HOW DO THE COLOMBIAN FAMILIES RESPOND TO THE CHANGES IN THE ECONOMIC CONDITIONS?

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Introduction

The homes respond to the changes in the global economic activity, through changes in the labor offer of the husband and wife, and the other members of the family. During recession times, when incomes fell down, the spouse, particularly the woman, who does not participate in the labor market, goes into it. Meanwhile, the decreasing of the income makes young people in scholar age get out from school, in order to look for a job or make the not remunerated housework. The same happens -although in the opposite direction-, when the employ and the income increase to a better global economic situation.

However, the homes' answer to the changes in the economic situation is not the same in all cases. The homes in worse economic situation react in a different way than the middle/upper class homes. The answer of the labor participation of spouses and young people can be greater than the one of the homes that have a better economic situation. Thus, many children and young people of the poorest homes get out from school during the difficult times and, even though they return in good times, they cannot return to the classrooms. This situation causes that the crisis has a permanent regressive effect on the accumulation of human capital, especially for the most vulnerable families.

This work will try to measure the differentiated effect that the changes in the economic conditions have on the families in terms of labor participation of the spouses and other members of the family, as well as its effect on the scholar attendance of children and young people. In order to obtain the differentiated effect, the families will be classified according structural characteristics of the householder head -education, genre and age -. The differentials effects will let determine which groups have greater volatility and greater vulnerability to the economic cycles. These results are the key for the **social policies' design** that resist or mitigate the effect of the cycles on the homes, particularly in the recession periods.

Background

In spite of widely recognizing the importance of the family as basic economic structure of the society, there are very few studies that deal with the performance of the members within it in a detailed way, especially in which way the homes respond to adverse economy situations. The characteristics that make the homes more or less vulnerable and the strategies with which they have responded before this kind of situations have already been analyzed. In this sense, Hoddinott and Quisumbing (2003) propose several techniques to measure the vulnerability of homes. That is, vulnerability as expected poverty, vulnerability as low expected utility, and vulnerability as exposure to risk.

These authors define vulnerability as the probability that a negative shock decreases the homes or individuals' welfare. That is to say that a home or a person is vulnerable when it faces a negative shock, as for example, a decreasing of its income, loosing the employ or, in general, becoming poor. In this sense, it is important to establish the difference between risk and vulnerability. As the authors mention, the vulnerability is associated to the risk definition. Nevertheless, the first one only considers negative shocks. The authors make four questions that must be analyzed when examining the shocks' impact and the homes' answers in front of them: Who is vulnerable? Which are the sources that determine the vulnerability? How do the homes face risk situations and vulnerability? Which is the relation between risk and the mechanisms to manage them?

An empirical study made by Guarcello et al. (2003) evaluated the strategies of the Guatemalan homes to manage the risk and to reduce the vulnerability. Among the vulnerability factors, the authors studied the labor offer to the families and the scholar attendance of their children. By means of a "propensity scores" methodology, they conclude that the accumulation of human capital depends mainly on the credit restrictions and on the capacity that the homes have to smooth the effect of the adverse economy shocks. This means that the idiosyncratic or collective shocks increase the probability that children leave the studies, looking for a job, or give up full time studies to dedicate to work and to study, but in both cases, they decrease the scholar attendance.

On the other hand, Gaviria (2002), when studying the homes' answer to adverse shocks to their income in seven Latin American countries, observes that the effect of this kind of shocks has three important impacts on the behavior of the homes: firstly, it increases the labor participation of some family members, selling actives and decreasing the investment in human capital[1]; secondly, these shocks affect, for the most part, the behavior of the poor homes; and third, the homes belonging to lower middle stratums reduce the investment in human capital of all the home members, and they move to cheaper neighborhoods. The author concludes proposing the creation of safety nets with state funds, directed to decrease the risk of the most vulnerable homes.

In Colombia, the National Department of Plantation - DNP (2004) - analyzed the strategies used by the families to face the adverse conditions of the economy. According to the report, one of the main factors that affect the homes' risk is the loss of job of the householder head. Once this happens, it increases the probability that the home falls into the poverty. Basing on the information of the Quality of Life Survey (ECV), DNP found a narrow relation between the loss of job of the householder head, and the decreasing of the human capital[2]. In the most vulnerable homes, the youngest children get out searching work and they leave definitively the school. In some cases, the youngest children work at the same time that they study, and logically, this affects the quality of their learning. And finally, when the children of legal age find a job, they decide to leave completely their studies.

All these researches let determine some factors that make the Colombian homes more vulnerable. Some of them analyze the effects of changes in the economic conditions and the result of being more prone or not to face risks. Nevertheless, none of them quantifies the magnitude of the homes vulnerability. Therefore, the intention of this study is to quantify the vulnerability of the Colombian homes, considering a characterization of them, according to the genre, the educative level and the age of the householder head.

[1] The reduction on the human capital investment affects the productivity of the home members, and this increase the probability that the home become vulnerable in the long-term.

[2] That means that the decreasing of the home income, as a result of the job loss of the householder head and the companion, cause that their children go in search of work and abandon the studies.

The Data

This study determines the impact of the economic cycle on labor variables and of homes' education in the seven main cities of Colombia for the period 1984-2002. Among the variables that describe the labor situation, it will be used the unemployment rate, the occupation rate, the labor participation rate and the worked hours of the different home members. Respecting to the education variables, it will be considered the scholar attendance as measure of scholar desertion in the homes, and the educative level average of all the home members. The information has been obtained from the quarterly National Survey of Homes (ENH) 1984-2000 and from the Continuous Survey of Homes (ECH) 2001-2002. These surveys are representative at national level and for the seven main cities.

Groups of homes are constructed according to the genre characteristics, the educative level and the age of the householder head. Among the educative levels, it has been considered the individuals with primary schooling complete or incomplete (from 1 to 5 years of education), secondary schooling complete or incomplete (from 6 to 11 years) and superior education (more than 11 years of education). On the other hand, there are considered the young people (from 21 to 34 years old), adults (from 35 to 44 years old) and senior (from 45 to 54 years old). According to this, the householder heads have been classified in 18 groups.

DESCRIPTIVE STATISTICS

a. Main indicators evolution

Labor Situation

The changes in the economic conditions affect the work decisions of the different homes' members, depending on the depth of the economic change and the vulnerability of the home. According to this, the families adjust to the conditions of the market and make decisions that minimize the decreasing of the home's well-being in the short term.

Considering the genre and the educative level of the householder head, it is observed that the labor participation of the men householder head has stayed constant throughout the two decades studied for the heads of all the education levels. On the contrary, a progressive participation increase of the women family head is observed, especially, from middle ´90, for the women group less qualified. Additionally, it is observed that from 1984, there is an education gap in the women participation. Throughout the period, the gap stays, but at the end of the '90 the groups' tendencies seem to converge (see panel A, Graph 1).

A more interesting result is in the case of the participation of the householders' spouses in the labor market. In first place, the participation of the he householders' spouses has increased throughout the period. In 1984, this indicator represented between the 30% and the 55% of the men householder heads' spouses for the three educative levels, and augmented more than 20 percentage points in 2002. Thus, the 55% of the spouses of the men householder head with primary schooling participate in the labor market, 64% of them have secondary schooling complete and incomplete, and more of 70% of them have superior educative level.

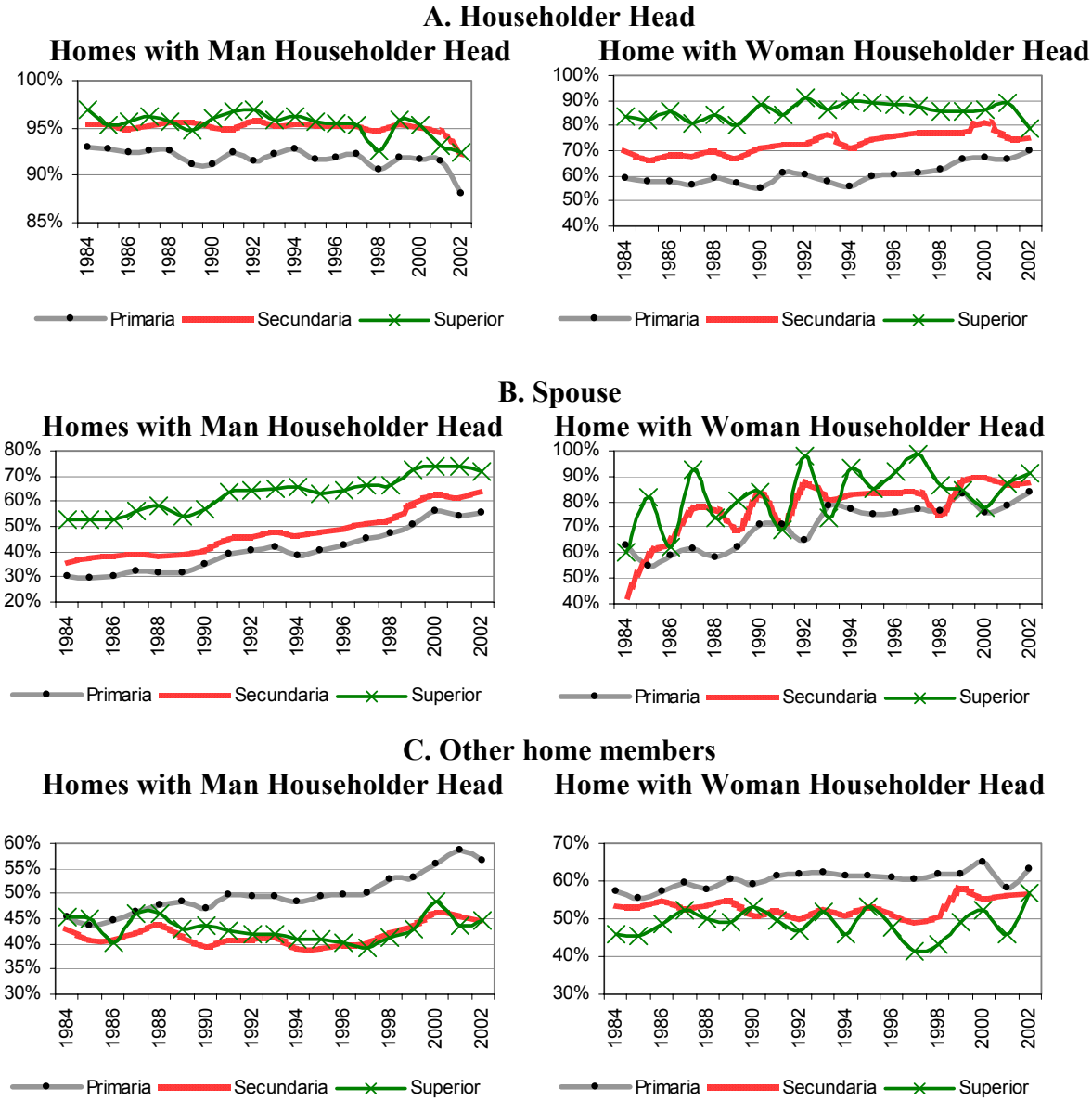
Secondly, the participation of the spouses of the women family head presents great fluctuations between 1984 and 2002. Nevertheless, the participation level is higher than the previous case. This means that in the homes led by women with superior education, their spouses change its decisions of participation in the labor market from a period to another one. Meanwhile, in the homes with women householder head with mid and low education, the participation of the spouses increases until mid '90, period in which it stays around 80% (Panel B, Graph 1).

Finally, it is assessed that the participation of the other home members with a man householder stays constant for the higher education levels. Meanwhile, for the heads with low educative level, this indicator has been increasing since the late '80, reaching to 60% in 2001. Respecting to the participation of the other home members where there is a woman householder, it is observed again that those who participate more in the labor force are those with low education level.

These results would indicate that at recession times, the members of all the homes get out in order to search new opportunities to elude the decreasing of their income. Nevertheless, in the homes with men householder there are more members that can join the work market, as for example the

wife. On the contrary, in the homes with women householders, the absence of the husband in most cases carries to other relatives, like children who are studying, to abandon the school or university to search a job (Panel C, Graph 1). Similar results are in other Latin America countries. Gaviria (2002) finds that the homes that face adverse shocks in their income, increase the labor participation of some of the members, especially those in which the householder head is young and has low education levels.

Graph 1. LABOR PARTICIPATION



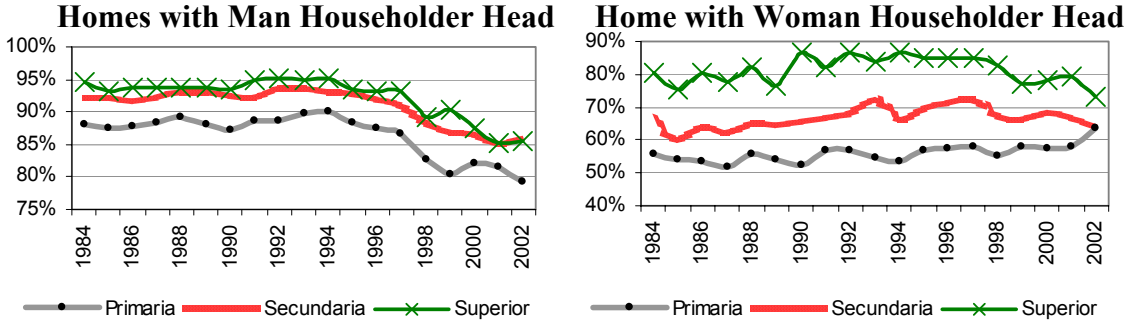
Source: ENH y ECH – Own Calculation

On the other hand, the rate of occupation of the men householder heads has been decreasing from mid '90. For the men householder heads of the three educative levels, the participation in 1984 was around 90% and it stayed constant until 1995, when it was reduced to little less than 85%. In the case of the woman householder heads, the rate of occupation presents changes in the three educative levels. For example, the householders with basic education increased their employ level from 1998, reaching to 64% in 2002. The woman householders with mid education increased their employ level from the '80, reaching a maximum of 72% in 1993, period in which this indicator is reduced gradually until arriving at the same level of the less educated. The rate of occupation of the woman family head with superior education presents an increasing tendency throughout the period. However, at the end of the '90, it is reverted and decreased in more than 10 percentage points, changing from 85% to 73% (Panel A, Graph 2). Observing the behavior of the occupation rate of the spouses of both types of homes, there is a tendency very similar to the participation rate, as for the homes with men householders, as for the homes with women householders (Panel B, Graph 2).

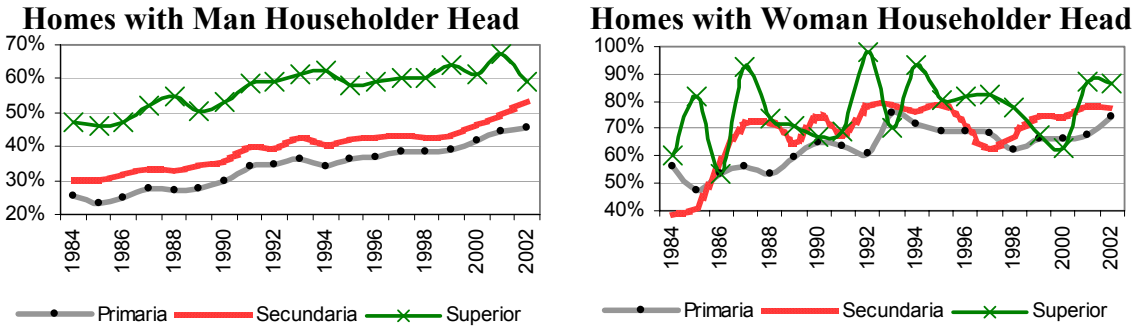
Respecting to the other home members, a greater employ level is observed among those who belong to homes with feminine head, mainly, where the women have low educative level. The increasing tendency for all the groups of homes since the beginning of the '80 is reverted from 1994, when the economy begins to decelerate (Panel C, Graph 2). Finishing the '90, the rate of occupation returns to its level of the beginnings of the '90 for most of the groups, possibly by the jobs decreasing and the increase of the participation of many family members in the work market.

Graph 2. OCCUPATION RATE

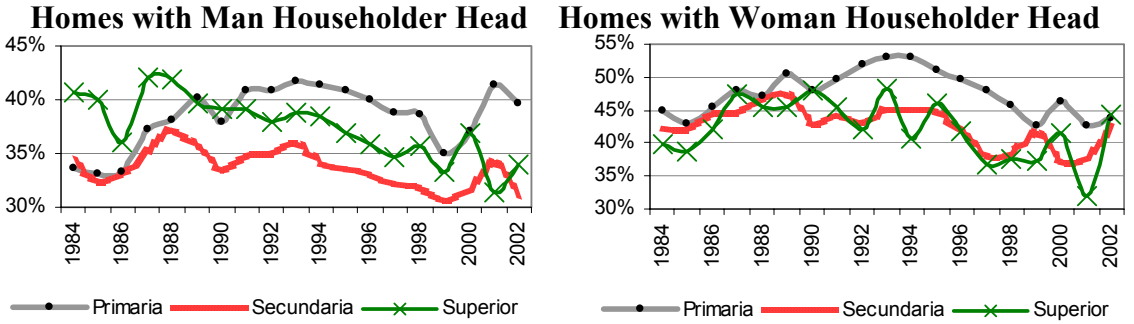
A. Householder Head



B. Spouse



C. Other home members



Source: ENH y ECH – Own Calculation

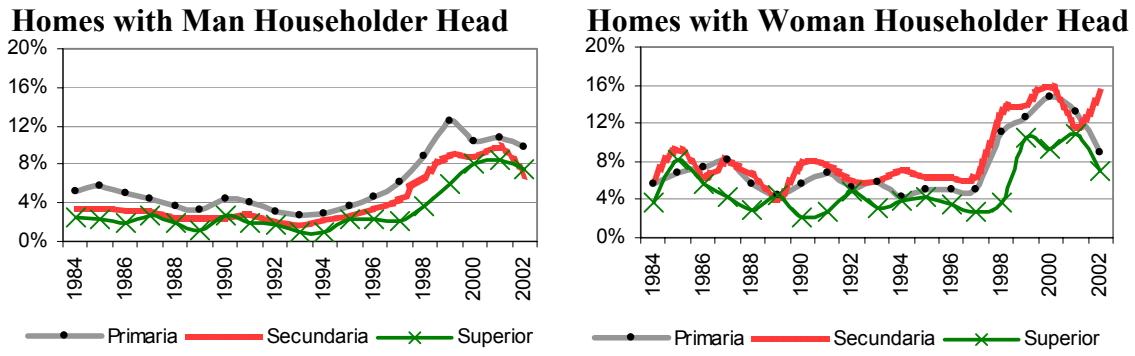
If it is considered the unemployment rate by groups of homes, a very similar pattern for all the groups is observed, except for the spouses of the women head of family. In general terms, the unemployment rate has decreased gradually from the beginnings of the ’80, reaching a minimum level in 1994. From that year, however, it has increased in an accelerated way, arriving to the maximum historical for all the groups between 1999 and 2000. Particularly, the greater unemployment levels have been experienced by the groups with med education level in the homes with feminine head, and with low education level in the homes with male head. The homes where the householder head has superior education presented the lowest unemployment rates. If it is analyzed the situation of each member of the home, greater unemployment rates are appraised at recession times for the she householder heads (Panel A, Graph 3).

The spouse of the men head of family presents higher unemployment rates at the ends of the ’90. Nevertheless, the unemployment level of the women householder heads’ spouses varies along the time (see Panel B, Graph 3). Finally, it is observed that the unemployment of the other home

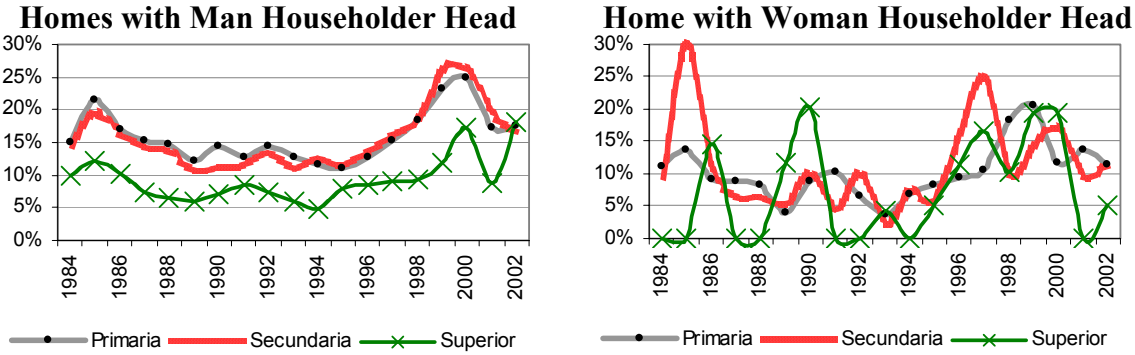
members with feminine householder is greater than the unemployment of the homes with male householder, with the exception of those family heads with superior education (panel C Graph 3).

Graph 3. UNEMPLOYMENT RATE

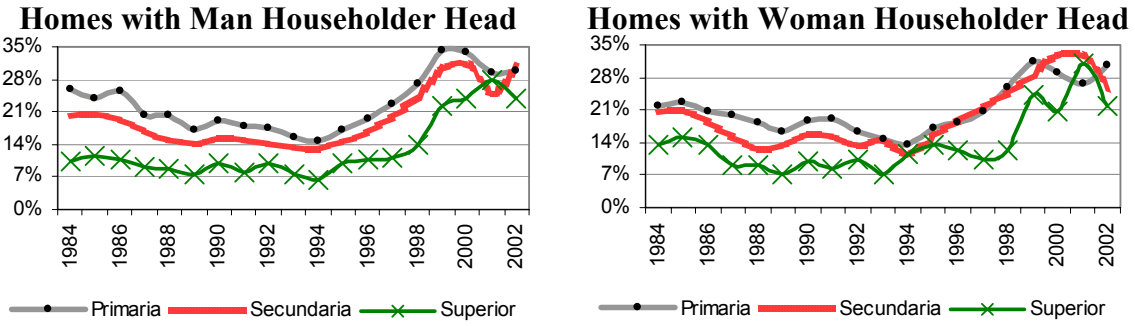
A. Householder Head



B. Spouse



C. Others home members

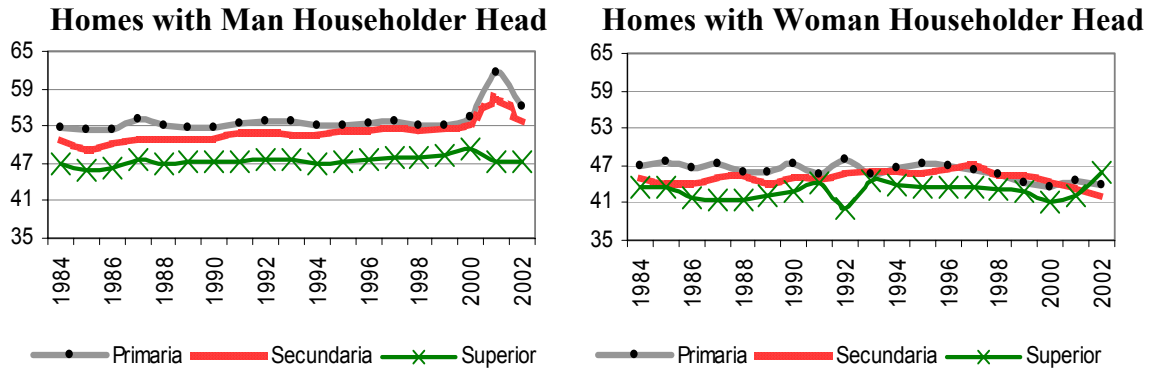


Source: ENH y ECH – Own Calculation

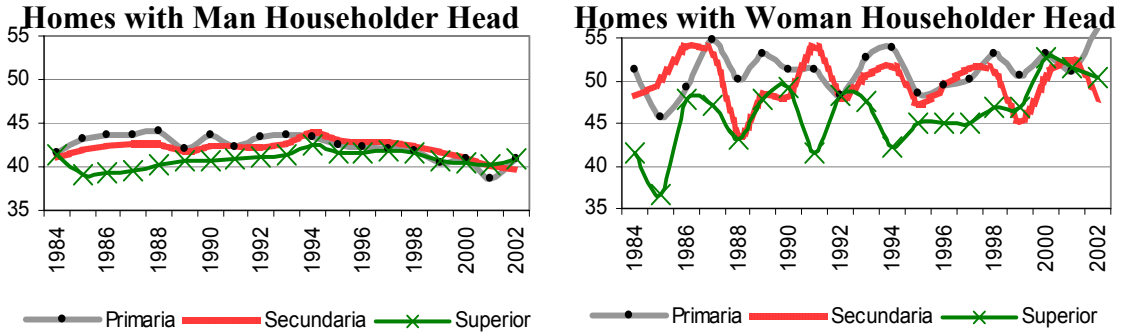
Respecting to the evolution of the worked hours of the family members, there are not many changes during the period. Nevertheless, the number of worked hours per week of the members of each group of homes behaves in a different way. In first place, it is appraised that the men householders with superior education decrease the number of worked hours from 2000, while the workers with lower education levels increased the number of hours in the same period. On the other hand, the women family heads do not seem to show changes in this indicator, even though in 1996, they show a small decreasing. Secondly, the spouses of the men householder heads reveal a similar tendency to the women householder heads. For the spouses of these women head of family, there is not a defined pattern. Later, the other home members with masculine and feminine head decreased continuously the number of worked hours per week. This result stays for the families of the householders of all the educative levels, but those with superior education seem to work more hours (see the results in Panel A, B and C, Graph 4).

Graph 4. NORMALLY WORKED HOURES PER WEEK

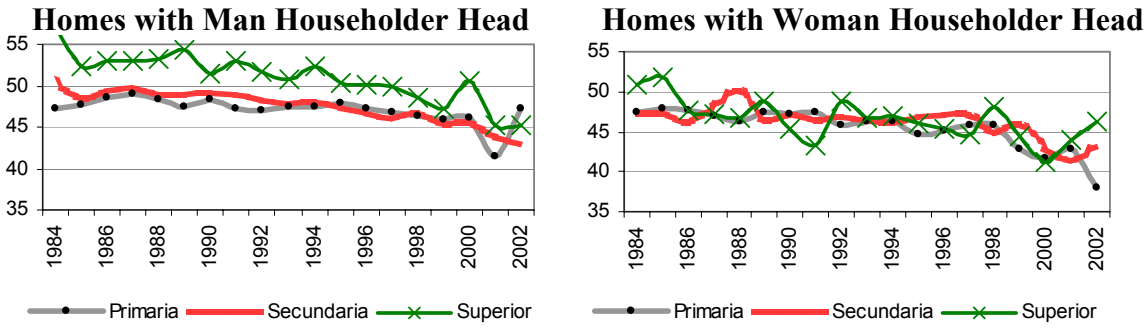
A. Home Head



B. Spouse



C. Other home members



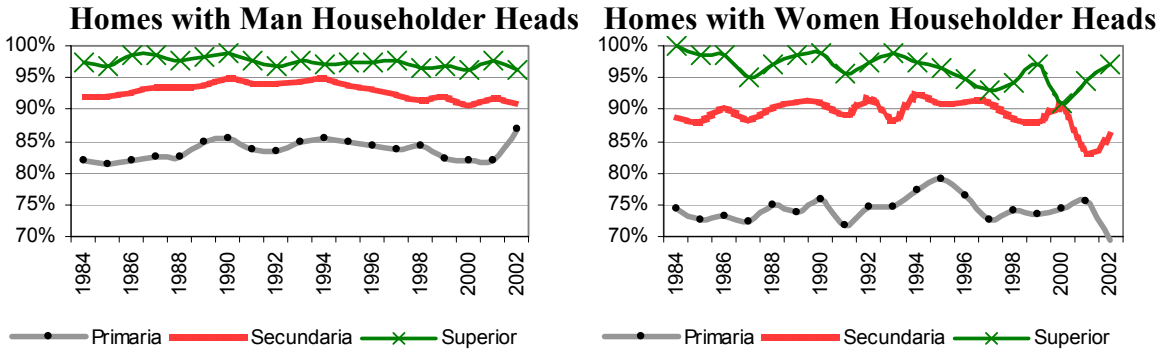
Source: ENH y ECH – Own Calculation

Education

The Graph 5 shows the scholar attendance[3] of the homes with masculine and feminine household heads. In the first case, it is observed that in the homes where the head has only primary schooling, the scholar attendance of the family members increased from 81% in 1984 to 86% in 2002.On the contrary, the scholar attendance of families with mid education levels decreased from mid ´90. Meanwhile, in the homes with superior education, the attendance stayed constant during the period. In the case of the homes with women household heads, those persons that belong to families with householders with primary education, the level of scholar attendance is very low (in the whole period it does not reach 80%); in the families with secondary education, the attendance also decreases from 1996, and in opposition to the homes with he householders with superior education, the attendance decreases in the ´90, but from 2000, it returns to its habitual level. This result shows us that the members of homes with householders with low education levels have greater probability of deserting of the school or educative center, when they face adverse shocks in the economic activity[4].

[3] That means the number of persons between 6 and 18 years old that attend some educative center, divided by the total people in scholar age (from 6 to 18 years old).

Graph 5. SCOOLAR ATTENDANCE



Source: ENH y ECH – Own calculation

With the found tendencies, it is possible to affirm that somehow the changes in the economy conditions affect the labor offer of the homes. Thus, adverse shocks force the home members to change their decisions about the labor situation and the education. Some works at international level have found that the answer of the homes to the economic cycle varies depending on the exposure to the risk of loosing the job[5], on the labor qualification degree of the home members[6] and on the socioeconomic level of the home[7].

With this fact, it is evident that the economy shocks have a different impact on the homes, depending on the characteristics of the home members and its composition. It turns out interesting, then, to explore how the different groups of homes respond, according to the age and the education of the householder head, and to establish if this inequality is the one which determines the vulnerability of the home or if it does not depend on the characteristics of the members that compose it. Therefore, it is necessary to make a study that would analyze the relative effects of the economic cycle on different groups of homes, considering the characteristic of the home members.

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[4] This result is also found by Gaviria (2002) on his study "Household Responses to Adverse Income Shocks in Latin America".
[5] Clark et. al (1994)
[6] Prasad (1996)
[7] Gaviria (2002)

Volatility of the homes

In order to determine possible ways of answer of the homes to face the changes in the economy conditions, it was made an exercise comparing the variation of a variable of interest for a group of homes and the variation of the reference group. In this case, there were analyzed the homes with he and she householder heads with low, mid and high education, in the seven main cities of Colombia. The reference group is conformed by homes where the head is a man with superior education. In Annex 1, Graphical A1.1 to A1.5, there are shown the volatility measuring of each group of homes relative to the reference group, for each variable of interest.

Each point in the graphs indicates the average variation (calculated as the average of the absolute value of change) in the pointed period, for the *m* city and *j* group. In the x-axis, it appears the average variation of each variable of the labor market or scholastic attendance for the reference group, and in the y-axis, the average variation of the same variable to a specific group. The volatility degree of the group is simply the distance of the group to the respective axis. The relative volatility is determined by observing if the group is above or below the 45 degrees line. When dividing the distance to the axis of the specific group (in the y-axis) by the distance of the control group (in the x-axis), it is obtained the relative vulnerability of the mentioned group. The volatility changes in the periods 1984 -1992 and 1993 -2002[8] are simply the difference between the both periods of the absolute and relatives values (see Pictures 1 and 2). This result is obtained for the seven main cities of the country.

In first place, when comparing the average variation of the variables of the labor market and the scholastic attendance of the groups where the householder head is a man with mid or basic education or, against the control group, a man with superior education, it is found that:

- The variation of the participation rate of the spouses and the home members is greater in the second period (1993-2002), thus, the relative volatility increases the volatility of the reference group. This is also perceived in the Graphs of Annex 1.

[8] It has been chosen these periods with the aim of determining if the economy opening and the work reforms from the beginning of the ’90 motivated some change in the homes’ volatility.

- In some cities, the relative variation change from being close to the 45 degrees line in the first period, to being over the line in the second period (some points of other cities are located below this line in the same period).
- Something similar happens with the variation of the employ and the participation in the homes with feminine householders head.

This result let recognize that the individuals of different groups of homes are more affected by the changes in the economy conditions in the period between 1993 and 2002, than the individuals that belong to the reference group. In the first period, all the homes reacted in a similar way to the reference group. The volatility of the unemployment rate of the homes with low and mid educative level behaves in the same way in front of the economic cycle, only for the home members different of the householder head and the spouse. The spouses of families with higher superior education seem to have reduced the volatility of the unemployment during the ’90 in relation to the homes with more educated he householder heads.

Finely, if it is observed the relative variation of the scholar attendance, it is found that the family members with she householders with mid and low education are more affected in the second period than those that belong to homes with he heads. Thus, the children of the she householder heads with greater probability, since very few have spouses or companions, get out in search of work to resist the income decreasing of the home and, therefore, with greater probability of deserting school[9].

[9] In the Annex 2, from Graphs A2.1 to A2.5, it is presented the relation between the average variations of each group respecting to the reference group, of the homes with feminine householder head.

Picture 1. Relative volatility to the reference group

a. Homes with he householder heads – 7 cities

Variable	1984-1992 Period		1993-2002 Period		Volatility Change	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
PARTICIPATION RATE						
Spouse	1.541	1.404	0.783	0.800	-0.758	-0.605
Other members	1.188	1.129	0.886	0.892	-0.302	-0.238
OCCUPATION RATE						
Spouse	1.470	1.235	0.792	0.790	-0.678	-0.445
Other members	1.050	0.998	0.932	0.956	-0.118	-0.041
UNEMPLOYMENT RATE						
Spouse	0.957	1.238	1.338	1.340	0.381	0.102
Other members	1.513	1.386	0.893	1.103	-0.620	-0.283
WORKED HOURS						
Spouse	1.520	1.276	1.263	0.925	-0.257	-0.351
Other members	0.768	0.778	0.956	0.585	0.188	-0.193
SCHOOLAR ATTENDANCE						
	1.083	0.897	1.276	1.574	0.193	0.677

Source: ENH, ECH – Own calculation

b. Homes with he householder heads – 7 cities

Variable	1984-1992 Period			1993-2002 Period			Volatility Change		
	Primary	Secondary	Superior	Primary	Secondary	Superior	Primary	Secondary	Superior
PARTICIPATION RATE									
Spouse	1.060	1.180	1.290	0.742	0.709	0.858	-0.318	-0.471	-0.432
Other members	1.394	1.305	1.649	0.610	0.583	0.653	-0.784	-0.723	-0.996
OCUPATION RATE									
Spouse	0.931	1.001	1.232	0.851	0.739	0.891	-0.080	-0.262	-0.341
Other members	1.192	1.128	1.516	0.800	0.591	0.726	-0.392	-0.537	-0.790
UNEMPLOYMENT RATE									
Spouse	0.921	1.329	1.067	1.465	1.289	1.719	0.544	-0.040	0.652
Other members	1.444	1.359	1.142	1.156	1.145	1.120	-0.287	-0.214	-0.022
WORKED HOURS									
Spouse	6.100	6.584	16.435	3.143	3.646	4.906	-2.957	-2.938	-11.528
Other members	0.917	0.950	2.173	1.259	0.815	1.425	0.341	-0.135	-0.748
SCHOOLAR ATTENDANCE									
	0.965	1.056	1.186	1.194	1.119	1.237	0.229	0.063	0.051

Source: ENH, ECH – Own calculation

Once the relative volatility is known (Picture 1), it is necessary to determine the absolute changes in the variables of interest for the groups of homes. In other words, the absolute volatility of the homes is calculated (Picture 2). If the difference in the distance between both periods is positive

(Distance $_{t}$ - Distance $_{t-1}$ >0), the absolute volatility increases. If the difference is negative, the home is less volatile in the second period.

As it is observed in the Panel A of Picture 2, the absolute volatility of the wife and the other home members who belong to homes with he householders, increases to most of the labor variables and to the different educative levels of the head. Nevertheless, in the case of the unemployment rate, the change of the absolute volatility of other home members is negative when the head has low or mid education. This indicates a decreasing of the absolute volatility of both groups. It happens the same with the scholar attendance of other members of the group when the head has secondary schooling.

If now we observe the results of Panel B, it is perceived a decreasing on the indicator for a greater number of groups of homes with feminine householder head and labor variables, especially when the head has superior education. The change in the participation and the occupation of the home members with she householder less educated is very small, indicating that this group of people is affected in a similar way in both periods by the changes in the economy conditions. On the other hand, the spouses do seem to face more difficultly the adverse shocks in the second period. The variation in the participation and the occupation of this group is greater between 1993 and 2002. Finally, the worked hours seem to be less volatile during the second period in the homes with she heads and basic, medium and superior education.

Picture 2. Absolute volatility by group of homes

a. Homes with he householder heads – 7 cities

Variable	1984-1992 Period			1993-2002 Period			Volatility Change		
	Primary	Secondary	Superior	Primary	Secondary	Superior	Primary	Secondary	Superior
PARTICIPATION RATE									
Spouse	0.174	0.159	0.125	0.254	0.254	0.331	0.080	0.094	0.206
Other members	0.067	0.064	0.058	0.113	0.114	0.131	0.047	0.050	0.073
OCCUPATION RATE									
Spouse	0.152	0.128	0.110	0.258	0.258	0.337	0.105	0.130	0.227
Other members	0.058	0.055	0.056	0.103	0.108	0.115	0.045	0.053	0.058
UNEMPLOYMENT RATE									
Spouse	0.059	0.077	0.063	0.109	0.095	0.111	0.050	0.019	0.047
Other members	0.102	0.097	0.073	0.079	0.096	0.101	-0.023	-0.001	0.028
WORKED HOURS									
Spouse	0.049	0.043	0.037	0.059	0.044	0.050	0.010	0.001	0.012
Other members	0.042	0.044	0.060	0.066	0.040	0.078	0.023	-0.004	0.018
SCHOLAR ATTENDANCE									
	0.039	0.032	0.038	0.093	0.108	0.078	0.053	0.076	0.040

Source: ENH, ECH – Own calculation

a. Homes with she householder heads – 7 cities

Variable	1984-1992 Period			1993-2002 Period			Volatility Change		
	Primary	Secondary	Superior	Primary	Secondary	Superior	Primary	Secondary	Superior
PARTICIPACION RATE									
Spouse	0.123	0.134	0.151	0.240	0.240	0.277	0.116	0.106	0.126
Other members	0.079	0.074	0.097	0.077	0.074	0.083	-0.001	0.000	-0.013
OCCUPATION RATE									
Spouse	0.099	0.104	0.133	0.286	0.250	0.290	0.187	0.146	0.157
Other members	0.066	0.063	0.084	0.088	0.065	0.080	0.022	0.003	-0.004
UNEMPLOYMENT RATE									
Spouse	0.058	0.083	0.067	0.140	0.096	0.128	0.082	0.013	0.061
Other members	0.093	0.095	0.080	0.102	0.095	0.093	0.009	0.000	0.013
WORKED HOURS									
Spouse	0.187	0.202	0.503	0.146	0.171	0.235	-0.041	-0.031	-0.268
Other members	0.055	0.059	0.118	0.090	0.061	0.102	0.035	0.002	-0.016
SCHOLAR ATTENDANCE									
	0.035	0.038	0.044	0.091	0.084	0.091	0.056	0.046	0.047

Source: ENH, ECH – Own calculation

Methodology

The relative impact of the economic cycle was quantified on the labor situation of the home members, considering the characteristics of the householder head, as genre, educative level and age. To do it, it has been used the methodology suggested by Hoynes (1999). Supposing that y_{jmt}

is the variable of interest (labor situation[10] and education access) of the home member of the *j* group, in the *m* city and the *t* moment, the effect differentiated by groups of homes is considered as it is shown in the equation (1):

$$\ln(y_{jmt}) = \alpha_{0j} + \alpha_j t + \delta_t + \mu_m + \gamma_j \ln(y_{mt}) + \nu_{jmt} \qquad (1)$$

In this equation, α_{oj} are the permanent differences between the groups of homes, α_j are the specific tendencies of each group, δ_t are the temporary fixed effects, μ_m are the permanent differences between the cities and ν_{jmt} is the estimation error. The γ_j interest parameters represent the effect of the economic cycle of the *m* city in the *t* period, on each group of homes.

Differentiating the equation (1), it is obtained the following result:

$$\Delta \ln(y_{jmt}) = \alpha_j + \lambda_t + \gamma_j \Delta \ln(y_{mt}) + \varepsilon_{jmt} \qquad (2)$$

The change in the labor situation and/or the scholar attendance of the home members is explained mainly by the change in the local economic conditions along the time. Nevertheless, this estimation can have a problem when trying to quantify an exogenous measure of the economic cycle $\Delta \ln(y_{mt})$. In first place, Summers and Clark (1981) use the unemployment rate as a variable of the economic cycle. However, this leads to an endogenous problem that has been orchestrated by Bound and Holzer (1993). On the other hand, Hoynes (1999) uses an alternative measure, where he considers the shock in *m* city and the *t* moment as non-observed and he estimates each $\Delta \ln(y_{mt})$ as parameters to estimate the effect of the economic cycle, by means of the following equation:

$$\Delta \ln(y_{jmt}) = \alpha_j + \gamma_j \beta_{mt} + \varepsilon_{jmt} \qquad (3)$$

The β_{mt} are the parameters to consider. These ones capture the shock on *m* city in the *t* period. In the model, there are totally M*T shock parameters, and J*M*T observations, where J is the total number of the groups of homes, M are the cities and T are the number of periods. Therefore, the parameters of the equation can be considered without identification problems.

[10] It will be considered the participation rate, the occupation rate, the unemployment rate and the normal worked

For each variable of interest (work and education), it is estimated the equation (3) by Nonlinear Square Minimums[11]. It is important to mention that the parameters that capture the shocks' effect on each group of homes (γ_j's) are standardized to establish a scale in the relative effect to a reference group. The *j* group is chosen and the respective parameter is standardized as equal to one (γ_j=1). Thus, the other groups' parameters capture the relative effect of each group respecting to the effect of the reference group.

The exercises will be done grouping the homes according to some characteristics of the householder head, such as genre, educative level and age. Additionally, the variables related to the householder head, his/her spouse and the other home members will be contemplated, in order to establish if the homes' vulnerability is determined by the vulnerability of some member in particular.

The economic cycle effect over the homes

The results of the estimation of the relative economic effect of the cycles on the labor situation and the scholar attendance of the home members were obtained based on a model for each interest variable, having as reference group the homes with adult men householder heads with superior education.

In Annex 3, Picture A3.1, the γ parameters appear. They capture the shock effect on *m* city in the *t* period over the participation rate and occupation rate of the groups of homes, related to the effect on the same variables of the reference group[12].

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hours per week of the householder head, the spouse or other home members.

[11] In a more specific way, it is estimated the following equation:

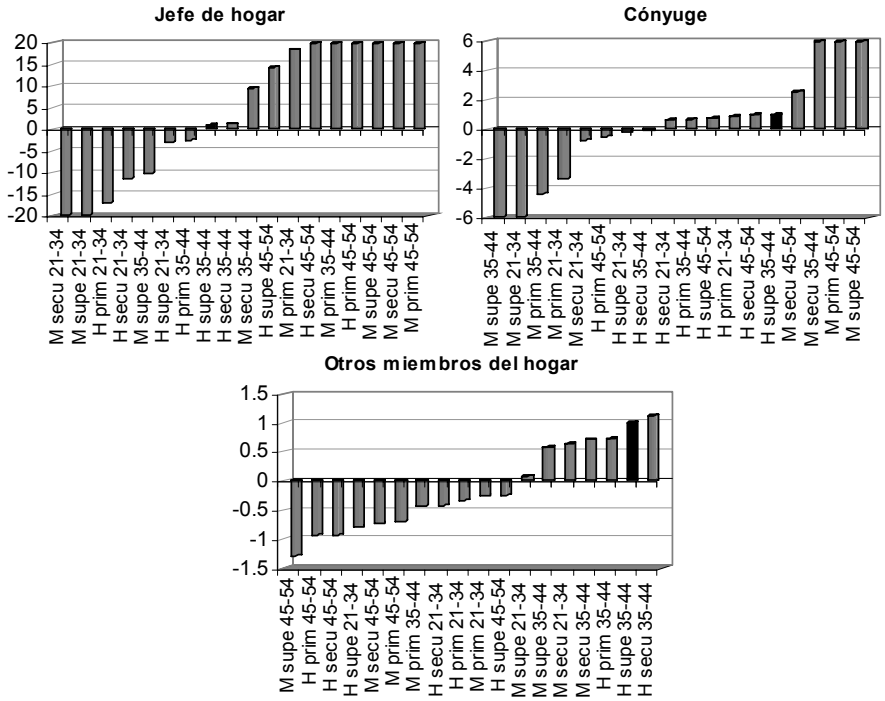
$$\Delta \ln(y_{jmt}) = \sum_{j=1}^{J} \alpha_j * D_j + \sum_{j=1}^{J} \gamma_j D_j * \left(\sum_{m=1}^{M} \sum_{t=1}^{T} \beta_{mt} D_{mt} \right) + \varepsilon_{jmt}$$

Here, Dj is a dummy that represents each group of homes, and Dmt represents each city at each moment.

[12] The estimations' results can also be appreciated from Graph 6 to Graph 10.

In first place, the participation rate of the householder heads is more volatile for the majority of the groups of homes, respecting to the group of adult men householder head with secondary education (see Graph 6). In some cases, the answer of the homes is countercyclical, like for example, the homes with young householder head, as men so as women with higher education level. The groups that seem more affected by the economy fluctuations are the householder heads greater than 45 years old, of all education levels. Respecting to the participation of the spouse, it is observed that the participation of the spouses of the homes with he household head is less affected than the spouses of she householder head. The relative coefficients to each group are greater than one, which means that the effect of an adverse shock in the economy carries the husband of the she householder head get out in search of work. Different results are obtained in the rest of the home members. The labor participation rate is more volatile in the majority of the homes respecting to those that belong to the reference group.

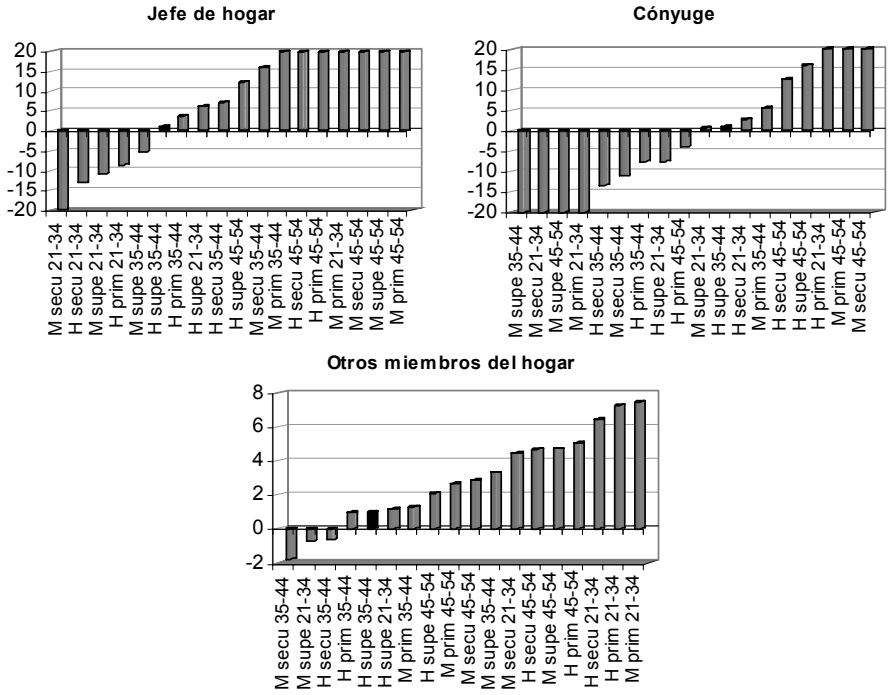
Graph 6. γ Parameters – Participation rate



Secondly, the occupation rate of the householder heads presents the same behavior that the participation rate (see Graph 7). Nevertheless, the answer of some groups of homes changes to be greater than the one of the reference group.

This indicates that the householder heads of all the groups of families are more employed at recession times than the adult men family heads with superior education. In this sense, the employ level of the spouses and the other home members vary in greater magnitude in all the homes than in those that belong to the reference group. It is important to note that when the economy recovers, the husbands of the she householder head of all ages, do not leave their jobs; they continue not just being part of the labor force, but also employed (this is perceived by the negative sign of the coefficients of these groups of homes).

Graph 7. γ Parameters – Occupation Rate

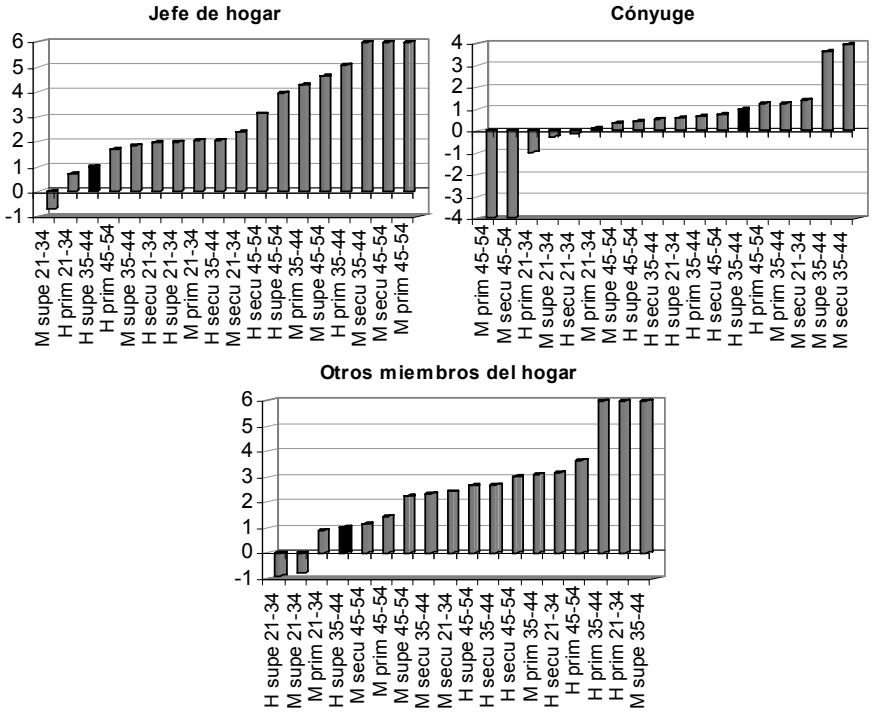


Considering the unemployment rate, all the householder heads are more affected by the economic fluctuations than the heads of the reference group. Thus, the heads of the majority of the homes loose their employ at recession times, except the young women householder head more educated and young men head with basic education (Graph 8). The impact of the adverse economy shocks is more than six times greater in the unemployment of homes with she heads than on the unemployment of the reference group. Again, the spouses of the he householder heads are more

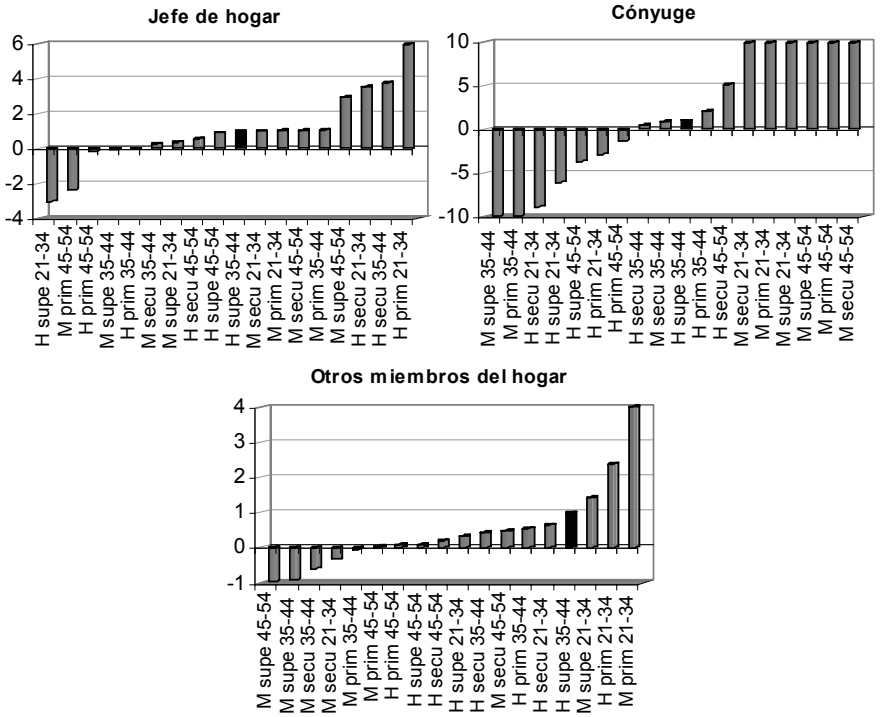
protected against the unemployment that the spouses of the women. On the other hand, the unemployment of the other home members is more volatile in most of the homes, because they present a greater answer than the group of adult men householder heads with superior education.

Another very important variable in the labor situation analysis of the home members is the number of normally worked hours per week. The men householder heads with mid and low education level, who are adults of age, must increase the number of worked hours in a greater proportion, in order to resist the income reduction of the home, caused by the deceleration of the economy. Meanwhile, the young men with superior education reduce the number of worked hours, possibly because they decide to increase their human capital or because they do not work more by a less income, since their reserve salary is much greater (see Graph 9). The situation for the spouses of the women householder heads is similar to which happens in the participation; however, the situation for the spouses of the men householder heads gets worse. A greater number of spouses must work more hours per week to compensate the income reduction of the home. The contrary happens with the other home members. In most homes, the individuals different from the head or the spouse do not seem to increase the number of worked hours per week, except in the homes with young men heads and women with low education level.

Graph 8. γ Parameters – Unemployment rate

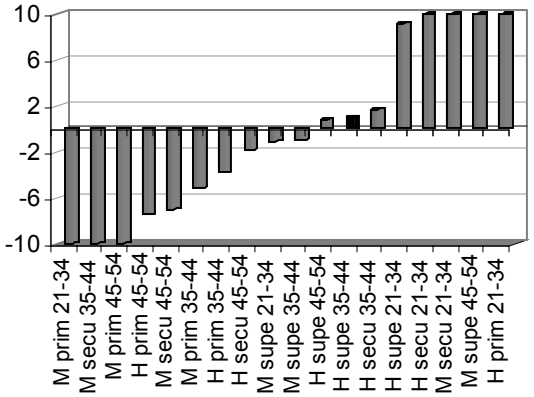


Graph 9. γ Parameters – Worked hours



Finally, it is observed that the scholar desertion is much greater in homes with young heads with mid education. Once the economy returns to grow, the members of homes with older heads do not return to study, continuing in the labor market (see Graph 10). As a result of the permanent abandonment of the study, the children of the most affected families stop the human capital accumulation, and this is translated in the long term in lower occupation levels, and therefore, lower income levels for the home.

Graph 10. γ Parameters – Scholar Attendance



Conclusions

In order to determine the vulnerability of the homes in front of adverse economy shocks, there has been considered indicators that measure the labor situation of the home members, as well as the scholar attendance of them. With information of the quarterly National Survey of Homes (ENH) and the Continuous Survey of Homes (ECH), there were made estimations about the variables unemployment rate, participation rate, occupation rate, worked hours, and scholar attendance.

Considering some characteristics of the householder head, as genre, educative level and age, it was found that the women householder heads and their spouses get out in search of work opportunities at adverse situations with more frequency and they are employed more than those that belong to homes with masculine householder heads. The home members different from the head and his/her spouse do not get out in work search; they seem to remain more time in the home before getting out in search of work than those that belongs to the homes of the reference group (homes with adult men householder heads with superior education). Nevertheless, a greater number of them remain unemployed. In this same line, the women householder head continue being the most vulnerable. That means that the unemployment of the heads and spouses of homes with feminine householder head responds in greater magnitude than the homes with masculine head. It was also found that the heads and other members of homes with younger householder

heads increase the number of worked hours per week, as a result of an income decreasing of the home.

Respecting to the scholar attendance, it was found that the members of families with young householder heads and mid education levels, are those who retire more frequently from schools or educative centers at recession times, in order to resist the income decreasing of the home. Thus, the families moderately educated respond to adverse shocks stopping to invest in human capital.

All these results allow recognize that the homes led by women do not have enough adjustment mechanisms to face the adverse economy shocks. Therefore, the social protection policies must be directed mainly to favor this group of homes.

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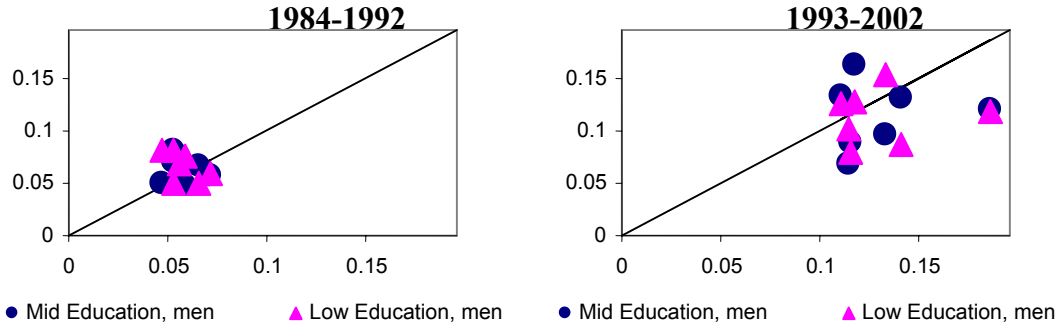
ANNEX 1. Volatility of the homes with male head

Graph A1.1. Participation Rate

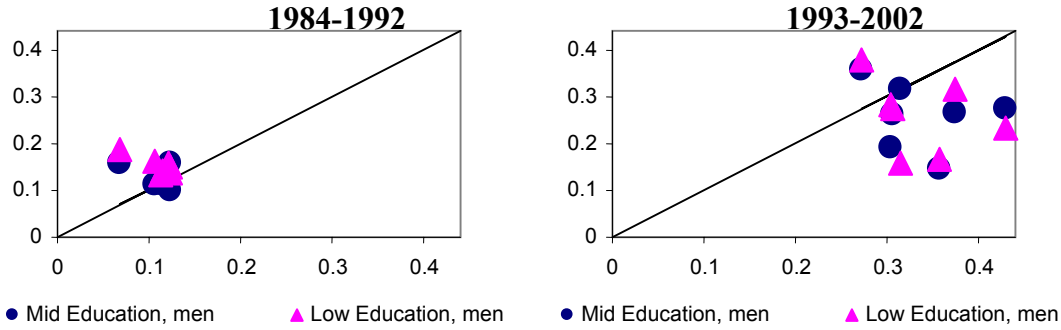
A. Spouse

B. Other home members

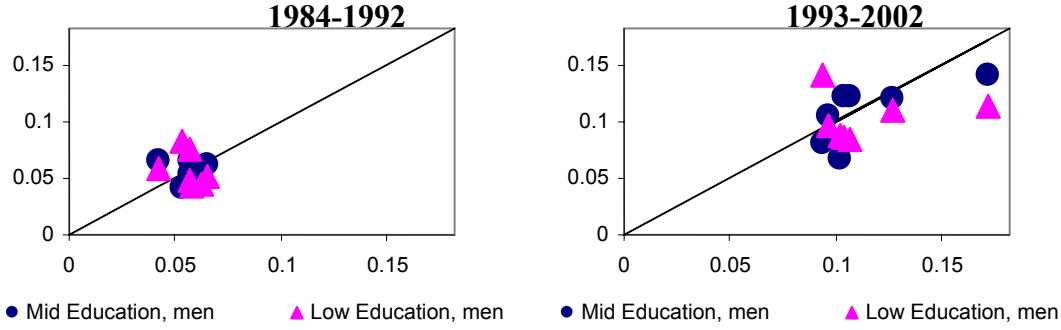


Graph A1.2. Occupation Rate

A. Spouse

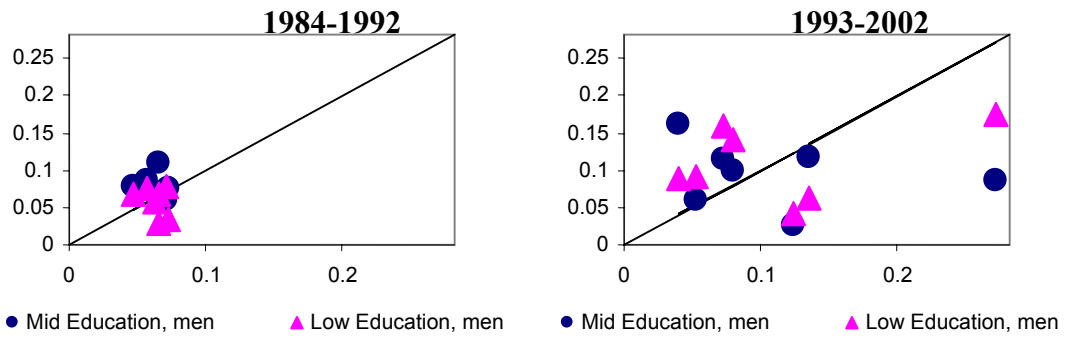


B. Other home members

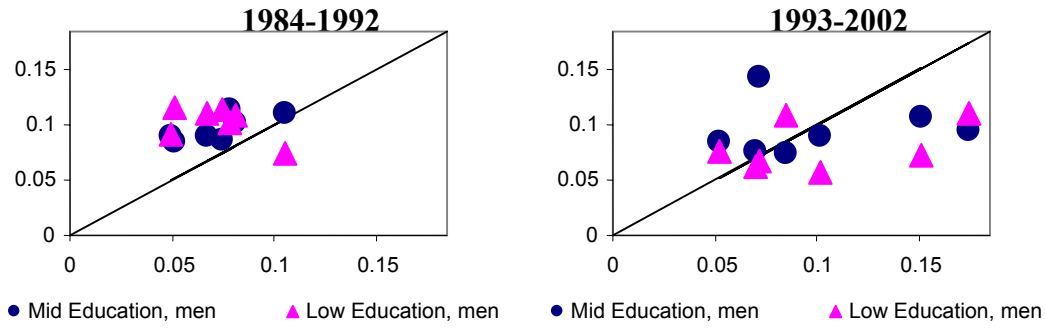


Graph A1.3. Unemployment Rate

A. Spouse

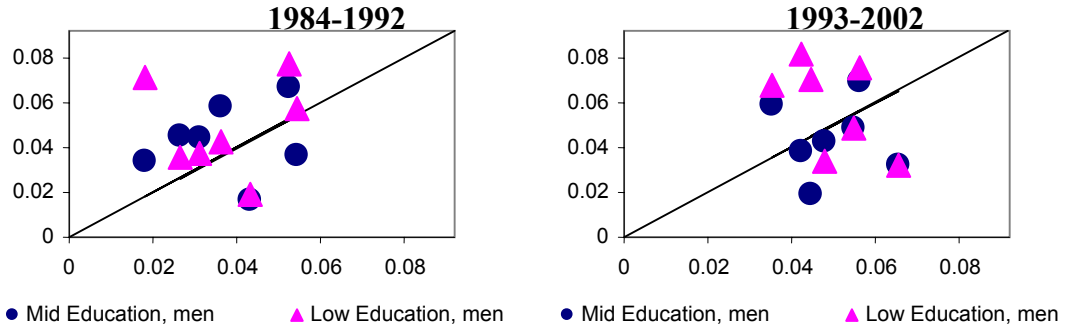


B. Other home members

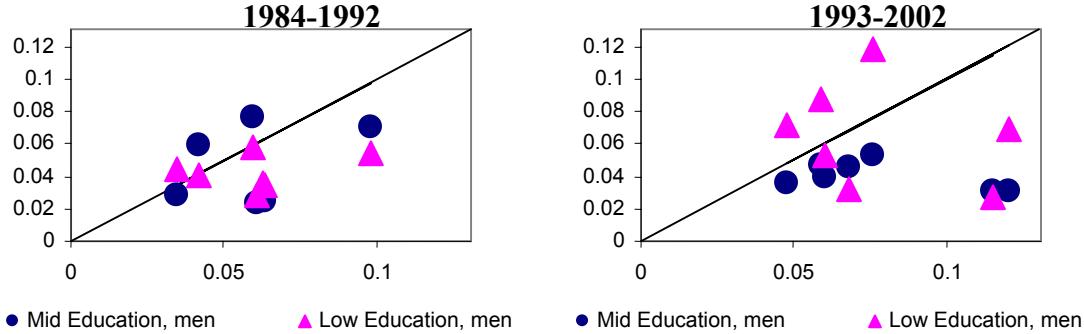


Graph A1.4. Worked hours

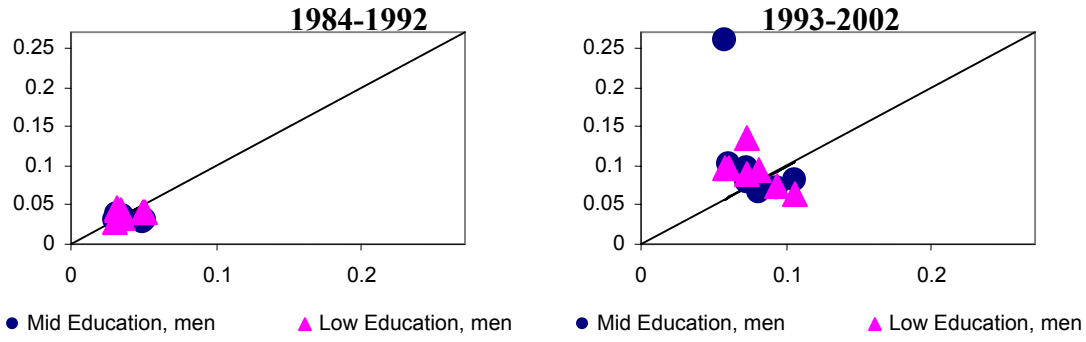
A. Spouse



B. Other home members



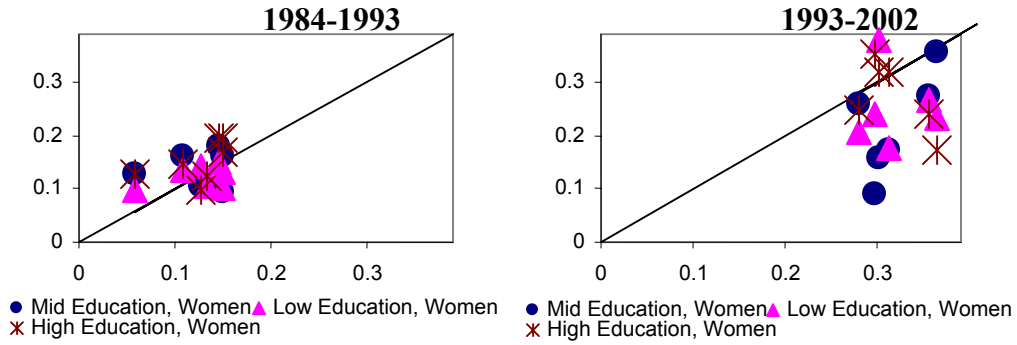
Graph A1.5. Scholar Attendance



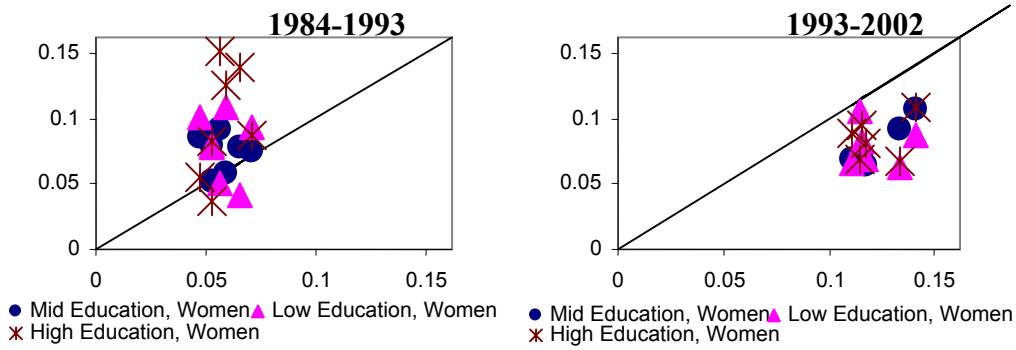
ANNEX 2. Volatility of the homes with feminine head

Graph A2.1. Participation Rate

A. Spouse

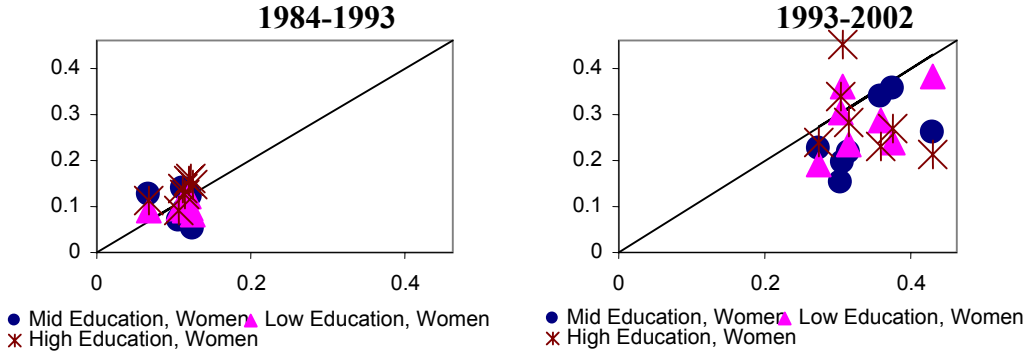


B. Other home members

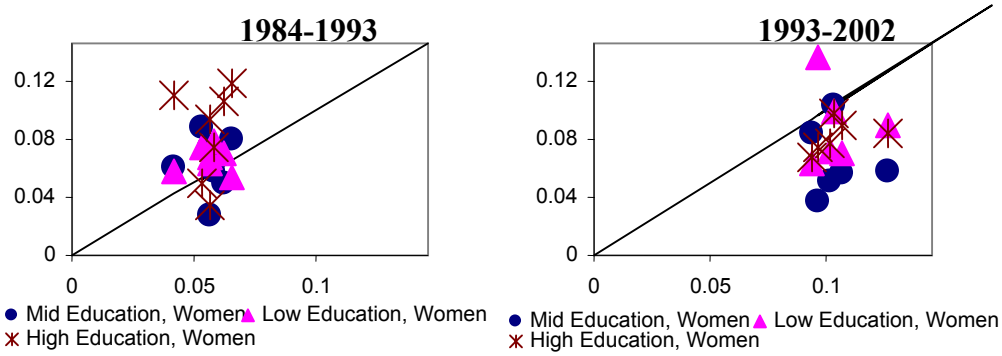


Graph A2.2. Occupation Rate

A. Spouse

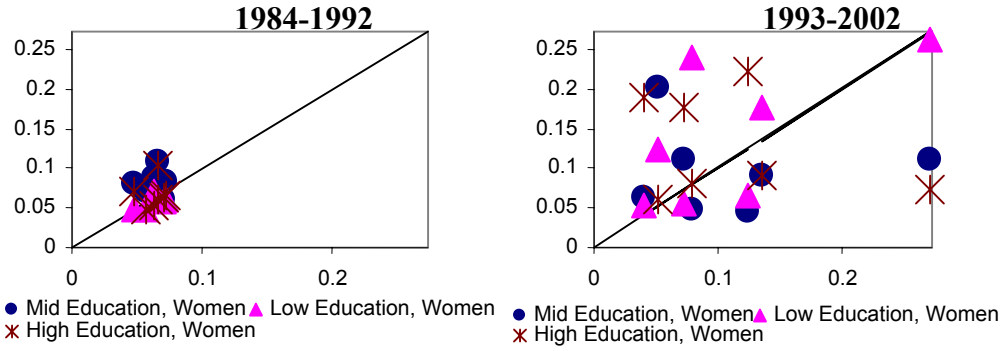


B. Other home members

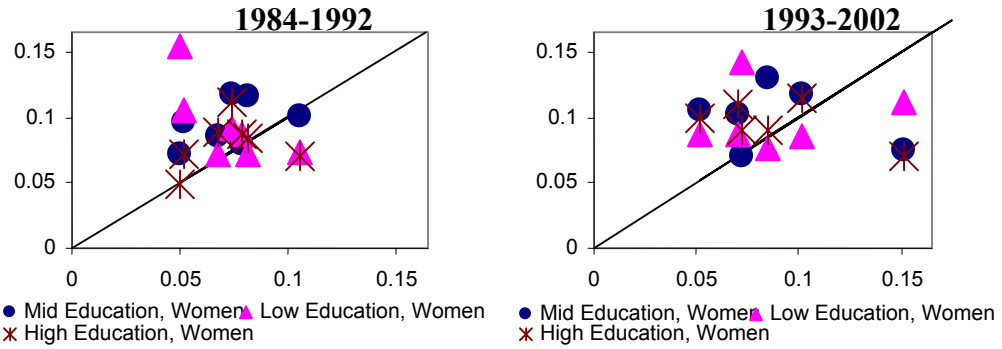


Graph A2.3. Unemployment Rate

A. Spouse

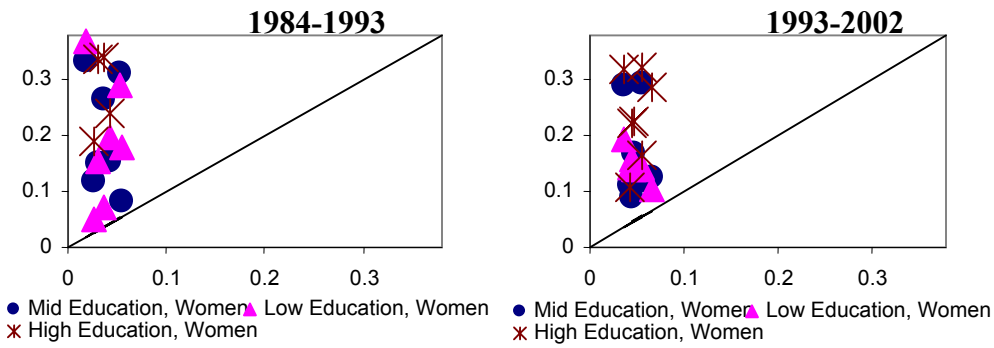


B. Other home members

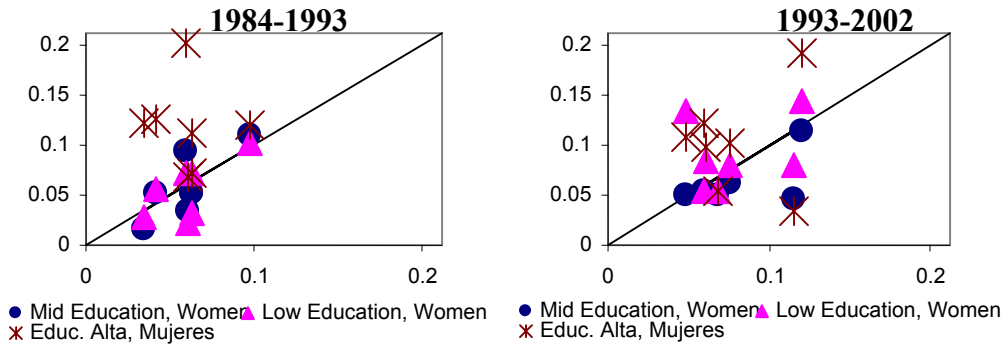


Graph A2.4. Worked Hours

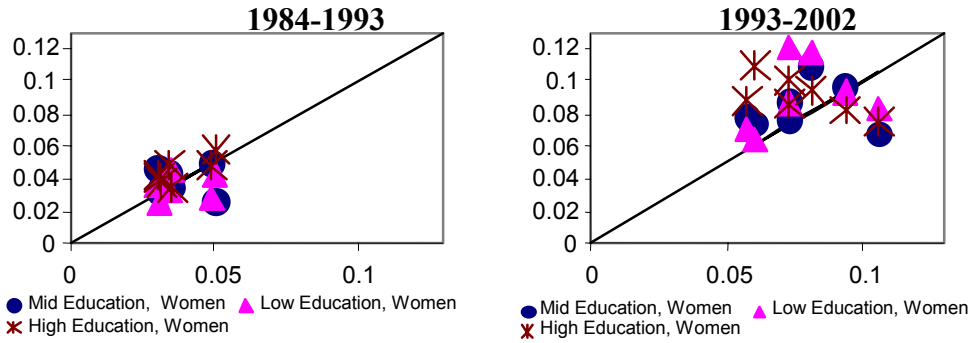
A. Spouse



B. Other home members



Graph A2.5. Sholar Attendance



Picture A3.1. Relative effect of the economic cycle over the homes – Participation - Occupation

	Participation Rate				Occupation Rate			
Householder head's Characteristics	**Spouse**		**Other Home members**		**Spouse**		**Other home members**	
Man, primary, young (21-34 years old)	0.847 (0.007)	***	-0.332 (0.000)	***	36.799 (1.837)	***	7.245 (0.060)	***
Man, primary, adult (35-44 years old)	0.692 (0.004)	***	0.719 (0.000)	***	-7.635 (0.363)	***	0.952 (0.008)	***
Man, primary, aged (45-54 years old)	-0.503 (0.004)	***	-0.929 (0.000)	***	-4.100 (0.183)	***	5.005 (0.034)	***
Man, secondary, young (21-34 years old)	0.608 (0.005)	***	-0.427 (0.000)	***	2.800 (0.175)	***	6.409 (0.047)	***
Man, secondary, adult (35-44 years old)	-0.118 (0.004)	***	1.124 (0.000)	***	-13.293 (0.640)	***	-0.651 (0.008)	***
Man, secondary, aged (45-54 years old)	0.985 (0.007)	***	-0.926 (0.000)	***	12.604 (0.690)	***	4.661 (0.037)	***
Man, superior, young (21-34 years old)	-0.200 (0.007)	***	-0.792 (0.000)	***	-7.489 (0.352)	***	1.125 (0.012)	***
Man, superior, adult (35-44 years old)	1		1		1		1	
Man, superior, aged (45-54 years old)	0.715 (0.007)	***	-0.240 (0.000)	***	15.982 (0.925)	***	2.079 (0.016)	***
Woman, primary young (21-34 years old)	-3.396 (0.020)	***	-0.260 (0.000)	***	-23.606 (1.214)	***	7.446 (0.066)	***
Woman, primary, adult (35-44 years old)	-4.410 (0.022)	***	-0.443 (0.000)	***	5.447 (0.330)	***	1.291 (0.016)	***
Woman, primary, aged (45-54 years old)	23.237 (0.153)	***	-0.713 (0.000)	***	195.731 (10.39)	***	2.631 (0.024)	***
Woman, secondary, young (21-34 years old)	-0.741 (0.012)	***	0.639 (0.000)	***	-66.811 (3.028)	***	4.418 (0.036)	***
Woman, secondary, adult (35-44 years old)	5.969 (0.033)	***	0.715 (0.000)	***	-11.140 (0.678)	***	-1.778 (0.018)	***
Woman, secondary, aged (45-54 years old)	2.592 (0.013)	***	-0.737 (0.000)	***	207.458 (9.731)	***	2.844 (0.024)	***
Woman, superior, young (21-34 years old)	-6.749 (0.037)	***	0.081 (0.000)	***	0.659 (0.109)	***	-0.735 (0.022)	***
Woman, superior, adult (35-44 years old)	-12.514 (0.072)	***	0.579 (0.001)	***	-95.163 (4.915)	***	3.296 (0.031)	***
Woman, superior, aged (45-54 years old)	30.706 (0.179)	***	-1.292 (0.001)	***	-66.482 (3.999)	***	4.688 (0.042)	***
R quadrate	0.2334		0.3926		0.223		0.1074	

Picture A3.2. Relative effect of the economic cycle over the homes – Unemployment, worked hours and scholar attendance

Hombre, primaria,	Unemployment Rate		Worked Hours		
Householder Head's **Characteristics**	**Spouse**	**Other Home Members**	**Spouse**	**Other Home Members**	**Scholar Attendance**
Man, primary, young (21-34 years old)	-0.988 *** (0.001)	9.375 *** (0.026)	-2.826 *** (0.091)	2.377 *** (0.001)	145.046 *** (2.629)
Man, primary, adult (35-44 years old)	0.668 *** (0.001)	6.867 *** (0.019)	2.077 *** (0.065)	0.540 *** (0.000)	-3.794 *** (0.077)
Man, primary, aged (45-54 years old)	1.254 *** (0.001)	3.665 *** (0.010)	-1.385 *** (0.043)	0.078 *** (0.000)	-7.464 *** (0.148)
Man, secondary, young (21-34 years old))	-0.143 *** (0.000)	3.170 *** (0.009)	-8.872 *** (0.211)	0.645 *** (0.000)	22.810 *** (0.416)
Man, secondary, adult (35-44 years old)	0.558 *** (0.000)	2.685 *** (0.007)	0.408 *** (0.022)	0.426 *** (0.000)	1.724 *** (0.034)
Man, secondary, aged (45-54 years old)	0.739 *** (0.001)	3.000 *** (0.008)	5.166 *** (0.144)	0.187 *** (0.000)	-1.865 *** (0.039)
Man, superior, young (21-34 years old))	0.595 *** (0.001)	-0.892 *** (0.004)	-6.111 *** (0.163)	0.324 *** (0.000)	9.166 *** (0.169)
Man, superior, adult (35-44 years old)	1	1	1	1	1
Man, superior, aged (45-54 years old)	0.421 *** (0.000)	2.670 *** (0.007)	-3.671 *** (0.099)	0.081 *** (0.000)	0.842 *** (0.027)
Woman, primary, young (21-34 years old))	0.092 *** (0.002)	0.900 *** (0.006)	51.877 *** (1.444)	4.538 *** (0.003)	-23.616 *** (0.447)
Woman, primary, adult (35-44 years old)	1.265 *** (0.001)	3.115 *** (0.010)	-10.792 *** (0.251)	-0.046 *** (0.000)	-5.229 *** (0.112)
Woman, primary, aged (45-54 years old)	-4.901 *** (0.004)	1.439 *** (0.004)	158.561 *** (4.210)	0.025 *** (0.000)	-13.017 *** (0.271)
Woman, secondary, young (21-34 years old))	1.407 *** (0.002)	2.433 *** (0.008)	31.016 *** (0.737)	-0.316 *** (0.000)	27.828 *** (0.517)
Woman, secondary, adult (35-44 years old)	3.968 *** (0.004)	2.336 *** (0.007)	0.879 *** (0.041)	-0.608 *** (0.000)	-13.199 *** (0.234)
Woman, secondary, aged (45-54 years old)	-4.027 *** (0.003)	1.147 *** (0.004)	212.228 *** (6.034)	0.465 *** (0.000)	-7.006 *** (0.132)
Woman, superior, young (21-34 years old))	-0.262 *** (0.002)	-0.783 *** (0.007)	54.468 *** (1.326)	1.404 *** (0.001)	-1.110 *** (0.054)
Woman, superior, adult (35-44 years old)	3.629 *** (0.004)	9.557 *** (0.028)	-11.634 *** (0.304)	-0.923 *** (0.001)	-0.966 *** (0.055)
Woman, superior, aged (45-54 years old)	0.330 *** (0.002)	2.234 *** (0.007)	116.817 *** (2.612)	-0.978 *** (0.000)	30.913 *** (0.639)
R quadrate	0.2957	0.2296	0.3862	0.3258	0.4063