ** 95%, ***99%.

A key thing to note here is that, given that we have abstracted the demand for quality from the analysis due to the lack of information, there is an inherent element of heterogeneity that is not captured in the estimations. The differences in quality should be accounted for in later stages, as will be described in the following section. By not

including the demand for quality we're making the simplifying assumption that there are no observable quality differences in child care across alternatives and families who choose paid care consume a fixed amount of time (all the difference is given in prices). This is not the most desirable assumption, but it is the best we can do given the data restrictions.

VIII. Concluding Remarks

This paper uses recent Colombian data to perform a characterization of the child care market. We find that despite its growth and tendency towards formal modes of care, the child care market remains largely informal. There are differential patterns of usage across the income distribution: poorer families choose either ICBF or parental care, whereas better off ones use either center or non-parental. HCB, provided by ICBF, has both the most progressive focalization and the lowest average fees paid by care users in formal modes. Thus, it plays a very important social role. However, such attributes seem to have been attained partly at the expense of quality. Regarding mother's labor market engagement, both the participation and employment rates of the mothers of young children is extremely high, especially for those using non-parental care. This stresses the importance of a dynamic child care policy that adjusts to the changing needs of the mothers of young children.

There seem to be low levels of "unmet" demand for care. Non-attendance to formal modes of care, especially for very young children, can de interpreted as a revealed preference on the behalf of the agents for informal over formal modes, rather than actual restrictions faced by families. However, poor families are restricted in their choices. When analyzing the reasons why families don't choose formal care modes, it is apparent that around one quarter of the poorest families face constraints. This implies that the observed decisions might not correspond to consumer behavior but rather to the lack of alternatives. The government should continue their efforts to widen the available set of choices for low-income families, since the restrictions they face are more binding. Poor families also face the hurdle of child care costs. This is both because of the high percentage of the per capita income they represent, and the lack of substitutes.

Child care choices have an important effect on the mother's working decision. This aspect has been largely neglected in previous efforts of analyzing ICBF programs. Our results show that mode choice has a significant effect on the mother's employment. The use of ICBF, Center and Non-Parental increases the probability of being employed by 20%, 23% and 50%, respectively. Furthermore, the effect on employment status is much higher for low-income families. Thus, special emphasis should be put in the pertinent public policies to ensure that low-income families can attain their potential by removing the child care obstacle. In addition, effects vary across age groups; for very young children the availability of an alternative care provider is key to mother's employment. As children grow the impact of formal care modes increases significantly, and the effect of Non-Parental care decreases.

As expected, the mother labor market status has significant effects on the risk of using ICBF, Center and Non-Parental Care, which highlights the relationship between the

work decision and the choice of care mode. Also, maternal work increases the use of Non-Parental care relative to Formal care modes, stressing the importance of the availability of Non-Parental care. As the mother's wage increases, Parental care is substituted by other modes. In particular, families turn to formal care modes. As the child gets older, the relative risk of using Center care versus Parental increase; when children turn 4 years old, the use of Centre Care increases dramatically. This might be capturing the normal age at which children are first sent to pre-school. At the same time, it suggests family preferences: mothers want someone close to them (Non-Parental) to take care of their children, especially when they're toddlers, despite the availability of formal modes. However, as children grow, they tend to favor formal care modes.

This study aimed at shedding light at how Colombian families make their care decisions, simultaneously choosing whether the mother works, whether to pay for care and what mode to use. The main conclusions are very similar to those obtained estimating the equations separately. Some additional features are: (i) Education significantly affects the decision to work. As compared to mothers with secondary education, lower educational levels decrease the probability of being employed while higher schooling attainment increases it; (ii) the probability of the mother working increases with child age, especially when the child reaches 4 years of age; (iii) the poor have a lower probability of paying for care and hence care costs might be a hurdle for these families, given that Sisben levels are important in the decisions of whether to pay for care; and (iv) ICBF is vital for poor families, since they have higher the probability of choosing formal care. This highlights of the important role played by ICBF for low-income families.

Despite the present effort to characterize the market, an in-depth characterization is vital to understand the underlying problems and market failure. Especial emphasis should be put in the study of the characteristics of informal providers, and on the quality-price distribution across the available choices. This would imply a survey to providers, to combine with demand information, to investigate the nature of the child care problem in Colombia, and determine the necessary actions to be taken in terms of public policy.

When discussing the future of child care policy in the country, the existence of a trade-off between the two main objectives of child care should be acknowledged explicitly since money spent in enhancing the development and well being of children does not necessarily fulfill cost-effectiveness criteria when thinking about facilitating the employment of parents. The Colombian public supply of child care services does not incorporate explicitly the latter objective. Even though it is not as politically correct as "guaranteeing children the fulfillment of their basic needs, especially regarding nutrition, protection and individual development"[21], it is also a vital role played by these programs. It enables females with young children to work and earn additional income that generates important improvements in the quality of life of the whole family.

HCB has many aspects: nutrition, early stimulation and facilitating parental employment. It is very difficult to ascertain what the optimal design for such a program is, since it has to balance the three objectives. An impact evaluation, as proposed by the government, is needed to safely calculate the impact of the program in the different dimensions. This is particularly important if we want to answer questions such as whether it is desirable to

[21] Law 89 of 1988.

moving from the higher quality-more expensive CAIP model towards the lower quality-less resource per child HCB.

This work is preliminary and it could be improved in many ways. Thus, further steps should be taken to ensure the robustness of the results, such as estimating the system of simultaneous equations using FIML, given the restrictions imposed by the use of the linear probability model. Also, to account for correlation between disturbances and unobserved heterogeneity, following Blau and Hagy (1998), we can assume a common structure of the error term. Finally, a non-parametric characterization of the quality of care could be performed by treating it as unobserved heterogeneity and estimating its kernel density[22]. This exercise would be the first approximation to studying the quality of child care in Colombia that includes private forms of care as well as informal arrangements.

[22] Clearly, we can't identify individually unobserved heterogeneity and quality.

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Annex 1. Predicted Wages with sample selection

Table A2. Wage Equation corrected for Sample Selection

	Wage Equation with Selection Bias Heckman		
	Coef.	**Std. Err.**	
Constant	1,610.24	536.40	***
Age	23.88	14.30	*
No education	-299.23	924.74	
Primary Incomplete	-488.27	417.91	
Primary	-577.32	357.01	
Seconday Incomplete	-537.96	265.86	**
Superior without title	429.79	283.73	
Superior	3,670.20	316.73	***
Atlantic Coast	-775.35	402.76	*
Central-Eastern Region	-297.74	407.42	
Coffee Region	-491.21	423.59	
South-Western Region	-710.42	356.04	**
Antioquia	-542.60	468.04	
Valle del Cauca	-663.09	350.47	*
San Andrés and Providence	-765.50	795.63	
Eastern Plains	-512.34	872.76	
Selectivity Correction			
Rho	-0.28	0.07	
Sigma	3,266.48	80.21	
Lambda	-928.86	256.12	
Sample size	2,644		
Censored	1,419		
Uncensored	1,225		
LR test indept eqns (rho=0) chi2(1)=6.72 Prob>chi(2)=0.0095			

Note: significant at * 90%, ** 95%, *** 99%.

The likelihood-ratio test reported at the bottom of the output justifies the Heckman selection equation with these data at a 99% confidence level, given the value of the Chi-squared.

Annex 2. Mother's Work Decision by Age Groups

Table A3. Mother's Employment Decision -Age of youngest child-

	Work (0-1 years)					Work (2-4 years)				
	Logit			Marginal Eff@		Logit			Marginal Eff@	
	Coef.	Std. Err.		Coef.	Std. Err.	Coef.	Std. Err.		Coef.	Std. Err.
Intercept	4.85	2.52	*			-0.48	1.87			
ICBF	0.60	0.44		0.15	0.11	1.43	0.46	***	0.33	0.09
Center	1.32	0.54	**	0.31	0.11	1.46	0.48	***	0.33	0.10
Non-Parental	2.92	0.32	***	0.56	0.03	2.74	0.35	***	0.45	0.03
Pays for Care	-0.05	0.47		-0.01	0.12	-0.24	0.46		-0.06	0.11
Log Hourly Wage	-1.65	0.28	***	-0.41	0.07	-0.96	0.20	***	-0.24	0.05
Education										
No education	-0.05	0.47		-0.01	0.11	-0.26	0.44		-0.06	0.11
Primary Incomplete	-1.40	0.31	***	-0.29	0.05	0.17	0.24		0.04	0.06
Primary	-1.13	0.28	***	-0.25	0.05	-0.41	0.26		-0.10	0.06
Seconday Incomplete	-0.64	0.23	***	-0.15	0.05	-0.30	0.19		-0.07	0.05
Superior without title	0.80	0.27	***	0.20	0.06	0.53	0.24	**	0.13	0.06
Superior	2.90	0.49	***	0.53	0.04	1.88	0.39	***	0.37	0.05
Age	0.32	0.08	***	0.08	0.02	0.10	0.06	*	0.03	0.01
Age Squared	0.00	0.00	**	0.00	0.00	0.00	0.00		0.00	0.00
Non-Wage Income	0.08	0.08		0.02	0.02	0.35	0.08	***	0.09	0.02
Number of children	-0.27	0.16	*	-0.07	0.04	-0.21	0.17		-0.05	0.04
Marital Status										
Married	0.12	0.19		0.03	0.05	-0.03	0.16		-0.01	0.04
Widowed	2.61	1.31	**	0.48	0.11	1.74	0.68	**	0.34	0.08
Divorced	0.78	0.25	***	0.19	0.06	0.55	0.21	***	0.13	0.05
Single	0.49	0.24	**	0.12	0.06	0.14	0.20		0.03	0.05
Rural	-0.09	0.18		-0.02	0.04	0.12	0.18		0.03	0.04
Region										
Atlantic Coast	-0.58	0.27	**	-0.14	0.06	-1.04	0.24	***	-0.25	0.05
Central-Eastern Region	0.05	0.28		0.01	0.07	0.06	0.23		0.01	0.06
Coffee Region	-0.14	0.28		-0.03	0.07	-0.51	0.25	**	-0.13	0.06
South-Western Region	0.44	0.35		0.11	0.09	0.36	0.31		0.09	0.07
Antioquia	-0.85	0.33	**	-0.19	0.07	-0.83	0.24	***	-0.20	0.05
Valle del Cauca	0.13	0.32		0.03	0.08	-0.37	0.24		-0.09	0.06
San Andrés, Providence	-0.59	2.14		-0.13	0.45	-0.44	2.19		-0.11	0.54
Eastern Plains	-0.40	0.83		-0.09	0.19	-0.44	0.76		-0.11	0.18
Sample size	1,240					1,404				
Pseudo R2	0.28					0.18				
y = Pr(decision) =				0.43					0.53	

Note @: Evaluated at mean of independent variables

Note: * significant at 90%, ** 95%, ***99%.