Micro-Econometric Studies of How Government Programs Affect Labor Supply and Saving in Mexico

by

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Abstract

This thesis analyzes the micro-economic effects of different government programs on the savings and labor supply behavior of Mexican households and individuals. The first two chapters deal with household saving behavior and government intervention. Chapter 1 assesses the impact of increasing financial access on low-income people saving rates and on different informal savings instruments. It considers an exogenous expansion of a Mexican savings institute that targets low-income people and uses the 1992 and 1994 National Surveys of Income and Expenditures. Results show that the expansion increased the average saving rate of affected households by more than 3 to almost 5 percentage points of income. Evidence of crowding out of informal savings instruments caused by the expansion is limited. Chapter 2 investigates the effects of the country’s financial reform in the early 1990’s on households’ saving rates. It uses the 1989 and 1992 Mexican National Surveys of Income and Expenditures. Households had different degrees of exposure to the financial reform depending on their income level and location. Results indicate that households located in cities, which are more likely to have financial intermediaries, reduced their saving rate significantly after the financial reform. The effects were significantly stronger among richer households. Findings are consistent with the hypothesis that the financial reform reduced borrowing constraints among younger households. Finally, chapter 3 evaluates the effects of a Mexican training program on the unemployment spells of trainees. This program consists of training courses on several types of activities. Non-parametric estimations and different hazard rate models are estimated. To tackle selection biases, a propensity score procedure was calculated. Parametric results for the complete database show that training increases the hazard rate of leaving unemployment by 20 percent to 60 percent, depending on the type of training. Average effects hide substantial variation among men and women. The training effect is in general non-significant for men, while it is highly significant for women.

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To my Mother and Father
Introduction
This thesis analyzes the micro-economic effects of different government programs on the behavior of Mexican households and individuals. The selected topics, saving and labor supply, are key economic variables not only for the Mexican economy. The first two chapters deal with household saving behavior and government interventions. Private savings are crucial for economic development. In less developed countries, low national savings are considered an important cause of low investment and low economic growth. Furthermore, the relevance of savings in developing countries is not only about creating capital, but also about allowing consumption smoothing, especially for low-income individuals. Consequently, access to financial instruments should improve welfare in the economy.

Chapter 1 assesses the impact of increasing financial access on low-income people savings. Access to formal savings instruments is commonly assumed in the economics literature. Nevertheless, in developing countries, availability of these instruments for low-income people is not universal. According to conventional models of savings behavior, if people are constrained not to save in certain instruments, they should be saving using alternative ways. Access to new and better instruments should imply a crowd out of the less attractive saving methods. This analysis is relevant not only for Mexico but for most developing countries that have or are thinking about establishing financial intermediaries for low-income people.

The specific questions that this chapter tackles are the effects of increasing financial access on the saving rate of low-income people and on the crowding out of informal savings instruments. It uses the 1992 and 1994 Mexican National Surveys of Income and Expenditures. These surveys have detailed household level data. The government intervention analyzed here is an exogenous reform and expansion of a savings institute targeted to low-income individuals (called Pahnal). The expansion is used to identify the effects of increasing financial access on the saving rate of households. The Pahnal's expansion included not only an increase in the number of its branches but also the development of new savings instruments. This expansion was carried out in 1993; it
included only some cities in Mexico. Consequently, it is possible to use the saving rates of households located in non-expansion towns as a control for the experiment.

Results indicate that households located in towns that had an expansion of the savings institute had a saving rate that was on average 3 to 5 percentage points higher than that of non-affected households. Furthermore, effects were stronger for low-income individuals in the sample. In some cases, affected low-income households had a saving rate that was on average more than 7 percentage points higher than other low-income families located in towns without expansion. The expansion, in general, had no effect on the saving rates of high-income households.

The second main question of chapter 1 is whether expanded access had some impact on informal savings instruments. Rotating credit and savings associations, saving unions, loans to non-family members, foreign currencies, jewelry, precious metals, investment in equipment, machinery, and animals, and investment in land and houses are considered as informal savings instruments. Using the savings institute’s expansion, this paper explores the existence of crowding out of this type of instruments. Results showed no statistical evidence of displacement of possible informal savings forms by the expansion of the institute. The findings suggest that a considerable fraction of the increase in households’ savings could have come from new savings, although the statistical evidence on crowding out is weak. Two main lessons could be taken away from chapter 1. First, low-income people save a considerable fraction of their income when they have access to financial instruments. Second, it was not possible to rule out or rule in the displacement of informal savings instruments caused by the increment in formal financial access.

Chapter 2 analyzes the effects of the early 1990’s Mexican financial liberalization. Financial reforms have been one of the main pillars of economic restructuring in several developing countries during the last two decades. In most countries, reforms commonly include liberalization of interest rates, elimination of selective credit structures, strengthening of the regulatory framework and development of non-banking intermediaries. Mexico followed this pattern.
When analyzing financial reforms in developing countries it is important to recognize that in those countries access to financial services is not uniform. Access to financial intermediaries in Mexico is a positive function of the income level. Low-income individuals are constrained from financial services: usually borrowing is unavailable for this sector of the population and savings accounts are not adequate for their income level. Another factor that limits access to financial intermediaries is households’ location. Financial units need a minimum market size to operate; therefore they are rarely present in small communities. The effect should be stronger if the community is not only small but also relatively poor. In this sense, financial markets in developing countries are fragmented.

This chapter analyzes households’ savings behavior after the Mexican financial reform. It recognizes explicitly the role of fragmented markets on the effects of the early 1990’s liberalization. It uses the 1989 and 1992 National Surveys of Income and Expenditures. It shows that households had different degrees of exposure to the financial reform depending on their income level and location. The probability of having access to credit increases substantially with household income level. Also, the presence of financial intermediaries is negatively correlated with the proportion of rural population and rural communities in the Mexican states.

The two sources of fragmentation are analyzed separately and together. Results indicate that households with higher exposure to the financial liberalization reduced their saving rate significantly after the financial reform. Their saving rate was between 22 percent and 33 percent lower than that of households with similar income level but located in smaller communities. The results are robust to different estimation techniques and to alternative definitions of fragmentation variables. The analysis was also done stratifying households by age of household’s head. Findings indicate that the change in saving rates is stronger among younger and richer households.
The findings are consistent with the hypothesis that the financial reform reduced borrowing constraints among younger households. It is also possible that the reform in the pension system during this period changed the expectations of younger households and caused the reduction of their saving rate. Nevertheless, other alternative hypotheses for households’ saving behavior, not related to the financial reform, do not fit the rural and urban patterns found.

Chapter 3 deals with another highly relevant issue for Mexico: the effects of training on labor supply. This is especially important during periods of rapid economic restructuring in which the rates of destruction of old and creation of new forms of work are high. Under these conditions, the Mexican government has offered training for unemployed individuals. Training has been one of the most important government tools to reduce the costs of major economic restructuring. This has also been one of the few measures designed to support the unemployed and to facilitate their reemployment. This program consists of training courses on several types of activities like construction, carpentry, shoe making, apparel-making, among others. The magnitude of the training program is considerable and it has substantially increased since 1994.

Careful evaluation of this government program is necessary given its magnitude and relevance for employment. Chapter 3 estimates the effects of training on the unemployment spells of trainees. A panel of trainees and non-trainees is used for the evaluation. Different estimation techniques are used. First, non-parametric estimations are presented. Second, different hazard rate models are estimated. These methods are the Cox proportional hazard, the exponential, and the weibull estimations. The analysis is done not only for the complete database, but also separate by men and women.

Given that selection into the training program is not random, a propensity score procedure, that diminishes the selection bias problem, was used. Also, matched groups were constructed to estimate the effects of training on more similar observations.
Results for the complete database show that training increases the hazard rate of leaving unemployment by 20 percent to 60 percent, depending on the type of training. Nevertheless, average training effects hide substantial variation among men and women. For men, the scholar-training program's effect tends to be zero or negative and statistically insignificant. This fact holds in every one of the estimation techniques used and in the propensity score estimation. For women, the scholar-training program reduces their unemployment spells and this effect is usually statistically significant. When the coefficient is significant, it represents an increase in the hazard rate of at least 50 percent. Results are robust to different types of hazard estimation methods and to the propensity score procedure.

The pattern found for men and women is similar to the one found in the economics literature for the United States. For this country, usually estimates of training programs' impact for women are stronger than the results for men. Additional analysis is required on the implicit or explicit differences of women and men. Understanding their differences could be a good way to determine what actions should be taken to improve the effects of training on men.

The essays of this thesis show that government programs significantly affect the behavior of Mexican households. The Mexican experience could cast some light on the expected effects of similar policies implemented by other countries. In the case of savings, financial intermediaries for low-income people have received a lot of attention lately but only few descriptive analyses on the effects on savings have been done. In the case of the training program, results suggest that, despite the substantial differences in the Mexican and the United States economies, training programs effects are similar: women benefit more, on average, from training. This is an issue that deserves additional research. Finally, using microeconomic data has clear benefits; one of them is that the impact of these programs can be evaluated for different sectors of the population, which gives greater flexibility and richness to the analysis.
Chapter 1

Effects of Financial Access on Savings by Low-Income People
1.1 Introduction

Access to formal savings instruments is commonly assumed in the economics literature. Nevertheless, in developing countries, availability of these instruments for low-income people is not universal. Usually in these countries, opening a bank account has relatively high transaction costs and relatively high fees and commissions for this sector of the population. These impediments to save or savings constraints must have some impact on the individual’s behavior. In spite of that, little is known about this issue.

According to conventional models of savings behavior, if people are constrained to save in certain instruments, they should be saving using alternative ways. Access to new and better instruments should imply a crowd out of the less attractive into the more desirable ones. The new level of total savings would depend on the relative weights of the substitution and income effects. Will this be the case of low-income people?

Actually, it is widely believed that low-income people do not save. However, empirical evidence has proven this to be wrong. Once suitable financial instruments are available to this group of people, they become eager and regular savers.¹ Nevertheless, no estimates of the precise effect of these instruments on individuals’ savings behavior exist. At most, it is only possible to find descriptive and anecdotal evidence.

Also, it is not feasible to infer from the literature if these savings are new savings or if they came from informal instruments. In a related issue, it is not possible to know if low-income people were saving before formal savings accounts were available to them. Did they become eager and regular savers after access or they had those characteristics before? Moreover, is it possible to explain savings behavior of low-income people only with conventional savings models?

These are questions that do not have a good answer in the economics literature. This chapter tries to give an answer to some of the main questions. It analyzes the effects of

increasing financial access on the saving rate of low-income people and on the crowding of informal savings instruments.

Several factors make these questions highly relevant. First, given that borrowing constraints are more stringent for low-income people, a clear way to relax them is by mobilizing their savings into the formal financial sector.\(^2\) Mobilization is highly dependent on the responsiveness of this group of people to financial developments.

Second, international institutions are interested in increasing financial access to low-income people. Empirical evidence shows that the success or long term viability of these programs depends on the responsiveness of people’s total savings to this increment in access.\(^3\)

Third, as mentioned before, lack of access to financial services could force households to adopt inefficient forms of savings. The range of informal instruments is wide. It can include from cash under the mattress to extreme forms that could even be children, especially with the purpose of providing old age support to the parents. This kind of behavior has important effects in fertility and in the perpetuation of poverty. The World Bank (1994) documents this issue and its effects.

To answer these questions, the chapter uses the 1992 and 1994 Mexican National Surveys of Income and Expenditures. These surveys have detailed household level data. Also, the paper uses, as a natural experiment, an exogenous expansion of a savings institute targeted to low-income individuals to identify the effects of increasing financial access on the saving rate of households.

\(^2\) Deaton (1990) remarks that savings are not only about accumulating assets but also about consumption smoothing, especially for low-income people.

\(^3\) Financial institutions for low-income people usually rely on subsidies to operate. Only those which effectively mobilized savings are subsidy-free, some of them with impressive results. For more on the subject see Morduch (1997).
The expansion included not only the increase in the number of branches but the development of new savings instruments. This expansion was carried out in 1993; it comprehended only some cities in Mexico. Consequently, it is possible to use the saving rates of households located in non-expansion towns as a control to the experiment.

Results show that households located in towns that had an expansion of the savings institute had a saving rate that was on average 3 to 5 percentage points higher than the one of non-affected households. Furthermore, effects are stronger for low-income individuals in the sample. In some cases, affected low-income households had a saving rate that was on average more than 7 percentage points higher than other low-income families located in towns without expansion.

The expansion, in general, had no effect on the saving rates of high-income households. Most of the time the effects were not statistically different from zero. Also, evidence shows that the effect was stronger in towns in which the new office of the savings institute was the institute's only office in town.

An important related question is whether expanded access had some impact on informal savings instruments. Using the savings institute’s expansion, this chapter explores the existence of crowding out of this type of instruments. Results showed no statistical evidence of displacement of other possible informal savings forms by the expansion of the institute. Furthermore, survey data shows that not many households had financial transactions into informal savings instruments.

The remainder of the chapter is organized as follows. Section 1.2 presents a review of the financial institutions that provide services to low-income individuals and an overview of existing literature. Section 1.3 explores the relevance of the Mexican case to study low-income people savings and contains a general overview of its macroeconomic environment and its savings during the period of analysis. Section 1.4 summarizes the main characteristics of the Mexican savings institute (Pahnal) and its new savings instruments, describes its 1993 expansion, and its validity as a natural experiment.
Section 1.5 presents the data and the calculation of the saving rates. The identification strategy and the effects of financial access on the saving rates are included in section 1.6. Section 1.7 presents the analysis of informal savings instruments. It contains a description of available data and the effects of the expansion on these informal instruments. Section 1.8 presents the conclusions of the paper.

1.2 Microfinance Institutions and Literature Review

The assertion that low-income people do not save can be refuted. Probably this unfounded belief may be based on the fact that their savings instruments are not necessarily financial assets, not even properties such as houses or land, but any object that can be used to preserve value and perhaps increase it from the present to the future. Such savings instruments then could include gold coins, jewelry, cash and even animals. Rosenzweig and Wolpin (1993) describe the use of bullocks as an asset in India. In their model, bullocks are investment assets used both to generate income and to smooth consumption. Nevertheless, most of the evidence about this issue is anecdotal. It is possible that poor people’s savings are low simply because it is not attractive for them to save given the lack of access to good formal savings instruments (i.e. non-expensive, simple to understand and reliable). Several papers have found that when

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4 In the case of rural Western Tanzania, Dercon (1998) mentions cattle as a good asset to smooth consumption. However, low-income households can not accumulate enough assets to obtain that lumpy investment. Instead, they use small livestock, such as goats and sheep, which are liquid assets. Low-income individuals tend to specialize in low-risk low-return activities.

5 This is described in several articles. Good references about the subject are Adams (1978) and Bouman and Hospes (1994).

6 Several articles deal with the estimation of how saving programs affect net savings, especially in the United States for the case of Individual Retirement Accounts (IRAs) and 401(k)s. There is a debate about the effectiveness of these instruments to increase savings. Despite the many articles that study tax incentives and savings, uncertainty remains about the effects of the policies designed to promote savings. This is especially true when these policies also affect the functioning of savings related institutions. This uncertainty is even higher in the case of low-income people since many of them may not have access to financial instruments at all. For reference see Berheim (1996); Venti and Wise (1986 and 1990); Gale and Scholz (1995); and Poterba, Venti and Wise (1995).
suitable financial instruments are accessible to low-income individuals, they are regular and eager savers.\(^7\) \(^8\)

A related issue is the effect of increasing the number of branches of commercial banks, especially in more convenient places, on low-income people savings. Accessible bank offices could have an impact on the participation of these people in formal financial markets and in their savings behavior. Ikhide (1996) finds that a 10 percent reduction in the ratio of population to the number of commercial banks branches increases 7.7 percent the private saving rate of five Sub-Saharan African countries.

Deaton (1990) mentions at least four reasons for studying savings in developing countries. First, at the microeconomic level, households tend to be large and poor with income prospects more uncertain than in developed countries. Second, at the macroeconomic level, few developing countries have fiscal systems that permit deliberate manipulation of personal disposable income to stabilize output and employment. Third, the postwar literature sustains that saving is too low in developing countries, and that this impedes development. Fourth, saving is even more difficult to measure in developing countries that in advanced economies.

Nevertheless, financial access and savings behavior of low-income people have been understudied. The literature has focused more on the lending side. Some studies have analyzed the effects of expanding access to credit, but little has been done on the effects of increasing access to savings instruments.\(^9\) This literature is mainly descriptive, almost without any quantification of the impact of increasing financial services.

Increasing financial access for poor people is called Microfinance. The development of these types of institutions has been an active policy for several governments. The leading

\(^7\) For reference see Mansell (1995) and Robinson (1992).
\(^8\) McKinnon (1973) mentions that, in fragmented economies, money and investment are complements. Increasing the return of money raises the desirability to store it and makes it easier to accumulate capital to take opportunities of lumpy investments. Access to formal savings instrument is one of the ways in which the return of money can be increased.
\(^9\) Probably, because there are few institutions that offer this kind of services and available data is scarce.
or most documented microfinance institutions in the world are Grameen Bank (GB) in Bangladesh, Banco Sol (BS) in Bolivia and Bank Rakyat Indonesia (BRI). The microfinance institutions can be grouped according to their lending characteristics: lending to groups (such as GB and BS) and lending to individuals (such as BRI). It is also possible to divide them by their effort to mobilize savings (BRI mobilize voluntary savings, while GB only requires saving deposits as lending requisites).¹⁰

The Bangladeshi Grameen Bank lends to groups as a mechanism to raise the repayment rate of credits without increasing monitoring costs. GB groups consists of five borrowers each, with lending first to two of the members, then to the next two and then to the last member. If any group member defaults, no one is allowed to borrow again. Most loans have a one-year maturity, with an average size just over 100 dollars. No collateral is required and the typical interest rate is 20 percent (approximately 12 percent real interest rate).

Last year, GB had more than two million borrowers, 94 percent of them were women, and they received loans that totaled 30 to 40 million dollars per month. Recent repayment rates average 97 to 98 percent. GB also provide its clients with vocational training, productive inputs (such as seeds and seedlings) and encourage improvement of hygiene, health and education. GB requires subsidies to operate.

The impact of the Grameen Bank is well documented. This bank does not have voluntary savings; therefore the main analysis of the literature is on the lending rather than the savings side. The lending activity of this bank increased household income by approximately 17 cents for every dollar lent.¹¹ It also increased assets held by women and it had a moderately positive impact on the education of sons (Pitt and Khandker, 1995).¹²

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¹⁰ For a more complete description of the microfinance institutions and a discussion of the benefits and costs of group lending see Morduch (1997).
¹¹ However, the effectiveness of the program is not clear. For the same period, subsidies at GB were 21.5 cents for every dollar lent.
¹² Morduch (1998) finds that GB programs are associated with lower variation in labor supply and consumption across seasons. However, he finds no evidence that the programs increase consumption levels or the educational enrollments for children exposed to them.
The Bolivian Banco Sol also lends to groups, but it differs in some important ways with GB. First, its focus is more on banking (not on social service like GB). Second, loans are made to all members of the group simultaneously and interest rates are higher in nominal and real terms. Third, the bank does not rely on subsidies (BS sells its certificates of deposits in the New York Stock Exchange). Fourth, Bolivian borrowers are richer than those in Bangladesh, and loans' amounts are larger (average loans are five times larger than those of GB). By 1994, BS had 63,000 low-income clients (about 1/3 of the clients in the entire Bolivian banking system).

The Indonesian is a very special case.\textsuperscript{13} 14 The Bank Rakyat Indonesia (BRI) is perhaps the leading microfinance institution in the world. BRI lends exclusively to individuals, not to groups; its loans require collateral, so the very poorest borrowers are excluded, but operations remain small-scale. Bank officials get to know borrowers over time. The initial amount that a client can borrow is small, but it increases with her repayment performance. In 1995, loan interest rates were 34 to 24 percent depending on payment realizations (roughly 25 to 15 percent in real terms). In the same year, BRI earned 175 million dollars in profit on their loans to low-income households. Repayment rates and profits on loans to poor households exceeded the performance of their loans to corporate clients.\textsuperscript{15}

Since 1983, BRI has centered on achieving cost-effectiveness by setting up a network of small branches (with an average of five staff members each); these are called unit banks. BRI now serves about 2 million borrowers and 16 million depositors.

BRI developed new savings instruments in 1986. The introduction of a set of deposit instruments, with different mixes of liquidity and returns appropriate for the varied demand of local credit markets, was an essential requirement to mobilize savings. Before these reforms, most rural people kept their savings in their houses or in informal savings

\textsuperscript{13} For an excellent analysis of the Indonesian experience, see Robinson (1992, 1994 and 1995).
\textsuperscript{14} Johansson (1998) explains the growth in private saving rates in Indonesia using macroeconomic analysis. Her main explanation for the growth in private saving rates is the drop in the dependency ratio.
\textsuperscript{15} Morduch (1997).
and credit societies. Most of the latter provided no returns; some offered the possibility of high returns with high risks. Savings in-kind (gold, animals, land, grain, etc.) predominated in rural areas.

By December 1983, deposits in 3,600 unit banks nationwide totaled only $17.6 million. By 1988, after the introduction of adequate savings instruments for low-income people, over 4 million poor households were saving through the program, and by December 1996, over 16 million had deposits. This represents over 3 billion dollars in savings and gives BRI a relatively cheap source of funds for re-lending while providing households with means to build assets and to better smooth consumption. In October 1993, the average loan was 469 dollars and the average balance on an account was 175 dollars. Of all accounts, 86 percent had balances below 242 dollars, while 46 percent were below 12 dollars. Therefore, BRI was actually targeting low-income people.

BRI differs from GB in two important ways. First, GB deposits its savings in fixed and short-term accounts in other banks; while BRI uses its deposits for own lending. GB's average borrower is considerably poorer than the average BRI borrower. The BRI loans are available from 13 to 13,000 dollars, while the maximum GB loan is 200 dollars. Second, the cost of lending is higher for GB than for BRI. This is in part due to the relative size of the loans and that GB's labor and administrative costs appear to be substantially higher than those of BRI.

The lessons from the Indonesian microfinance experience show that poor households are willing and able to save if given attractive instruments. Nevertheless, there is no explicit quantification of the effect. Evidence suggests that liquidity and safety may be more important than interest rates.

Finally, it is widely believed that low-income people save for emergencies and unexpected investment opportunities. This could explain their preference for highly liquid accounts. They also save to self-finance long-term investments, such as the

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16 People mainly preferred highly liquid savings instruments.
purchase of land or children’s education; house construction; and to finance old age and disability.

1.3 Relevance of the Mexican Case to Study Low-Income People Savings

The existing literature has no answer for the effect of increasing poor people’s access to financial services on their saving rate, total savings and savings composition. This paper deals with these questions. It attempts to measure the effect of financial access on low-income individuals’ saving rate and on informal savings instruments, using Mexican data and the expansion of a savings institute targeted to low-income people.\textsuperscript{17}

The Mexican case is propitious to study the savings behavior of low-income people for several reasons. First, after 1986, Mexico went through a deep economic reform process. After almost a complete decade of high inflation and scarce economic growth, its macroeconomic performance improved substantially from 1989 to 1994.\textsuperscript{18} Sound and stable macroeconomic performance is required to study the effect of increasing financial access on savings behavior.\textsuperscript{19} Without these, the effects could be distorted by changes in consumption and savings caused by macroeconomic instability.

Second, from 1983 to 1991, the Mexican government modified the country’s financial institutions in at least five aspects:\textsuperscript{20} financial liberalization; financial innovation; strengthening financial intermediaries; privatizing commercial banks; and financing the government deficit through credit markets instead of compulsory reserve requirements to commercial banks, credits from the central bank or inflation. As consequence of these

\textsuperscript{17} Section 1.4 presents a complete description of this Mexican savings institute.
\textsuperscript{18} Inflation (measured using the consumer price index) went down from almost 160 percent in 1987 to around 7.5 percent in 1993 and 10.2 percent in 1994. Also, the budget deficit was reduced from almost 5 percent of Gross Domestic Product (GDP) in 1989 to a 0.7 percent surplus in 1993 and a 0.3 percent deficit in 1994.
\textsuperscript{19} Robinson (1992) makes clear that a necessary condition for BRRI’s success was the macroeconomic stability that Indonesia had for most of the period of analysis (1983 to 1996).
\textsuperscript{20} Aspe (1993).
improvements in the Mexican financial markets, distortions to individuals' savings behavior should had been reduced.

The financial liberalization led to a substantial decrease in the importance of private domestic savings (which is composed by firms' and households' savings)\(^ {21}\) on total national savings. It also led, along with the deregulation of foreign investment, to a remarkable increase in the amount of external flows to Mexico.

However, Székely (1996) has shown that households' savings have been a stable component of total savings in Mexico. In 1984, they represented 22.8 percent of total savings, the proportion was 24.9 percent in 1989 and 25.4 percent in 1992.\(^ {22}\) Nevertheless, firms' savings decreased as a proportion of total savings from 54.9 percent in 1984 and 53.9 percent in 1989 to 14.1 percent in 1992.

Third, Mexico is a country that is richer than Indonesia, Bangladesh and Bolivia in per capita GDP terms.\(^ {23}\) However, Mexican income distribution is highly unequal. The Gini index in Mexico was 50.3 in 1992, while it was 42.0 for Bolivia in 1990, 31.7 for Indonesia in 1993, and 28.3 in Bangladesh in 1992. Also, from 1981 to 1995, the percentage of people living on less than 1 dollar a day (using PPP) was 14.9 percent in Mexico, while it was 7.1 percent in Bolivia and 14.5 percent in Indonesia (the information for Bangladesh is not available).\(^ {24}\) Therefore, there is a substantial fraction of

\(^{21}\) Other motives for the decrease in private savings have been addressed in the literature, including misalignments in the real exchange rate, increase in the value of the Mexican stocks, and macroeconomic stability (which should decrease the need for precautionary savings). For a complete description on the issue see Székely (1996)).

\(^{22}\) Total savings in Mexico had varied substantially and had shown a positive correlation with the growth of GDP. From 1970 to 1981, total savings showed a positive growth. In 1981, savings represented approximately 27 percent of GDP (its historical maximum). However, after the debt crisis in 1982, the trend was reverted. In 1994, total national savings were approximately 23 percent of GDP.

\(^{23}\) In 1995, Gross National Product (GNP) per capita in Mexico was 3,320 dollars (equivalent to 6,400 dollars in purchasing power parity (PPP) terms). While in Bolivia was 800 dollars (equivalent to 2,540 dollars in PPP terms); in Indonesia was 980 dollars (equivalent to 3,800 dollars in PPP terms); and in Bangladesh was 240 dollars (equivalent to 1,380 dollars in PPP units). World Bank (1997).

\(^{24}\) World Bank (1997).
the population in Mexico that is poor and for which access to financial services is limited.\textsuperscript{25}

All these reasons, along with reliable sources of data and the expansion of a low-income savings institute, make Mexico a good case to look for the effects of increasing financial access on low-income people savings behavior.

1.4 Description of Pahnal and its 1993 Expansion

Patronato del Ahorro Nacional, commonly known as “Pahnal”, is a Mexican government institution. It began operations in December 1949, with the objective of collecting and promoting the habit of savings, especially among low-income people. During the 70’s, Pahnal offered two savings instruments. One was a liquid bond, issued in different denominations; its maturity was 3 years. In 1986, these bonds paid an implicit nominal interest rate of 26 percent.\textsuperscript{26}

The second type of instrument was the Systematic Monthly Savings Plan. It had fixed monthly deposits and a 3 years maturity. The minimum monthly deposit was approximately 93 pesos and the maximum was around 1,230 pesos (both quantities are presented in 1998 pesos; the exchange rate in August 1998 was approximately 10 pesos per dollar). It did not allow withdrawals before maturity. As with the bonds, the nominal interest rate was 26 percent in 1986.\textsuperscript{27} This instrument was explicitly targeted to the poor sector of the population.

There were two ways of making deposits: at established offices or through agents that visited the depositors’ homes. At the end of the 70’s, Pahnal had 4 percent of the banking system’s total deposits in the country.

\textsuperscript{25} Mansell (1995) has a good description of the scarce access of low-income people to financial services and describes the reasons for this lack of access.

\textsuperscript{26} The average inflation from 1970 to 1980 was 17 percent. However, during 1986, it was 79.6 percent.

\textsuperscript{27} Interest rates of both instruments did not vary much from the rest of the 80’s to 1993.
However, during the 80's, average inflation in Mexico was 65 percent a year. Pahnal did not adjust its interest rates and, consequently, its depositors suffered substantial losses in real terms. This situation, along with the bad reputation of the savings collectors\textsuperscript{28}, caused a substantial decline in the presence of Pahnal in the financial sector in Mexico by the beginning of the 90's. From July 1992 to the end of that same year, deposits fell by 19 percent. In July 1993, deposits were 8 percent lower than in December 1992.

1.4.1 Pahnal's expansion

During the second half of 1993 Pahnal embarked on significant reforms in two dimensions. First, there was an explicit intention to reach new areas while keeping administrative costs low. To accomplish this, Pahnal opened new branches in post offices; this model was already implemented in countries like Germany, Israel and Japan.\textsuperscript{29}

To keep the administrative costs low, on average, there were only two employees in this new kind of office. Moreover, only one simple form needed to be filled out to open an account,\textsuperscript{30} account statements were not mailed to depositors, and important economies of scale were realized by locating branches within the post office network.

The second part of the reform was the creation of savings instruments. It is important to remark that during the period of analysis, banks only offered savings instruments that were not adequate for low-income people. In February 1994, a leading bank in Mexico offered a savings account that required a minimum initial deposit and a minimum balance of 1,000 pesos (around 330 dollars on that period).\textsuperscript{31} \textsuperscript{32}

\textsuperscript{28} Some people argue that part of the decline in Pahnal's performance was caused by the bad image of the collectors. Some of them actually stole depositors' savings.

\textsuperscript{29} Section 1.4.2 presents detailed information about the number of offices opened and their location.

\textsuperscript{30} In contrast, commercial banks typically required more forms to open an account, substantial minimum balances, and impose fees and commissions when opening an account.

\textsuperscript{31} Before the 1990 Mexican financial liberalization, banks used to offer savings instruments that required low minimum balances and low fees and commissions. Banks were able to cross-subsidize among high and low balances accounts; the existent financial repression in Mexico made that possible. However, after
This type of bank account had several fees and commissions. The bank charged a 30 pesos fee just to open the account; an annual 30 pesos commission for handling it; a 2 pesos fee for each withdrawal and for each balance inquiry; and a 50 pesos penalty if the monthly balance was lower than 1,000 pesos. This account paid an interest rate of 6.4 percent (negative in real terms). Furthermore, banks required complicated paperwork and a small proportion of their branches were located in poor or rural areas. Consequently, access to formal financial instruments was very limited for low-income people.

Pahnal changed the savings opportunities of low-income people. It offered two new, simple and easy-to-understand financial instruments. The first one is a fixed term instrument called Tandahorro. It has compulsory monthly deposits of at least 50 pesos (a little more than five dollars at the end of August 1998). Its balances may not be withdrawn until maturity. There are three maturity terms: 12, 24 and 36 months.

Tandahorro’s interest rates are a proportion of the returns paid by government bonds (roughly 60 to 70 percent). In 1994, the average rate paid by this instrument was 12.5 percent net of taxes, while the average inflation in the same year was 7.1 percent. In July 1998, the interest rate was 10.4 percent. Also, if the interest rate is less than inflation, under some conditions, the saver receives a cash payment as compensation.\(^{33}\) There are no fees or commissions and there is automatic renewal if principal is not withdrawn at maturity.

The second instrument is called Cuentahorro. The minimum balance in this instrument is 50 pesos.\(^{34}\) It has immediate withdrawal privileges, and there are no commissions or fees. This instrument offers interest rates approximately 5 percent lower than Tandahorro. In liberalization they were forced to offer more competitive interest rates and the cross subsidies disappear. Banks then started to increase requirements for savings accounts. For a more detailed description see Mansell (1995).

\(^{32}\) It is safe to assume that most Mexican banks had similar requirements for their savings accounts. Two reasons can be given: first, the oligopolistic nature of the Mexican banking system and the high costs of handling a big number of small accounts.

\(^{33}\) Savers receive this compensation provided that they have complied with all monthly deposits, made by the established dates, and a minimum balance of 1,800 pesos.
July 1998, the net interest rate paid by this instrument was 9.8 percent. There is no compensation for losses caused by inflation.

Pahnal offers monthly lotteries to its account holders. For every 250 pesos in her account, the depositor gets one ticket to participate in a lottery. This is a monthly lottery with 300,000 pesos in prizes, which are deposited directly into the winners’ accounts.

Pahnal has additional programs. It has a new savings program for children. The objective is to promote the habit of savings among them. To this end, it created an account with a minimum initial deposit of 30 pesos (around 3 dollars at the end of August 1998), and with a 1-year maturity. The interest rate of this instrument is 50 percent of the government bonds rate. Along with the opening of the account, Pahnal gives the child a collectible stamps-album. Stamps are given with each deposit that the children make to their accounts. This instrument also has a lottery with in-kind prizes. One ticket for the lottery is given for every 120 pesos in balance of the account.

The institute has a pilot program in the City of Puebla. Retired government officials of the city are able to cash their pension checks at Pahnal’s offices. These retirees, numbering about 4,000, are encouraged to open accounts. The results of the program are promising. Up till now, 32 percent of them have opened an account.

It has a housing program. Individuals are encouraged to save for the down payment of a house using Pahnal’s instruments. Pahnal has made alliances with construction companies to increase the effectiveness of the program.

Pahnal is also expanding in the rural areas of Mexico. In December 1997, it opened 100 offices in rural areas of 8 states. The program is ambitious; Pahnal wants to expand its rural network to 400 branches by the end of the year 2000.

34 For both instruments, the required minimum initial deposit is 50 pesos.
In April 1998, 61 percent of Pahnal’s savers were women. The average age of account holders was 36.1 years. Housewives represented 33 percent of Pahnal’s account holders. Small traders, carpenters, plumbers, mechanics, craftspeople, retirees, employees of the informal sector, and maids represented 54.5 percent of Pahnal’s account holders.

Table 1 presents some of the results of the Pahnal’s reform at the end of 1994.\textsuperscript{35} As shown, the importance of the old instruments had diminished considerably.\textsuperscript{36} In July 1993, old instruments represented 47 percent of total balances, while by December 1994 they accounted for only 26 percent of the total deposits in the system. During the same period, there was an increase of more than 43 million dollars in total deposits.

Total deposits increased from 154.9 million pesos in July 1993 to 970.6 million pesos in June 1998. From June 1994 to June 1998, the annual rate of growth of total nominal deposits in pesos was 45 percent.

The most popular instrument is Cuentahorro, the short-term instrument. At the end of 1994, it represented more than 74 percent of the accounts.\textsuperscript{37} This reflects depositors’ preference for liquidity. The same type of behavior was also found in the Indonesian experience.\textsuperscript{38} From July 1993 to December 1994, the number of accounts increased 174 percent (from 83,300 to 228,500). As of June 1998, the total number of accounts was 560,800.

At the end of 1994, the average balance in a Pahnal account (including only Cuentahorro and Tandahorro) was 1,057 pesos.\textsuperscript{39} Cuentahorro’s average balance was lower than Tandahorro’s, reflecting the more extensive use of the liquid account by relatively poorer

\textsuperscript{35} Table 1 contains information up to December 1994 for two reasons. First, it avoids the effects of the end of year peso devaluation on the dollar value of deposits, and second, that is the period of analysis in the following sections.

\textsuperscript{36} Old instruments refer to pre-reform instruments that include bonds and the Systematic Monthly Savings.

\textsuperscript{37} In 1998, Cuentahorro remains the most preferred instrument, representing 72 percent of the total number of accounts in Pahnal.

\textsuperscript{38} In a survey done by Pahnal in April 1998, 51.2 percent of its customers responded that they preferred liquidity to return.

\textsuperscript{39} Around 313 dollars valued at the average exchange rate of 1994. In the same year, Mexican GDP per capita was 4,835 dollars.
individuals. In June 1998, the average account balance was 1,678 pesos. In the same month, 48 percent of accounts had balances lower than 500 pesos (the average exchange rate during that month was 8.95 pesos per dollar).

Pahnal’s average account balances are similar to those of other microfinance institutions in the world. According to data from Sustainable Banking with the Poor of the World Bank, the average deposit of microfinance institutions (in several regions of the world including East Asia and the Pacific, Africa and Latin America) was 367 dollars in 1996. The median deposit was 121 dollars in the same year. However, in East Asia and the Pacific, the average deposit was only 219 dollars and the median was 54 dollars.

Pahnal has two sources of financing it administrative expenditures. The first one is the interest rates spread between the return of government instruments and the return paid to its account holders; it is important to note that all Pahnal’s deposits are invested in government instruments. The second source comes from government subsidies. Pahnal is not far from being sustainable without subsidies. According to estimates of Pahnal’s officials, the institute would be capable of operating without subsidies with total deposits of 1,172 million pesos (as noted before, in June 1998, Pahnal had 970.6 million pesos and the rate of growth in total deposits is substantial).\textsuperscript{40}

It is important to remark that, since 1990, the financial landscape in Mexico has changed considerably.\textsuperscript{41} Furthermore, since 1996, these changes have been substantial in the case of financial instruments for low-income people. During the second half of that year, several commercial banks began to offer savings instruments for low-income people. According to bankers, they didn’t service low-income people due to lack of infrastructure to handle a big number of accounts with small balances.\textsuperscript{42}

\textsuperscript{40} However, this calculation does not include the implicit subsidy from opening and operating branches using the infrastructure of the postal service.

\textsuperscript{41} For a description of the financial landscape in Mexico consult Mansell (1995).

\textsuperscript{42} At least four commercial banks initiated a low-income savings program during the second half of 1996 (El Economista, 1996).
In July 1998, twelve commercial banks had some type of low-income saver account. However, the minimum balance to open an account was in general higher than the one required by Pahnal (only two banks offered instruments with initial deposit lower than 50 pesos). Also, the interest rates paid by these instruments were lower than those of Pahnal. These new commercial banks’ instruments usually have access to automatic teller machines (however sometimes the client has to pay a fee every time she uses this service). As Pahnal, some of these banks have established lotteries. However, the minimum balance to participate in the lottery is always higher than the one of Pahnal.

1.4.2 Validity of the Expansion as a Natural Experiment

During the second half of 1993, Pahnal began an expansion of its number of branches. In 1992, Pahnal had 96 offices in 67 towns. By December 1993, the total number of offices opened was 98 in a total of 34 towns. Almost 95 percent of the opened offices used the infrastructure of the postal services. Map 1 shows the location of the new offices and Table 2 shows this expansion on a timeline.

The expansion was carried out only in 8 of the 31 Mexican states. The expansion was mainly done in towns that didn’t have a Pahnal office before 1993. Pahnal’s expansion covered 27 new towns.

The expansion continued until recently. By June 1998, Pahnal had 391 offices and covered all Mexican states. 100 offices were located in rural areas. The number of offices is projected to rise, more rural areas will be covered.

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43 These states are Chiapas, Jalisco, Mexico State, Nuevo León, Puebla, Oaxaca, Veracruz, and Zacatecas.
44 Mexico City is also a federal district.
45 When compared with private banks in Mexico, Pahnal does not look as a small financial intermediary. In June 1998, there were 37 private banks in the country. Pahnal was the 5th place in number of branches. It was the 4th place in number of savings accounts; when considering all types of private banks’ accounts, checking, savings and long term deposits, Pahnal was the 8th place. It was the 11th place in number of employees (Mexican Banking Commission, September 1998).
Pahnal’s expansion can be used as a natural experiment to study the effect of increasing financial access on savings behavior of low-income people. It is possible to compare the saving rate of individuals affected by expansion versus those that were not affected, before and after the extension of the system occurred.

For the results to be valid, the expansion should not be related to the households’ savings preferences.\(^{46}\) About this issue several points can be addressed. First, it is important to mention that in none of the documents describing the Pahnal’s expansion (official or unofficial) is any reference of a specific method of selection of places for the new offices.

Second, as shown in Maps 1 and 2, the expansion was carried out in areas where Pahnal had a long-standing presence. There are metropolitan areas, such as Guadalajara City in Jalisco and Mexico City. This reflects convenience and prompt response to any operational issue or problem in the new offices; according to conversations with Pahnal’s officials, they chose places in which they could supervise closely the operation of the new offices.

Nevertheless, they also chose to expand in some states in which its presence was limited: Zacatecas, Chiapas, Oaxaca, and Nuevo León. Therefore, the expansion was carried out not solely in places where there might already be Pahnal’s branches or private banks’ branches, but also in towns with limited or no presence of financial institutions.

It is possible to argue that, households in high-income states have strong preferences for high savings or that in low-income states, the opposite occurs. If the expansion had been carried out only in high or low-income states, this would have been a problem for the validity of the experiment.

There is no clear correlation between the opening of an office and the level of income in the state. Nuevo León is a high-income state, Zacatecas is a middle-income and Chiapas and Oaxaca are the last two on the income scale. Furthermore, different correlation

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\(^{46}\) It should be clear that a demand driven model did not influence the selection of cities or towns.
coefficients between 1992 average income in the states and the expansion of Pahnal were never significant. Therefore, the expansion was not concentrated in states with a specific level of income.

A more direct test of the validity of the experiment is to check if the expansion was correlated to the saving rates of the states\textsuperscript{47} (for example if only high-saver states were selected). As can be seen from Maps 2 and 3, the expansion is not closely related to the average saving rate in the state. There are low saver states that were part of the expansion, such as Puebla. There are middle savers too, such as Mexico City, the State of Mexico, and Veracruz. There are high savers such as Zacatecas, Jalisco, and Nuevo León.\textsuperscript{48} Different correlation coefficients between the households’ saving rates living in different states in 1992 and Pahnal’s expansion were small and never significant.

Other important aspect for the validity of the experiment is to check if there were important differences in the characteristics of the affected and non-affected towns before the expansion. One of these main characteristics is the 1992 average saving rate among selected and non-selected towns. Using the saving rate in which consumption definition includes housing expenditures, it is statistically possible to reject that the average saving rate of affected towns in 1992 is the same as the one of households living in non-affected towns in the same year. Nevertheless, using the saving rate in which consumption definition does not include housing expenditures, it is not possible to reject the null hypothesis of means equality.

A probable explanation to this finding is that the proportion of homeowners in non-affected towns was bigger than the one in affected towns. Due to the nature of the calculation of the saving rate with consumption including housing expenditures, the

\textsuperscript{47} For the method of calculation the saving rates see section 1.5.
\textsuperscript{48} Chiapas is a special case due to the Zapatistas’ movement and the high transfers that the state received from the federal government during 1994.
higher proportion of homeowners in non-affected towns is driving the difference in households' saving rates means among expansion and non-expansion towns in 1992.\textsuperscript{49}

Another way to test the validity of the Pahenal's expansion as a natural experiment is by performing a reverse experiment. This analysis was done using the 1989 and 1992 Household's Income and Expenditure surveys. The same types of regressions, as those described in section 1.6, were performed.

According to this exercise, households located in towns that were going to be selected for a Pahenal office expansion, but in 1992, did not show a significant change in their saving rate, when compared to households located in the same towns in 1989. Most of the coefficients of the difference in difference estimators were non-significant and with the wrong sign.\textsuperscript{50} Therefore, there is no evidence of significant differences in the saving rates of affected and non-affected towns in the 1989-1992 period, which validates the exogeneity of Pahenal's expansion in 1993.

1.5 Data Description and Saving Rates Calculation

The data consists of 1992 and 1994 Mexican Household's Income and Expenditure surveys (Encuesta Nacional Ingreso Gasto de los Hogares). They are representative at the national level and strictly comparable. The data collection was done during the same days of both years. Both surveys used the same data collection techniques.\textsuperscript{51} The 1992 survey includes observations of 10,530 households; the 1994 survey includes 12,815 households. The surveys have detailed information on after tax income, expenditures, financial transactions as well as job and demographic characteristics.

\textsuperscript{49} Nevertheless, doing separate analyses for homeowners and non-homeowners do not change the general trends of the paper's results. These estimates are included in appendix 1 at the end of the paper.

\textsuperscript{50} The estimates are shown in appendix 2 at the end of the paper.

\textsuperscript{51} For a detailed description of the survey characteristics, see Inegi (1994).
Two simple measures of flow saving were constructed. In one, consumption definition includes housing expenditures while the other does not. The reason for this is the treatment of imputed rent in the surveys. The construction of this variable was not explained clearly and it was difficult to make sense of some of the estimates. Also, a considerable proportion of the imputed rent values was missing from the surveys. Any partial adjustment on this type of expenditure would be arbitrary; therefore it was decided to have two alternative definitions of saving rates. Furthermore, using two different measures of saving rates represents a robustness test of the results.

Table 3 shows means and standard errors of relevant variables. Statistics are calculated dividing the sample into expansion and non-expansion towns before and after the Pahnal’s reform. As can be seen, saving rates are higher in non-expansion than in expansion towns, both in 1992 and 1994 and independently of the saving rate definition used. This difference is attributed to the ratio of homeowners to non-homeowners in control and treatment towns. This ratio is higher in non-expansion towns. Nevertheless, as the appendix 1 of the paper shows, splitting the sample between homeowners and non-homeowners to do the analysis does not change the main results.

In the case of non-expansion towns, saving rates show a decrease from 1992 to 1994. The decrease is significant for saving rates that include housing expenditures. The main reason is that housing rents, on average, increased 7.4 percent on real terms from 1992 to 1994. Also, the group that had income per member of the household of two to five minimum wages reduced their saving rate in 1994, independently of the definition used. One reason could be the effects of the financial liberalization. Households with that level of income were likely to receive an expansion in credit to buy durables (for example automobiles).

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52 Saving rates are defined as household income minus household consumption divided by household income. Income is defined as the sum of wage income, business income, rent income, income from transfers and other income. Household consumption is the sum of food expenditures, communications and transport expenditures, personal expenditures, health expenditures, educational expenditures, appliances expenditures, clothing expenditures, travel and leisure expenditures, housing expenditures and other expenditures. The difference among the two saving rates is that in one consumption includes housing expenditures, while this type of expenses are not included in the alternative definition.

53 Homeowners save on average more than non-homeowners do.
On the other hand, saving rates of expansion towns increased from 1992 to 1994. The increment was 59 percent in the case of the saving rate for which consumption includes housing expenditures and 22 percent for the other definition of saving rates.

The saving rate distribution in the sample is not symmetrical, despite the definition used. This holds for saving distributions generated with different combinations of years, expansion or non-expansion towns and income per member levels. Different normality tests for these distributions were rejected.

In the case of income, the mean of this variable is smaller for households living in non-expansion towns. The reason is that expansion was concentrated in bigger towns and cities. Average income is highly correlated with the size of the city; rural areas tend to be poorer. However, this difference in income between non-expansion and expansion groups is not driving the results. A similar analysis to the one done in section 1.6, but using income as a dependent variable, showed that the effect of the expansion in this variable was not significant.\footnote{As a robustness test, the analysis of the saving rates was also done without including Mexico City. The main results hold.}

Average income shows a small reduction from 1992 to 1994 in the case of the control group. Nevertheless, this decrement is only 5 percent. In the case of expansion towns, mean income increases slightly, but the difference between 1992 and 1994 is not significant in this case.

Table 4 exhibits the relation between saving rates and income. It shows that average saving rates, for the entire sample, increase with the level of household income. As can be seen, households with incomes up to the minimum wage have, on average, a negative saving rate equal to -5.8 percent if housing expenditures are included in the calculation of the saving rate. When they are not included, the saving rate is 3.2 percent. The most well
off people in the sample save between 27 and 34 percent of their income, depending on the saving rate definition used.

As mentioned above, the survey data is nationwide representative. Thus, it is possible to infer from it the income distribution of households in Mexico. Table 5 presents the percentage of households in each income bracket. Two forms of defining income brackets were used: by total income in the household and by income per member of the household.

Using total income brackets, 9 percent of the households have total income lower than the minimum wage\textsuperscript{55}, 21 percent have total income between one and two times the minimum wage, and 45 percent have a total income between two and five times the minimum wage. Only 29 percent of the households have a total income greater than five times the minimum wage.

The situation is quite different if income per household member is used to construct the income distribution. With this definition, 65 percent of the households’ members have income lower than the minimum wage. Only 3 percent of the households have an income per member greater than five times the minimum wage.

The share of wages in total income and the share of food expenses in total expenditures are presented in Table 6. Wages are not the main source of income for the poorest people in the sample, as it represents only 34 percent of total income. For them, a considerable source of income consists of transfers received from relatives or the government. Transfers represent 23 percent of their income. Also, a considerable fraction of the persons in this group is self-employed (mainly as small merchants and in the informal economy). Their reported business income is 32 percent of their total income.

\textsuperscript{55} The minimum monthly wage in Mexico was less than 100 dollars at that time.
The importance of wages increases with the level of income. It represents almost 58 percent of total income for households with income between one and two times the minimum wage. The fraction for higher levels of income is between 63 and 66 percent.

Food represents more than half of the expenses of the poorest families in Mexico. This proportion is reduced with the level of income. For the wealthiest individuals, expenditures on food are 23 percent of total expenses.\textsuperscript{56}

It is also important to mention that for people with income lower than the minimum wage, educational expenditures are a very small fraction of total expenditures. They represent only 2.6 percent. This sharply contrasts with the 12 percent share of educational expenditures for the highest income individuals.

1.6 Identification Strategy and Results of the Effects of Financial Access on the Saving Rates

1.6.1 Identification Strategy

As stated in the introduction, the goal of this chapter is to compare the savings of households with access to formal instruments to those without it and try to identify whether there is an effect on the saving rate or on other forms of savings caused by the availability of formal financial vehicles. The problem with this kind of estimation is the savings heterogeneity across households. The ideal equation to estimate would be of the following form:

\[ S_i = X_iB + \delta PAHNAL_i + \varepsilon_i \]  

Where \( S_i \) is the saving rate or the amount of different savings components\textsuperscript{57}, \( X_i \) is the set of control variables, and \( PAHNAL_i \) is equal to 1 if the household has access to Pahnal (or

\textsuperscript{56} Housing expenditures are included in this calculation.)
if in fact the household has a formal savings instrument). The coefficient of interest is $\delta$. It measures the effect of access on the saving rate. The problem is that this PAHNAL variable is correlated with unobservables. Household preferences for savings should be correlated with the use of formal financial instruments and, in general, with the access to those type of instruments.\textsuperscript{58}

Therefore, the fundamental empirical difficulty is to handle savings heterogeneity among households. The expansion of Pahnal, described in the section 1.4, helps to solve this problem; it can be used as a natural experiment.

It allows the construction of experimental and control groups as follows: households that lived in towns or cities in which Pahnal opened an office in 1993 form the experimental group. Residents of non-affected towns or cities form the control group. Comparison between these two groups will show the effect of increasing financial access on saving rates, especially for low-income people.

Theoretically, the program should have higher effects on the poor than on the wealthiest households. Given the type of instruments that Pahnal offers and the implicit assumption that richer households already have access to formal financial institutions, their behavioral response should be smaller than the one of the poorest individuals.

Table 7 presents the saving rates before and after the expansion for affected towns. From 1992 to 1994, the average saving rate in these towns increased between 22 percent to 59 percent, depending on the saving rate definition used. Average income also increased in the same period, but only by 1.5 percent. As will be clear from the regressions' results, this incremental income is not sufficient to explain the increase in the saving rate.

\textsuperscript{57} As mentioned, one important aspect of increasing financial access is the possible displacement of informal forms of savings.

\textsuperscript{58} This problem is described extensively in the literature. For a good description of the subject, see Bernheim (1996).
The basic equation to estimate is the following:

\[ S_i = \delta_0 \text{ Dummy 1994}_i \times \text{ New Town Expansion}_i \]
\[ + \delta_1 \text{ Dummy 1994}_i \times \text{ Expansion}_i + \delta_2 \text{ Dummy 1994}_i \]
\[ + \delta_3 \text{ New Town Expansion}_i + \delta_4 \text{ Expansion}_i + X_i \beta + \epsilon_i \quad (2) \]

The dependent variable \( S_i \) is the saving rate for household \( i \). Two alternative definitions of saving rates are used in the estimation procedures. In the first one, expenditures include housing expenses; while in the second, this type of expense is not included.

As stated in Section 1.5, the main reason to have two alternative definitions of savings is the following: the surveys are not very clear about the way in which imputed rent is calculated for homeowners and, in some cases, there is no estimate of this variable. Therefore, it was not possible to obtain the rent component for all households in the sample. Another reason was to test the robustness of the results using different definitions of the dependent variable.

The first exogenous variable in equation (2) \( (\text{Dummy 1994}_i \times \text{ New Town Expansion}_i) \) is the interaction between two dummy variables. The first equals one if the year is 1994. The second is a variable equal to one if the expansion was in a town or city where the new Pahnal office was the only office of the system in town.

The next independent variable \( (\text{Dummy 1994}_i \times \text{ Expansion}_i) \) is the interaction between 1994 and the expansion of the system, but in a town that already had a Pahnal office.

The explicit differentiation between these two types of expansion (new town expansion and town with a pre-expansion office) is useful to identify different effects of the system expansion. It is possible to assume that access will not be a big problem for households if
the new office is located in a town that already had a Pahnal office. Unfortunately, the issue is not so simple.

It maybe the case that only one office in the location was not enough; one of the reasons could be that the old office was not conveniently located.\textsuperscript{59} Also, advertising and promotion of the institute could be more effective in postal offices, which are known by most of the people.\textsuperscript{60} Therefore, it is important to control for both kinds of expansions.

A third case could be considered: towns with Pahnal offices that did not have an expansion in 1993, but started offering the new instruments. As a robustness test, the analysis was also done including this third case. Results did not change significantly for the expansion in a new town and in a town that had a Pahnal office before 1993. Towns with offices but no expansion showed smaller, and sometimes significant, ccefficients.

Equation (2) also has a dummy for 1994 observations (\textit{Dummy 1994}_{i}); a dummy for households that are located in towns in which the new office was the only office (\textit{New Town Expansion}_{i}); and a dummy for households living in towns in which the new office was not the only office (\textit{Expansion}_{i}).

The rest of the exogenous variables (represented by \textit{X}_{i}) are income per member of the household, household head gender, education indicator variable and its square, occupation of household head, a dummy for irregular reception of income\textsuperscript{61}, a dummy for employment stability\textsuperscript{62}, a dummy for access to medical services, the number of income recipients in the household, the children in the household (as a percentage of total number of members), the interaction of the percentage of children with the availability of medical services, and state dummies.

\textsuperscript{59} Mansell (1995) explains that sometimes even when the local bank is not far away in miles from a community, it is in travel time. Mainly road conditions and available public transportation cause this. She has some examples documenting this issue.

\textsuperscript{60} Robinson (1992) explains that much of the success of Bank Rakyat Indonesia was its use of former "rice banks units". During the 70's, producers got subsidized rice seed through these rice banks. When this program failed, its offices were used to open BRI units. Advertising of BRI was not highly necessary, given that most of the people knew these offices.

\textsuperscript{61} Income reception is considered irregular if it is received in time spans greater than 3 months.
The second type of equation includes income per member level dummies and their interaction with the expansion of the system. This exercise deals with one of the central expected implications of the expansion: the increase in financial access should be beneficial mostly for low-income people. Pahnal’s financial vehicles are targeted to this fragment of the population; richer households should not be affected as much.

This estimation is of the following form:

\[
S_i = \sum_{j=1}^{4} \delta_{1j} \times IncomeLevelDummy_{ji} + \\
\sum_{j=1}^{4} \delta_{2j} \times IncomeLevelDummy_{ji} \times Dummy1994_i \times NewTownExpansion_i + \\
\sum_{j=1}^{4} \delta_{3j} \times IncomeLevelDummy_{ji} \times Dummy1994_i \times Expansion_i \\
+ \delta_4 Dummy1994_i + \delta_5 NewTownExpansion_i + \delta_6 Expansion_i + X_i \beta + \epsilon \quad (3)
\]

In this specification, \( S_i \) denotes saving rate of household \( i \). Subscript \( j \) represents different income per member brackets. There are four brackets of income per member of the household: up to the minimum wage, between one and two times the minimum wage, between two and five times the minimum wage and between five and ten times the minimum wage. Income level dummies, a 1994 dummy and Pahnal’s expansion dummies (in its two forms) are included. The continuous variable income per member and the interaction variables of the 1994 dummy and the Pahnal expansion (in both of its forms) are not included. The rest of the specification is similar to the one in equation (2).

As a robustness test of the estimates, an extension of equation (3) was estimated. In that exercise, the interactions of the 1994 dummy and the income per member dummies were

\(^{62}\) Variable equals one if the worker is in a union and has a formal job contract.
included as additional independent variables. Results are similar to those found using specification (3).

There are two concerns for the estimation of this problem. The first one is the presence of outliers in the data. The second one is the non-normality of the saving distribution. In order to address these issues, two estimation techniques were used. The first one is a method robust regression.\(^{63}\) This method deals with the presence of gross outliers in the data.\(^{64}\)

Given the rejection of normality tests of the saving rate distribution, it is not clear that the center of analysis should be the mean of it (which tends to be driven by the upper tail). The second method of estimation is the median regression. This method deals directly with this problem. This type of estimation describes the behavior at the center of the population distribution, thus evading the sensitivity to extreme values. In this paper, in order to avoid any assumption about the distribution of the standard errors, the median regressions are done with bootstrapped standard errors (with 100 iterations).\(^{65}\)

\subsection*{1.6.2 Results of the Effects of Financial Access on the Saving Rates}

\subsubsection*{1.6.2.1 Basic Analysis}

The basic question of this paper is whether increasing financial access has an effect on the saving rate of affected households, especially on low-income households. Equation (2) deals directly with this issue. Saving rates of households located in towns affected by the expansion in 1994 (either with or without a pre-expansion Pahmal office) should reflect the effect of increased access.

\footnotesize
\(^{63}\) The robust regression method first estimates an ordinary least squares regression and performs a Cook’s outliers test. After eliminating gross outliers, the method performs the regression again, calculates case weights based on absolute residuals, and regresses again using those weights. The process iterates until the change in weights drops below a tolerance level.

\(^{64}\) OLS estimates were also calculated. In general, OLS results were stronger than robust regression results.

\(^{65}\) For both types of methods the data set was cleaned before estimation. Saving rates were constrained to be in the \(-100\) percent to 100 percent interval. Estimates using the complete data set were calculated. Results did not change significantly.
This first specification shows the average effect of increasing access for all affected households, regardless of their level of income. Table 8 presents the results for the saving rate with housing expenditures. The first two columns show the robust regression estimates, including and not including covariates. As shown in the table, opening an office in a new town increased the saving rate of affected households by 4.7 to 6.7 percentage points. These estimates are significant at the 5 percent and at the 1 percent level, respectively. In contrast, expansion in a town that had a Pahnal office before 1993 caused a 3.9 to 4.2 percentage points increase in the saving rate. The degree of significance of these coefficients is higher in this case. The equality of the coefficients for the two types of expansion can not be statistically rejected.

In the case of the median regression, the median saving rate is 5.0 to 6.7 percentage points higher for households located in towns in which the new Pahnal office was the only office in 1994. These estimates are significant at the 5 percent and at the 1 percent level, respectively. The expansion of the system in a town that already had an office has a positive effect of around 4.0 percentage points on the saving rate and it is significant at the 1 percent level in the estimation without covariates (the significance is 5 percent when adding covariates).

For both types of estimation methods, income per member has a significant but small effect on the saving rate of the households. Other interesting results of the basic analysis are that the saving rate increases when a man is the head of the household by more than 5.9 percentage points than when the head is a woman. Also, the saving rate is higher when the number of income recipients in the households is higher (by approximately 4 percentage points) or if the head of the household is an employer. Households tend to save more when their income stream is irregular; their saving rate is on average 5 percentage points higher.
Table 9 presents the basic estimation results for the alternative definition of savings: saving rate without housing expenditures.\textsuperscript{66} Robust regression estimates, including and not including covariates, show that households located in towns in which the new Pahnal office was the only office had a saving rate that is on average 4.2 to 5.7 percentage points higher than unaffected households. These estimates are significant at the 10 percent and the 5 level, respectively.

According to the robust regression results, if the household is located in a town in which the new office was not the only one, the effect of the expansion on its saving rate is smaller, around 3.1 to 3.3 percentage points. These coefficients are significant at the 5 percent level.

Using the median regression technique, the impact of the expansion in a new town is 7 percentage points and it is highly significant in the no covariates case. Nevertheless, when adding covariates, the effect of this type of expansion is reduced to 3.2 percentage points and is no longer significant.\textsuperscript{67} In the case of an expansion in a town that had a pre-expansion Pahinal office, its effect on the saving rate is 1.8 to 3.4 percentage points. The estimate that includes covariates is not significant. Nevertheless, the estimate is significant at the 5 percent level in the other case.

The saving rate without housing expenditures is higher if the head of the household is a man; the effect is around 2.7 percentage points. The same is true if the number of income recipients increases (this has an impact of approximately 3.0 percentage points for every working member) or if the head of the household is an employer (the saving rate in this case is between 6.5 and 7.4 percentage points higher). Irregular reception of income also increases the household saving rate.

\textsuperscript{66} An important result is that the significance of the 1994 dummy is reduced when this dependent variable is used. The probable reason is that this definition of saving rate does not include the value of rents that increased 7.4 percent in real terms from 1992 to 1994.
\textsuperscript{67} The t-statistic is 1.286.
1.6.2.2 Analysis by Levels of Income per Household Member

From last section it can be concluded that, in general, the expansion of Pahnal had a positive effect on the saving rates of affected households. But the average effect of this policy masks large variations in the responses of households’ saving rates according to different household characteristics, such as income. There are reasons to believe that households with different levels of income responded differently to the program since Pahnal explicitly targeted its instruments to low-income individuals.

Equation 3 deals with this issue. The interaction of the level of income per member of the household and Pahnal’s expansion gives the effect of increasing access to specific income groups of the population.

Table 10 presents the results when the dependent variable is the saving rate with housing expenditures. In the robust regression estimates, Pahnal’s expansion in a new town increases the saving rate of the poorest households by 8 to 9 percentage points. These estimates are significant at the 1 percent level.

For higher levels of income, the results are different. For the income bracket of one to two times the minimum wage, the effect is significant for the estimate without covariates; however is non-significant in the estimate with covariates. For the two to five times the minimum wage income bracket, the program increases the saving rate by 8.8 to 9.6 percentage points and it is not significant for the estimation without covariates and significant in the other case. In the five to ten times the minimum wage income bracket category, the saving rate is reduced by 12.8 to 14.5 percentage points and these estimates are significant at the 10 percent level.

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68 In this section, income always represents income per member in the household. Income levels regressions were also done including interactions of the 1994 dummy and the income per member dummies. Results were similar to those showed in tables 10 and 11.

69 These are households with income per member of up to the minimum wage.
In expansions in a town that already had an office, the policy increased the saving rate of the poorest households by 6.3 to 7 percentage points (up to one minimum wage per member). These estimates are significant at the 1 percent level. For the rest of the income brackets, the expansion had no statistical effect on the saving rate; the coefficients are all non-significant.

It cannot be statistically rejected that the two types of expansions had the same effect for households with incomes up to five times the minimum wage. In the remaining income bracket (five to ten minimum wages), according to the robust regression estimates, the expansion had different effects depending on its type.

Results are very interesting in the case of the median regression. In the estimates without covariates, the expansion in a town that did not have a Pahnal office before 1993, increases the saving rate of affected households by around 7 percentage points for households with income per member up to two minimum wages. The effect of the expansion is smaller in towns that had a pre-expansion office, however the equality of coefficients between both types of expansion cannot be statistically rejected.

In the estimation with covariates, the only interaction coefficient that is still significant is the one for the lowest income population, no matter the kind of expansion. The effect for both types of expansion is similar: around an 8 percentage point increase in the saving rate of poorest households. All other interactions are not significant. This result supports the prior that only the poorest individuals should be affected by the increase in financial access.

The behavior of the rest of the exogenous variables is maintained in the income level estimation (regardless of the estimation technique used). The saving rate of the household is higher if the household head is a man, if the head is an employer, if the number of income recipients increases, or if the reception of income is irregular.

70 Here it is important to mention that the omitted income category is the richest population. Also, the results for this income bracket are not robust to different estimation techniques and not even to different measures of saving rates.
Table 11 presents the results for the saving rate without housing expenditures. The expansion of the system to a new town increases the saving rate of the poorest (those with income up to the minimum wage per member) households by 6.8 to 7.8 percentage points. These effects are significant at the 5 percent and 1 percent level, respectively. The expansion of the system also increases the saving rate for those in the two to five times the minimum wage income bracket by 8.1 to 9 percentage points. In this case, the effect is non-significant for the case without covariates and significant at the 10 percent level in the estimation with covariates. None of the other income brackets interactions present a significant effect caused by the system.

For this saving rate definition, robust regression estimates of the impact of an expansion in a town that had an office before the expansion are, in general, non-significant and negative for the higher income brackets, in the case with covariates. Nevertheless, once again, the expansion only had a positive effect on the saving rate of the poorest households. The effect is around 5.5 percentage points increase in the saving rate and is significant at the 1 percent level.

In the case of the median regression, the Pahnal expansion has, in general, no significant effect on the median saving rate without housing expenditures. Once again, the expansion to a new town only had significant effects on the saving rate of the poorest households in the sample (in the estimates without covariates, the expansion has a significant effect in the 1 to two minimum wages bracket). The saving rate of the poorest households increased by 6.2 to 6.8 percentage points and these estimates were significant at the 10 percent and at the 1 percent level, respectively.

For the expansion in a town that had a Pahnal’s office before 1993, the households’ median saving rate, with income per member up to the minimum wage, was 4.1 to 6.5 percentage points higher if they were located in towns affected by the expansion. These coefficients were significant at the 10 percent and at the 1 percent level, respectively.
In this case, for both estimation techniques, the rest of the exogenous variables have similar effects to those described for other specifications. Once again, only for the poorest households the program has positive impact on the saving rate. Estimates offer consistent evidence that Pahnal’s expansion had an effect mainly on the poorest households. The effect is on the order of 3 to 8 percentage points for the estimates that include all exogenous variables.

1.6.2.3 Estimated Magnitude of Pahnal’s Exposure

The effects described in the last two sections are caused by the household’s exposure to Pahnal’s expansion. Therefore, the problem of self-selection into the program is avoided: the paper is not considering account holders versus non-account holders. However, this creates a concern about the size or magnitude of this exposure. If the exposure is small, the results are questionable. To tackle this matter, estimates of the amount of savings collected by Pahnal, as a proportion of total savings and low-income savings in specific cities of Mexico, were constructed.

Using the information of the surveys it is possible to calculate the total amount of savings in the cities of Mexico. These estimates use surveys’ weights. These weights are the inverse of the total number of households that each household in the survey represents in the complete population of the city. The sum of all the inverse weights for the same city gives the number of households in the specific community. So, with this information, it is possible to extrapolate the savings of a city for a specific year.\textsuperscript{71}

In 1994, according to the estimates, in a typical medium size city, Pahnal’s gross deposits were insignificant as a proportion of total savings in the city.\textsuperscript{72} However, the institute’s gross deposits were a substantial fraction of low-income people savings in the city. The

\textsuperscript{71} Estimates assume that quarterly savings are stable through the whole year. It is important to mention that, usually, in the fourth quarter of the year households’ expenditures tend to increase. So, in that circumstance and if all other conditions remain the same, the estimates would be a lower bound of total yearly savings in the city. Also, estimates are calculated using the two definitions of the saving rates.

\textsuperscript{72} Medium size cities like Veracruz, Xalapa and Puebla. Gross deposits refer to the total amount of deposits at the system in a specific city at the end of 1994.
estimates for average cities ranged from 21 percent to 29 percent of low-income people savings. When considering the net change of savings deposits in Pahnal, from December 1993 to December 1994, the amount of net deposits in Pahnal represented 10 percent to 14 percent of low-income people savings. The proportion is not constant among cities; it decreases with the size of the city. It can be concluded that exposure is significant for the relevant segment of the population, as reflected by these estimates.

1.7 Crowding Out of Informal Savings Instruments

The Mexican Households Surveys of Income and Expenditures of 1992 and 1994 contain information about possible informal saving instruments. Surveys have expenditures and earnings received from these instruments. Some of them are categorized as financial transactions and some as income concepts. Unfortunately, in some cases, the surveys are not as detailed to clearly identify informal instruments. Some of them are mixed with formal instruments and it is not possible to distinguish among them. Nevertheless, it is most likely (as will be showed) that the formal instruments do not represent a high proportion of the mixed categories.

There are, basically, 6 sets of categories in the surveys that include possible informal saving instruments. The first one is expenditures (income) in (from) Rotating Savings and Credit Associations (ROSCAS), Savings Unions, Savings Accounts, Stocks, and bonds.\textsuperscript{73}

As can be seen, in this concept, informal and formal savings instruments are mixed together. The reason is that the 1992 survey asks about expenditures (income) in (from) all these instruments in a single question. Nevertheless, it is possible to use the 1994 survey to assess the magnitude of the problem. The 1994 survey has two separate

\textsuperscript{73} ROSCAS are usually formed by a small group of people. All of them contribute a fixed amount of money. They contribute the same number of periods as the number of individuals in the group. Every period, one person gets all the contributions from the rest of the ROSCAS' members. Savings associations or savings unions are usually not regulated by the Government. People can get credit from the savings union only if they are savers. For reference on ROSCAS and savings associations see Bouman and Hospes (1994).
questions, one for ROSCAS, saving unions and savings accounts, and a second question for stocks and bonds. In this survey, only 6 households reported positive expenditures in stocks and bonds and there is no significant reason to assume a different proportion for the 1992 survey.

The surveys also have information about interest income from different savings instruments. On the two surveys, only 96 households reported interest income from savings accounts; only 72 households reported this type of income from fixed term deposits; and only 4 households reported income from interests from bonds. Therefore, there were only 172 households reporting interest income from formal savings instruments. Consequently, it is reasonable to assume that the presence of these instruments is expected to be small.

Expenditures (income) in (from) loans to non-family members represent the second probable informal saving instrument used by households. These types of loans are a way to save. The surveys ask precisely how much expenditure and how much income comes from this informal source.

Another concept in the surveys that reflects the use of an informal savings instrument by the household is interest income from the loans mentioned in the preceding paragraph. Interests from loans to non-family members are not considered jointly with the amount of expenditures (income) in (from) these loans because the surveys only ask about interest income but not about interest payments. Therefore, these concepts are treated separately in the estimation procedures.

Surveys have information on expenditures (income) in (from) foreign currencies, jewelry, and gold and other precious metals. These items are all included in a single question; clearly, these objects can be used to preserve value and to transfer it from the present to the future. They represent the third set of informal savings instruments.
The fourth category of possible informal instruments includes expenditures (income) in (from) land and houses. This category considers expenditures in land and houses used directly by the family or purchased as investment. These informal instruments are probably not very compelling given their low liquidity; however they have been documented in the literature as probable informal savings options. It is also known that some low-income people tend to invest in their houses.\footnote{See Mansell (1995), Bouman and Hospes (1994).}

The surveys ask about expenditures (income) in (from) machinery, equipment and animals. These items could represent an informal way to save and to produce, especially for low-income families. Machinery could be sold and it could preserve value for a reasonable period of time. Also, according to the literature, people tend to buy small animals, like chickens, because they are easier to sell and more divisible (it is inefficient to sell a big animal, like a bullock, if the household require a small amount of money). These concepts represent the fifth set of possible informal savings instruments.

The last set of possible informal savings instruments includes income from selling used appliances and from selling used cars. It has been documented that some appliances are used also as instruments to store value. Availability of formal instruments to low-income households could increase the selling of appliances to take advantage of the more efficient financial instrument. Cars could also represent a way to store value, however it is expected that their services are their principal purpose. Unfortunately, the surveys do not make explicit difference between appliances and cars.

1.7.1 Data Description of Informal Savings Instruments

Descriptive statistics of informal savings instruments are presented in two tables. Table 12 and 13. Table 12 includes expenditures in possible informal savings instruments. These expenditures represent savings flows into these informal instruments. Table 13 presents net flows into informal savings instruments. Net flows are defined as the difference of expenditure minus income into these informal instruments (they represent
net flow savings into these instruments). Both tables show flows as percentage points of households' total income.

Several points about the data on informal instruments should be addressed. First, not many households were reporting expenditures (income) in (from) these informal instruments. In both surveys, on average 5.6 percent of households reported a transaction on these instruments. The most common transaction was the one of ROSCAS, savings unions, savings accounts, stocks, and bonds with 4,949 observations in both surveys. The second most popular instrument was loans to non-family members with 699 observations.

The second point to make is that, in terms of percentage points of income, the mean expenditures (income) in (from) informal instruments are relatively small, especially when considering all households in the sample. Nevertheless, considering only households that reported an informal instrument transaction, the mean expenditures (income) could be substantial. For this group of households, mean expenditures in the case of ROSCAS, savings unions, savings accounts, stocks, and bonds represented 16.2 percent of their income. For the same group, average net flows into this category were around 8.0 percent of their income.

Finally, in general, households had small but positive average net flows into informal financial instruments. In four of the five informal net flows instruments categories, households were net savers. However, in the case of loans to a non-family member, households were on average net borrowers.

1.7.2 Econometric Analysis and Results of Informal Savings Instruments

The objective is to look at the effect of Pahnal's expansion on the probability of finding people saving using informal instruments. This is the same as asking if people are reducing or increasing their expenditures in informal savings instruments. Specifically, it is important to check if there was crowding out of informal savings instruments caused
by increasing access to formal instruments. This is an implication of conventional savings models.

An indirect way to check for crowding out of informal savings instruments is by looking the effects of the Pahnal’s expansion on the probability of having expenditures in informal instruments. The estimation of probits is adequate to try to answer this question. The set of regressions to analyze crowding out of expenditures in informal savings instruments uses the specification of equations (2) and (3) of the paper. The same exogenous variables were included, only the econometric techniques used are different.

Table 14 presents the results. As can be seen, few coefficients are significant. The expansion tends to reduce the probability of spending in ROSCAS, savings unions and savings accounts, however the coefficients are non-significant. For expansions in towns that had an office before 1993, there were only three coefficients that were significant at the 10 percent level: (1) in the case of loans to non-family members, expenditures of households with up to 1 minimum wage per member, the interaction coefficient was 0.2867. (2) In the case of land and houses, expenditures of households with up to 1 minimum wage per member, the interaction coefficient was 0.4040. And (3) in the case of land and houses, expenditures of households with income per member of 2 to 5 minimum wages, the interaction coefficient was –0.4477. Once again there is not strong evidence that the expansion of Pahnal changed the probability of having expenditures in informal savings instruments.

Other important issue is the study of net financial flows into informal savings instruments and the effect of the Pahnal’s expansion on them. Ordinary least squares regressions with robust standard errors were used to do the analysis of net flows. The specifications for the estimations are the same as in equations (2) and (3) of the paper.

Table 15 presents the results of net flows analysis. Evidence on crowding out (or crowding in) of net flows is not strong. Only few coefficients were significant and only in few cases there was a crowding out caused by the expansion of Pahnal. For example, net
flows into loans to non-family members, machinery, equipment and animals seem to be reduced by the expansion of Pahnal; but once again, evidence is not conclusive in this matter.

According to the regressions' results, there is not strong evidence to support the presence of crowding out of informal savings instruments caused by the expansion of Pahnal in 1993. Also, in the cases were there was crowding out of informal savings by the expansion, the displacement was small in terms of percentage points of income.

1.8 Conclusions

This paper focused in two main questions. First, it asks whether increasing financial access has an effect on the saving rates of low-income people. Second, it looks for crowding out or crowding in of informal savings instruments caused by the expansion of the savings institute.

In the case of the first question, this paper has shown that the effects of increasing financial access on low-income people saving rate are statistically significant and of an important magnitude. The expansion of a Mexican savings institute (Pahnal) increased the average saving rate of affected households by 3 to 5 percentage points. This result is robust to different saving rate specifications and estimation techniques.

Furthermore, the effect was always higher and significant for low-income individuals, who were the ones targeted by the expansion. Households with income per member lower than the minimum wage that were located in towns affected by expansion had, on average, a saving rate that was more than 5.7 to approximately 8 percentage points higher than those located in towns not affected by the expansion.

It is important to note that the effect of the expansion on the saving rate was always positive and significant only for the poorest households. This evidence shows that there
was a clear targeting of Pahnal to low-income individuals. It is also in accordance with
the analytical implication that only low-income people have limited access to financial
institutions and therefore only they should be affected by the expansion.

The effect of the expansion was generally stronger (approximately by 1 percentage point)
if the new office was the only office in town. This is also congruent with the hypothesis
that the effects of the program should be stronger in places where financial access was
more limited.

Given that this paper deals with the exposure of households to the expansion of Pahnal,
an estimate of the magnitude of this exposure was calculated. It was found that Pahnal’s
gross deposits represented 21 percent to 29 percent of total low-income people savings in
typical cities in the sample at the end of 1994.

Lack of access to standard savings accounts can force households to save using informal
instruments. This paper presents an analysis of possible informal savings instruments and
its presence in the Mexican database. The first point to mention is that not many
households reported expenditures (income) from these informal instruments. The average
proportion of households reporting them was 5.61 percent.

The paper analyzes effects of the expansion on expenditures in informal savings
instruments. The exercise was to consider effects on the probability of reporting
expenditures in informal savings instruments. Results show little effects of the expansion
on this type of expenditures. In most of the cases, evidence is not sufficiently strong to
rule out crowding out or to support it.

Net flows into informal instruments were also analyzed. There was not strong evidence to
support the presence of crowding out of informal savings instruments caused by the
expansion of Pahnal in 1993.
Moreover, in the cases where the expansion had a significant impact on the amount of resources into informal savings instruments, these effects were in general small in terms of income. Therefore, evidence is not sufficient to rule out the existence of crowding out of informal savings instruments.

It was not possible to consider all informal savings instruments in the analysis. The included categories do not represent the whole set of informal instruments. Specially, it was not possible to identify cash hoarding of the households. Nevertheless, results do not rule out the possibility that a considerable fraction of the increase in households’ savings could have come from new savings.

Two main lessons could be taken away from the paper. First, low-income people save a considerable fraction of their income when they have access to financial instruments; second, evidence is not sufficient to sustain crowding out of informal savings instruments by the increment in access.
References


**Table 1**

**Pahnal\(^1\) Reform Statistics**

<table>
<thead>
<tr>
<th>Balances (dollars)</th>
<th>July '93</th>
<th>December '94</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>49,967,742</td>
<td>93,258,065</td>
</tr>
<tr>
<td>Cuentahorro (short term instrument)</td>
<td>19,161,290</td>
<td>57,419,355</td>
</tr>
<tr>
<td>Tandahorro (long term instrument)</td>
<td>7,387,097</td>
<td>20,548,387</td>
</tr>
<tr>
<td>Old Instruments (bonds and monthly savings plan)</td>
<td>23,419,355</td>
<td>15,290,323</td>
</tr>
</tbody>
</table>

Cuentahorro and Tandahorro as % of Total Balances: 53.13% , 83.60%

**Number Accounts\(^2\)**

<table>
<thead>
<tr>
<th>Number of Accounts</th>
<th>July '93</th>
<th>December '94</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>83,300</td>
<td>228,500</td>
</tr>
<tr>
<td>Cuentahorro (short term instrument)</td>
<td>67,800</td>
<td>170,000</td>
</tr>
<tr>
<td>Cuentahorro accounts as % of total accounts</td>
<td>81.39%</td>
<td>74.40%</td>
</tr>
<tr>
<td>Tandahorro (long term instrument)</td>
<td>15,500</td>
<td>58,500</td>
</tr>
<tr>
<td>Tandahorro account as % of total accounts</td>
<td>18.61%</td>
<td>25.60%</td>
</tr>
</tbody>
</table>

**Average Individual Account Balances (dollars)**

<table>
<thead>
<tr>
<th>Average Individual Account Balances (dollars)</th>
<th>July '93</th>
<th>December '94</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuentahorro (short term instrument)</td>
<td>283</td>
<td>310</td>
</tr>
<tr>
<td>Tandahorro (long term instrument)</td>
<td>477</td>
<td>323</td>
</tr>
<tr>
<td>Average of both instruments</td>
<td>319</td>
<td>313</td>
</tr>
</tbody>
</table>

\(^1\) Mexican Savings Institute.
\(^2\) Includes only Cuentahorro and Tandahorro.
Source: Pahnal.

---

**Table 2**

**Pahnal’s Expansion and Surveys Timeline**

<table>
<thead>
<tr>
<th>1992</th>
<th>1993</th>
<th>1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Quarter of 1992: National Survey of Income and</td>
<td>Pahnal was expanded using the postal offices.</td>
<td>4th Quarter of 1994: National Survey of Income and</td>
</tr>
<tr>
<td>Expenditure. The survey includes 10,530 households living</td>
<td></td>
<td>Expenditure. The survey includes 12,815 households living</td>
</tr>
<tr>
<td>in 366 towns.</td>
<td></td>
<td>in 366 towns.</td>
</tr>
<tr>
<td>There were 67 towns with at least 1 Pahnal Office (none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>of them in a postal office).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By December 93, Pahnal had a total expansion of 98 offices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in 34 towns. 27 towns didn’t have an office before the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>expansion.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Pahnal
Table 3
Table of Means

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving Rates (percentage points of income)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. With Housing Expenditures</td>
<td>10.95</td>
<td>4.06</td>
<td>8.27</td>
<td>6.44</td>
</tr>
<tr>
<td>Expenditures</td>
<td>(0.45)</td>
<td>(0.83)</td>
<td>(0.40)</td>
<td>(0.73)</td>
</tr>
<tr>
<td>2. Without Housing Expenditures</td>
<td>17.77</td>
<td>13.97</td>
<td>16.75</td>
<td>17.10</td>
</tr>
<tr>
<td>Income (1992 pesos)</td>
<td>4,939</td>
<td>7,904</td>
<td>4,695</td>
<td>8,022</td>
</tr>
<tr>
<td>Household Size</td>
<td>5.04</td>
<td>4.58</td>
<td>4.90</td>
<td>4.49</td>
</tr>
<tr>
<td>Age of Head</td>
<td>40.57</td>
<td>40.51</td>
<td>41.61</td>
<td>41.07</td>
</tr>
<tr>
<td>Education Indicator</td>
<td>2.20</td>
<td>3.46</td>
<td>2.31</td>
<td>3.64</td>
</tr>
<tr>
<td># of Income Recipients</td>
<td>1.65</td>
<td>1.71</td>
<td>1.77</td>
<td>1.72</td>
</tr>
<tr>
<td># of Kids</td>
<td>1.69</td>
<td>1.23</td>
<td>1.49</td>
<td>1.14</td>
</tr>
<tr>
<td># of Observations</td>
<td>6893</td>
<td>1691</td>
<td>7667</td>
<td>1810</td>
</tr>
</tbody>
</table>

\(^{v}\) Standard errors in parenthesis. Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between −100 percent and 100 percent. Source: own calculations using the 1992 and the 1994 surveys of Income and Expenditures in Mexico.

Table 4
Average Saving Rates by Level of Household Income
(percentage of total income)

<table>
<thead>
<tr>
<th>Household Income:</th>
<th>Saving Rate (including Housing Expenditures)</th>
<th>Saving Rate (excluding Housing Expenditures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1 minimum wage</td>
<td>-5.83%</td>
<td>3.26%</td>
</tr>
<tr>
<td>Between 1 and 2 m.w.</td>
<td>-0.33%</td>
<td>8.57%</td>
</tr>
<tr>
<td>Between 2 and 5 m.w.</td>
<td>6.99%</td>
<td>15.47%</td>
</tr>
<tr>
<td>Between 5 and 10 m.w.</td>
<td>18.93%</td>
<td>26.28%</td>
</tr>
<tr>
<td>Greater than 10 m.w.</td>
<td>27.48%</td>
<td>33.95%</td>
</tr>
</tbody>
</table>

\(^{v}\) Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between −100 percent and 100 percent. Source: own calculations using the 1992 and the 1994 surveys of Income and Expenditures in Mexico.
Table 5
Percentage of Households in Different Income Levels
by Total Income and by Income per Member in the Household

<table>
<thead>
<tr>
<th>Distribution of Households by Level of Income</th>
<th>Household Total Income</th>
<th>Household Income Per Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1 Minimum Wage</td>
<td>9%</td>
<td>65%</td>
</tr>
<tr>
<td>Between 1 and 2 m.w.</td>
<td>21%</td>
<td>21%</td>
</tr>
<tr>
<td>Between 2 and 5 m.w.</td>
<td>41%</td>
<td>11%</td>
</tr>
<tr>
<td>Between 5 and 10 m.w.</td>
<td>19%</td>
<td>2%</td>
</tr>
<tr>
<td>Greater than 10 m.w.</td>
<td>10%</td>
<td>1%</td>
</tr>
</tbody>
</table>


Table 6
Wages and Food Expenses
As Percentages of Income and Expenditures, Respectively

<table>
<thead>
<tr>
<th>Household Income:</th>
<th>Wages/Total Income</th>
<th>Food Expenses/Total Expenditures(^{\dagger})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1 Minimum Wage</td>
<td>34.43%</td>
<td>54.90%</td>
</tr>
<tr>
<td>Between 1 and 2 m.w.</td>
<td>57.85%</td>
<td>51.24%</td>
</tr>
<tr>
<td>Between 2 and 5 m.w.</td>
<td>65.28%</td>
<td>44.56%</td>
</tr>
<tr>
<td>Between 5 and 10 m.w.</td>
<td>66.68%</td>
<td>35.57%</td>
</tr>
<tr>
<td>Greater than 10 m.w.</td>
<td>63.13%</td>
<td>23.43%</td>
</tr>
</tbody>
</table>

\(^{\dagger}\) Total expenditures include housing expenses.

Table 7
Saving Rates and Average Income for Towns that had a Pahmal Expansion (Before and After the Expansion)$^1$

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Saving Rate</td>
<td>Saving Rate</td>
<td>Income</td>
<td>Saving Rate</td>
</tr>
<tr>
<td></td>
<td>with Housing$^2$</td>
<td>without Housing$^3$</td>
<td>($^92$ pesos)</td>
<td>with Housing$^2$</td>
</tr>
<tr>
<td>Mean</td>
<td>0.04</td>
<td>0.14</td>
<td>7,904</td>
<td>0.06</td>
</tr>
<tr>
<td>Median</td>
<td>0.06</td>
<td>0.16</td>
<td>4,700</td>
<td>0.09</td>
</tr>
<tr>
<td>St. Dev.</td>
<td>0.34</td>
<td>0.33</td>
<td>17,725</td>
<td>0.31</td>
</tr>
<tr>
<td>Max.</td>
<td>0.95</td>
<td>0.96</td>
<td>454,867</td>
<td>0.95</td>
</tr>
<tr>
<td>Min.</td>
<td>-0.98</td>
<td>-0.98</td>
<td>300</td>
<td>-0.99</td>
</tr>
<tr>
<td>% Change on means</td>
<td></td>
<td></td>
<td>58.62</td>
<td>22.41</td>
</tr>
</tbody>
</table>

$^1$Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between −100 percent and 100 percent. Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income.

Average income is in pesos of 1992. The consumer price index was used to deflate the 1994 observations.

$^2$Consumption used for calculation on the saving rate includes housing expenditures.

$^3$Consumption used for calculation of the saving rate does not include housing expenditures.

Source: own calculations using the 1992 and the 1994 surveys of Income and Expenditures in Mexico.
| Table 8  
Basic Analysis  
Dependent Variable: Saving Rate with Housing Expenditures, Percentage Points  
Standard Errors in Parenthesis
<table>
<thead>
<tr>
<th></th>
<th>Robust Regression(^2)</th>
<th>Median Regression(^2,3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Saving Rate between (-1,1))</td>
<td>(Saving Rate between (-1,1))</td>
</tr>
<tr>
<td></td>
<td>No Covariates</td>
<td>Adding Covariates</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Income Per Member</td>
<td>3.51E-03</td>
<td>2.58E-03</td>
</tr>
<tr>
<td></td>
<td>(8.36E-05)</td>
<td>(3.72E-04)</td>
</tr>
<tr>
<td>1994 Dummy</td>
<td>-2.63</td>
<td>-2.86</td>
</tr>
<tr>
<td></td>
<td>(0.59)</td>
<td>(0.58)</td>
</tr>
<tr>
<td>Dummy</td>
<td>(1.61)</td>
<td>(1.80)</td>
</tr>
<tr>
<td>System Expansion Town that had</td>
<td>-7.30</td>
<td>-5.76</td>
</tr>
<tr>
<td>Pahnal Dummy</td>
<td>(1.13)</td>
<td>(1.74)</td>
</tr>
<tr>
<td>Interaction Expansion in New</td>
<td>6.73</td>
<td>4.77</td>
</tr>
<tr>
<td>Town-1994</td>
<td>(2.52)</td>
<td>(2.40)</td>
</tr>
<tr>
<td>Interaction Expansion in Town</td>
<td>4.28</td>
<td>3.93</td>
</tr>
<tr>
<td>that had Pahnal-1994</td>
<td>(1.52)</td>
<td>(1.45)</td>
</tr>
<tr>
<td>Dummy of Gender of Household</td>
<td>5.95</td>
<td>5.60</td>
</tr>
<tr>
<td>Head (male=1)</td>
<td>(0.83)</td>
<td>(0.86)</td>
</tr>
<tr>
<td>Age of Household head</td>
<td>0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Education Indicator Level (Head)</td>
<td>-1.56</td>
<td>-1.48</td>
</tr>
<tr>
<td></td>
<td>(0.42)</td>
<td>(0.58)</td>
</tr>
<tr>
<td>Square of Education Indicator</td>
<td>0.08</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Household Head Blue Collar</td>
<td>-2.59</td>
<td>-3.12</td>
</tr>
<tr>
<td></td>
<td>(0.99)</td>
<td>(1.06)</td>
</tr>
<tr>
<td>Household Head Peasant</td>
<td>-0.92</td>
<td>-1.48</td>
</tr>
<tr>
<td></td>
<td>(1.18)</td>
<td>(1.29)</td>
</tr>
<tr>
<td>Household Head Employer</td>
<td>7.99</td>
<td>8.34</td>
</tr>
<tr>
<td></td>
<td>(1.34)</td>
<td>(1.60)</td>
</tr>
<tr>
<td>Household Head Self-employed</td>
<td>2.46</td>
<td>1.78</td>
</tr>
<tr>
<td></td>
<td>(1.02)</td>
<td>(1.23)</td>
</tr>
<tr>
<td>Irregular Reception of Income</td>
<td>5.10</td>
<td>4.69</td>
</tr>
<tr>
<td></td>
<td>(0.87)</td>
<td>(1.27)</td>
</tr>
<tr>
<td>Employment Stability</td>
<td>0.54</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>(0.55)</td>
<td>(0.58)</td>
</tr>
<tr>
<td>Medical Service</td>
<td>0.91</td>
<td>1.89</td>
</tr>
<tr>
<td></td>
<td>(1.03)</td>
<td>(1.21)</td>
</tr>
<tr>
<td>Number of Income Recipients in</td>
<td>3.99</td>
<td>4.09</td>
</tr>
<tr>
<td>Household</td>
<td>(0.28)</td>
<td>(0.36)</td>
</tr>
<tr>
<td>% of Children in the Household</td>
<td>-2.21</td>
<td>-4.04</td>
</tr>
<tr>
<td></td>
<td>(1.49)</td>
<td>(1.97)</td>
</tr>
<tr>
<td>Interaction of % of Children and</td>
<td>1.91</td>
<td>-0.18</td>
</tr>
<tr>
<td>Availability of Medical Services</td>
<td>(2.14)</td>
<td>(2.37)</td>
</tr>
</tbody>
</table>
Table 8 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Robust Regression(^7) (Saving Rate between (-1,1))</th>
<th>Median Regression(^7,8) (Saving Rate between (-1,1))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Covariates</td>
<td>Adding Covariates</td>
</tr>
<tr>
<td>Constant</td>
<td>12.73 ((0.43))</td>
<td>13.74 ((0.53))</td>
</tr>
<tr>
<td></td>
<td>0.52 ((2.32))</td>
<td>5.10 ((2.90))</td>
</tr>
<tr>
<td>F-statistic</td>
<td>15.57</td>
<td>60.97</td>
</tr>
<tr>
<td>N</td>
<td>18061</td>
<td>18061</td>
</tr>
</tbody>
</table>

\(^7\) Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between –100 percent and 100 percent. Saving rates are calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Consumption includes housing expenditures.

\(^8\) State dummies are included in all regressions but are not presented. Regressions were also done without constraining the data. Results were similar to those presented here.

\(^8\) Bootstrapped standard errors are calculated with 100 iterations.
Table 9
Basic Analysis
Dependent Variable: Saving Rate without Housing Expenditures, Percentage Points
Standard Errors in Parenthesis

<table>
<thead>
<tr>
<th></th>
<th>Robust Regression (^2) (Saving Rate between (-1,1))</th>
<th>Median Regression (^2) (Saving Rate between (-1,1))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Covariates</td>
<td>Adding Covariates</td>
</tr>
<tr>
<td>Income Per Member</td>
<td>3.00E-03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.07E-05)</td>
<td></td>
</tr>
<tr>
<td>1994 Dummy</td>
<td>-0.94</td>
<td>-1.32</td>
</tr>
<tr>
<td></td>
<td>(0.56)</td>
<td>(0.56)</td>
</tr>
<tr>
<td>System Expansion New Towns</td>
<td>-5.71</td>
<td>-6.80</td>
</tr>
<tr>
<td></td>
<td>(1.54)</td>
<td>(1.74)</td>
</tr>
<tr>
<td>System Expansion Town that had</td>
<td>-3.55</td>
<td>3.15</td>
</tr>
<tr>
<td></td>
<td>(1.08)</td>
<td>(1.68)</td>
</tr>
<tr>
<td>Interaction Expansion in New</td>
<td>5.73</td>
<td>4.21</td>
</tr>
<tr>
<td>Town-1994</td>
<td>(2.42)</td>
<td>(2.32)</td>
</tr>
<tr>
<td>Interaction Expansion in Town</td>
<td>3.31</td>
<td>3.16</td>
</tr>
<tr>
<td>that had Pahnal-1994</td>
<td>(1.46)</td>
<td>(1.40)</td>
</tr>
<tr>
<td>Dummy of Gender of Household</td>
<td>2.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
<td></td>
</tr>
<tr>
<td>Head (male=1)</td>
<td>-0.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td></td>
</tr>
<tr>
<td>Education Indicator Level (Head)</td>
<td>-1.28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td></td>
</tr>
<tr>
<td>Square of Education Indicator</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td></td>
</tr>
<tr>
<td>Household Head Blue Collar</td>
<td>-1.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.95)</td>
<td></td>
</tr>
<tr>
<td>Household Head Peasant</td>
<td>-2.27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.14)</td>
<td></td>
</tr>
<tr>
<td>Household Head Employer</td>
<td>6.58</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.29)</td>
<td></td>
</tr>
<tr>
<td>Household Head Self-employed</td>
<td>1.82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.99)</td>
<td></td>
</tr>
<tr>
<td>Irregular Reception of Income</td>
<td>4.23</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.84)</td>
<td></td>
</tr>
<tr>
<td>Employment Stability</td>
<td>-0.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.53)</td>
<td></td>
</tr>
<tr>
<td>Medical Service</td>
<td>-0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.00)</td>
<td></td>
</tr>
<tr>
<td>Number of Income Recipients in</td>
<td>2.90</td>
<td></td>
</tr>
<tr>
<td>Household</td>
<td>(0.27)</td>
<td></td>
</tr>
<tr>
<td>% of Children in the Household</td>
<td>-5.32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.44)</td>
<td></td>
</tr>
<tr>
<td>Interaction of % of Children</td>
<td>3.70</td>
<td></td>
</tr>
<tr>
<td>and Availability of Medical</td>
<td>(2.07)</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 9 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Robust Regression (Saving Rate between (-1,1))</th>
<th>Median Regression (Saving Rate between (-1,1))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Covariates</td>
<td>Adding Covariates</td>
</tr>
<tr>
<td>Constant</td>
<td>19.72</td>
<td>17.68</td>
</tr>
<tr>
<td></td>
<td>(0.41)</td>
<td>(2.24)</td>
</tr>
<tr>
<td>F-statistic</td>
<td>4.46</td>
<td>48.27</td>
</tr>
<tr>
<td>N</td>
<td>18061</td>
<td>18061</td>
</tr>
</tbody>
</table>

1. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between −100 percent and 100 percent. Saving rates are calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Consumption does not include housing expenditures.

2. State dummies are included in all regressions but are not presented. Regressions were also done without constraining the data. Results were similar to those presented here.

3. Bootstrapped standard errors are calculated with 100 iterations.
Table 10  
Income per Member Dummies Analysis  
Dependent Variable: Saving Rate with Housing Expenditures  
Percentage Points, Standard Errors in Parenthesis$^{1^*}$

<table>
<thead>
<tr>
<th></th>
<th>Robust Regression$^{2^*}$ (Saving Rate between (-1,1))</th>
<th>Median Regression$^{2^*}$ (Saving Rate between (-1,1))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Covariates</td>
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</tr>
<tr>
<td>1994 Dummy</td>
<td>-3.05</td>
<td>-2.76</td>
</tr>
<tr>
<td></td>
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<td>(0.56)</td>
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<tr>
<td></td>
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<td>(1.75)</td>
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<tr>
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<td>-7.19</td>
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<td>(2.50)</td>
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<td>(2.95)</td>
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Interaction of Dummies 1994, Expansion in New Town and Income Per Member Bracket:

<table>
<thead>
<tr>
<th></th>
<th>Up to 1 Minimum Wage</th>
<th>1 to 2 Minimum Wages</th>
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<th>5 to 10 Minimum Wages</th>
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<td>(4.27)</td>
<td>(5.24)</td>
<td>(6.93)</td>
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<td>(3.84)</td>
<td>(4.88)</td>
<td>(9.97)</td>
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<tr>
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<td>(4.69)</td>
<td>(6.71)</td>
<td>(11.62)</td>
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</table>

Interaction of Dummies 1994, Expansion in Town that had Pahnal and Income Per Member Bracket:

<table>
<thead>
<tr>
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<th>Up to 1 Minimum Wage</th>
<th>1 to 2 Minimum Wages</th>
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<th>5 to 10 Minimum Wages</th>
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<td></td>
<td>(1.81)</td>
<td>(2.11)</td>
<td>(2.40)</td>
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<tr>
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<td>(2.05)</td>
<td>(2.32)</td>
<td>(4.47)</td>
</tr>
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<td>3.76</td>
<td>1.06</td>
<td>2.25</td>
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<td></td>
<td>(1.91)</td>
<td>(2.18)</td>
<td>(2.53)</td>
<td>(4.35)</td>
</tr>
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<td>1.07</td>
<td>0.01</td>
<td>1.09</td>
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<tr>
<td></td>
<td>(1.74)</td>
<td>(2.21)</td>
<td>(2.49)</td>
<td>(5.88)</td>
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69
Table 10 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Robust Regression(^2) (Saving Rate between (-1,1))</th>
<th>Median Regression(^3) (Saving Rate between (-1,1))</th>
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<tbody>
<tr>
<td></td>
<td>No Adding Covariates</td>
<td>No Adding Covariates</td>
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<tr>
<td>Dummy of Gender of Household</td>
<td>6.75</td>
<td>6.00</td>
</tr>
<tr>
<td>Head (Male=1)</td>
<td>(0.82)</td>
<td>(0.89)</td>
</tr>
<tr>
<td>Age of Household Head</td>
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<td>0.00</td>
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<tr>
<td></td>
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<td>(0.04)</td>
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<tr>
<td>Education Indicator Level (Head)</td>
<td>-2.88</td>
<td>-2.81</td>
</tr>
<tr>
<td></td>
<td>(0.42)</td>
<td>(0.54)</td>
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<tr>
<td>Square of Education Indicator</td>
<td>0.12</td>
<td>0.14</td>
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<tr>
<td></td>
<td>(0.05)</td>
<td>(0.06)</td>
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<tr>
<td>Household Head Blue Collar</td>
<td>-1.72</td>
<td>-1.38</td>
</tr>
<tr>
<td></td>
<td>(0.97)</td>
<td>(1.04)</td>
</tr>
<tr>
<td>Household Head Peasant</td>
<td>0.84</td>
<td>0.98</td>
</tr>
<tr>
<td></td>
<td>(1.16)</td>
<td>(1.24)</td>
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<tr>
<td>Household Head Employer</td>
<td>6.60</td>
<td>7.12</td>
</tr>
<tr>
<td></td>
<td>(1.32)</td>
<td>(1.53)</td>
</tr>
<tr>
<td>Household Head Self-employed</td>
<td>2.47</td>
<td>2.57</td>
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<tr>
<td></td>
<td>(1.00)</td>
<td>(1.25)</td>
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<tr>
<td>Irregular Reception of Income</td>
<td>5.51</td>
<td>5.55</td>
</tr>
<tr>
<td></td>
<td>(0.86)</td>
<td>(1.15)</td>
</tr>
<tr>
<td>Employment Stability</td>
<td>-0.16</td>
<td>-0.51</td>
</tr>
<tr>
<td></td>
<td>(0.54)</td>
<td>(0.60)</td>
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<tr>
<td>Medical Service</td>
<td>-0.21</td>
<td>-0.32</td>
</tr>
<tr>
<td></td>
<td>(1.02)</td>
<td>(1.08)</td>
</tr>
<tr>
<td>Number of Income Recipients in</td>
<td>3.58</td>
<td>3.94</td>
</tr>
<tr>
<td>Household</td>
<td>(0.27)</td>
<td>(0.35)</td>
</tr>
<tr>
<td>% of Children in the Household</td>
<td>2.69</td>
<td>1.89</td>
</tr>
<tr>
<td></td>
<td>(1.48)</td>
<td>(1.94)</td>
</tr>
<tr>
<td>Interaction of % of Children and</td>
<td>3.86</td>
<td>4.61</td>
</tr>
<tr>
<td>Availability of Medical Services</td>
<td>(2.11)</td>
<td>(2.28)</td>
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<tr>
<td>Constant</td>
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<td>47.43</td>
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<tr>
<td></td>
<td>(2.45)</td>
<td>(4.12)</td>
</tr>
<tr>
<td></td>
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<td>(4.67)</td>
</tr>
</tbody>
</table>

\(^1\) Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between −100 percent and 100 percent. Saving rates are calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Consumption includes housing expenditures.

\(^2\) State dummies are included in all regressions but are not presented. Regressions were also done without constraining the data. Results were similar to those presented here.

\(^3\) Estimates were also done including the interactions of the 1994 dummy and the income per member level dummies. Results did not change significantly. All median regressions are calculated with bootstrapped standard errors with 100 iterations.
### Table 11
Income per Member Dummies Analysis
Dependent Variable: Saving Rate without Housing Expenditures
Percentage Points, Standard Errors in Parenthesis

<table>
<thead>
<tr>
<th></th>
<th>Robust Regression&lt;sup&gt;2/3&lt;/sup&gt; (Saving Rate between (-1,1))</th>
<th>Median Regression&lt;sup&gt;2/3&lt;/sup&gt; (Saving Rate between (-1,1))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Covariates</td>
<td>Adding Covariates</td>
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<tr>
<td>1994 Dummy</td>
<td>-1.36</td>
<td>-1.24</td>
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<tr>
<td></td>
<td>(0.54)</td>
<td>(0.54)</td>
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<tr>
<td>System Expansion New Towns</td>
<td>-9.29</td>
<td>-7.18</td>
</tr>
<tr>
<td>Dummy</td>
<td>(1.47)</td>
<td>(1.69)</td>
</tr>
<tr>
<td>System Expansion Town that have</td>
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<td>-4.60</td>
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<tr>
<td>Minimum-Wage</td>
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<td>(1.63)</td>
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<tr>
<td>Income Per Member up-to-1-</td>
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<td>-43.72</td>
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<td>(2.43)</td>
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<td>Income btw-1-2-m.w.</td>
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<td>(2.41)</td>
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<td>-20.19</td>
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<td>Income btw-5-10-m.w</td>
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<td>(2.90)</td>
<td>(2.85)</td>
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Interaction of Dummies 1994, Expansion in New Town and Income Per Member Bracket:

<table>
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<th>Up to 1 Minimum Wage</th>
<th>1 to 2 Minimum Wages</th>
<th>2 to 5 Minimum Wages</th>
<th>5 to 10 Minimum Wages</th>
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<td>(2.75)</td>
<td>(3.76)</td>
<td>(2.65)</td>
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<td>6.71</td>
<td>3.78</td>
<td>8.56</td>
<td>4.70</td>
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<td>(4.12)</td>
<td>(4.17)</td>
<td>(4.44)</td>
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<td>(5.06)</td>
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<td>-0.09</td>
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<td>(6.86)</td>
<td>(6.69)</td>
<td>(6.88)</td>
<td>(9.05)</td>
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Interaction of Dummies 1994, Expansion in Town that had Pahnal and Income Per Member Bracket:

<table>
<thead>
<tr>
<th></th>
<th>Up to 1 Minimum Wage</th>
<th>1 to 2 Minimum Wages</th>
<th>2 to 5 Minimum Wages</th>
<th>5 to 10 Minimum Wages</th>
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<td>5.73</td>
<td>4.19</td>
<td>6.53</td>
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<td></td>
<td>(1.73)</td>
<td>(1.70)</td>
<td>(2.17)</td>
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<td>(2.45)</td>
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<td>-2.68</td>
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<td>(2.13)</td>
<td>(2.23)</td>
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<td>0.05</td>
<td>-0.66</td>
<td>-2.73</td>
<td>-0.28</td>
</tr>
<tr>
<td></td>
<td>(4.42)</td>
<td>(4.32)</td>
<td>(5.68)</td>
<td>(4.58)</td>
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</tbody>
</table>
Table 11 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Robust Regression(^\text{1}) (Saving Rate between (-1,1))</th>
<th>Median Regression(^\text{2}) (Saving Rate between (-1,1))</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No Covariates Adding Covariates</td>
<td>No Covariates Adding Covariates</td>
</tr>
<tr>
<td>Dummy of Gender of Household</td>
<td>3.46 (0.79)</td>
<td>3.34 (0.91)</td>
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<tr>
<td>Head (Male=1)</td>
<td>-0.04 (0.03)</td>
<td>-0.05 (0.03)</td>
</tr>
<tr>
<td>Age of Household Head</td>
<td>-2.53 (0.40)</td>
<td>-2.76 (0.43)</td>
</tr>
<tr>
<td>Education Indicator Level (Head)</td>
<td>0.12 (0.05)</td>
<td>0.17 (0.05)</td>
</tr>
<tr>
<td>Square of Education Indicator</td>
<td>-1.19 (0.94)</td>
<td>-1.55 (1.11)</td>
</tr>
<tr>
<td>Household Head Blue Collar</td>
<td>-0.58 (1.12)</td>
<td>-1.20 (1.34)</td>
</tr>
<tr>
<td>Household Head Peasant</td>
<td>5.21 (1.28)</td>
<td>6.03 (1.66)</td>
</tr>
<tr>
<td>Household Head Employer</td>
<td>1.79 (0.97)</td>
<td>1.45 (1.22)</td>
</tr>
<tr>
<td>Household Head Self-employed</td>
<td>4.71 (0.83)</td>
<td>4.72 (1.06)</td>
</tr>
<tr>
<td>Irregular Reception of Income</td>
<td>-0.77 (0.53)</td>
<td>-0.76 (0.59)</td>
</tr>
<tr>
<td>Employment Stability</td>
<td>-1.12 (0.99)</td>
<td>-0.74 (1.13)</td>
</tr>
<tr>
<td>Medical Service</td>
<td>2.50 (0.26)</td>
<td>2.74 (0.28)</td>
</tr>
<tr>
<td>Number of Income Recipients in</td>
<td>-0.66 (1.43)</td>
<td>-2.01 (1.77)</td>
</tr>
<tr>
<td>Household</td>
<td>5.44 (2.04)</td>
<td>6.63 (2.42)</td>
</tr>
<tr>
<td>% of Children in the Household</td>
<td>51.65 (2.34)</td>
<td>59.16 (3.23)</td>
</tr>
<tr>
<td>Availability of Medical Services</td>
<td>50.80 (3.79)</td>
<td>60.72 (4.21)</td>
</tr>
</tbody>
</table>

F-statistic 83.89 36.01
N 18061 18061

\(^1\) Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between -100 percent and 100 percent. Saving rates are calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Consumption does not include housing expenditures.

\(^2\) State dummies are included in all regressions but are not presented. Regressions were also done without constraining the data. Results were similar to those presented here.

\(^3\) Estimates were also done including the interactions of the 1994 dummy and the income per member level dummies. Results did not change significantly. All median regressions are calculated with bootstrapped standard errors with 100 iterations.
<table>
<thead>
<tr>
<th>Table 12</th>
<th>Statistics of Financial Outflows and Inflows to/from Informal Savings Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(As Percentage Points of Household Income) [1]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Number of Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
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<tr>
<td><strong>ROSCAS/Savings Unions/ Savings Accounts/Stocks/Bonds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>General</td>
<td>18061</td>
<td>4.45</td>
<td>12.75</td>
<td>0.00</td>
<td>435.64</td>
</tr>
<tr>
<td>Only Positive Entries</td>
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<td>16.25</td>
<td>20.04</td>
<td>0.04</td>
<td>435.64</td>
</tr>
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<td>1992 and No Expansion Town</td>
<td>6893</td>
<td>3.69</td>
<td>11.70</td>
<td>0.00</td>
<td>287.19</td>
</tr>
<tr>
<td>1992 and Expansion Town</td>
<td>1691</td>
<td>3.45</td>
<td>9.13</td>
<td>0.00</td>
<td>127.54</td>
</tr>
<tr>
<td>1994 and No Expansion Town</td>
<td>7667</td>
<td>5.08</td>
<td>14.30</td>
<td>0.00</td>
<td>435.64</td>
</tr>
<tr>
<td>1994 and Expansion Town</td>
<td>1810</td>
<td>5.65</td>
<td>12.30</td>
<td>0.00</td>
<td>114.35</td>
</tr>
</tbody>
</table>

| **Loans to Non-Family Members**      |                        |      |                    |         |         |
| General                              | 18061                  | 0.24 | 2.77               | 0.00    | 236.43  |
| Only Positive Entries                | 699                    | 6.26 | 12.70              | 0.05    | 236.43  |
| 1992 and No Expansion Town           | 6893                   | 0.26 | 2.08               | 0.00    | 65.58   |
| 1992 and Expansion Town              | 1691                   | 0.17 | 1.65               | 0.00    | 38.83   |
| 1994 and No Expansion Town           | 7667                   | 0.26 | 3.59               | 0.00    | 236.43  |
| 1994 and Expansion Town              | 1810                   | 0.19 | 1.75               | 0.00    | 36.33   |

<p>| <strong>Foreign Currencies/Jewelry/ Precious Metals</strong> |                       |      |                    |         |         |
| General                                      | 18061                  | 0.06 | 0.85               | 0.00    | 55.90   |
| Only Positive Entries                        | 328                    | 3.48 | 5.32               | 0.08    | 55.90   |
| 1992 and No Expansion Town                  | 6893                   | 0.08 | 0.80               | 0.00    | 35.24   |
| 1992 and Expansion Town                     | 1691                   | 0.06 | 0.76               | 0.00    | 24.24   |
| 1994 and No Expansion Town                  | 7667                   | 0.06 | 0.94               | 0.00    | 55.90   |
| 1994 and Expansion Town                     | 1810                   | 0.04 | 0.72               | 0.00    | 19.42   |</p>
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Data was constrained to do the calculations. Only households with saving rates in the −100 percent to 100 percent interval were included. Only households with head older than 20 and younger than 65 were included and with income greater than 100 pesos (around 30 dollars in 1994).
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1Net financial flows are equal to expenditures minus income into informal savings instruments.
2Data were constrained to do the calculations. Only households with saving rates in the –100 percent to 100 percent interval were included. Only households with head older than 20 and younger than 65 were included and with income greater than 100 pesos (around 30 dollars in 1994).
Table 14
Probit Analysis of the Effect of Pahnal’s 1993 Expansion on Financial Outflows and Inflows to/from Informal Savings Instruments\(^1\) (Standard Errors in Parenthesis)

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<td>(0.1946)</td>
<td>(0.2587)</td>
<td>(0.2552)</td>
<td>(0.2833)</td>
<td>(0.2091)</td>
</tr>
<tr>
<td>5 to 10 Minimum Wages</td>
<td>0.1769</td>
<td>-0.0046</td>
<td>-0.5666</td>
<td>-0.1972</td>
<td>----</td>
<td>0.0193</td>
<td>0.1537</td>
</tr>
<tr>
<td></td>
<td>(0.1736)</td>
<td>(0.2799)</td>
<td>(0.4674)</td>
<td>(0.3644)</td>
<td>----</td>
<td>(0.4283)</td>
<td>(0.2853)</td>
</tr>
</tbody>
</table>

<sup>1</sup> Financial outflows refers to expenditures or money invested by the household. Different possible informal savings instruments. Table presents only interaction coefficients. Demographic variables and state dummies were included in the calculations.

<sup>2</sup> Basic analysis includes interaction coefficients of Pahnal’s expansion (in a town that didn’t have an office before and a town that had an office before) and a 1994 dummy.

<sup>3</sup> Income per member dummies analysis includes the interaction of the level of income per member of the household with Pahnal’s expansion and with the 1994 dummy, along with dummies for the income per member brackets.

<sup>4</sup> This concept includes also stocks and bonds, but its significance is expected to be small. The 1994 survey contains separate information for stocks and bonds. The number of positive values of stock and bonds in this survey is six. (ROSCAS means Rotating Savings and Credit Associations).

<sup>5</sup> This concept includes houses and land bought for use by the family or for rent or investment.

<sup>6</sup> These are machinery, equipment and animals to use in a business own by the family.

<sup>7</sup> These represent income received by the households from these categories.
<table>
<thead>
<tr>
<th></th>
<th>ROSCAS/ Savings Unions/Savings Accounts&lt;sup&gt;5/&lt;/sup&gt;</th>
<th>Loans to Non-Family Members</th>
<th>Foreign Currencies/Jewelry/Precious Metals</th>
<th>Land/Houses&lt;sup&gt;6/&lt;/sup&gt;</th>
<th>Machinery and Equipment/Animals&lt;sup&gt;7/&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Analysis&lt;sup&gt;3/&lt;/sup&gt;</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction Expansion in New</td>
<td>0.00</td>
<td>0.35</td>
<td>-0.01</td>
<td>-0.61</td>
<td>-0.06</td>
</tr>
<tr>
<td>Town-1994</td>
<td>(0.80)</td>
<td>(0.48)</td>
<td>(0.03)</td>
<td>(0.22)</td>
<td>(0.42)</td>
</tr>
<tr>
<td>Interaction Expansion in Town</td>
<td>0.72</td>
<td>-0.60</td>
<td>0.03</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>that had Pahnal-1994</td>
<td>(0.50)</td>
<td>(0.23)</td>
<td>(0.04)</td>
<td>(0.16)</td>
<td>(0.11)</td>
</tr>
<tr>
<td><strong>Income per Member Dummies Analysis&lt;sup&gt;4/&lt;/sup&gt;</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction of Dummies 1994, Expansion in New Town and Income Per Member Bracket:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 1 Minimum Wage</td>
<td>-0.78</td>
<td>0.24</td>
<td>0.07</td>
<td>-0.20</td>
<td>-0.48</td>
</tr>
<tr>
<td></td>
<td>(0.65)</td>
<td>(0.54)</td>
<td>(0.04)</td>
<td>(0.22)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>1 to 2 Minimum Wages</td>
<td>0.20</td>
<td>0.25</td>
<td>0.04</td>
<td>-0.31</td>
<td>-0.75</td>
</tr>
<tr>
<td></td>
<td>(2.08)</td>
<td>(0.66)</td>
<td>(0.07)</td>
<td>(0.22)</td>
<td>(0.39)</td>
</tr>
<tr>
<td>2 to 5 Minimum Wages</td>
<td>2.63</td>
<td>0.88</td>
<td>-0.02</td>
<td>-0.68</td>
<td>-0.43</td>
</tr>
<tr>
<td></td>
<td>(1.94)</td>
<td>(0.73)</td>
<td>(0.04)</td>
<td>(0.29)</td>
<td>(0.40)</td>
</tr>
<tr>
<td>5 to 10 Minimum Wages</td>
<td>-6.90</td>
<td>0.31</td>
<td>-0.09</td>
<td>-0.58</td>
<td>1.01</td>
</tr>
<tr>
<td></td>
<td>(4.58)</td>
<td>(0.87)</td>
<td>(0.05)</td>
<td>(0.66)</td>
<td>(2.41)</td>
</tr>
</tbody>
</table>
### Table 15 (Continued)

<table>
<thead>
<tr>
<th></th>
<th>ROSCAS/ Savings Unions/Savings Accounts&lt;sup&gt;5&lt;/sup&gt;</th>
<th>Loans to Non-Family Members</th>
<th>Foreign Currencies/Jewelry/Precious Metals</th>
<th>Land/Houses&lt;sup&gt;6&lt;/sup&gt;</th>
<th>Machinery and Equipment/Animals&lt;sup&gt;7&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction of Dummies 1994, Expansion in Town that had Pahnal and Income Per Member Bracket:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 1 Minimum Wage</td>
<td>-0.05</td>
<td>-0.30</td>
<td>0.07</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(0.48)</td>
<td>(0.26)</td>
<td>(0.04)</td>
<td>(0.21)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>1 to 2 Minimum Wages</td>
<td>-0.09</td>
<td>-1.02</td>
<td>0.04</td>
<td>0.33</td>
<td>-0.23</td>
</tr>
<tr>
<td></td>
<td>(0.81)</td>
<td>(0.34)</td>
<td>(0.06)</td>
<td>(0.23)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>2 to 5 Minimum Wages</td>
<td>1.18</td>
<td>-0.32</td>
<td>0.14</td>
<td>-0.16</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>(1.05)</td>
<td>(0.40)</td>
<td>(0.09)</td>
<td>(0.31)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>5 to 10 Minimum Wages</td>
<td>3.84</td>
<td>0.77</td>
<td>-0.05</td>
<td>-0.21</td>
<td>-1.24</td>
</tr>
<tr>
<td></td>
<td>(3.09)</td>
<td>(1.07)</td>
<td>(0.06)</td>
<td>(0.70)</td>
<td>(0.45)</td>
</tr>
</tbody>
</table>

<sup>1</sup> Ordinary least squares with robust standard errors is the method used.

<sup>2</sup> Net financial outflows refer to expenditures minus income received by the household by different possible informal savings instruments. Table presents only interaction coefficients. Demographic variables and state dummies were included in the calculations.

<sup>3</sup> Basic analysis includes interaction coefficients of Pahnal’s expansion (in a town that didn’t have an office before and a town that had an office before) and a 1994 dummy.

<sup>4</sup> Income per member dummies analysis includes the interaction of the level of income per member of the household with Pahnal’s expansion and with the 1994 dummy, along with dummies for the income per member brackets.

<sup>5</sup> This concept includes also stocks and bonds, but its significance is expected to be small. The 1994 survey contains separate information for stocks and bonds. The number of positive values of stock and bonds in this survey is six. (ROSCAS means Rotating Savings and Credit Associations).

<sup>6</sup> This concept includes houses and land bought for use by the family or for rent or investment.

<sup>7</sup> These are machinery, equipment and animals to use in a business own by the family.
Map 1. 1993 Pahnal's Expansion
Notation:
- New office and the only office in location
- New office(s) (not the only office in location)
- States with Pahnal expansion and positive change in the savings rate between 1992 and 1994
Map 3. Average Savings Rate
(Percentage points, 1992 and 1994 data)
Appendix 1

Effects of Financial Access on Homeowners and Non-Homeowners

Mexican National Surveys of Income and Expenditures present problems with housing expenditure data. There is not information on how imputed rents are calculated for homeowners. Also, some of the imputed rents are not available in the surveys. Given this limitation, two saving rates were presented: one in which consumption included housing expenditures and other in which they were not included.

An additional, robustness test of the results is to divide the sample among homeowners and non-homeowners. Table A1.1 presents the estimates of the interaction coefficients for homeowners. In general, homeowners present the same effects as those found for all the households in the survey. Nevertheless, the effects seem stronger in towns that did have an office before the expansion. However, statistically the effects in towns with pre-expansion offices and in towns without pre-expansion offices were not different.

Table A1.2 presents the results of non-homeowners. In this case, the coefficients’ degree of significance is lower, and they are of lower magnitude for households located in towns with pre-expansion offices. However, the trends are sustained, especially for low-income people.
Table A1.1
Effects of Pahnal’s Expansion to Saving Rates of Homeowners
Percentage Points (Standard Errors in Parenthesis)\(^{1}\)

<table>
<thead>
<tr>
<th></th>
<th>Saving Rates with Housing Expenditures</th>
<th>Saving Rates without Housing Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS Regressions(^{2})</td>
<td>Median Regressions(^{3})</td>
</tr>
<tr>
<td>Basic Analysis(^{4})</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.82)</td>
<td>(3.04)</td>
</tr>
<tr>
<td>Interaction Expansion in town that had Pahnal-1994</td>
<td>5.62</td>
<td>7.40</td>
</tr>
<tr>
<td></td>
<td>(1.81)</td>
<td>(1.41)</td>
</tr>
<tr>
<td>Income per Member Dummies Analysis(^{5})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interaction of dummies 1994, Expansion in New Town and Income per member bracket:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 1 minimum wage</td>
<td>8.33</td>
<td>8.32</td>
</tr>
<tr>
<td></td>
<td>(3.37)</td>
<td>(3.53)</td>
</tr>
<tr>
<td>1 to 2 minimum wages</td>
<td>6.53</td>
<td>6.48</td>
</tr>
<tr>
<td></td>
<td>(4.92)</td>
<td>(4.53)</td>
</tr>
<tr>
<td>2 to 5 minimum wages</td>
<td>12.04</td>
<td>11.95</td>
</tr>
<tr>
<td></td>
<td>(6.08)</td>
<td>(6.10)</td>
</tr>
<tr>
<td>5 to 10 minimum wages</td>
<td>-6.80</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>(7.50)</td>
<td>(10.32)</td>
</tr>
<tr>
<td>Interaction of dummies 1994, Expansion in Town that had Pahnal and Income per member bracket:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 1 minimum wage</td>
<td>8.00</td>
<td>10.11</td>
</tr>
<tr>
<td></td>
<td>(2.16)</td>
<td>(1.93)</td>
</tr>
<tr>
<td>1 to 2 minimum wages</td>
<td>3.83</td>
<td>3.11</td>
</tr>
<tr>
<td></td>
<td>(2.61)</td>
<td>(2.10)</td>
</tr>
<tr>
<td>2 to 5 minimum wages</td>
<td>3.65</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>(2.83)</td>
<td>(2.45)</td>
</tr>
<tr>
<td>5 to 10 minimum wages</td>
<td>4.12</td>
<td>7.01</td>
</tr>
<tr>
<td></td>
<td>(5.57)</td>
<td>(6.01)</td>
</tr>
</tbody>
</table>

\(^{1}\)Table includes only coefficients of interest. Demographic variables and state dummies were included in the calculations.
\(^{2}\)Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between –100 percent and 100 percent. Saving rates are calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculated with robust standard errors.
\(^{3}\)Bootstrapped standard errors, calculated with 100 iterations.
\(^{4}\)Corresponds to the specification of equation (2) in the paper.
\(^{5}\)Corresponds to the specification of equation (3) in the paper.
### Table A1.2
Effects of Pahal's Expansion to Saving Rates of Non-Homeowners
Percentage Points (Standard Errors in Parenthesis)\(^{1}\)

<table>
<thead>
<tr>
<th>Basic Analysis(^{4})</th>
<th>Saving Rates with Housing Expenditures</th>
<th>Saving Rates without Housing Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS Regressions(^{2})</td>
<td>Median Regressions(^{3})</td>
</tr>
<tr>
<td>Interaction Expansion in new town-1994</td>
<td>4.55 (4.61)</td>
<td>6.61 (5.05)</td>
</tr>
<tr>
<td>Interaction Expansion in town that had Pahal-1994</td>
<td>0.13 (2.46)</td>
<td>-1.36 (3.41)</td>
</tr>
</tbody>
</table>

#### Income per Member Dummies Analysis\(^{2}\)
Interaction of dummies 1994, Expansion in New Town and Income per member bracket:

<table>
<thead>
<tr>
<th></th>
<th>Saving Rates with Housing Expenditures</th>
<th>Saving Rates without Housing Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS Regressions(^{2})</td>
<td>Median Regressions(^{3})</td>
</tr>
<tr>
<td>Up to 1 minimum wage</td>
<td>7.02 (5.28)</td>
<td>9.73 (6.71)</td>
</tr>
<tr>
<td>1 to 2 minimum wages</td>
<td>0.19 (8.62)</td>
<td>-0.75 (8.73)</td>
</tr>
<tr>
<td>2 to 5 minimum wages</td>
<td>4.00 (10.29)</td>
<td>0.00 (12.29)</td>
</tr>
<tr>
<td>5 to 10 minimum wages</td>
<td>-55.24 (19.31)</td>
<td>-48.45 (23.49)</td>
</tr>
</tbody>
</table>

Interaction of dummies 1994, Expansion in Town that had Pahal and Income per member bracket:

<table>
<thead>
<tr>
<th></th>
<th>Saving Rates with Housing Expenditures</th>
<th>Saving Rates without Housing Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS Regressions(^{2})</td>
<td>Median Regressions(^{3})</td>
</tr>
<tr>
<td>Up to 1 minimum wage</td>
<td>3.85 (3.03)</td>
<td>4.55 (3.36)</td>
</tr>
<tr>
<td>1 to 2 minimum wages</td>
<td>-2.76 (3.33)</td>
<td>-2.46 (4.27)</td>
</tr>
<tr>
<td>2 to 5 minimum wages</td>
<td>-5.85 (4.07)</td>
<td>-6.02 (4.72)</td>
</tr>
<tr>
<td>5 to 10 minimum wages</td>
<td>-2.07 (7.57)</td>
<td>-5.04 (8.04)</td>
</tr>
</tbody>
</table>

\(^{1}\) Table includes only coefficients of interest. Demographic variables and state dummies were included in the calculations.

\(^{2}\) Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between -100 percent and 100 percent. Saving rates are calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculated with robust standard errors.

\(^{3}\) Bootstrapped standard errors, calculated with 100 iterations.

\(^{4}\) Corresponds to the specification of equation (2) in the paper.

\(^{5}\) Corresponds to the specification of equation (3) in the paper.
Appendix 2

Reverse Experiment Using 1989 and 1992 Observations

Using the 1989 and the 1992 Households' Income and Expenditure Surveys it is possible to construct a reverse experiment of the 1993 Pahnal's expansion. This reverse experiment is used as a validity test of the exogeneity of the institute's expansion. The 1989 survey contains information of 11,494 households. The survey is similar to those of 1992 and 1994 and it is comparable to them.

This allows the construction of a control and an experimental group for the 1989-1992 period. Households located in towns that were going to have a new office of Pahnal, in 1993, form the experimental group. Households located in towns that were not going to be chosen for the 1993 expansion form the control group. Of course, given that the period of analysis here is 1989 to 1992, there should be no difference in experimental group's behavior and control group's behavior, because the expansion was done until 1993.

Results of the reverse experiment are shown in table A2.1. As can be seen, the differences in differences estimates are in general non-significant. Specifically, for the basic analysis, the coefficients are non-significant; only for the case of the interaction in a new town the coefficient is significant. Once again, for the income per member dummies analysis, the coefficients for the low-income people are in general non-significant. Results hold when different estimation techniques are used.
### Table A2.1

**Coefficients of Interest in the Reverse Experiment**

Using the 1989 and 1992 Household’s Income and Expenditure Surveys

Percentage Points (Standard Errors in Parenthesis)\(^1\)

<table>
<thead>
<tr>
<th>Interaction of dummies 1992, Expansion in New Town and Income per member bracket:</th>
<th>Saving Rates with Housing Expenditures</th>
<th>Saving Rates without Housing Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Controls</td>
<td>With Controls(^2)</td>
</tr>
<tr>
<td>(2.48)</td>
<td>(2.42)</td>
<td>(2.22)</td>
</tr>
<tr>
<td>Interaction Expansion in town that would had Pohnal-1992</td>
<td>0.92</td>
<td>0.48</td>
</tr>
<tr>
<td>(1.64)</td>
<td>(1.61)</td>
<td>(1.47)</td>
</tr>
</tbody>
</table>

**Income per Member Dummies Analysis\(^3\)**

<table>
<thead>
<tr>
<th>Interaction of dummies 1992, Expansion in Town that would had Pohnal and Income per member bracket:</th>
<th>Saving Rates with Housing Expenditures</th>
<th>Saving Rates without Housing Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Controls</td>
<td>With Controls(^2)</td>
</tr>
<tr>
<td>Up to 1 minimum wage</td>
<td>-2.69</td>
<td>-2.54</td>
</tr>
<tr>
<td>(2.74)</td>
<td>(2.68)</td>
<td>(2.51)</td>
</tr>
<tr>
<td>1 to 2 minimum wages</td>
<td>0.30</td>
<td>-0.65</td>
</tr>
<tr>
<td>(3.63)</td>
<td>(3.46)</td>
<td>(3.38)</td>
</tr>
<tr>
<td>2 to 5 minimum wages</td>
<td>-7.34</td>
<td>-7.24</td>
</tr>
<tr>
<td>(4.31)</td>
<td>(4.22)</td>
<td>(4.20)</td>
</tr>
<tr>
<td>5 to 10 minimum wages</td>
<td>-18.09</td>
<td>-15.18</td>
</tr>
<tr>
<td>(8.29)</td>
<td>(7.72)</td>
<td>(7.68)</td>
</tr>
</tbody>
</table>

**N** 17,688

\(^1\) Table includes only coefficients of interest. Ordinary least squares with robust standard errors were used to perform the analysis. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to be between –100 percent and 100 percent. Saving rates are calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income.

\(^2\) Demographic variables and state dummies were included in the calculations.

\(^3\) Corresponds to the specification of equation (2) in the paper.

\(^4\) Corresponds to the specification of equation (3) in the paper.
Chapter 2

Households' Saving Effects of a Financial Reform in a Fragmented Economy: The Mexican Case
2.1 Introduction

Financial reforms have been one of the main pillars of economic restructuring in several developing countries during the last two decades. They commonly include liberalization of the interest rates, elimination of selective credit structures, strengthening of regulatory framework and developing of non-banking intermediaries (for example insurance companies).

Understanding the effects of these reforms and the characteristics that increase their probability of success is highly relevant. A central question when analyzing this type of reform is whether financial liberalization can raise private savings. This is a main concern especially in less developed countries where usually low national savings are considered an important cause of low investment and low economic growth.

When analyzing financial reforms in developing countries it is important to recognize that in those countries access to financial services is not uniform. Some households have greater access than others do. Access to financial intermediaries should be a positive function of the income level. Low-income individuals are constrained from financial services: usually borrowing is unavailable for them and savings accounts are not adequate for their income level. Other factor that limits access to financial intermediaries is the households’ location. Financial units need a minimum market size to operate; therefore their presence would be limited in small communities. The effect is even stronger if the community is not only small but also relatively poor. In this sense, financial markets in developing countries are fragmented.

Therefore, in less developed countries households have different exposure to the financial reform. This implies that the impact of the financial reform could depend substantially in the relative presence of different groups in the population.
This paper analyzes households' savings behavior after the Mexican financial reform. It recognizes explicitly the role of fragmented markets on the effects of the early 1990's liberalization. The paper uses the 1989 and 1992 National Household Surveys of Income and Expenditures.

It is shown that households had different degrees of exposure to the financial reform depending on their income level and location. The paper does separate analyses of the two sources of fragmentation and a combination of them. Results indicate that households with higher exposure to the financial liberalization reduced their saving rate significantly after the financial reform. Their saving rate was between 22 percent and 33 percent lower than that of households with similar income level but located in smaller communities. Results were robust to different estimation techniques and definitions of fragmentation variables.

The analysis was also done considering different age of household's head. Results show that the change in saving rates is stronger among younger and richer households. Results are consistent with the hypothesis that the financial reform reduced borrowing constraints among younger households.

The remainder of the paper is organized as follows. Section 2.2 presents an overview of relevant literature for the present analysis. Section 2.3 describes the main characteristics of the financial reform in Mexico. It has special emphasis on the reforms that had direct impact on households' saving behavior. It also discusses the main aggregate effects of the liberalization and present the expected effects of the financial liberalization on the households' saving rate. Section 2.4 presents the data and a description and analysis of the fragmentation variables. It describes the main characteristics of households before and after the reform. Section 2.5 contains the empirical strategy and the main results of the paper, including estimates by type of fragmentation, combining both types, and considering age categories in the analysis. It also presents alternative hypotheses to the obtained results. Section 2.6 presents the conclusions of the chapter.
2.2 Literature Review

McKinnon (1973) and Shaw (1973) were the first authors to emphasize the complementary of money and capital in developing countries. They predict that raising maximum limits of interest rates would increase financial savings and, in particular, holding of bank deposits. This approach had (and has) substantial influence in the spread of financial liberalization across developing countries during the 1980’s and 1990s.¹

There is an extensive descriptive literature about the experiences of developing countries with financial liberalization. A large proportion of the literature concentrates on the appropriate sequencing of financial reforms. Several authors (among them Galbis (1994), and Jbili, et. al. (1998)) have analyzed the tradeoffs between big-bang type and sequencing type liberalizations. Results show that only in the absence of market distortions and/or externalities is the big-bang approach optimal. The same is true in the case of political constraints and limited credibility of reforms. Perhaps the most important result is that there is no single recipe for the way in which financial reforms should be implemented. It depends on initial conditions and specific countries’ characteristics.

The relevant question for the present chapter is the following: can financial reforms raise private saving, especially in the case of interest rate liberalization and elimination of selective credit systems? Schmidt-Hebbel, et. al. (1996) mention that financial liberalization could affect private saving through, at least, four channels: first, capital market reforms may reverse capital flight, increasing domestic saving, but not necessarily private saving. Second, it may raise the efficiency of intermediation, increasing growth and hence private saving. Third, financial liberalization could increase the geographical density of financial institutions, the range of financial instruments, and the quality of financial regulation and supervision. This typically leads to financial deepening that should be reflected in a permanent increase in the stocks (and a temporary increase in the

¹ This theory was criticized by the new-structuralists. Their critique sustains that the failure of several financial reforms were due to the fact that the resultant increase in interest rates in the official market reduces the quantity of finance available to firms; because it draws resources out of the unorganized market
flows) of financial savings. Fourth, financial liberalization usually increases consumer lending and lessens borrowing constraints of consumers, both of which could decrease private saving.

Results of the effects of financial liberalization on savings, using cross-country samples, are ambiguous. Determining the impact of financial deepening in savings, with a measure of broad money as an indicator of deepening, have lead to inconclusive results.

Nevertheless, the effects of variables that reflect credit constraint have been easier to identify. Japelli and Pagano (1994) show that liquidity constraints on households could raise the saving rate. The authors perform cross-country regressions (including only OECD countries) of saving and growth rates on indicators of liquidity constraints on households. Their results suggest that the financial deregulations in the 1980’s have contributed to the decline in national saving and growth rates in OECD countries.²

Few papers have dealt with the microeconomic impact of financial reforms. One exception is the article by Attanasio and Weber (1994). The authors, using repeated cross-sections of UK household surveys, test alternative hypotheses for the consumer boom in the late 1980’s.³ Using household level information allows them to test different hypothesis for different cohorts. According to their findings, younger cohorts increased consumption due to an upward revision in expected labor income; while older cohorts reacted after the liberalization of the housing markets that took place during the period.

The present chapter contributes to the existing literature in the following way: the analysis recognizes that the impact of a financial reform in a developing country depends on the degree of households’ access to financial intermediaries. Access to this type of

² Several authors have found that increasing the loan-to-asset-value ratios reduces net national saving in developing countries. Also, a negative but insignificant impact of consumer credit on private savings in both industrial and developing countries have been found (Schmidt-Hebbel, et. al. (1996)).
³ The consumption boom phenomenon during financial liberalizations is not an unique characteristic of England. The same phenomenon was observed during liberalization periods in Chile, Scandinavia, Israel and also Mexico (Dornbusch and Park (1995), Lennart and Bergström (1995)).
intermediaries is not universal in developing countries. In general, income levels and households’ location are correlated with the degree of exposure to financial intermediaries and, consequently, to financial developments.

2.3 The Mexican Financial Reform

2.3.1 Description of Main Reforms⁴

During most of the 1980’s, Mexican monetary authorities relied on three instruments to regulate private financial institutions in the country. First, there was a legal reserve requirement for commercial banks, which in fact represented compulsory credit to the public sector. Second, there were quantitative controls to credit under a scheme known as “selective credit quotas”. In this scheme, financial intermediaries had the obligation to keep a given proportion of their lending portfolios assigned to certain priority sectors such as agriculture, or to small or medium size enterprises. Third, borrowing and lending rates were set by the monetary authorities and usually remained fixed for very long periods. As consequence of these three measures the financial system in Mexico was repressed.

The Mexican financial reform of the late 1980’s and early 1990’s substantially changed the financial sector in the country. The government did a comprehensive reform with the following main aspect. First, monetary policy was carried on through open market operations and interest rates were allowed to respond rapidly to internal and external shocks. Selective credit quotas and minimum reserve requirement for commercial banks were eliminated.

Second, there was a promotion of financial innovation. It included more elaborated saving instruments that allowed access to mutual funds. Third, new regulation for

⁴ This section is not intended to be an extensive description of the financial reform in Mexico. Its objective is to highlight the reforms that should have a greater impact on households’ saving behavior. For a complete description of the Mexican financial reform see Ortiz (1994).
banking and non-banking financial intermediaries was introduced with the objective of strengthening the financial system as a whole. This new regulation also included more support for the stock market operations and a gradual opening of the sector to foreign investment. Fourth, the government privatized the commercial banks and changed commercial banking regulation so that to offer banking services the private sector did not need a concession anymore but only an authorization from the Ministry of Finance.\(^5\) Fifth, the government developed and strengthened market oriented ways of financing its deficit. The use of debt instruments through credit markets was generalized.\(^6\) Table 1 shows a list with the different financial events.\(^7\)

From the standpoint of household savings, the most relevant aspects of the financial reform were the liberalization of passive interest rates and changes in credit policy of banks.\(^8\)

The liberalization of passive interest rates was a progressive process. Since autumn 1988, the monetary authorities decided to let the markets decide the level of interest rates. It is important to mention that, despite their liberalization, passive interest rates for 1 to 3 months fixed term deposits were negative in real terms in 1988, 1990, and 1991. Therefore, for most of the period of analysis, the return on savings that households were likely to obtain was not attractive.\(^9\)\(^10\)

\(^5\) This is an important distinction in Mexican regulation. The government grants concessions to the private sector for activities that are considered public services. The government grants authorizations for important activities of general interest.

\(^6\) As mentioned by Aspe (1993), an initial pre-condition for a successful financial reform in Mexico was to find alternative ways of financing the public sector and in general to improve the fiscal balance.

\(^7\) The sequencing of financial reforms in Mexico was similar to the experiences of many developing countries (Dornbusch and Park (1995), Jbili, et al. (1994) and Galbis (1994)).

\(^8\) The substantial capitalization of the stock market and the pension reform could also have significant effects on households' savings decision. Nevertheless, only a small sector of the population participated in the stock market and the introduction of the pension reform was done almost at the end of the period of analysis. More details about these two issues will be given in the paper.

\(^9\) The real interest rate of these instruments was around 10 percent in 1989 and approximately 5 percent in 1992.

\(^10\) The interest rate of comparable government bonds (in this case Cetes with 28 days maturity) has been greater than commercial banking deposit instruments. During the period of analysis, Cetes' interest rates were on average 20 percent higher than banking instruments. Nevertheless, it is unlikely that the median investor had direct access to the Cetes' return.
Banks' credit policy was substantially changed by the removal of selective credit quotas and by the elimination of minimum reserve requirements. By the end of 1988, the government decided that preferential credit should have to be given only through the development banks. In October 1988, the credits' quota restrictions were eliminated for resources that banks obtained through certificates of deposit and promissory notes (commonly called nontraditional banking instruments). In April 1989, bank resources from traditional time deposits were also excluded from the selective credit quotas. In August of the same year, this reform was extended to checking accounts. Simultaneously, banks were authorized to pay interest on checking accounts.

While the selective credit quota system was eliminated during the second half of 1989, the minimum reserve requirement was not. Before August 1989, mandatory reserves were mainly in the form of deposits at the central bank. These resources were channeled by this institution to the government or priority development sectors. The amount of these mandatory reserves was 30 percent of deposits.

In August 1989, the regulation changed so that the minimum reserve requirements did not have to take the form of deposits at the central bank. The new regulation required instead a 30 percent liquidity coefficient of total banks' perceptions, independently of the form that reserves took. Nevertheless, as a result of the type of accounts offered by the banks and related regulations, the effective liquidity coefficient was 41 percent.\textsuperscript{11} In September 1991, the liquidity coefficient was eliminated. This represented a considerable increase in the amount of credit that the banks could offer.

Therefore, despite the fact that the selective credit quota system was progressively eliminated from October 1988 to August 1989, the minimum reserve requirement was not removed completely until 1991. Consequently, the main impact of this credit liberalization should have been felt after 1991.

\textsuperscript{11} Some of the banks' instruments offered to the public gave access to mutual funds operated by the same banks. Therefore, the liquidity coefficient had to be fulfilled twice, when opening the instrument and when including the resources of that instrument into the mutual fund. In 1991, this type of instruments represented half of the total banks' deposits.
Households' savings behavior could have also been affected by the reform of different non-banking institutions done in January 3rd, 1990. This reform influenced the operation of insurance and leasing companies, which should be related with the households' savings. Other important changes in regulation were the constitutional reform to allow private ownership of commercial banks in May 2nd, 1990; and the pension and housing reforms in February 24th, 1992. The pension reform introduced new individualized accounts for retirement and housing. The deposits into these accounts are 2 percent of wages for retirement and 5 percent for housing credits.

2.3.2 Important Aggregate Results of the Financial Reform

From 1988 to 1993, financial savings (resources stock in the financial sectors, excluding currency) increased 92.4 percent in real terms, with a real annual rate of growth of 11.9 percent. Financial savings represented 31.1 percent of GDP in December 1988, while it was 43.3 percent of GDP in 1993.

During the period of analysis, the government reduced its importance as a user of financial savings. While in 1988, the government's debt instruments represented 31 percent of financial savings, they were around 21 percent in 1993.

The reduction in the amount of government financial instruments in financial savings, as a proportion of GDP, coincides with the elimination of the liquidity coefficient in 1991. From 1990 to 1991, this proportion dropped from 32 percent to approximately 22 percent of financial savings. This implies that the financial savings not channeled to the public sector increased 109.4 percent in real terms from 1988 to June 1993.

12 Privatization of commercial banks ended after the period of analysis of this paper.
13 The Mexican government has a housing program for workers called Infonavit. This program gives credit based on the amount of funds in the housing accounts.
As mentioned before, from the households’ perspective, some of the most relevant reforms were the liberalization of the interest rates, and the consumption credit and mortgages expansion.

The behavior of the real interest rates in Mexico was erratic during the period of analysis. In 1988, the short-term government bonds\textsuperscript{14} real interest rate was highly negative. However, in 1989, these bonds paid a real positive return of 17.3 percent. But in 1990 and 1991, the return on these instruments was negative. In 1992, the average annual return was 4.3 percent (see graph 1).

Most Mexican households do not have direct access to government bonds. They usually have access to savings bank accounts and to fixed certificate of deposits (CDs). These instruments usually pay a lower interest rate than the one on government bonds. From 1989 to 1992, the return of 1 to 3 months fixed CDs was on average only 82.4 percent of the government bonds’ return. The CDs mean annual real rate of interest was 10.3 percent in 1989, -3.2 percent in 1990, -6.5 percent in 1991 and 2.0 percent in 1992. As can be seen, from the point of view of most households, real interest rates were small or negative during most of the period of analysis.

Perhaps more important than the change in the real interest rate was the expansion of credit and, specifically, of consumption credit. In general, credit given by the commercial banks increased 209 percent in real terms from 1988 to 1993. Also, the credit allocation in the economy changed substantially in the same period. In December 1988, 7.3 percent of total credit given by commercial banks was allocated to agriculture and mining; 32.8 percent to several industries; 6.7 percent to housing; 21.7 percent to services (including consumption credits); 13 percent to commercial activities; and 18.4 percent to the government.

In July 1993, 7.6 percent of the total credit given by commercial banks was channeled to agriculture and mining; 28.8 percent to industries; 13.8 percent to housing; 28.7 percent

\textsuperscript{14} These are Cetes with 28 days maturity.
to services (including consumption credits); 18.8 percent to commercial activities; and only 2.3 percent to the government.

In the case of consumption credit, between December 1989 and June 1993, it increased 259.9 percent in real terms. As a proportion of total credit, consumption credit rose from 5.4 percent of total credit in December 1989 to 9.3 percent in June 1993.\textsuperscript{15} Mortgages increased 275.1 percent in real terms from December 1989 to June 1993. As a proportion of total credit, they rose from 6.7 percent in 1988 to 13.8 percent in July 1993.

There are other aspects of the financial reform that could have significant impact on the households' saving decision. One is the behavior of the stock market during the period of analysis. The financial reform and, more generally, the market oriented economic policies had significant impact in the Mexican stock market. Its capitalization value grew 570.7 percent in real terms from 1988 to 1993. As a proportion of GDP, the capitalization value increased from 8.9 percent of GDP in 1988 to 44.2 percent of GDP in 1993. For the same period, the stock market index increased 26.9 percent per year in real terms.

The proportion of foreign participants in the Mexican stock market increased substantially from 1988 to 1993. In 1988, foreign investment represented 4.2 percent of the capitalization value; by 1992, it was around 22 percent and by 1993, investments by foreigners were 25 percent of the total capitalization value.\textsuperscript{16}

Likewise, in the case of other non-banking financial intermediaries, new regulation promoted rapid growth. Non-banking financial intermediaries that could have substantial impact in the amount of households' savings are the insurance companies. The resources in these companies increased 60 percent in real terms from December 1988 to June 1993. In the case of leasing companies, their resources raised 50 percent in real terms from December 1990 to June 1993.

\textsuperscript{15} Ortiz (1994) mentions that the increment in consumption credit allowed a substantial sector of the population to buy durables, mainly automobiles.
\textsuperscript{16} This represented a flow of foreigner resources of $18.1 billion dollars for the 1988-1993 period.
Finally, during 1992 a pension and housing reform was introduced in Mexico. The contributions into this new pension and housing system started in June 1992. One year later, these contributions represented 0.88 percent of financial savings in the case of pensions and 1.24 percent of financial savings in the case of housing. The contributions were not of an important magnitude during the period of analysis.

2.3.3 Expected Effects of Financial Reform on Households’ Saving Rates

The expected effects of all these policies on households’ saving rates are varied. First, the liberalization of the interest rate did not conduce to a higher real value of the interest rate for the whole period of analysis (see graph 1), therefore their impact on savings should be limited.\(^\text{17}\)

The elimination of the selective credit quotas should have an impact on households’ saving rate. Credit constraints should had been reduced after the reform, which will imply a decrease in the saving rate of affected households. Nevertheless, as will be seen in the next section, the degree of exposure to the financial reform varied among households.

The development of non-banking financial intermediaries (especially insurance companies) should also have an impact on the saving rate, precautionary motives for saving should be reduced after the growth of these institutions.

The set of financial reforms and in general the market oriented policies of the Mexican government, increased substantially the capitalization value of the stock market. This increment in value provokes substitution and income effects for families that participated in this market. Therefore, the savings effects for households with access to the stock market are not determined. Nevertheless, not a lot of households had direct access to the stock market in Mexico.

\(^\text{17}\) Actually, the financial liberalization literature found that savings are not affected substantially by the level of interest rates after the financial reform.
Finally, despite the fact that contributions to the new pension and housing system were not of an important magnitude during the period of analysis, expectations about having a more secure and a more efficient systems could have had significant effects on households’ saving behavior. Nevertheless, the effects on saving rates are not determined. Households could reduce their savings if they were saving on their own for retirement, but it is possible that they increase their saving if they perceive they can get a better standard of living during retirement if they save on their own.

2.4 Data Description and Financial Fragmentation Variables

This paper uses the 1989 and 1992 Mexican Households Surveys of Income and Expenditure (Encuesta Nacional Ingreso Gasto de los Hogares). The surveys are representative at the national level and comparable.\(^{18}\) Both surveys were collected in the same periods of the year and both used the same data collection techniques. The 1989 survey has information on 11,494 households, while the 1992 survey contains 10,119 households. The surveys have detailed information on after tax income and its sources, types of expenditures, job and demographic characteristics and some financial transaction variables.

The key endogenous variable of the chapter is the saving rate. The calculated saving rate is a flow measure of savings equal to household quarterly after tax income minus household quarterly consumption divided by household quarterly after tax income. Income is defined as the sum of wage income, business income, rent income, income from transfers and other income. Household consumption is the sum of expenditures in food, communications and transport, personal goods, health, educational, appliances, clothing, travel and leisure, housing, and other.\(^{19}\)

\(^{18}\) For a detailed description of the survey characteristics, see Inegi (1994).
\(^{19}\) An alternative definition of saving rate was calculated. In that definition, household’s consumption does not include housing expenditures. The main results were not affected when using this alternative definition.
An important aspect of the financial reform was the increase in credit for consumption. An analysis of households’ expenditures in different durable goods was done. Tobit regressions of the expenditures in durables on a 1992 dummy variable were estimated. In the case of vehicles (cars, small trucks and motorcycles), the coefficient of the 1992 dummy was positive and significant. For TV’s and videos the coefficient was negative but not significant. For audio equipment it was positive but not significant. For big appliances (like refrigerators and stoves) the coefficient was positive and significant. Expenditures in other appliances increased significantly from 1989 to 1992. In the case of furniture the coefficient was negative but not significant.

According to the surveys, households in urban areas increased significantly their expenditures in all the categories of durable goods. Nevertheless, the relation is not that clear when considering households with different income level in the calculation.

The empirical strategy of the paper (explained in detail in the next section) is based on the fragmented financial markets of the Mexican economy. During the period of analysis, households have different exposure to financial services depending on two dimensions: their income and their location.

High-income households had greater access to financial services than low-income households did in the period of analysis. Using the same data set, Székely (1996) shows that there is a clear positive relation between the level of income and the percentage of households with credit cards and mortgages, his results are presented in Table 2. As can be seen, in 1989, only 0.1 percent of households in the first income decile had a credit card and only 0.6 percent had a mortgage. The proportions increase with income, 31.3 percent of the households in the highest income decile had a credit card in 1989, while 10.7 percent of them had a mortgage in the same year. For 1992, the proportion of

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20 The durable goods analyzed were vehicles (cars, small trucks, and motorcycles), TV’s and video, audio equipment, big appliances (among others refrigerators and stoves), other small appliances, and furniture. Regressions are not shown to save space. Regressions included only the 1992 dummy and a constant.

21 The proportion of households in the sample buying new vehicles increased from 1.4 percent in 1989 to 9.3 percent in 1992.
households with a credit card in the lowest income decile is very small, while only 0.1 percent of them had a mortgage. In contrast, 49 percent of the households at the top of the income distribution had a credit card and 12.2 percent had a mortgage in 1992.

Table 3 shows probit regressions that explain the impact of different households’ income per member levels in their probability of having a credit card.\textsuperscript{23} As can be seen, using the complete sample, the discrete change in probability of having a credit card increases significantly with the households’ income per member category. The coefficient increases from 0.12 for the 1 to 2 minimum wage category to 0.65 for the highest income per member level. It is possible to statistically reject the equality of the coefficients of the different income per member categories.

For the 1989 and 1992 exercises, it is also true that the probability of a household having a credit card increases substantially and significantly with the income of the household. Therefore, as can be seen from the households’ surveys of income and expenditures, exposure to the financial market depended substantially in the income level of the household. This type of fragmentation implies that the effects of the financial reform should be stronger in those with higher income.

Nevertheless, this type of analysis does not rule out differences in tastes for financial instruments. It is possible that low-income people do not use a credit card simply because their credit preferences are different from those of high-income individuals. If this were the case, the probit coefficients would be biased by unobservables. It also does not consider changes in tastes overtime. However, the experience of financial intermediaries for low-income people (i.e. microfinance experience) has shown that this sector of the

\textsuperscript{22} In this case the tobit regressions were including the interaction of a big town dummy and 1992. The definition of a big town will be described below.

\textsuperscript{23} Income per member of the household is measured in multiples of the 1992 Mexican minimum wage, which was approximately 100 dollars on that time.
population is constrained from financial services given the considerable importance of transaction costs of providing services to this fragment of the population.\textsuperscript{24}

The second type of fragmentation comes from the fact that availability of financial services is not universal in developing countries. Small towns usually offer limited or null financial services. This is especially important in developing countries given the significant differences between rural and urban areas.

For the Mexican case, Mansell (1995) mentions that only in urban areas households had access to formal credit and formal savings instruments before 1994. Also, she describes that access is even lower in rural-poor areas. This fact reduces the impact of the financial reform in locations that did not have financial intermediaries.\textsuperscript{25}

Using data from the 1990 Mexican population census and from the 1989 economic census, it is possible to construct correlation indexes of the proportion of population located in the rural areas of a state with the availability of financial access. The same correlation indexes were calculated for the proportion of rural communities in the states with the availability of financial services in the states.

Rural communities are defined as those with total population lower than 15,000 people.\textsuperscript{26} Table 4 exhibits the correlation indexes. The correlation between the number of financial units in a state and the proportion of rural population in the state was \(-0.58\); while the correlation between the proportion of financial sector employees in a state and the proportion of rural population was \(-0.85\). These correlation indexes were significant at the 1 percent level.

\textsuperscript{24} This is true in the case of small loans and small savings accounts (Morduch (1997)). In the case of Mexico, Mansell (1995) documents that before 1994 the representative savings account in the country was too expensive for low-income people.

\textsuperscript{25} The author has also documented the significant costs that people have to incur when traveling from the rural communities or semi-urban communities to urban areas in order to go to the bank. This transaction cost is generally nontrivial.

\textsuperscript{26} The exercises were also done considering rural communities those with total population lower than 50,000 people. The correlation indexes were similar in magnitude and in degree of significance.
The correlation indexes between the proportion of rural communities in a state and the number of financial units in the state was –0.76. The correlation between the percentage of rural communities and the proportion of financial employees in the state was –0.70. Both correlation indexes were significant at the 1 percent level.

These statistics show that there is a lower concentration of financial services in states with higher proportion of rural communities. Smaller locations are less likely to have financial intermediaries. In those communities, the effects of the financial reform should be second order effects, given their limited or null presence in rural areas. This is the second type of financial fragmentation that the paper explores and uses in the empirical strategy.

Given these two dimensions of fragmentation, the following variables were constructed: a dummy variable equal to one if the household have an income per member greater or equal than two minimum wages. Households in that income category should have access to financial services. Households with lower income per member should have limited access to financial services.27

There is a reason to choose this specific level of income per member to determine the degree of exposure to the financial reform. It comes from the fact that the probability of households having a credit card increases substantially from the less than 2 minimum wages to the 2 to 5 minimum wages category (the change in the probability raises from 0.11 to 0.32). Nevertheless, using an alternative definition for the income level does not change the results as long as the definition is not extreme.

Therefore, income level is used as an indicator of how important is the financial exposure of households. Consequently, it is possible to construct a group of high financial exposure versus a group of low financial exposure.

27 In terms of income deciles, households with income per member greater or equal than 2 minimum wages belong to the fourth to tenth income deciles (with the highest concentration of households in the tenth decile). It is possible to find households with income per member lower than 2 minimum wages in every
The fragmentation caused by the location of the household is captured by defining a threshold for rural (small) and for urban (big) towns in the sample. A community was identified as rural or small if it had less than 15,000 people. With this definition a dummy variable was created. The main estimates of the paper were also done using an alternative definition for rural communities. In that definition, a town was considered rural if its population was lower than 50,000 people; results did not change significantly.\textsuperscript{28} With this fragmentation, it is possible to construct a group of households with high exposure to financial services (those located in big towns) and a group of households with low exposure to financial services (those living in rural communities).

Tables 5 and 6 show the means of relevant variables in the estimation exercises. Table 5 presents the statistics divided by the sample year and by the households' income per member level. In 1989, low-income households (those with income per member lower than two minimum wages) were saving 5.77 percentage points of their income, while the saving rate of the high income households in the same year was 22.5 percent. In 1992, the mean saving rates of both income groups were higher, 6.66 percent for the low-income and 26.89 percent for the high-income households. The difference for the mean saving rates in the two years is significant for high-income but not for low-income households.

As can be seen from table 5, in 1989, average income for the richer households was around 4 times the income of poorer families. This ratio increased to approximately 5 in 1992. The 1989 and 1992 differences in average household income were statistically significant for both groups in the sample.

For the rest of the variables, age of the household head is approximately the same for all the groups in both surveys. The education level is higher for the richest households in both years. The number of income recipients is stable through the groups and sample

decile of the income distribution. Nevertheless, the highest concentration of this type of households is in the first to the fifth decile.
\textsuperscript{28} Only in the case of the triple interaction coefficients the degree of significance was smaller.
years. Finally, the average number of kids in the household is smaller for the high-income households, but the relative proportions are stable for the two years.

A different perspective is obtained when the means are calculated using the town size fragmentation variable. As table 6 exhibits, in 1989 the average saving rate of households located in communities with less than 15,000 people was different from the one of those located in bigger towns. In the first case, the average saving rate was 5.70 percent, while in the second case was 8.21 percent. This difference increased in 1992. In that year, the average saving rate of households located in small towns increased to 14.16 percent, while it decreased to 5.79 percent for households living in cities with more than 15,000 people. The data show that households located in urban areas were reducing their savings from 1989 to 1992, while households living in smaller communities were increasing their saving rate.

As can be seen in table 6, average income was higher in bigger cities. In this type of communities, average income increased significantly from 1989 to 1992, while in smaller towns it remained approximately constant during the period (actually, the difference is not statistically significant).

For the rest of the variables, household size remains approximately constant among groups and between years. The average age of the household head was stable across groups. The differences in the education indicator between households located in small communities versus those living in towns with more than 15,000 people increased from 1989 to 1992. Finally, the number of income recipients and the number of kids look similar between the different groups.

It is relevant to mention that the relative number of households living in small towns versus those located in bigger cities looks different from 1989 to 1992. The 1989 survey has data for households located in 258 towns (considering big and small communities); the 1992 survey includes 363 towns. Nevertheless, exploring the composition of the surveys for those two years, it was found that the number of towns surveyed in both
samples at the same time was only 130. This could, in fact, pose a problem for the present estimation. For this reason, the appendix, at the end of the paper, contains the main estimations of this article using only the information of households located in towns that were surveyed in both years. As the appendix shows, results were similar to those found when the complete sample was used; the different composition of the sample between the two survey years is not causing the results.

2.5 Empirical Strategy, Results and Alternative Explanations

2.5.1 Empirical Strategy

As was described in section 2.3, the financial reform was one of the most important economic policies in Mexico at the beginning of the 1990’s. This reform should had had significant impact in the saving behavior of households in Mexico. However, not all of the Mexican households are affected in the same magnitude. Their direct exposure to the financial reform depends substantially in their level of income and in their location.

A suitable way to analyze the effects in households’ savings will be to follow the same household before and after the reform. The problem is that the available Mexican microeconomic data is not on the form of a panel. The 1989 and 1992 household surveys of income and expenditures are repeated cross sections.

Nevertheless, the fragmentated financial markets in the Mexican economy can be used to construct an empirical strategy for the estimation of the reform’s impact. The first determinant of fragmentation is the income level of the households.

The effects of the financial reform should be greater for the households with higher exposure. Therefore, the interaction coefficient of the high-income dummy and the 1992
dummy should give the savings behavior of households that were more exposed by the reform.

As was explained in section 2.4, high-income households are defined as those with a total income per member greater than 2 minimum wages in 1992. A different definition for high versus low-income households does not change the results, as long as the new definition is not extreme.

For this type of determinant of financial fragmentation, the equation to estimate is the following:

\[
S_i = \delta_0 \text{Dummy}1992_i \times \text{HighIncomeDummy}_i + \delta_1 \text{Dummy}1992_i + \delta_2 \text{HighIncomeDummy}_i + X_i \beta + \epsilon
\]

(1)

The dependent variable \( S_i \) is the saving rate for household \( i \). The coefficient of the first exogenous variable in equation (1) (\( \text{Dummy}1992_i \times \text{High Income Dummy}_i \)) represents the effect on the saving rates of households with higher access to financial intermediaries after the reform took place.

Equation (1) also has a dummy for 1992 and a dummy equal to one if the household is high-income. The rest of the exogenous variables (represented by \( X_i \)) are household head gender, education variable indicator and its square, occupation of household head, a dummy for irregular reception of income\(^{29} \), a dummy for employment stability\(^{30} \), a dummy for access to medical services, the number of income recipients in the household, the percentage of children in the household, and state dummies.

As mentioned before, if saving preferences are different between high-income and low-income households, this could imply that even if low-income households had access to financial intermediaries their behavior would not have changed after reform simply because they have different preference for savings.

\(^{29}\) Income reception is considered irregular if it is received in time spans greater than 3 months.
One way to overcome this problem is by using a different sourcing of financial fragmentation, in this case the households’ location. Households located in rural areas had less contact with financial intermediaries. Rural areas in Mexico and small cities usually have limited or null formal financial services. In order to capture this source of financial fragmentation, a dummy variable for the size of cities was created. The variable is equal to one if the population in the city is greater or equal than 15,000 people.\(^{31}\)

This type of fragmentation should be less problematic. The reason is that towns had households with all levels of income, despite their size. The difference relies on the fact that households in bigger cities are more exposed to the financial reforms than households in rural or smaller communities, despite their income level.

The estimated regression for this type of fragmentation is represented by equation (2).

\[
S_i = \alpha_0 Dummy1992_i \times BigTownDummy_i + \alpha_1 Dummy1992_i + \alpha_2 BigTownDummy_i + X_i \beta + \varepsilon
\]  

(2)

In this specification, \(S_i\) also represents the household’s saving rate. The interaction of the 1992 Dummy variable and the Big Town Dummy is the effect for households with higher exposure to financial reform. The 1992 Dummy and the Big Town Dummy were also included separately. The exogenous variables included (represented by \(X_i\)) are the same as for the estimation in the income level fragmentation plus the level of income of the households.

A natural extension of the two exercises is to combine the two types of financial fragmentation into a single estimation. The degree of exposure to the financial reform increases with income and with the size of the town. So it is possible to take into account

\(^{30}\) Variable equals to one if the worker is in a union and has a formal job contract.

\(^{31}\) This was not the only benchmark used. An alternative definition, in which big cities were defined as those with population greater or equal than 50,000 people, was employed. The estimation results using this latest definition are not significantly different from those found with the 15,000 people benchmark.
this two dimensions by a triple interaction coefficient. The triple interaction variable gives the effect of the financial reform for the most exposed households (high-income and living in a big city in 1992). In a sense, it represents the effect of the extra exposure to the financial reform that the high-income households received compared with the low-income ones. Equation (3) is the specification for the triple interaction estimator.

\[ S_i = \gamma_0 \text{Dummy}_1992_i \times \text{HighIncomeDummy}_i \times \text{BigTownDummy}_i \]
\[ + \gamma_1 \text{Dummy}_1992_i \times \text{HighIncomeDummy}_i \]
\[ + \gamma_2 \text{Dummy}_1992_i \times \text{BigTownDummy}_i \]
\[ + \gamma_3 \text{HighIncomeDummy}_i \times \text{BigTownDummy}_i \]
\[ + \gamma_4 \text{Dummy}_1992_i + \gamma_5 \text{HighIncomeDummy}_i + \gamma_6 \text{BigTownDummy}_i \]
\[ + X_i \beta + \epsilon \] (3)

In specification (3), \( S_i \) represents the saving rate of the household. The first exogenous variable is the interaction of a 1992 Dummy, a High Income Dummy and a Big Town Dummy. High-income and big town dummies definitions are the same as before. The regression also includes second order interaction terms of the dummy variables and the dummy variables by themselves. The rest of the exogenous variables (represented by \( X_i \)) are the same as in specification (1).

### 2.5.2 Results

For all the estimations, two different techniques were used. The first one was ordinary least squares with robust standard errors. Nevertheless, statistical tests on the normality of the saving rates distribution were always rejected, despite the analyzed period and despite the household group in question. Consequently, a median regression estimation technique was used to avoid non-normality problems. For this technique, bootstrapped standard errors were calculated with 100 iterations.

All the calculations were done after cleaning the data for extreme values of the saving rate. The saving rate was constrained to be in the -100 percent to the 100 percent interval.
Also, minimum values for income, and maximum and minimum values for household’s head age were required.\textsuperscript{32}

2.5.2.1 Fragmentation by Income Level

Table 7 presents the results of the fragmentation by income level. The first column of that table contains the ordinary least squares estimates for the case without controls. As can be seen, the coefficient on the 1992 dummy is small and non-significant. However, the high-income dummy is significant and of important magnitude. High-income households save on average 16.7 percentage points of their income more than the low-income ones do. The interaction coefficient between the 1992 dummy and the high-income dummy is 3.5 percentage points of income and significant at the 5 percent level. This would imply that households more affected by the financial reform increased their saving rate by 3.5 percentage points of income.

In the case of the ordinary least squares regression with controls (second column of table 7), the 1992 dummy is also non-significant and the high-income dummy is of important magnitude (19.1 percentage points of income) and significant at the 1 percent level. The interaction coefficient is approximately the same as in the non-control case, 3.9 percentage points of income, however its degree of significance increases.

For the rest of the exogenous variables, the gender and the age of the household’s head do not have a significant effect on the saving rate. An increment in the education indicator level reduces the saving rate by 1.6 percentage points of income and this effect is significant. Nevertheless, the square of the education indicator is non-significant. If the household head is a employer or a self employed person, the saving rate of the household is greater by 9.6 percentage points or 4.0 percentage points of income, respectively. Both coefficients are significant. Employment stability and availability of medical services reduce the saving rate, however their impact is non-significant. Increasing the number of

\textsuperscript{32} The observations that do not satisfy those conditions are 3,480, around 16 percent of the total sample.
income recipients in the household increases the saving rate by 4.3 percentage points of income; this effect is significant at the 1 percent level. Finally, the percentage of children in the household is non-significant.

In the case of the median regressions (third and fourth column in table 7), results are similar to those using ordinary least squares. It is relevant to mention that the interaction coefficients are bigger with this technique. For the specification without controls, the interaction coefficient of the 1992 dummy and the high-income dummy is 5.7 percentage points of income and is significant at the 1 percent level. For the specification with controls, the coefficient for the same variable is 5.5 percentage points of income. In the case of the other exogenous variables, the value of their estimated coefficients and their degree of significance are similar to those of the ordinary least squares regression.

Using the household’s income level as an indicator of its degree of financial access indicates that savings of the group exposed to the financial reform increased after the reform. However, in order for this type of fragmentation to be adequate, it should be assumed that low-income and high-income households have comparable preferences for savings. This will imply a similar behavioral response to the financial reform if the exposure were the same for both groups.

2.5.2.2 Fragmentation by Location

The former type of fragmentation does not take into account the fact that some households, despite their income level, could be financially constrained given the scarce or null presence of financial intermediaries in the community they live in. Therefore, it is possible to construct an alternative identification strategy for the effects of the financial reform based on the town’s size. The estimation results using this empirical strategy are shown in table 8.

---

33 In this case, a town is considered small if its population is lower than 15,000 people. The estimates were done using an alternative benchmark for small town: less than 50,000 people. The results for both benchmarks are similar.
For the ordinary least squares estimates without controls (first column of table 8), the
1992 dummy coefficient is significant and of important magnitude (8.5 percentage points
of income). The coefficient of the dummy for towns with population greater than 15,000
people is 2.5 percentage points of income and significant at the 5 percent level.
Nevertheless, the interaction coefficient of the 1992 dummy and the big towns dummy is
significant at the 1 percent level. This coefficient is −10.9 percentage points of income,
this indicates that households located in communities with financial services decreased
their saving rate after the financial reform.

The same estimation was done only for low-income and only for high-income households
(using the income per member definition of section 2.5.2.1).\textsuperscript{34} According to these
estimates, both groups were reducing their saving rate in big cities. The interaction
coefficients are −12.8 percentage points for low-income households and −24 percentage
points of income for high-income households. Therefore, both households in bigger cities
were saving less after the financial reform despite their level of income. Nevertheless, the
reduction in the high-income households saving rate was bigger than the decrease in low-
income households saving rate.

The story is similar in the case of the ordinary least squares estimation with controls
(second column table 8). The 1992 dummy is significant and of important magnitude,
while the big town dummy is non-significant. The coefficient of the interaction of the two
dummy variables is −8.3 percentage points of income and it is significant at the 1 percent
level too. Therefore, the saving rate for households living in towns with financial services
was significantly reduced after the financial reform.

For the rest of the exogenous variables in this specification, the household’s income level
is significant at the 1 percent level but its impact on the saving rate is very small. The
gender and the age of the household head do not affect significantly the saving rate. The
education indicator and its square are significant at the 1 percent level. A higher

\textsuperscript{34} Results are not included in the paper to save space.
education indicator reduces the saving rate by 1.2 percentage points of income, while a raise in its square increases the saving rate by 0.2 percentage points of income. If the household head is an employer or a self-employed, the household saving rate increases by 11 percentage points and 4 percentage points of income, respectively.

If income in the household were received irregularly, the saving rate would be on average 2.9 percentage points higher (this coefficient is significant at the 1 percent level). Neither employment stability nor the availability of medical services changes significantly the saving rate of households. Households with a higher number of income recipients have a higher saving rate (the coefficient for this variable is 4.4 percentage points and is significant at the 1 percent level). Finally, The percentage of children in the household reduces the saving rate by 5.08 percentage points of income.

Using the median regression technique, the estimates without controls show a similar pattern to the one in the ordinary least squares case. The coefficient in the 1992 dummy is 8.4 percentage points of income and is significant at the 1 percent level. The big town dummy is also significant and with almost the same magnitude that the one in the ordinary least squares case. The 1992 dummy and the big town dummy interaction coefficient is −12.4 percentage points of income (actually stronger than the ordinary least squares case) and is significant at the 1 percent level. This indicates the same type of behavior, households living in bigger cities after the reform reduced their saving rates.

The median results with controls are shown in the fourth column of table 8. As can be seen, the estimated coefficients are similar to those found in former cases. Here the 1992 dummy and the big town dummy interaction coefficient is −10.7 percentage points of income and is significant at the 1 percent level too.

Results for the rest of the exogenous variables are similar to those found with the least squares technique. However, the education indicator and its square are no longer significant.
2.5.2.3 Results Combining both Sources of Fragmentation

According to the last two sections, different answers on the financial reform’s impacts are obtained depending on the source of the financial fragmentation. It is important to take consideration of both of them at the same time. It was true that bigger towns had financial services in the 1989-1992 period, but is also true that for low-income households access to financial instruments is limited.\(^{35}\) Therefore, households’ degree of exposure to the financial reform is a combination of their location and their income. The degree of exposure is highest for high-income households in big cities.

A way to combine the two sources of fragmentation is by doing a triple interaction estimation. The first column of table 9 shows these results for the ordinary least squares. As can be seen, the 1992 dummy coefficient is 7.9 percentage points of income and is significant at the 1 percent level. The high-income dummy coefficient is around 20 percentage points of income and is also highly significant. The big town dummy coefficient is small and significant only at the 10 percent level.

In the case of the second order interaction coefficients, the interaction coefficient of the 1992 and the high-income dummy is 15.9 percentage points of income and is significant at the 1 percent level. The interaction of the 1992 dummy and the big town dummy decreases the saving rate by almost 13 percentage points of income; this coefficient is highly significant. Finally, the high-income dummy and big town dummy interaction has a negative but not significant coefficient.

The triple interaction coefficient, i.e. the interaction coefficient of the 1992 dummy, the high-income dummy and the big town dummy, is \(-11.2\) percentage points of income and is significant at the 5 percent level. This implies that households most exposed to the financial reform reduced their saving rate by a significant amount. This coefficient is

\(^{35}\) As mentioned before, during the period of analysis, saving instruments were not adequate for low-income individuals and usually there were other transaction costs that impede access to financial instruments (Mansell (1995)).
reduced to −8.8 percentage points when more variables are added to the ordinary least squares regression. 36

When using the median regression technique, the results for most of the 1992 dummy, the high-income dummy, the big town dummy and the second order interaction dummies are similar to those of the ordinary least squares regression. However, the triple interaction coefficients have a bigger magnitude and a higher degree of significance. The triple interaction coefficient is −16.2 percentage points and is significant at the 1 percent level in the estimation without controls. For the estimation with controls, this estimate is around -13 percentage points of income and is significant at the 1 percent level. 37 These results suggest that the households most exposed to the financial reform reduced significantly their saving rate after the reform took place.

2.5.2.4 Triple Interaction Results by Age Categories

Important behavioral responses to the financial reform could come from the age of the household. Households with different age structures could have different reasons to save. For example, younger households are more likely to face borrowing constraints. In this section, the estimation for the triple interaction specification is realized splitting the triple interaction coefficient by different age categories.

Using the age of the household head, five years age categories were constructed. In this procedure the triple interaction coefficient is interacted with the different age category dummies. The estimation was done without controls and using ordinary least squares. Results show that the impact of the reform was higher for younger households. For households in the 20 to 25 years age category, the triple interaction coefficient is −17 percentage points of income and is significant at the 1 percent level. The estimated

36 Using the alternative definition for big towns (those with population greater than 50,000 people) the triple interaction coefficients are also negative, but their degree of significance is reduced.
37 For both types of estimation techniques, the coefficients of the rest of the exogenous variables observe similar patterns to those that were found before.
coefficient is -12.8 percentage points for the 25 to 30 years age category, -14.7 percentage points for the 30 to 35 years age category, and -12.6 percentage points of income for the 35 to 40 years age category. All those estimated coefficients are highly significant. However, for households in older age categories, the coefficient estimates are smaller and generally non-significant. Graph 2 presents the estimated coefficients and bands with the 95 percent confidence interval.

High-income younger households are the ones that react significantly after the financial reform. Those are households that, despite their level of income, maybe did not have sufficient access to credit before the financial reform (a possible explanation for this could be that they did not have enough collateral to get a consumption credit). This result is consistent with the presence of more stringent borrowing constraints before the financial reform.

2.5.3 Some Alternative Explanations to the Results

Results of this section are consistent with the hypothesis that financial liberalization reduced the borrowing constraints of households with exposure to it. Under this scenario, households should have reduced their saving rate and purchased durable goods. Findings are also consistent with households having better expectations of the new pension and housing systems. In this case, people should have decreased their savings because they perceived an increase in the efficiency and trustworthiness of the new systems.

Other probable explanation of households’ saving behavior is the increase in the capitalization value of the stock market during the period of analysis. High-income households could had been spending the profits made in the stock market and adjusting their level of savings as a consequence. However, this does not explain the behavior of low-income households in urban areas.
Also, the analysis of this paper does not disentangle the effect of reforming the financial sector and a probable increase in the number of branches or units of financial intermediaries. Part of the effects of the financial reform could have been caused by the increase in access to financial intermediaries in urban areas. Additional work in this area is necessary.

Alternative hypotheses for the behavior of the saving rates, not related directly to the financial reform, can be constructed. The first one is that younger households probably changed their expectations on future labor income. Specifically, given the macroeconomic stability and the market-oriented policies, it is possible that some households increased their expected level of future labor income. However, the question that arises is why the expectations were different for households located in rural versus those located in urban areas? A limitation in this paper is that the surveys used do not have information on expected labor income.

The second alternative hypothesis is that the reduction in government deficit (i.e. the increase in public savings) and the increase in foreign savings during the period crowded out private savings in Mexico. The existent macroeconomic analyses in the literature find displacements of private savings when public savings and/or foreign savings rise.\footnote{Schmidt-Hebbel, et. al. (1996). The authors also mention that usually the effects of a tax reform on savings are not significant.} Nevertheless, this hypothesis can not explain the different patterns of savings among urban and rural areas, especially in the case of high-income households.

Finally, it is possible that consumption patterns between urban and rural households were different during the period. Probably, the type of durable goods demanded by consumers in the cities are those for which credit was available. In the case of low-income people, it is also possible that the stores that gave credit for appliances were established in urban areas. However, this hypothesis is highly related to the one in which borrowing constraints were reduced.
Therefore, most of the alternative hypothesis related only indirectly to the financial reform could not explain the differences in the saving behavior of households located in urban areas versus those located in rural communities.

2.6 Conclusions

This paper has shown that access to financial services is limited for a considerable group of Mexican households. The probability of having a credit card increases substantially with household’s income level. Also, the presence of financial intermediaries is negatively correlated with the proportion of rural population and rural communities in the states.

Considering these sources of fragmentation, it is found that households with higher exposure to the Mexican financial liberalization reduced their saving rate. Specifically, high-income households living in urban areas had a saving rate that was 22 percent to 33 percent lower than the one of high-income households living in communities with limited presence of financial intermediaries. Results were robust to different estimation techniques and different benchmarks for the definition of high-income households and towns’ size.

The reduction on the saving rate was stronger among younger and richer households in urban areas. This finding is consistent with the hypothesis that the financial liberalization reduced the borrowing constraints for this sector of the population, which lead them to a higher consumption.

It is also possible that the reform in the pension system during that period changed the expectations of younger households. Despite the fact that the reform was done during the second half of 1992 and that only a limited fraction of the population had access to the new pension system, it could have important repercussions on households’ saving decisions.
More work needs to be done. This paper does not answer all the questions on the effects of financial liberalization and does not rule out other alternative hypotheses for the behavioral change of households during the period of analysis. Nevertheless, some alternative hypotheses for the households’ saving behavior do not fit well the rural and urban patterns found.

Also, the present analysis does not take into account that with the financial liberalization not only different saving instruments or new consumption credits were offered, but it is also probable that new financial units were opened in different locations. Explicit consideration of these factors should be important. This is an area in which additional research is required.
References


Table 1
Key Events and Dates in Mexican Financial Liberalization

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Assets market law.</td>
<td>1975</td>
</tr>
<tr>
<td>• Multiple functions banks allowed.</td>
<td>1978</td>
</tr>
<tr>
<td>• Introduction of main government debt instrument: Cetes. The government determined the interest rate and buyers the amount of bonds.</td>
<td>1978</td>
</tr>
<tr>
<td>• Cetes were offered using Dutch auctions.</td>
<td>1989</td>
</tr>
<tr>
<td>• Constitutional reform that change bank operations from concession to authorization.</td>
<td>January, 1990</td>
</tr>
<tr>
<td>• Constitutional reform to allow the privatization of commercial banks. It allowed private and public ownership of banks.</td>
<td>May, 1990</td>
</tr>
<tr>
<td>• Law of Credit Institutions that regulated:</td>
<td>January, 1990</td>
</tr>
<tr>
<td>- Insurance companies</td>
<td></td>
</tr>
<tr>
<td>- Factoring companies</td>
<td></td>
</tr>
<tr>
<td>- Leasing companies</td>
<td></td>
</tr>
<tr>
<td>- Credit institutions</td>
<td></td>
</tr>
<tr>
<td>- Stock market</td>
<td></td>
</tr>
<tr>
<td>- Investment societies</td>
<td></td>
</tr>
<tr>
<td>• Elimination of liquidity coefficient.</td>
<td>September, 1991</td>
</tr>
<tr>
<td>• Law of auxiliary credit institutions. Savings unions were legally recognized.</td>
<td>December, 1991</td>
</tr>
<tr>
<td>• Pension reform in Mexico.</td>
<td>February, 1992</td>
</tr>
<tr>
<td>• New law for credit institutions and for financial groups.</td>
<td>June, 1992</td>
</tr>
<tr>
<td>• Additional reforms to the following laws:</td>
<td>May, 1993</td>
</tr>
<tr>
<td>- Credit institutions</td>
<td></td>
</tr>
<tr>
<td>- Financial groups</td>
<td></td>
</tr>
<tr>
<td>- Stock market</td>
<td></td>
</tr>
<tr>
<td>- Auxiliary credit institutions</td>
<td></td>
</tr>
<tr>
<td>- Insurance companies</td>
<td></td>
</tr>
<tr>
<td>• Independent Mexican Central Bank.</td>
<td>May, 93</td>
</tr>
</tbody>
</table>

Ortiz (1994)

Table 2
Access to Credit Indicators

<table>
<thead>
<tr>
<th>Income Decile</th>
<th>1989 % of Households with Credit Cards</th>
<th>1989 % of Households with Mortgages</th>
<th>1992 % of Households with Credit Cards</th>
<th>1992 % of Households with Mortgages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>6.43</td>
<td>5.12</td>
<td>9.04</td>
<td>5.06</td>
</tr>
<tr>
<td>I</td>
<td>0.12</td>
<td>0.61</td>
<td>0.0</td>
<td>0.13</td>
</tr>
<tr>
<td>II</td>
<td>0.27</td>
<td>1.30</td>
<td>0.10</td>
<td>1.28</td>
</tr>
<tr>
<td>III</td>
<td>0.41</td>
<td>2.89</td>
<td>0.43</td>
<td>2.47</td>
</tr>
<tr>
<td>IV</td>
<td>0.65</td>
<td>1.76</td>
<td>1.19</td>
<td>3.03</td>
</tr>
<tr>
<td>V</td>
<td>0.69</td>
<td>3.91</td>
<td>1.44</td>
<td>3.98</td>
</tr>
<tr>
<td>VI</td>
<td>2.20</td>
<td>4.20</td>
<td>2.87</td>
<td>3.76</td>
</tr>
<tr>
<td>VII</td>
<td>5.77</td>
<td>7.64</td>
<td>5.01</td>
<td>4.88</td>
</tr>
<tr>
<td>VIII</td>
<td>10.03</td>
<td>7.00</td>
<td>9.20</td>
<td>8.64</td>
</tr>
<tr>
<td>IX</td>
<td>12.78</td>
<td>11.18</td>
<td>21.17</td>
<td>10.33</td>
</tr>
<tr>
<td>X</td>
<td>31.31</td>
<td>10.74</td>
<td>48.97</td>
<td>12.12</td>
</tr>
</tbody>
</table>

Source: Székely (1996)
Table 3
Probit Analysis of Credit Access Indicators
Dependent Variable Equals to 1 if the Household had a Credit Card\(^1/2\)
(Standard Errors in Parenthesis)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 2 Minimum Wages</td>
<td>0.116</td>
<td>0.113</td>
<td>0.119</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.009)</td>
<td>(0.010)</td>
</tr>
<tr>
<td>2 to 5 Minimum Wages</td>
<td>0.317</td>
<td>0.288</td>
<td>0.347</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.017)</td>
<td>(0.018)</td>
</tr>
<tr>
<td>5 to 10 Minimum Wages</td>
<td>0.549</td>
<td>0.479</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.041)</td>
<td>(0.035)</td>
</tr>
<tr>
<td>More than 10 Minimum Wages</td>
<td>0.654</td>
<td>0.598</td>
<td>0.681</td>
</tr>
<tr>
<td></td>
<td>(0.037)</td>
<td>(0.074)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>N</td>
<td>18,133</td>
<td>9,549</td>
<td>8,584</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>2,156.1</td>
<td>909.2</td>
<td>1,246.3</td>
</tr>
</tbody>
</table>

\(^1\) Coefficients report the discrete change in the probability of having a credit card if the household is in the specified income per member category. Regressions include a constant and the income per member level dummies, but no other covariates.

\(^2\) Estimates were done after cleaning the data for extreme values in the saving rates. Specifically, the saving rates were constrained to be in the \(-100\) percent to 100 percent interval. It also imposes minimum values for income and minimum and maximum age levels.

Table 4
State Level Correlation Indexes of the Proportion of Rural Population and the Proportion of Rural Communities with Financial Indicators\(^1/2\)

<table>
<thead>
<tr>
<th></th>
<th>Proportion of Population Located in Rural Communities in the State</th>
<th>Proportion of Rural Communities in the State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Financial Units in the State</td>
<td>-0.588</td>
<td>-0.762</td>
</tr>
<tr>
<td>Employees in the Financial Sector as a Proportion of Total Employment in the State</td>
<td>-0.850</td>
<td>-0.704</td>
</tr>
</tbody>
</table>

\(^1\) Calculations are done using the 1990 Mexican Census and the 1989 Economic Census. Rural communities are defined as those with total population lower than 15,000 people.

\(^2\) All correlation indexes are significant at the 1 percent level.
### Table 5

Table of Means Presented by Income Per Member Level<sup>1,2</sup>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving Rates (percentage points of income)</td>
<td>5.77 (0.41)</td>
<td>22.50 (1.04)</td>
<td>6.66 (0.42)</td>
<td>26.89 (1.00)</td>
</tr>
<tr>
<td>Income (1992 pesos)</td>
<td>3,560 (27.73)</td>
<td>15,353 (927.29)</td>
<td>3,433 (29.14)</td>
<td>17,845 (783.83)</td>
</tr>
<tr>
<td>Household Size</td>
<td>5.32 (0.03)</td>
<td>3.61 (0.05)</td>
<td>5.19 (0.03)</td>
<td>3.51 (0.05)</td>
</tr>
<tr>
<td>Age of Head</td>
<td>41.61 (0.13)</td>
<td>41.30 (0.36)</td>
<td>40.48 (0.14)</td>
<td>40.98 (0.33)</td>
</tr>
<tr>
<td>Education Indicator</td>
<td>2.24 (0.02)</td>
<td>4.78 (0.08)</td>
<td>2.03 (0.02)</td>
<td>4.94 (0.08)</td>
</tr>
<tr>
<td># of Income Recipients</td>
<td>1.71 (0.01)</td>
<td>1.79 (0.03)</td>
<td>1.66 (0.01)</td>
<td>1.68 (0.02)</td>
</tr>
<tr>
<td># of Kids</td>
<td>1.68 (0.02)</td>
<td>0.68 (0.03)</td>
<td>1.73 (0.02)</td>
<td>0.81 (0.03)</td>
</tr>
</tbody>
</table>

| N                    | 8,398 | 1,151 | 7,339 | 1,245 |

<sup>1</sup> Standard errors in parenthesis. Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between −100 percent and 100 percent.

<sup>2</sup> Low-income households are defined as households with income per member lower than 2 minimum wages. High-income households are those with income per member equal or higher than 2 minimum wages.

Source: own calculations using the 1989 and the 1992 surveys of Income and Expenditures in Mexico.
Table 6  
Table of Means Presented by Towns’ Size  
(Small Towns are Those with Population ≤ 15,000) 1

<table>
<thead>
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<tbody>
<tr>
<td>Saving Rates (percentage points of income)</td>
<td>5.70 (0.96)</td>
<td>8.21 (0.42)</td>
<td>14.16 (0.63)</td>
<td>5.79 (0.50)</td>
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<tr>
<td>Income (1992 pesos)</td>
<td>3,829 (106.97)</td>
<td>5,219 (143.97)</td>
<td>3,609 (110.53)</td>
<td>7,119 (214.27)</td>
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<tr>
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<td>5.30 (0.06)</td>
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<td>5.37 (0.04)</td>
<td>4.59 (0.03)</td>
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<td>Age of Head</td>
<td>41.51 (0.29)</td>
<td>41.58 (0.13)</td>
<td>41.33 (0.19)</td>
<td>39.91 (0.17)</td>
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<tr>
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<td>2.08 (0.05)</td>
<td>2.64 (0.03)</td>
<td>1.43 (0.02)</td>
<td>3.30 (0.04)</td>
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<tr>
<td># of Income Recipients</td>
<td>1.65 (0.03)</td>
<td>1.73 (0.01)</td>
<td>1.58 (0.01)</td>
<td>1.73 (0.01)</td>
</tr>
<tr>
<td># of Kids</td>
<td>1.73 (0.04)</td>
<td>1.53 (0.02)</td>
<td>1.93 (0.03)</td>
<td>1.33 (0.02)</td>
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N = 1,628 7,921 3,902 4,682

1 Standard errors in parenthesis. Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between −100 percent and 100 percent.

Source: own calculations using the 1989 and the 1992 surveys of Income and Expenditures in Mexico.
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<tr>
<td>High Income Dummy</td>
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<tr>
<td></td>
<td>(1.12)</td>
<td>(1.17)</td>
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<tr>
<td><strong>1992 Dummy × High</strong></td>
<td><strong>3.49</strong></td>
<td><strong>3.92</strong></td>
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<tr>
<td><strong>Income Dummy</strong></td>
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<td><em>(1.51)</em></td>
</tr>
<tr>
<td>Dummy of Gender of</td>
<td>0.28</td>
<td>1.13</td>
</tr>
<tr>
<td>Household Head (male=1)</td>
<td><em>(0.83)</em></td>
<td><em>(0.81)</em></td>
</tr>
<tr>
<td>Age of Household head</td>
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<td>-0.02</td>
</tr>
<tr>
<td></td>
<td><em>(0.03)</em></td>
<td><em>(0.04)</em></td>
</tr>
<tr>
<td>Education Indicator Level</td>
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<tr>
<td><em>(Head)</em></td>
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<td><em>(0.52)</em></td>
</tr>
<tr>
<td>Square of Education</td>
<td>0.08</td>
<td>0.06</td>
</tr>
<tr>
<td>Indicator</td>
<td><em>(0.05)</em></td>
<td><em>(0.06)</em></td>
</tr>
<tr>
<td>Household Head Blue Collar</td>
<td>0.73</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td><em>(1.00)</em></td>
<td><em>(1.03)</em></td>
</tr>
<tr>
<td>Household Head Peasant</td>
<td>1.42</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td><em>(1.29)</em></td>
<td><em>(1.41)</em></td>
</tr>
<tr>
<td>Household Head Employer</td>
<td>9.59</td>
<td>10.91</td>
</tr>
<tr>
<td></td>
<td><em>(1.51)</em></td>
<td><em>(1.80)</em></td>
</tr>
<tr>
<td>Household Head Self-</td>
<td>3.98</td>
<td>4.07</td>
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<tr>
<td>employed</td>
<td><em>(1.08)</em></td>
<td><em>(1.43)</em></td>
</tr>
<tr>
<td>Irregular Reception of</td>
<td>4.35</td>
<td>5.86</td>
</tr>
<tr>
<td>Income</td>
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<td><em>(1.16)</em></td>
</tr>
<tr>
<td>Employment Stability</td>
<td>-0.01</td>
<td>-0.38</td>
</tr>
<tr>
<td></td>
<td><em>(0.48)</em></td>
<td><em>(0.50)</em></td>
</tr>
<tr>
<td>Medical Service</td>
<td>-1.07</td>
<td>-0.81</td>
</tr>
<tr>
<td></td>
<td><em>(0.67)</em></td>
<td><em>(0.76)</em></td>
</tr>
<tr>
<td>Number of Income</td>
<td>4.33</td>
<td>4.66</td>
</tr>
<tr>
<td>Recipients in Household</td>
<td><em>(0.28)</em></td>
<td><em>(0.28)</em></td>
</tr>
<tr>
<td>% of Children in the</td>
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<td>-2.90</td>
</tr>
<tr>
<td>Household</td>
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<td><em>(1.77)</em></td>
</tr>
<tr>
<td>Constant</td>
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<td>-3.33</td>
</tr>
<tr>
<td></td>
<td><em>(0.41)</em></td>
<td><em>(3.17)</em></td>
</tr>
</tbody>
</table>

<sup>b</sup> Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between -100 percent and 100 percent.

<sup>c</sup> Robust standard errors in parenthesis.

<sup>d</sup> Bootstrapped standard errors with 100 iterations.

<sup>e</sup> State dummies are included in these regressions but are not presented.
Table 8
Effects of Financial Reform on the Saving Rate
Analysis of Big Towns versus Small Towns (Big Towns are those with Population > 15,000)
(Percentage Points of Income, Standard Errors in Parenthesis)\textsuperscript{1}\textsuperscript{2}\textsuperscript{3}\textsuperscript{4}

<table>
<thead>
<tr>
<th></th>
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<tr>
<td></td>
<td>Without Controls</td>
<td>With Controls\textsuperscript{4}</td>
</tr>
<tr>
<td>1992 Dummy</td>
<td>8.47</td>
<td>6.82</td>
</tr>
<tr>
<td></td>
<td>(1.15)</td>
<td>(1.18)</td>
</tr>
<tr>
<td>Town Dummy (Equal to 1 if Population &gt; 15,000)</td>
<td>2.52</td>
<td>1.39</td>
</tr>
<tr>
<td></td>
<td>(1.05)</td>
<td>(1.10)</td>
</tr>
<tr>
<td>1992 Dummy × Town Dummy</td>
<td>-10.89</td>
<td>-8.29</td>
</tr>
<tr>
<td></td>
<td>(1.32)</td>
<td>(1.36)</td>
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<tr>
<td>Income Per Member</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Dummy of Gender of</td>
<td>-0.38</td>
<td>-0.29</td>
</tr>
<tr>
<td>Household Head (male=1)</td>
<td>(0.84)</td>
<td>(1.02)</td>
</tr>
<tr>
<td>Age of Household head</td>
<td>0.00</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>Education Indicator Level of (Head)</td>
<td>-1.23</td>
<td>-0.91</td>
</tr>
<tr>
<td>Square of Education</td>
<td>0.16</td>
<td>0.04</td>
</tr>
<tr>
<td>Indicator</td>
<td>(0.06)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>Household Head Blue Collar</td>
<td>0.47</td>
<td>0.29</td>
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<tr>
<td></td>
<td>(1.00)</td>
<td>(1.21)</td>
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<tr>
<td>Household Head Peasant</td>
<td>-0.21</td>
<td>-0.56</td>
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<tr>
<td></td>
<td>(1.30)</td>
<td>(1.43)</td>
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<tr>
<td>Household Head Employer</td>
<td>11.01</td>
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<tr>
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<td>(1.76)</td>
<td>(1.74)</td>
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<td>Household Head Self-employed</td>
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<tr>
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<td>(1.09)</td>
<td>(1.34)</td>
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<tr>
<td>Irregular Reception of Income</td>
<td>2.93</td>
<td>4.81</td>
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<tr>
<td></td>
<td>(1.02)</td>
<td>(1.30)</td>
</tr>
<tr>
<td>Employment Stability</td>
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<td></td>
<td>(0.48)</td>
<td>(0.49)</td>
</tr>
<tr>
<td>Medical Service</td>
<td>-0.49</td>
<td>-0.40</td>
</tr>
<tr>
<td></td>
<td>(0.68)</td>
<td>(0.79)</td>
</tr>
<tr>
<td>Number of Income</td>
<td>4.37</td>
<td>4.58</td>
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<tr>
<td>Recipients in Household</td>
<td>(0.28)</td>
<td>(0.35)</td>
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<tr>
<td>% of Children in the Household</td>
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<td>-4.21</td>
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<tr>
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<td>(1.79)</td>
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<tr>
<td></td>
<td>(0.96)</td>
<td>(3.34)</td>
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</table>

\footnotesize{\textsuperscript{1} Savings rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between -100 percent and 100 percent. 
\textsuperscript{2} Robust standard errors in parenthesis 
\textsuperscript{3} Bootstrapped standard errors with 100 iterations 
\textsuperscript{4} State dummies are included in these regressions but are not presented.}
Table 9
Effects of Financial Reform on Households’ Saving Rate
Triple Interaction Analysis (Big Towns are those with Population > 15,000)
(Percentage Points of Income, Standard Errors in Parenthesis)\textsuperscript{v}

<table>
<thead>
<tr>
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<tr>
<td></td>
<td></td>
<td>Without Controls\textsuperscript{v}</td>
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<tr>
<td>1992 Dummy</td>
<td>7.92</td>
<td>6.00</td>
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<td></td>
<td>(1.18)</td>
<td>(1.21)</td>
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<tr>
<td>High Income Dummy</td>
<td>20.38</td>
<td>21.44</td>
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<tr>
<td></td>
<td>(3.49)</td>
<td>(3.50)</td>
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<tr>
<td>Town Dummy (Equal to</td>
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</tr>
<tr>
<td>1 if Population &gt; 15,000)</td>
<td>(1.09)</td>
<td>(1.14)</td>
</tr>
<tr>
<td>1992 Dummy × High</td>
<td>15.90</td>
<td>12.93</td>
</tr>
<tr>
<td>Income Dummy</td>
<td>(4.27)</td>
<td>(4.19)</td>
</tr>
<tr>
<td>Dummy</td>
<td>(1.37)</td>
<td>(1.40)</td>
</tr>
<tr>
<td>High Income Dummy ×</td>
<td>-4.25</td>
<td>-3.65</td>
</tr>
<tr>
<td>Town Dummy</td>
<td>(3.68)</td>
<td>(3.66)</td>
</tr>
<tr>
<td>Dummy × High Income</td>
<td>(4.59)</td>
<td>(4.50)</td>
</tr>
<tr>
<td>Dummy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dummy of Gender of</td>
<td>-0.40</td>
<td>0.40</td>
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<td>Household Head</td>
<td>(0.83)</td>
<td>(1.01)</td>
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<tr>
<td>(male=1)</td>
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<td></td>
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<tr>
<td>Age of Household head</td>
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<tr>
<td></td>
<td>(0.03)</td>
<td>(0.03)</td>
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<td>Education Indicator</td>
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<td>-0.81</td>
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<tr>
<td>Level (Head)</td>
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<td>(0.48)</td>
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<tr>
<td>Square of Education</td>
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<td>0.02</td>
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<td>(0.06)</td>
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<tr>
<td>Household Head Blue</td>
<td>0.84</td>
<td>1.03</td>
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<td>Collar</td>
<td>(1.00)</td>
<td>(1.13)</td>
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<td>Household Head Peasant</td>
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<td>-0.09</td>
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<td>(1.30)</td>
<td>(1.42)</td>
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<tr>
<td>Household Head</td>
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<td>10.09</td>
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<td>Employer</td>
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<td>(1.89)</td>
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<td>Household Head Self-</td>
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<td>of Income</td>
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<td>(0.53)</td>
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<td>-0.66</td>
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<td>(0.79)</td>
</tr>
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<td>Number of Income</td>
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<td>Recipients in Household</td>
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<td>(0.33)</td>
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<tr>
<td>% of Children in the</td>
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<td>-3.68</td>
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<tr>
<td>Household</td>
<td>(1.38)</td>
<td>(1.68)</td>
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Table 9 (continued)

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<tr>
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</tr>
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<td>N</td>
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</tbody>
</table>

<sup>1</sup>Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between –100 percent and 100 percent.

<sup>2</sup>Robust standard errors in parenthesis

<sup>3</sup>Bootstrapped standard errors with 100 iterations

<sup>4</sup>State dummies are included in these regressions but are not presented.

Graph 1

Short Term Cetes and CD's Real Interest Rates
(January 1989 – December 1992)
Graph 2
Triple Interaction Coefficients by Household Head's Age Categories
(Estimation Method: OLS without Controls)
Appendix

The number of towns included in the 1989 survey was 258 towns (considering big and small communities); in 1992, 363 towns were considered in the survey. However, the number of towns surveyed in both samples at the same time was only 130. This difference in the composition of the two surveys could be a problem for the estimation.

This appendix presents the main estimates but using only those 130 towns for their calculation. Considering only the towns that were included in both surveys reduces possible biases caused by the differences in towns’ selection.

Table A1 presents the means by income per member level. As can be seen, results are similar to those when the full sample was used. Table A2 exhibits the means of the relevant variables by towns’ size. In general, these means are not very far from those obtained when using the full sample. Nevertheless, it is important to mention that the 1989 relative size of the group with high exposure to the group with low exposure to financial reform is closer to the 1992 relative magnitude in this case than when the complete sample was used. Using the restricted sample, the 1989 relative size is around 3.3, while the 1992 relative magnitude is approximately 3.1. However, considering the complete sample, the 1989 relative size is near 4.9, while the 1992 relative magnitude is only 1.2.

The estimates in this appendix were calculated using only observations from the restricted sample. Table A3 presents the coefficients of interest for two fragmentation variables and for the triple interaction estimation. As can be seen, results are similar to the full sample estimates.
### Table A1

**Means Presented by Income Per Member Level**

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<th>1989</th>
<th></th>
<th>1992</th>
<th></th>
</tr>
</thead>
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<td>Low-Income</td>
<td>High-Income</td>
<td>Low-Income</td>
<td>High-Income</td>
</tr>
<tr>
<td>Saving Rates (percentage points of income)</td>
<td>4.53</td>
<td>22.68</td>
<td>3.34</td>
<td>22.88</td>
</tr>
<tr>
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<td>(0.49)</td>
<td>(1.12)</td>
<td>(0.54)</td>
<td>(1.12)</td>
</tr>
<tr>
<td>Income (1992 pesos)</td>
<td>4,013.87</td>
<td>15,725</td>
<td>3,773</td>
<td>17,480</td>
</tr>
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<td></td>
<td>(35.46)</td>
<td>(1077.89)</td>
<td>(39.46)</td>
<td>(846.35)</td>
</tr>
<tr>
<td>Household Size</td>
<td>5.18</td>
<td>3.66</td>
<td>5.06</td>
<td>3.50</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.06)</td>
<td>(0.04)</td>
<td>(0.05)</td>
</tr>
<tr>
<td>Age of Head</td>
<td>41.36</td>
<td>41.02</td>
<td>40.28</td>
<td>40.92</td>
</tr>
<tr>
<td></td>
<td>(0.16)</td>
<td>(0.39)</td>
<td>(0.18)</td>
<td>(0.37)</td>
</tr>
<tr>
<td>Education Indicator</td>
<td>2.63</td>
<td>4.83</td>
<td>2.41</td>
<td>5.30</td>
</tr>
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<td></td>
<td>(0.03)</td>
<td>(0.09)</td>
<td>(0.03)</td>
<td>(0.08)</td>
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<tr>
<td># of Income Recipients</td>
<td>1.76</td>
<td>1.81</td>
<td>1.68</td>
<td>1.72</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.03)</td>
<td>(0.02)</td>
<td>(0.03)</td>
</tr>
<tr>
<td># of Kids</td>
<td>1.55</td>
<td>0.71</td>
<td>1.59</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.02)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>N</td>
<td>5,445</td>
<td>977</td>
<td>4,024</td>
<td>932</td>
</tr>
</tbody>
</table>

1/ Standard errors in parenthesis. Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between –100 percent and 100 percent.

2/ Low-income households are defined as households with income per member lower than 2 minimum wages. High-income households are those with income per member equal or higher than 2 minimum wages.

Source: own calculations using the 1989 and the 1992 surveys of Income and Expenditures in Mexico.
<table>
<thead>
<tr>
<th></th>
<th>1989</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small Towns:</td>
<td>Big Towns:</td>
</tr>
<tr>
<td></td>
<td>Population ≤ 15,000</td>
<td>Population &gt; 15,000</td>
</tr>
<tr>
<td>Saving Rates (percentage points of income)</td>
<td>5.91 (1.01)</td>
<td>7.71 (0.51)</td>
</tr>
<tr>
<td>Income (1992 pesos)</td>
<td>3,842 (113.30)</td>
<td>6,385 (224.20)</td>
</tr>
<tr>
<td>Household Size</td>
<td>5.21 (0.06)</td>
<td>4.86 (0.03)</td>
</tr>
<tr>
<td>Age of Head</td>
<td>41.26 (0.31)</td>
<td>41.33 (0.17)</td>
</tr>
<tr>
<td>Education Indicator</td>
<td>2.08 (0.05)</td>
<td>3.23 (0.04)</td>
</tr>
<tr>
<td># of Income Recipients</td>
<td>1.61 (0.02)</td>
<td>1.81 (0.02)</td>
</tr>
<tr>
<td># of Kids</td>
<td>1.74 (0.04)</td>
<td>1.32 (0.02)</td>
</tr>
</tbody>
</table>

N 1,489 4,933 1,203 3,753

1/ Standard errors in parenthesis. Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between -100 percent and 100 percent.

Source: own calculations using the 1989 and the 1992 surveys of Income and Expenditures in Mexico.
Table A3
Different Types of Fragmentation and Triple Interaction Coefficients
Estimates Use Only Observations from Towns that were Included in Both Samples
(Percentage Points of Income, Standard Errors in Parenthesis)\(^{1/}\)

<table>
<thead>
<tr>
<th>Income Level Fragmentation(^{5/})</th>
<th>Ordinary Least Squares(^{2/})</th>
<th>Median Regressions(^{3/})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Controls</td>
<td>With Controls(^{4/})</td>
</tr>
<tr>
<td>1992 Dummy x High Income Dummy</td>
<td>1.40</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>(1.75)</td>
<td>(1.72)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Towns’ Size Fragmentation(^{6/})</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1992 Dummy x Big Town Dummy</td>
<td>-8.77</td>
<td>-8.29</td>
</tr>
<tr>
<td></td>
<td>(1.67)</td>
<td>(1.68)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Triple Interaction Estimation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1992 Dummy x Big Town Dummy x High Income Dummy</td>
<td>-16.80</td>
<td>-13.85</td>
</tr>
<tr>
<td></td>
<td>(5.84)</td>
<td>(5.65)</td>
</tr>
</tbody>
</table>

| N                                 | 11,378                        | 11,378                    | 11,378         | 11,378        |

\(^{1/}\) Saving rates were calculated as the difference of quarterly income minus quarterly consumption divided by quarterly income. Calculations were done after cleaning the data for extreme values in the saving rates and low incomes. Specifically, the saving rates were constrained to between –100 percent and 100 percent.

\(^{2/}\) Robust standard errors in parenthesis.

\(^{3/}\) Bootstrapped standard errors with 100 iterations.

\(^{4/}\) State dummies are included in these regressions but are not presented.

\(^{5/}\) Low-income households are defined as households with income per member lower than 2 minimum wages. High-income households are those with income per member equal or higher than 2 minimum wages.

\(^{6/}\) Big towns are defined as those with population greater than 15,000 people.
Chapter 3

Effects of a Mexican Training Program on Unemployment Spells Duration
3.1 Introduction

For more than a decade, the Mexican government has offered training for unemployed individuals. Training has been one of the most important government’s tools to reduce the costs of major economic restructuring. This has also been one of the few measures designed to support the unemployed and to facilitate their reemployment. The magnitude of the training program is considerable and it has substantially increased since 1994.

Careful evaluation of this government program is necessary given its magnitude and relevance for employment policy. This paper evaluates the effects of training on the unemployment spells of trainees. To do this, different estimation techniques are performed. First, non-parametric estimations are used. Second, different hazard rate models are estimated. These methods are the Cox proportional hazard, the exponential and the weibull estimations. The analysis is done not only for the complete database, but also doing a separate analysis for men and women.

Given that selection into the training program is not random, a propensity score procedure, that diminishes the selection bias problem, was calculated. Also, using the propensity score variable, matched groups were constructed to estimate the effects of training on more similar observations.

Results for the complete database show that training increases the hazard rate of leaving unemployment by 20 percent to 60 percent, depending on the type of training. Nevertheless, average training effects hide substantial variation among men and women. The training effect is non-significant for men, while it is highly significant for women. These results are robust to different types of hazard estimation methods and to the propensity score procedure.

The rest of the paper is as follows, section 3.2 describes the Mexican training program; it also includes summaries of previous evaluations of it. Section 3.3 presents data sources, a
description of the variables, and the variables’ means and proportions by different groups. Section 3.4 gives a brief introduction to hazard rates theory, along with the estimation of the different models used in this chapter. Section 3.5 presents the estimation results. It includes the non-parametric and parametric estimates. It also contains the propensity score matching method and its results. Finally, section 3.6 concludes.

3.2 Mexican Training Program for the Unemployed

In 1984, the Ministry of Labor of Mexico developed a training program for unemployed workers called Probecat. This program consists of training courses of several types of activities, like construction, carpentry, shoe making, apparel, etc. It also gives a monthly scholarship of one minimum wage. Course duration is between three to six months.

Probecat has two training modalities: mix and scholar. In the mix modality, participant factories conduct the training. Firms pay materials and instructors’ salaries. The Ministry of Labor (STPS by its initials in Spanish) pays the scholarship. Also, and most important for this analysis, the owner is committed to hire at least 70 percent of the students. In this case, course duration is approximately 1 to 3 months. In the scholar modality, courses are given at the offices of the Ministry of Labor. There is no commitment for hiring the students that finished the course.

The selection criteria is a nonlinear function of the following factors: first, participants must be between 18 and 55 years old. Second, trainees should be included in the lists of the Job Finding Offices of STPS. Third, they must have at least primary education. Fourth, they must have being unemployed for at least 3 months when entering the program. And finally, priority is given to unemployed people with dependent relatives.¹

¹ The requisites for becoming a trainee are not always satisfied. For example, 35 trainees in the sample did not fulfill the age requirement.
The size of the program is significant. Between 1984 and 1994, there were a total of 651,180 participants. Moreover, in 1995 alone there were an additional 350,000 participants. From 1987 to August 1997, this translated into almost two million monthly scholarships.

Two analyses of this training program have been done in the past. The first one is a paper by Revenga, Riboud and Tan (1992). The authors evaluate the training program during 1990 and 1991. They find that the program reduces the duration of unemployment of both men and women. The effect for men was higher than for women. The strongest effects were found for those individuals older than 25 years. They also analyze the effects of training on earnings. Their findings suggest that training increases the monthly earnings of men but not of women.

The second is an analysis done by the Ministry of Labor for the 1993-1994 period. This paper evaluates the performance of Probecat based on unemployment duration, wages and hours of work. It is found that training reduces significantly the unemployment spell of men and women. The effect was stronger in the case of women.

Both studies use a control and an experimental group to do the analysis. The control group is formed with a sample of unemployed people of the National Survey of Urban Employment (ENEU by its initials in Spanish). For the experimental group, a survey of participants was constructed.

Using the same database of the 1993-1994 Probecat evaluation, this paper tries to find the program’s effect on the unemployment spell duration. Different hazard rate models are estimated to test the robustness of the results. Also, due to the nonrandom selection into the training program a matching procedure of observations is performed.
3.3 Information Sources and Description of Variables

The database is formed by two separate surveys. The group of non-trainees is obtained from a sample of unemployed people of the National Survey of Urban Employment (ENEU). In the case of trainees, the STPS collected the Survey of Probecat’s graduates (ESEP by its initials in Spanish).

Both surveys have individual level observations. ENEU has information about gender, age, education level, working status, if the person has been looking for a job at all or if he or she is currently looking for one, and information about present job. The information on present job includes type of economic activity and size of the firm or factory, occupation, monthly income, and fringe benefits, among others variables.

ESEP has basically the same information plus the type of training the person did (scholar or mix), questions about trainees’ job before taking the course, and if they have been looking for job at all. It also includes information about the after training job (if the participant actually got one).

Part of the data was eliminated. The control group has 910 observations in total. From this group, 355 people reported that they were not looking for a job; also 30 individuals were less than 15 years old and 3 were older than 65.\(^2\) ESEP has 2,991 observations. In this group, 247 people were not looking for a job or did not recall if they were looking for one; therefore they were not included in the analysis. The final sample has 3,200 observations. 2,678 individuals were participants of Probecat and 522 were non-trainees.

\(^2\) For the analysis to be correct, people should be looking for a job. That is the reason why people that were not looking for a job were excluded. Also, age was constrained to be between 15 and 65 years old. That is the minimum and maximum trainees’ age.
In order to make comparable ENEU’s with ESEP’s information, the ENEU survey included two kinds of additional following up surveys. The first one, called Modulo A, has questions about the last job that non-trainees got before they became unemployed. The second one, called Modulo B, was applied in four consecutive quarters after the initial interview. Its main question is whether the individuals found a job and if so when they find it.

ESEP, the trainees’ survey, was collected during the end of the second and the beginning of the third quarter of 1994. Data includes information from the first quarter of 1993 up to the date they did the interview.

In the case of the control group, the survey identifies people that were unemployed in the first quarter of 1993. Interviews for Modulo A were done during the second quarter of the same year. Interviews for Modulo B were done from the second quarter of 1993 to the first quarter of 1994.

Therefore, the time span of both surveys is not the same. ESEP includes two extra quarters. This fact forced to censor the longest unemployment spell for the experimental group to be 64 weeks (which is the maximum period of time in the control group). In the case of trainees, courses’ durations were about 2 and a half quarters, i.e. from the first quarter of 1993 to half of the third quarter in the same year.

Unemployment spells were calculated in the following way: in the case of the control group, unemployment spell duration was considered since the beginning of the first quarter of 1993 up to the day people reported finding a job, or up to a maximum of 64 weeks. Unemployment durations of people at the experimental group were calculated from the time they finished training to the date they found a job or up to 64 weeks (whichever is smaller).
Table 1 contains the list of variables constructed using these two databases. As can be seen from the table, the included variables are the duration of unemployment and if the unemployment spell is censored or not, the type of training, gender, age, marital status, education, motives for leaving employment, and the position of the person in the household (head, spouse or daughter or son). Variables concerning the job prior to unemployment are fringe benefits, hours per week, and type of payment.

Table 2 presents means and proportions of selected variables. As can be seen, the mean of the unemployment spell is 27.51 weeks for the complete database. The average of this variable is 26.66 weeks for men and 29.88 weeks for women. By type of training, the average unemployment spell of scholar training participants is 27.53 weeks, while it is only 19.80 weeks for mix trainees. The mean unemployment spell for non-trainees is 32.70 weeks.

Mean age is approximately 28 years. The participants of mix training are the youngest of the sample on average. Their mean age is only 25 years. Average years of school is approximately 9 years for the different groups in the sample, only in the case of mix training the mean is lower. The number of children is significantly lower for individuals in the control group. While the average for other groups is around 1 child per person, the mean number of children for the control group is only 0.4.

The proportion of married individuals is smaller among the control group and the mix-training participants. A significant proportion of individuals has professional experience. The proportion for the complete sample is 84.56 percent. Also, 30 percent of the spouses in the sample are women.

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3 It is important to mention that it was not possible to know for how long these people were unemployed by the time they took the survey.
3.4 Analysis of Unemployment Spells using Hazard Rates Models

A problem with the use of unemployment spell duration for the estimation of training effects is the presence of censored spells. Spells could be censored in two ways. It is common that by the date in which interviews are done some of the spells can still be in progress. This problem is called right censoring. Also, the time span included in the survey usually is not enough to capture the beginning of all the spells, which implies left censoring. In both cases, total unemployment duration is unknown. If those censored spells were considered as complete, the estimates of the training effects would be biased.

This is why the raw use of unemployment data is inadequate. An ordinary least squares regression of the unemployment spell on several explanatory variables will be incorrect due to the presence of censored observations.

Commonly, hazard rates models are used for the analysis of unemployment duration. The hazard rate calculates the probability of leaving unemployment given that people have been unemployed up to that moment. Let $T$ be the duration of unemployment, the hazard rate function is represented by equation (1):

$$\lambda(t) = \frac{f(t)}{S(t)}$$

(1)

Where $f(t)$ is the density function of the unemployment duration of the agents (i.e. $f(t)=dF(t)/dt$). $S(t)$ is the survivor function defined as $S(t)=1-F(t)=Pr(T \geq t)$. $S(t)$ is just an alternative way to specify the distribution of $T$. Thus, $\lambda(t)$ is the rate at which durations are completed in the period $t$, given that the event has lasted up to $t$. The integrated hazard rate is the following:

---

4 For a more detailed and complete treatment see Kiefer (1988).
\( \Lambda(t) = \int_0^t \lambda(u)du \quad (2) \)

This is useful for specification tests, but it has no practical interpretation; the integrated hazard rate is not a probability. Using the hazard rate we can define duration dependence in time. Positive duration dependence exists in \( t^* \) if \( d\lambda(t)/dt > 0 \) in \( t=t^* \). This means that the probability of leaving unemployment increases through time. Negative duration dependence exists in \( t^* \) if \( d\lambda(t)/dt < 0 \) in \( t=t^* \). In this case, every period the probability of remaining unemployed increases.

In the present analysis two types of duration distributions are used. The first one is the exponential distribution.\(^5\) This distribution is called sometimes memoryless, because the hazard rate is constant and, consequently, duration has no dependence in time. There is an extensive use of this distribution due to the fact that estimation and interpretation are not complicated. Nevertheless, the family of exponential distributions, that is obtained when the parameter of the function (\( \gamma \)) varies, is not very flexible. The inconvenience is that the expected value and the variance of the duration is the reciprocal of the functional parameter (i.e. \( \text{E}(T)=1/\gamma \) and \( \text{Var}(T)=1/\gamma^2 \)). Therefore mean and variance can not be adjusted separately. Consequently, it is unlikely that this distribution is adequate if the sample contains extreme values of durations.

The weibull distribution is also commonly used as the baseline hazard.\(^6\) It can be thought as an exponential distribution but with a different time scale.\(^7\) The weibull hazard function can have positive or negative duration depending on the value of one of its parameter.\(^8\)

\( ^5\) The exponential distribution is defined with parameter \( \gamma > 0 \), and with the following functions:
\( F(t)=1-\exp(-\gamma t); \quad s(t)=\exp(-\gamma t); \quad f(t)=\gamma \exp(-\gamma t); \quad \lambda(t)=\gamma; \quad \Lambda(t)=\gamma t. \)

\( ^6\) The weibull distribution is defined with two parameters \( \gamma > 0 \) and \( \alpha > 0 \), with the following functions:
\( F(t)=1-\exp(-\gamma \alpha \alpha^\alpha t); \quad S(t)=\exp(-\gamma \alpha \alpha^\alpha t); \quad f(t)=\gamma \alpha \alpha^\alpha \exp(-\gamma \alpha \alpha^\alpha t); \quad \lambda(t)=\gamma \alpha \alpha^\alpha; \quad \Lambda(t)=\gamma \alpha \alpha^\alpha t. \)

\( ^7\) It can be shown that \( t^\alpha \) has an exponential distribution with parameter \( \gamma \).

\( ^8\) It has positive duration if \( \alpha > 1 \), negative if \( \alpha < 1 \) and constant when \( \alpha = 1 \) (being the same as the exponential case). The parameter \( \gamma \) does not affect duration dependence.
3.5 Estimation of Training Effects

The estimation of Probecat’s effects on unemployment effects is done in two ways. The first one is a simple non-parametric estimation. In this one, analyzes of the hazard and the survivor function splitting the control and experimental observations are done. In the case of the experimental group separate analyses are done for people that participated in the mix and for individuals that participated in the scholar course.

The second one is a parametric estimation. This is done based on the exponential and weibull distribution and in the Cox’s proportional hazard model. The estimates are realized using the full data set, separating by gender and using a propensity score procedure.

3.5.1 Non Parametric Estimation

The following variables were constructed for the experimental and the control group: let $h_j$ be the number of completed spells with duration $t_j$, for $j=1,\ldots,K$, where $K$ is the number of completed spells with different duration. In absence of ties, all the $h_j$ would be equal to one. Let $m_j$ be the number of censored observations between $t_j$ and $t_{j+1}$; $m_k$ is the number of spells with duration longer than $t_k$ (the longest completed duration). Let $n_j$ be the number of spells which are neither completed nor censored before $t_j$, hence:

$$n_j = \sum_{i=1}^{K} (m_i + h_i)$$

(3)

The hazard function $\lambda(t_j)$ is the probability of completing a spell at time $t_j$, conditional on has lasted up to $t_j$. This estimator is presented in equation (4).
\[ \hat{\lambda}(t_j) = h_j / n_j \]  

(4)

The estimated \( \hat{\lambda}(t_j) \) is equal to the number of completed spells divided by the number of completed and censored observations from time equal or greater than \( j \). The survivor function estimator is described by equation (5). This estimator is known as the Kaplan-Meier estimator.\(^9\)

\[ \hat{S}(t_j) = \prod_{i=1}^{j} \frac{(n_i - h_i)}{n_i} = \prod_{i=1}^{j} (1 - \hat{\lambda}(t_i)) \]  

(5)

The estimates of the hazard (equation (4)) and the survivor function (equation (5)) are constructed for the mix-course and scholar-course participants and for the control group. To do these calculations, censored spells with duration lower than 64 weeks were excluded from the sample.\(^10\)

Graphs 1 present the results for the mix-course participants. The hazard function has a clear U form. This was expected due to the mix-program structure. In this Probecat modality, the employer has to hire at least 70 percent of the program’s participants. It is also worth notice that from week 5 to week 46 of unemployment, the function is quite low and stable. This is reflected in the integrated hazard function. It grows at a moderate rate during the same weeks.

Furthermore, the value of the hazard rate is around 0.4 in week zero, but in the last two weeks of the analysis the hazard is only 0.2. Finally, the survivor function presents a stronger decreasing trend during the first 5 weeks of unemployment (this could be explained by the specific characteristics of the mix-program).

\(^9\) It is possible to interpret this estimator as a maximum likelihood estimate (see Kiefer (1988)).
For the scholar-course participants, the hazard rate is lower than 0.1 from week one to week 48 (see Graphs 2). Starting at week 48, there is a substantial increase in the hazard, up to almost 0.3. The function presents positive duration dependence. The marked increase in the hazard from week 48 to the end of the analysis could be related to an increase in the economic activity during the same period (the analysis for the mix-course participants present the same behavior in the hazard rate).

It is also important to notice that the survivor function presents a nearly constant decreasing rate. This result is due to the fact that for most of the weeks the hazard rate is less than 0.1.

In the case of the control group (Graphs 3), the hazard function is always less than 0.07. This differs from the two experimental groups in which the hazard rate showed a significant increase during the last weeks of the study. It is important to remember that the periods covered by the experimental and by the control survey are not the same. Specifically, the control survey is two quarters shorter. Thus differences in economic activity in those quarters could be the cause of the differences in the hazard rate functions.

For the control group the integrated hazard increases at a decreasing rate and the survivor function is around 0.3 by the end of analyzed period (in the other two cases the survivor function was around zero at the same time).

Graph 4 shows the survivor function of each of the three groups. The control group's survivor function is above the other two functions during the whole period. This indicates that participants of the program tend to find a job sooner than non-participants. But it is not possible to infer from this result that the program has a significant impact on the probability of finding a job.

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10 Calculations without excluding censored spells with duration lower than 64 weeks were done. Results did not change significantly.
This non-parametric analysis does not incorporate explanatory variables; like gender, age, and level of education. The parametric analysis tries to disentangle the specific effects of all the exogenous variables on the duration of unemployment. It also combines the observations of trainees and non-trainees to obtain estimates of the training effects.

### 3.5.2 Parametric Estimation

This section presents estimations of proportional hazard models. Let $\lambda_0 = \lambda_0(t, \alpha)$ be the base hazard, where $\alpha$ is a vector of parameters, then in the case of a proportional model the following specification is obtained:

$$\lambda(t, x, \alpha, \beta) = \phi(x, \beta) \lambda_0(t, \alpha)$$  \hspace{1cm} (6)

Where $x$ represents the vector of explanatory variables. In this analysis the exponential and the weibull distributions were used as base hazards. Also a linear approximation is included. Kiefer (1988) suggested this type of approximation, arguing that if censoring is not a big problem in the sample, then the coefficients of the linear version should not be very different from the nonlinear approximations.\(^{11}\)

### 3.5.2.1 Base Estimation Results\(^{12} \text{ }^{13}\)

To test the robustness of the results, the exponential hazard, the weibull hazard, and the Cox proportional hazard method are used in the calculations for base estimates. Results for a linear approximation of the problem are also obtained. The first set of estimates uses the complete database (3,200 observations), including participants of the mix-modality

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\(^{11}\) The chosen linear specification is the following: $-\ln t_i = X^t B + \varepsilon_i$

\(^{12}\) Parametric results should be different from the non-parametric estimates given the use of covariates and that for the parametric estimation observations of control and treatment groups are used simultaneously.

\(^{13}\) All regressions include state dummies as independent variables. Coefficients are not shown to save space.
and scholar-modality. In the second sets of estimates, mix-participants are excluded due to the special characteristics of this kind of training.

A) Estimation Results Including Complete Database

As can be seen from table 3, the linear approximation presents an upward bias of the mix-training effect on the duration of spells when compared with the coefficients of the nonlinear estimates. Both types of training, mix and scholar, have a positive and significant (1 percent level) impact in the probability of finding a job. The mix training impact is more than three times the scholar effect in the linear regression.

For the nonlinear regressions, the differences between the coefficients of the Cox model and the other two hazard rate models are significant. For the Cox model, being a trainee in the scholar modality increases the hazard rate of leaving unemployment by 29 percent, this effect is significant at the 1 percent level. In the case of the mix training, participants of this modality have a hazard rate of leaving unemployment 63 percent higher than those that did not take the training. This effect is significant at the 1 percent level. However, for the exponential and weibull the impact of the scholar training in the hazard rate is only a 20 percent increase. The mix training effect is similar in these estimation techniques to the one found in the Cox method.

For the rest of the exogenous variables, male trainees are more likely to leave unemployment early (the hazard rate for men is approximately 16 percent higher than the one of women, in all cases). Age of the individual is not a significant factor in the probability of remaining unemployed. Being married increases the probability of leaving

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14 The coefficients of the hazard rate regressions should be interpreted in the following way: a coefficient greater than zero means that a unit increase in the variable raises the baseline hazard by B% and leads to a shorter unemployment. While a coefficient less than zero means that a unit increase in the variable lowers the baseline hazard by B% and leads to a longer delay.

15 The average baseline hazard rate for the complete sample is 0.013. The minimum value of this hazard rate is 0.0003 and the maximum value is 0.073.
unemployment. Years of school and its square are not significant. Having professional experience before unemployment, in all models, reduces the probability of finding a job. Nevertheless, when looking at this coefficient, it is important to consider other variables that are related to previous job experience. In this case, the coefficients of the motives to leave employment and hours of work per week in the job before unemployment are significant and positive. This implies that the net effect of having professional experience is most likely to reduce the unemployment spell.

Also, household position reveals an interesting pattern. Being a spouse significantly reduces the probability of finding a job. The number of children in the family reduces the probability of finding a job. Finally, the number of fringe benefits and the type of payment in the pre-training or pre-unemployment job are non-significant.

B) Estimation Results Including Only Scholar Modality Observations and Control Observations

The characteristics of the mix modality are very peculiar and the established hiring conditions of this type of training force the rapid movement out of unemployment. Given that, according to the program, at least 70 percent of its participants are hired at the end of training, it is impossible to obtain a comparable control group. Therefore, it is convenient to analyze the impact of training without considering the mix modality.

Table 4 has the estimated coefficients without including mix-training observations. Once again, the linear approximation presents an upward bias on the coefficient of scholar training participation, especially when compared with the exponential and weibull specifications. There is a significant difference between the Cox model and the exponential and weibull models estimates of the training effect. In the Cox estimation, trainees have a hazard rate 26 percent greater than non-trainees do, while in the
exponential and weibull methods, training increases the hazard rate by 19 percent. These coefficients are significant.\textsuperscript{16}

In the case of the other exogenous variables, the gender of the individual has a greater effect than when using the full sample to do the calculations. The same is true for marital status. The coefficients of the rest of the exogenous variables are similar to those found using the complete database.

One important result is that comparing the estimated scholar-training coefficient in part A with the current estimation, it is noted that the value of the first estimate is not significantly different from the one found in this section. In the case of the Cox method, the scholar coefficient using the full sample was 0.29 and it was significant at the 1 percent level. When excluding mix-training observations, the estimated coefficient of scholar training is 0.26 for the Cox technique. The differences are even smaller in the case of the exponential and weibull techniques.

\textbf{3.5.2.2 Estimation by Gender}

Estimation by gender is important due to the implicit differences between the labor supply of women and of men. Women's labor supply decision differs from men's decision for several reasons. One of them is the presence of fixed costs of women to participate in the labor force (as for example the presence of children in the household). As a consequence, their participation in the labor force is not 100 percent.\textsuperscript{17} Therefore, it is convenient to do separate estimations for men and women, not only in the hours of work, but also in the type of models that are analyzed here.\textsuperscript{18}

\textsuperscript{16} The average baseline hazard rate excluding mix-training observations is 0.009. The minimum value of this hazard rate is 0.0004 and the maximum value is 0.058.

\textsuperscript{17} Another reasons are tax treatments and that the proportion of secondary earners among women is higher

\textsuperscript{18} The negative sign on the coefficient of household position as spouse is an indicator that separated analysis for men and women should be done.
A) Men's Analysis

The men's analysis is presented in tables 5 and 6. Table 5 exhibits estimation results using only men in both types of training and in the control group. The number of observations in this case is 2,358. It is noted that the linear approximation biases upward the effects of Probecat. The size of the bias here is higher than in the estimation that considers both men and women.

In the nonlinear estimation procedures, the coefficient of the scholar modality training is not significant. Furthermore, in the exponential and weibull models the coefficient has a negative sign. This is important because when using the full database (including men and women), the effect of scholar training was significant and of important magnitude (from 20 to 30 percent). Therefore, the positive effect of training on the reduction of unemployment spells disappears when only men are considered.

In the case of mix training, the coefficient is significant at 1 percent level. Nevertheless, its level is reduced by more than half when compared with the estimation that includes both genders. When considering only men, mix training increases the hazard rate approximately by 30 percent. This impact is roughly the same despite the nonlinear method used.19

Most of the other explanatory variables present the same behavior as in the case of the full sample estimates. It is important to mention that the number of children in the family does not reduce significantly the probability of finding a job (the coefficient is only significant at the 10 percent level in the Cox estimation). The other variables that are significant are professional experience, the reason to leave last job and the number of hours worked.

19 The average baseline hazard rate including only men observations is 0.016. The minimum value of this hazard rate is 0.0006 and the maximum value is 0.149.
The second analysis for men includes only scholar modality male trainees and the male observations of the control group. In this case the number of observations is 2,209. Results are presented in table 6. Once again, the linear estimation biases upward the effect of training. In the nonlinear procedures the effect of the scholar training program is insignificant and with a negative sign in the case of exponential and weibull procedures. Coefficients of the rest of the exogenous variables look similar to those found when considering both types of training.

B) Women's Analysis

Table 7 presents the results of the estimation using mix and scholar female trainees. The number of observations in this case is 842. Women results are substantially different from those of men. The scholar training coefficient for women is always significant in the nonlinear procedures. In the case of the Cox estimation, scholar training increases the hazard rate by 69 percent and it is significant at the 1 percent level. For the exponential and weibull procedures, the scholar training increases the probability of leaving unemployment by approximately 60 percent. The magnitude of these coefficients is twice the size of scholar training coefficients when the compi database is considered.

In the case of mix training, the coefficients of this training variable in the nonlinear procedures are always significant and of important magnitude. Mix training increases the hazard rate by approximately 110 percent in the nonlinear estimations. It is also worth noting that the mix modality coefficient for women is more than three times higher than the one for men. Evidence suggests that women get a greater benefit of Probecat than men do.

---

20 The average baseline hazard rate including only men but excluding mix-training observations is 0.015. The minimum value of this hazard rate is 0.0007 and the maximum value is 0.139.

21 The average baseline hazard rate including only women observations is 0.009. The minimum value of this hazard rate is 0.0006 and the maximum value is 0.046.
For the other exogenous variables, professional experience is non-significant; but age increases the duration of women’s unemployment spells. On the other side, household position has not significant effects.\footnote{22}

Table 8 presents results when the analysis is done only with scholar female trainees and control group females. Here the scholar-training coefficient is significant and stable in all the nonlinear procedures (the linear approximation biases downward the effect of the program). Scholar training increases the hazard rate by approximately 75 percent in the nonlinear procedures. The scholar modality coefficients found in this case are higher than those obtained using scholar and mix female data.\footnote{23} In this estimation, age is significant but only at 10 percent level. In general, the reduction in the sample increases the standard errors on most of the explanatory variables’ coefficients.

Therefore, evidence suggests that the scholar training does not have significant effects on the unemployment spells duration of men, but decreases the unemployment spells duration of women. The scholar training coefficient of women is always significant and greater than 60 percent in the nonlinear procedures.

3.5.2.3 Estimation Using Propensity Score

An important concern in this kind of program evaluation is the extent of comparability between the experimental and the control groups. The problem is caused by two facts: first, there are individual specific characteristics than can lead to self-selection into the training program. Second, the selection process into the training program is not random. People doing the selection into the program can influence the decision of who is in and who is out of the training, altering the probability of success of the program. All these lead to a non-random selection process.

\footnote{22} This could be supportive evidence on the intrinsic differences women and men labor supply decision.

\footnote{23} The average baseline hazard rate including only women but excluding mix-training observations is 0.005. The minimum value of this hazard rate is 0.0006 and the maximum value is 0.017.
Consequently, there is a necessity of developing procedures that increase the comparability between the experimental and the control groups. The matching procedure used in this chapter is the one described by Dehejia and Waba (1996). It is called Propensity Score. This method assumes that conditional upon observed covariates or pre-training variables, assignment to training can be considered random. This means that comparing two individuals with the same observable pre-training characteristics, one who participated in training and one who did not participate, is like comparing those two individuals in a randomized experiment. Therefore, matching in observables reduces the selection bias.

This is a two step method. In the first one, the propensity score is obtained by calculating a logistic function. The dependent variable of the logistic function is a dummy variable for participation in training. The estimated dependent variable is the propensity score (i.e. the probability of participation in training). The regressors of the logistic function are pre-training characteristics of individuals, which are related with the selection criteria into the program.

In the second step, the estimated propensity score is used to match trainees and non-trainees for the program evaluation. Non-trainees observations with a score lower than the minimum score of trainees are excluded from the estimation of the program evaluation. Also, non-trainees observations with a score higher than the maximum score of trainees are excluded too.

In the case of this paper, the included regressors in the logistic function are gender, age and its square, years of school and its square, marital status, professional experience, and the number of children. Interactions between gender, marital status, and position in the household are included as exogenous variables.
Two different logistic regressions were done. In the first one, the complete database was used for its calculation. In the second one, mix-training observations were excluded for the reasons already described. Therefore, two propensity scores were obtained by forecasting the dependent variable of these two logistic functions.

Table 9 presents the results of the propensity score procedure and compares them with the estimates obtained before. As can be seen, in the case of the propensity score procedure for mix and scholar observations, only 29 control observations, around 6 percent of the total number of non-trainees, had a score lower than the minimum score among trainees (i.e. were excluded from the estimation). In general, results are not significantly different from those found in the regular estimation procedures. The training impact for men and women is around 20 percent in the case of scholar training and around 60 percent in the mix modality.

When doing separate analysis for men and women, the propensity score results are also close to those of the regular estimations. Only mix training is significant in the case of men and the training effects on women are significant and of considerable magnitude despite the type of training.

A related exercise can be done. The propensity score variable is, as mentioned before, an indicator of the probability of participation in the program. It is then possible to compare individuals with similar probability of training participation. This exercise is relevant because it increases the degree of comparability of observations and gives information on which groups were responding more to training.

Three different groups for comparison were formed. Trainees and non-trainees with low probability of participation formed a group. This group includes individuals for whom the prediction variable (i.e. the propensity score) is less than 0.7. (it is called Group 70). Individuals with medium probability of participation were considered as the other group.
This second group then is integrated by persons for whom the propensity score variable is greater or equal than 0.7 but less than 0.8 (it is called Group 80). Finally, a group was constructed using those with a predicted participation greater or equal to 0.8 (called Group 100). Using these new groups of matched observations the estimations of former sections were done.

These groups were formed using the two different propensity scores, the one calculated with the complete database and the one that excludes mix training participants. The groups’ definition and the number of observations in each group are presented in table 10.

A) Propensity Score Matched Groups: Results Using the Complete Database

The coefficients for the dummy variables of mix and scholar training modalities are presented in table 11. In the case of men and women, the scholar training is not significant in any of the matched groups. This implies that comparing individuals with the same probability of participating in training reduces the significance of scholar training. In the case of mix training, its importance decreases with the propensity score. For trainees that had a low probability of going into training, mix training increases their hazard rate by 100 percent. Nevertheless, for those with high probability of going into training, the effect of mix training was only a 55 percent to a 62 percent increase in the hazard rate.

In the case of men, scholar training is not significant for any of the matched groups. However, mix training increases significantly the hazard rate of those individuals with higher probability of going into training. The increase is around 30 percent.

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24 Only the weibull estimated coefficients are shown in table 9. Results using the other nonlinear procedures are similar.

25 Weibull’s coefficients are shown in tables 11 and 12. Estimates using the Cox and the exponential method are similar.

26 Coefficients of other explanatory variables are similar to those that were found before. The degree of precision in the estimation is reduced, the matching procedure increases the standard errors in the estimation of coefficients.
When doing the analysis for women, the effect of scholar training is significant for those with medium and high probability of going into training. The effect goes from a 74 percent to an 81 percent increase in the hazard rate. In the case of mix training, the effect is similar to the one found before, mix training increases significantly the women's probability of leaving unemployment.

Therefore, the results for women are robust to the matched groups' procedure, while the mix training effect for men is reduced in this case.

**B) Propensity Score Matched Groups: Results Excluding Mix Training Observations**

In this exercise, the matched groups are constructed using the propensity score obtained when mix-training observations are excluded. Main results are presented in table 12. In the case of men and women, scholar training is significant only in the group formed by people with low probability of going into training. The coefficients for the other two groups are non-significant.

When considering only men, none of the groups present a significant impact of the scholar training on the probability of leaving unemployment. For women results are different. For the group of women with low probability of going into training, scholar training increases their hazard rate by 67 percent and is significant. Nevertheless, the effect of training is not significant for women with moderate probability of going into training. Finally, scholar training increases the hazard rate by 180 percent for trainees in the group with high probability of participation.
3.6 Conclusions

The estimates of the training program's effect using the complete database show that training increases the hazard rate of leaving unemployment by 20 percent in the case of scholar training and by 60 percent in the mix training. Nevertheless, these average results hide considerable variation when considering different segmentations of the sample (divided by gender or using the propensity score). Despite this fact, clear trends were found.

For men, the scholar-training program's effect tends to be nonexistent or with a negative sign and insignificant. This fact holds in every one of the estimation techniques used and in the propensity score estimation. For women, the scholar-training program reduces their unemployment spells and this effect is most of the time significant. When the coefficient is significant, it represents an increase in the hazard rate that is no lower than 50 percent.

Therefore, evidence suggests that the program had a significant effect on reducing the unemployment spells of women, but not the unemployment duration of men. This result is similar to those found in the economics literature for the United States. In this country, usually estimates of the training programs' impact for women are stronger than the results for men.27

Additional analysis is required on the implicit or explicit differences of women and men. Understanding their differences could be a good way to determine what actions should be taken to improve the effects of training on men. Finally, other dimensions of the training impact should be considered. One important characteristic is the training effects on earnings of participants.

---

References


### Table 1
**Description of Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scholar Training</strong></td>
<td>Variable equals to one if participant of scholar modality training.</td>
</tr>
<tr>
<td><strong>Mix Training</strong></td>
<td>Variable equals to one if participant of mix modality training.</td>
</tr>
<tr>
<td><strong>Course Dummy</strong></td>
<td>Variable equals to one if participant of Probecat in any training modality.</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Variable equals to one if male.</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>Age of individual in years.</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td>Variable equals to one if the individual is married or living in free union.</td>
</tr>
<tr>
<td><strong>Years of School</strong></td>
<td>Years of school.</td>
</tr>
<tr>
<td><strong>(Years of School)</strong></td>
<td>Square of years of school.</td>
</tr>
<tr>
<td><strong>Spell</strong></td>
<td>Unemployment spell duration in weeks.</td>
</tr>
<tr>
<td><strong>Type of Spell</strong></td>
<td>Variable equals to one if spell is complete.</td>
</tr>
<tr>
<td><strong>Work Experience</strong></td>
<td>Variable equals to one if the person has work experience.</td>
</tr>
<tr>
<td><strong>Motives to Leave</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Exogenous to the Worker</strong></td>
<td>Variable equals 1 to one if the reason for leaving last job was: factory or firm closed or go to bankrupt, layoff, strike in process, end of the agricultural cycle, etc.</td>
</tr>
<tr>
<td><strong>Endogenous to the Worker</strong></td>
<td>Variable equal to one if the reason for leaving last job was: individual got married, to give birth, childcare or care of other relatives, studies, change of city, sickness, personal non-satisfaction with job.</td>
</tr>
<tr>
<td><strong>Individual’s Household Position:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Head</strong></td>
<td>Variable equals to one if the individual is head of the household.</td>
</tr>
<tr>
<td><strong>Spouse</strong></td>
<td>Variable equals to one if individual position in household is as spouse.</td>
</tr>
<tr>
<td><strong>Children</strong></td>
<td>Variable equals to one if individual position in household is as daughter or son.</td>
</tr>
<tr>
<td><strong>Number of Children</strong></td>
<td>Number of children under 12 Years</td>
</tr>
<tr>
<td><strong>Hours of Work per Week</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Less than 35</strong></td>
<td>Variable equals to one if in last job individual worked less than 35 hours a week.</td>
</tr>
<tr>
<td><strong>35 to 48</strong></td>
<td>Variable equals to one if in last job individual worked between 35 and 48 hours a week.</td>
</tr>
<tr>
<td><strong>More than 48</strong></td>
<td>Variable equals to one if in last job individual worked more than 48 hours a week.</td>
</tr>
<tr>
<td><strong>Fringe Benefits</strong></td>
<td>Number of fringe benefits in last job. The maximum number is nine.</td>
</tr>
<tr>
<td><strong>Type of Payment:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Fixed Monthly Wage</strong></td>
<td>Variable equals to one if the worker’s last job was with a fixed wage.</td>
</tr>
<tr>
<td><strong>Per Hour or Day</strong></td>
<td>Variable equals to one if the worker’s last job included a daily payment or a payment by each specific realized duty.</td>
</tr>
<tr>
<td><strong>Percentage of Earnings</strong></td>
<td>Variable equals to one if in the worker’s last job, the form of payment was as a percentage of earnings.</td>
</tr>
<tr>
<td><strong>No Salary</strong></td>
<td>Variable equals to one if in the worker’s last job, no payment was given.</td>
</tr>
</tbody>
</table>

*Information for the job that the person had before training or unemployment spell.*
Table 2  
Means and Proportions of Selected Variables

<table>
<thead>
<tr>
<th></th>
<th>General</th>
<th>Men</th>
<th>Women</th>
<th>Experimental</th>
<th>Scholar</th>
<th>Mix</th>
<th>Control</th>
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<tr>
<td><strong>Means</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment Spells (weeks)</td>
<td>27.51 (0.39)</td>
<td>26.66 (0.44)</td>
<td>29.88 (0.81)</td>
<td>26.50 (0.42)</td>
<td>27.53 (0.44)</td>
<td>19.80 (1.20)</td>
<td>32.70 (0.99)</td>
</tr>
<tr>
<td>Age</td>
<td>27.77 (0.15)</td>
<td>28.04 (0.19)</td>
<td>27.01 (0.27)</td>
<td>27.87 (0.16)</td>
<td>28.30 (0.17)</td>
<td>25.08 (0.38)</td>
<td>27.24 (0.47)</td>
</tr>
<tr>
<td>Years of School</td>
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<td>9.00 (0.05)</td>
<td>9.18 (0.10)</td>
<td>8.93 (0.04)</td>
<td>9.00 (0.05)</td>
<td>8.44 (0.11)</td>
<td>9.65 (0.17)</td>
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<td>Number of Children</td>
<td>1.06 (0.02)</td>
<td>1.00 (0.03)</td>
<td>1.23 (0.05)</td>
<td>1.19 (0.03)</td>
<td>1.22 (0.03)</td>
<td>1.01 (0.07)</td>
<td>0.39 (0.04)</td>
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<tr>
<td><strong>Proportions (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>48.00</td>
<td>35.51</td>
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<td>48.29</td>
<td>39.55</td>
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<td>With Professional Experience</td>
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<td>85.68</td>
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<td>2,678</td>
<td>2,319</td>
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<td>522</td>
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</table>

"/ Standard errors in parenthesis.
Table 3
Estimated Coefficients Including Trainees of Mix and Scholar Training and Control Group (Robust Standard Errors in Parenthesis)\textsuperscript{11}

<table>
<thead>
<tr>
<th></th>
<th>Linear\textsuperscript{12}</th>
<th>Cox</th>
<th>Exponential</th>
<th>Weibull\textsuperscript{9}</th>
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<td>(0.06)</td>
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<td>(0.09)</td>
<td>(0.09)</td>
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<td>Endogenous to the Worker</td>
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<td>(0.09)</td>
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<td>-0.06</td>
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<td>(0.10)</td>
<td>(0.09)</td>
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<tr>
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<td>-0.04</td>
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<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Hours of Work per Week, Job before Training or Unemployment Spell</td>
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<td></td>
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<tr>
<td>Less than 35</td>
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<td>0.63</td>
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<td>(0.17)</td>
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<td>(0.16)</td>
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<td>35 to 48</td>
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<td>0.72</td>
<td>0.71</td>
<td>0.68</td>
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<td></td>
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<td>(0.17)</td>
<td>(0.16)</td>
<td>(0.16)</td>
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<tr>
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<td>0.01</td>
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</table>
Table 3 (continued)

<table>
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<tr>
<th>Type of Payment in Pre-Training/Pre-Unemployment Job</th>
<th>Linear(^1)</th>
<th>Cox</th>
<th>Exponential</th>
<th>Weibull(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Monthly Wage</td>
<td>0.05</td>
<td>0.04</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Per Hour or Day</td>
<td>0.05</td>
<td>0.03</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
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<td>(0.13)</td>
<td>(0.10)</td>
<td>(0.10)</td>
<td>(0.10)</td>
</tr>
<tr>
<td>Percentage of Earnings</td>
<td>0.26</td>
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<td>0.14</td>
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<tr>
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<td>(0.12)</td>
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<td>(0.12)</td>
</tr>
<tr>
<td>No Salary</td>
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<td>0.01</td>
<td>-0.01</td>
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</tr>
<tr>
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<td>(0.16)</td>
<td>(0.15)</td>
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<td>-3.62</td>
<td>-3.28</td>
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<tr>
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<td>(0.22)</td>
<td>(0.21)</td>
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</table>

| N                                                   | 3,200         | 3,200| 3,200        | 3,200        |
| \(\chi^2\) (F for linear estimation)                | 9.09          | 1,852.77| 649.19      | 639.37       |

\(^1\) All estimates include states dummies variables, coefficients are not shown.

\(^2\) The linear regression’s dependent variable is the log of unemployment spells (censored or not) plus one.

In all other estimations, the dependent variable is the spell (censored or not) plus one.

\(^3\) The estimated value of \(\alpha\) is 1.10 with a standard error of 0.015.
<table>
<thead>
<tr>
<th></th>
<th>Linear&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Cox</th>
<th>Exponential</th>
<th>Weibull&lt;sup&gt;3&lt;/sup&gt;</th>
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<td>(0.07)</td>
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<td>0.00</td>
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<td>(0.00)</td>
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<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Marital Status</td>
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<td>0.16</td>
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<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.06)</td>
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<td>-0.02</td>
<td>-0.02</td>
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<td>(0.03)</td>
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<tr>
<td>(Years of School)&lt;sup&gt;2&lt;/sup&gt;</td>
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<td>0.00</td>
<td>0.00</td>
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<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
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<td>-1.45</td>
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<td>(0.17)</td>
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<tr>
<td>Motives to Leave Employment</td>
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<tr>
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<td>(0.09)</td>
<td>(0.10)</td>
<td>(0.10)</td>
<td>(0.10)</td>
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<tr>
<td>Household Position of Individual Head</td>
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<tr>
<td>Head</td>
<td>-0.05</td>
<td>0.00</td>
<td>0.01</td>
<td>0.01</td>
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<tr>
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<td>(0.14)</td>
<td>(0.12)</td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Spouse</td>
<td>-0.23</td>
<td>-0.38</td>
<td>-0.35</td>
<td>-0.35</td>
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<td>(0.16)</td>
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<tr>
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<td>-0.08</td>
<td>-0.07</td>
<td>-0.07</td>
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<td>(0.10)</td>
</tr>
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<td>Number of Children Under 12 Years</td>
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<td>-0.04</td>
<td>-0.04</td>
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<tr>
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<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
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<td>Hours of Work per Week, Job before Training or Unemployment Spell</td>
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<td></td>
<td></td>
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<tr>
<td>Less than 35</td>
<td>0.38</td>
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<td>0.65</td>
<td>0.64</td>
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<td>(0.18)</td>
<td>(0.17)</td>
<td>(0.16)</td>
</tr>
<tr>
<td>35 to 48</td>
<td>0.52</td>
<td>0.74</td>
<td>0.72</td>
<td>0.71</td>
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<td>(0.17)</td>
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<td>(0.16)</td>
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<tr>
<td>More than 48</td>
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<td>0.72</td>
<td>0.71</td>
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<td>Number of Fringe Benefits in Pre-Training/Pre-Unemployment Job</td>
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Table 4 (continued)

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<th>Lineal(^1)</th>
<th>Cox</th>
<th>Exponential</th>
<th>Weibull(^3)</th>
</tr>
</thead>
<tbody>
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<td>0.04</td>
<td>0.01</td>
<td>0.01</td>
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<td>(0.11)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Per Hour or Day</td>
<td>0.04</td>
<td>0.01</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
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<td>(0.13)</td>
<td>(0.11)</td>
<td>(0.11)</td>
<td>(0.10)</td>
</tr>
<tr>
<td>Percentage of Earnings</td>
<td>0.22</td>
<td>0.09</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.13)</td>
<td>(0.12)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>No Salary</td>
<td>0.11</td>
<td>0.00</td>
<td>-0.01</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.19)</td>
<td>(0.17)</td>
<td>(0.17)</td>
<td>(0.17)</td>
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<td>----</td>
<td>-3.67</td>
<td>-3.54</td>
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<tr>
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<td>(0.26)</td>
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<td>(0.23)</td>
<td>(0.23)</td>
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</tbody>
</table>

\(^{1}\) All estimates include states dummies variables, coefficients are not shown.

\(^{2}\) The linear regression’s dependent variable is the log of unemployment spells (censored or not) plus one.

\(^{3}\) In all other estimations, the dependent variable is the spell (censored or not) plus one.

\(^{3}\) The estimated value of \(\alpha\) is 1.03 with a standard error of 0.017.
Table 5
Estimated Coefficients Including Only Men Trainees of Mix and Scholar Training and Control Group (Robust Standard Errors in Parenthesis)\textsuperscript{1}

<table>
<thead>
<tr>
<th></th>
<th>Linear\textsuperscript{2}</th>
<th>Cox</th>
<th>Exponential</th>
<th>Weibull\textsuperscript{3}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scholar Training</td>
<td>0.23</td>
<td>0.07</td>
<td>-0.02</td>
<td>-0.01</td>
</tr>
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<td>(0.11)</td>
<td>(0.09)</td>
<td>(0.08)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>Mix Training</td>
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<td>0.31</td>
<td>0.30</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
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<td>(0.14)</td>
<td>(0.13)</td>
<td>(0.13)</td>
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<td>0.00</td>
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</tr>
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<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Marital Status</td>
<td>0.01</td>
<td>0.13</td>
<td>0.09</td>
<td>0.08</td>
</tr>
<tr>
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<td>(0.10)</td>
<td>(0.08)</td>
<td>(0.08)</td>
<td>(0.07)</td>
</tr>
<tr>
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<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
</tr>
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<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.04)</td>
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<tr>
<td>(Years of School)\textsuperscript{2}</td>
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<td>0.00</td>
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<tr>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Professional Experience</td>
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<td>-1.90</td>
<td>-1.79</td>
<td>-1.74</td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.25)</td>
<td>(0.22)</td>
<td>(0.22)</td>
</tr>
<tr>
<td>Motives to Leave Employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exogenous to the Worker</td>
<td>0.55</td>
<td>1.08</td>
<td>1.02</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.11)</td>
<td>(0.10)</td>
<td>(0.10)</td>
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<tr>
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<td>1.12</td>
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<td>1.06</td>
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<td>(0.11)</td>
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<tr>
<td>Household Position of Individual Head</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Head</td>
<td>0.05</td>
<td>0.01</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(0.17)</td>
<td>(0.13)</td>
<td>(0.12)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Spouse</td>
<td>-0.14</td>
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<td>-0.08</td>
<td>-0.09</td>
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<td>(0.16)</td>
<td>(0.11)</td>
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<tr>
<td>Number of Children Under 12 Years</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>0.01</td>
<td>-0.04</td>
<td>-0.03</td>
<td>-0.03</td>
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<tr>
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<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
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<tr>
<td>Hours of Work per Week, Job before Training or Unemployment Spell</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 35</td>
<td>0.68</td>
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<td>0.99</td>
<td>0.96</td>
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<td>(0.24)</td>
<td>(0.24)</td>
<td>(0.22)</td>
<td>(0.21)</td>
</tr>
<tr>
<td>35 to 48</td>
<td>0.77</td>
<td>1.14</td>
<td>1.05</td>
<td>1.02</td>
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<tr>
<td>More than 48</td>
<td>0.79</td>
<td>1.11</td>
<td>1.03</td>
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<td>(0.24)</td>
<td>(0.21)</td>
<td>(0.21)</td>
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<td>Number of Fringe Benefits in Pre-Training/Pre-Unemployment Job</td>
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<tr>
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<td>(0.02)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
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\textsuperscript{1} Robust standard errors in parenthesis
\textsuperscript{2} Linear
\textsuperscript{3} Weibull
Table 5 (continued)

<table>
<thead>
<tr>
<th>Type of Payment in Pre-Training/Pre-Unemployment Job</th>
<th>Linear(^2)</th>
<th>Cox</th>
<th>Exponential</th>
<th>Weibull(^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Monthly Wage</td>
<td>0.00</td>
<td>0.02</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.10)</td>
<td>(0.10)</td>
<td>(0.10)</td>
</tr>
<tr>
<td>Per Hour or Day</td>
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<td>-0.01</td>
<td>-0.03</td>
<td>-0.03</td>
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<tr>
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<td>(0.14)</td>
<td>(0.12)</td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Percentage of Earnings</td>
<td>0.16</td>
<td>0.03</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.14)</td>
<td>(0.13)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>No Salary</td>
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<td>-0.08</td>
<td>-0.09</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.18)</td>
<td>(0.18)</td>
<td>(0.17)</td>
</tr>
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<td>(0.32)</td>
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<td>(0.25)</td>
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</tbody>
</table>

| \(N\) | 2,358 | 2,358 | 2,358 | 2,358 |
| \(\chi^2\) (F for linear estimation) | 4.48 | 329.28 | 284.30 | 283.05 |

\(^2\) All estimates include states dummies variables, coefficients are not shown.

\(^3\) The linear regression’s dependent variable is the log of unemployment spells (censored or not) plus one.
In all other estimations, the dependent variable is the spell (censored or not) plus one.

\(^3\) The estimated value of \(\alpha\) is 1.06 with a standard error of 0.018.
<table>
<thead>
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<th>Cox</th>
<th>Exponential</th>
<th>Weibull^v</th>
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<td>-0.02</td>
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</tr>
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<td>Number of Fringe Benefits in Pre-</td>
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Table 6 (continued)

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<th>Type of Payment in Pre-Training/Pre-Unemployment Job</th>
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<th>Exponential</th>
<th>Weibull(^3)</th>
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<td>Per Hour or Day</td>
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<td>0.01</td>
<td>-0.01</td>
<td>-0.01</td>
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<td>(0.14)</td>
<td>(0.12)</td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Percentage of Earnings</td>
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<td>0.04</td>
<td>0.04</td>
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<td>No Salary</td>
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<td>-0.05</td>
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</table>

\(N\)                                               | 2,209       | 2,209| 2,209       | 2,209        |
\(\chi^2\) (\(F\) for lineal estimation)           | 3.32        | 309.77| 272.90      | 269.64       |

---

1 All estimates include states dummies variables, coefficients are not shown.
2 The linear regression's dependent variable is the log of unemployment spells (censored or not) plus one.
3 In all other estimations, the dependent variable is the spell (censored or not) plus one.
4 The estimated value of \(\alpha\) is 1.03 with a standard error of 0.019.
Table 7
Estimated Coefficients Including Only Women Trainees of Mix and Scholar Training and Control Group (Robust Standard Errors in Parenthesis)\textsuperscript{V}

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<th>Cox</th>
<th>Exponential</th>
<th>Weibull\textsuperscript{V}</th>
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</thead>
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<td>(0.15)</td>
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<td>1.14</td>
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<td>(0.01)</td>
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<td>-0.03</td>
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<td>(0.19)</td>
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<tr>
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<td>-0.09</td>
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<td>(Years of School)$^2$</td>
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<td>0.00</td>
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<td>Professional Experience</td>
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<td>-0.37</td>
<td>-0.38</td>
<td>-0.36</td>
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<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.04)</td>
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<td>-0.23</td>
<td>-0.22</td>
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<td>(0.03)</td>
<td>(0.02)</td>
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Table 7 (continued)

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<th>Exponential</th>
<th>Weibull(^3)</th>
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<td>0.45</td>
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<td>(0.28)</td>
<td>(0.29)</td>
<td>(0.28)</td>
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<tr>
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<td>0.53</td>
<td>0.51</td>
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<td>(0.34)</td>
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<td>(0.37)</td>
<td>(0.35)</td>
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<tr>
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<td>(0.37)</td>
<td>(0.35)</td>
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<tr>
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</table>

\(N\)                                           | 842           | 842 | 842         | 842          |

\(\chi^2\) (F for lineal estimation) | 6.89          | 1,605.70 | 1,103.35 | 846.01      |

\(^2\) All estimates include states dummy variables, coefficients are not shown.
\(^3\) The linear regression’s dependent variable is the log of unemployment spells (censored or not) plus one.
In all other estimations, the dependent variable is the spell (censored or not) plus one.
\(\chi^2\) The estimated value of \(\alpha\) is 1.12 with a standard error of 0.03.
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<th>Exponential</th>
<th>Weibull</th>
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<td>0.75</td>
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<td>(0.32)</td>
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<td></td>
<td></td>
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<tr>
<td>Exogenous to the Worker</td>
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<td>0.30</td>
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<td>(0.22)</td>
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<tr>
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<td>0.03</td>
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<td>(0.05)</td>
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<td>(0.04)</td>
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<tr>
<td>Hours of Work per Week, Job before Training or Unemployment Spell</td>
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</tr>
<tr>
<td>Less than 35</td>
<td>-0.27</td>
<td>-0.26</td>
<td>-0.24</td>
<td>-0.25</td>
</tr>
<tr>
<td></td>
<td>(0.31)</td>
<td>(0.41)</td>
<td>(0.40)</td>
<td>(0.41)</td>
</tr>
<tr>
<td>35 to 48</td>
<td>0.09</td>
<td>-0.08</td>
<td>-0.06</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(0.30)</td>
<td>(0.39)</td>
<td>(0.38)</td>
<td>(0.39)</td>
</tr>
<tr>
<td>More than 48</td>
<td>-0.17</td>
<td>-0.25</td>
<td>-0.22</td>
<td>-0.23</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
<td>(0.40)</td>
<td>(0.39)</td>
<td>(0.40)</td>
</tr>
<tr>
<td>Number of Fringe Benefits in Pre-Training/Pre-Unemployment Job</td>
<td>-0.03</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
</tbody>
</table>
Table 8 (continued)

<table>
<thead>
<tr>
<th>Type of Payment in Pre-Training/Pre-Unemployment Job</th>
<th>Linear(^1)</th>
<th>Cox</th>
<th>Exponential</th>
<th>Weibull(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Monthly Wage</td>
<td>0.34</td>
<td>0.30</td>
<td>0.29</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>(0.27)</td>
<td>(0.33)</td>
<td>(0.32)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>Per Hour or Day</td>
<td>0.41</td>
<td>0.35</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td>(0.34)</td>
<td>(0.40)</td>
<td>(0.38)</td>
<td>(0.39)</td>
</tr>
<tr>
<td>Percentage of Earnings</td>
<td>0.79</td>
<td>0.72</td>
<td>0.70</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>(0.35)</td>
<td>(0.40)</td>
<td>(0.39)</td>
<td>(0.41)</td>
</tr>
<tr>
<td>No Salary</td>
<td>0.77</td>
<td>0.39</td>
<td>0.38</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td>(0.51)</td>
<td>(0.49)</td>
<td>(0.51)</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.01</td>
<td>----</td>
<td>-4.03</td>
<td>-4.40</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td></td>
<td>(0.53)</td>
<td>(0.59)</td>
</tr>
</tbody>
</table>

| N                                                      | 632         | 632 | 632         | 632          |
| \(\chi^2\) (F for linear estimation)                  | 3.91        | 2,093.61| 1,075.87   | 664.61       |

\(^1\) All estimates include states dummies variables, coefficients are not shown.

\(^2\) The linear regression’s dependent variable is the log of unemployment spells (censored or not) plus one.

In all other estimations, the dependent variable is the spell (censored or not) plus one.

\(^3\) The estimated value of \(\alpha\) is 1.09 with a standard error of 0.042.
<table>
<thead>
<tr>
<th>Type of Estimation Included Observations</th>
<th>Regular Estimation</th>
<th>Propensity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mix-Scholar</td>
<td>Scholar</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Men and Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>0.19</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Mix Training</td>
<td>0.60</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>3,200</td>
<td>2,841</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>639.37</td>
<td>605.03</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>1.10</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Only Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>-0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td></td>
<td>(0.08)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>Mix Training</td>
<td>0.31</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>2,358</td>
<td>2,209</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>283.05</td>
<td>269.64</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>1.07</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Only Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>0.59</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.16)</td>
</tr>
<tr>
<td>Mix Training</td>
<td>1.13</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>(0.16)</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>842</td>
<td>632</td>
</tr>
<tr>
<td>$\chi^2$</td>
<td>846.01</td>
<td>664.61</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>1.12</td>
<td>0.90</td>
</tr>
</tbody>
</table>

$^1$ All estimates include states dummy variables, and all other exogenous variables. Coefficients are not shown.

$^2$ Estimates use control group observations.

$^3$ The logistic regression, used to calculate the propensity score, includes all observations.

$^4$ The logistic regression, used to calculate the propensity score, excludes mix training observations.
Table 10
Description of Matching Groups using Propensity Score\textsuperscript{17}

<table>
<thead>
<tr>
<th>Name of Group</th>
<th>Observation belongs to Group if Propensity Score Variable (PSV):</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Complete Database</strong></td>
<td></td>
</tr>
<tr>
<td>Group 70</td>
<td>PSV &lt; 0.7</td>
<td>473</td>
</tr>
<tr>
<td>Group 80</td>
<td>0.7 ( \leq ) PSV &lt; 0.8</td>
<td>475</td>
</tr>
<tr>
<td>Group 100</td>
<td>PSV ( \geq ) 0.8</td>
<td>2,252</td>
</tr>
<tr>
<td></td>
<td><strong>Excluding Mix-Training Observations</strong></td>
<td></td>
</tr>
<tr>
<td>Group 70</td>
<td>PSV &lt; 0.7</td>
<td>563</td>
</tr>
<tr>
<td>Group 80</td>
<td>0.7 ( \leq ) PSV &lt; 0.8</td>
<td>374</td>
</tr>
<tr>
<td>Group 100</td>
<td>PSV ( \geq ) 0.8</td>
<td>1,904</td>
</tr>
</tbody>
</table>

\textsuperscript{17} Groups were formed using two different propensity scores. The first propensity score was calculated using the complete database. To obtain the second propensity score, mix-training observations were excluded from the calculation.
Table 11
Weibull’s Estimated Coefficients for Matching Groups using Propensity Score\(^1\)
Including Trainees of Mix and Scholar Training and Control Group
(Robust Standard Errors in Parenthesis)\(^2\)

<table>
<thead>
<tr>
<th></th>
<th>Group 70</th>
<th>Group 80</th>
<th>Group 100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men and Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>0.20</td>
<td>0.18</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.18)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Mix Training</td>
<td>1.00</td>
<td>0.62</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>(0.24)</td>
<td>(0.21)</td>
<td>(0.14)</td>
</tr>
<tr>
<td>N</td>
<td>444</td>
<td>475</td>
<td>2,252</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>742</td>
<td>344.52</td>
<td>277.64</td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.95</td>
<td>1.11</td>
<td>1.10</td>
</tr>
<tr>
<td><strong>Only Men</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>-0.17</td>
<td>0.25</td>
<td>-0.10</td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.27)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Mix Training</td>
<td>0.51</td>
<td>0.30</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>(0.56)</td>
<td>(0.31)</td>
<td>(0.17)</td>
</tr>
<tr>
<td>N</td>
<td>199</td>
<td>261</td>
<td>1,873</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>720.71</td>
<td>1,060.71</td>
<td>2,567.34</td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.78</td>
<td>1.05</td>
<td>1.07</td>
</tr>
<tr>
<td><strong>Only Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>0.27</td>
<td>0.74</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>(0.28)</td>
<td>(0.41)</td>
<td>(0.34)</td>
</tr>
<tr>
<td>Mix Training</td>
<td>1.48</td>
<td>1.23</td>
<td>1.17</td>
</tr>
<tr>
<td></td>
<td>(0.32)</td>
<td>(0.41)</td>
<td>(0.36)</td>
</tr>
<tr>
<td>N</td>
<td>245</td>
<td>214</td>
<td>379</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>549.42</td>
<td>1,691.76</td>
<td>623.01</td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.92</td>
<td>1.02</td>
<td>1.10</td>
</tr>
</tbody>
</table>

\(^1\) The logistic regression, used to calculate the propensity score, includes all observations.
\(^2\) All estimates include states dummies variables, and all other exogenous variables. Coefficients are not shown.
Table 12  
Weibull’s Estimated Coefficients for Matching Groups using Propensity Score\(^1\) 
Including Only Trainees of Scholar Training and Control Group 
(Robust Standard Errors in Parenthesis)\(^2\)

<table>
<thead>
<tr>
<th></th>
<th>Group 70</th>
<th>Group 80</th>
<th>Group 100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men and Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>0.30</td>
<td>0.09</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.20)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>N</td>
<td>550</td>
<td>374</td>
<td>1,904</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>523.32</td>
<td>310.07</td>
<td>686.98</td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.92</td>
<td>0.92</td>
<td>1.05</td>
</tr>
<tr>
<td><strong>Only Men</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>0.01</td>
<td>0.19</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>(0.21)</td>
<td>(0.32)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>N</td>
<td>235</td>
<td>220</td>
<td>1,741</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>1,364.31</td>
<td>347.15</td>
<td>2,361.02</td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.83</td>
<td>0.93</td>
<td>1.05</td>
</tr>
<tr>
<td><strong>Only Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholar Training</td>
<td>0.67</td>
<td>0.52</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>(0.22)</td>
<td>(0.51)</td>
<td>(0.65)</td>
</tr>
<tr>
<td>N</td>
<td>315</td>
<td>154</td>
<td>163</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>636.69</td>
<td>381.97</td>
<td>1,047.99</td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.88</td>
<td>0.82</td>
<td>0.83</td>
</tr>
</tbody>
</table>

\(^1\) The logistic regression, used to calculate the propensity score, excludes mix training observations. 
\(^2\) All estimates include states dummies variables, and all other exogenous variables. Coefficients are not shown.
Graphs 1
Estimated Functions for Mix Training Modality Participants
Excluding Censored Spells with Duration lower than 64 Weeks
Graphs 2
Estimated Functions for Scholar Training Modality Participants
Excluding Censored Spells with Duration lower than 64 Weeks
Graphs 3
Estimated Functions for Control Group Observations

- Hazard Rate vs. Weeks
- Integrated Hazard Rate vs. Weeks
- Survivor Function vs. Weeks
Graph 4
Estimated Survivor Functions of the Three Groups
(Mix, Scholar and Control)
NAME VARIES: ☑ Rodríguez
(Copy degree book)

IMPRINT: (COPYRIGHT)

COLLATION: 186 p

DEPT.: Econ
YEAR: 1999
DEGREE: Ph.D.
NAME: APORTELA, Fernando