

# Unemployment dynamics in Mexico: Can micro-data shed light on the controversy of labor market segmentation in developing countries?

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## 1 Introduction

The studies for Latin American and other developing countries, that have analyzed workers' movements to unemployment and out of the labor force and back to work, have highlighted three stylized facts that distinguish their labor markets from those in developed countries: the majority of job seekers that opt out of the labor market are individuals whose previous employment was informal; a relevant share of unemployed jobseekers who left an informal job become formal employees and, conversely, a non-negligible share of workers move from formal jobs to informal jobs, after an unemployment spell (Duryea *et. al.* 2006). With notable exceptions -*e.g.* Kugler, 2000 and Hoppenheim, 2000- these studies focuses on determinants of the likelihood of transiting from one job status to another one and not on determinants of durations in unemployment and in other job status. For this reason, they have been of limited use in policy debates.

A focus on destinations out of unemployment, together with determinants of durations in this state for workers with different characteristics is needed to answer questions related to the design of active labor market policies and in debates related to labor legislation reforms. Among them are the following ones: Which interventions are effective to prevent long-term unemployment? Are some job searching methods effective in helping individuals escape unemployment faster and are these methods equally efficient for employees in formal and informal sectors? Do previously informal

workers, relative to previously formal ones, require longer searching spells and efforts to get an acceptable job offer in the formal sector? Does search intensity for a formal job decrease with the length of unemployment period and, after a threshold, search intensity for an informal job increase?

To address questions related to determinants of unemployment duration, a developing country study must have employment data providing precise search time for each unemployed worker finding a job or moving out of the labor force and for those of them finding a job, how was their new employer contacted and what kind of status this job is (formal and informal salaried or self-employment). Also needed are characteristics of the person and information about previous job history, most notably if previous job was formal or not and reasons for separating from it.

This paper uses Mexico as a case study because, in addition to the richness of its employment data, shares with many developing countries institutional arrangements that affect firms' and workers' choices between formal and informal sectors and the wage dispersion between them -*e.g.* no unemployment insurance, a labor legislation favoring employment protection and an unequal enforcement of this legislation among firms sizes and type of activities.

By virtue of recent modifications to Mexico's questionnaires for quarterly employment surveys, it is possible to count, from 2005 onwards, with information that captures determinants of unemployment length, among them some specific to develop-

ing countries environments, namely if unemployed individual received job separation lump-sum payments associated to their job separation or if another member of the household has a job.

We analyze unemployment duration determinants of individuals that were without job, but looking for one during the first quarters of 2005, 2006 and 2007. Our data set has information obtained with a quarterly employment survey that is a rotating panel of workers which substitutes 20 percent of interviewed persons each quarter. This implies that we effectively include three cohorts of unemployed individuals in our analysis and that each of them belongs to years with different GDP growth rates. This offers the additional advantage of enabling us to assess questions related to economic cycles and unemployment dynamics. The year 2006 was of economic expansion, its real rate of growth was twice the corresponding figures for 2005 and 2007. We can therefore assess empirically if hazards out of unemployment increase (and if hazard out to not participation status decrease) with the upswing of the economic cycle. Other questions addressed in this paper are: according to the job statuses to which they end up after their employment search, how long do groups with different education and age groups survive in the unemployment pool? Do workers laid off from their previous job take longer to find a job and how do individuals' duration in unemployment and job status destination are related to having been a formal worker in their previous job? We also consider effectiveness of different search

methods in finding formal and informal jobs in developing countries (Márquez *et. al.* 2004, Woltermann, S. 2003, Calvo Armengo and Ioannides, 2005) and the extent to which counting with a "financial cushion" provided by a lump-sum payment for separation from his previous employment allows workers to look longer for a job with desired characteristics, relative to those that do not count with one.

Job search models and related frameworks for labor market analysis have put forward a number of reasons suggesting that a job-seeker's *criterion* for accepting a job changes with the duration of unemployment (*Cfr.* Van den Berg, 1990), but this kind of non-stationary implications of their models have not been extended yet to an environment with formal and informal jobs. In turn, studies that have addressed the controversy of whether labor markets are segmented in developing countries have focussed on relative wages between formal and informal job status for individuals with same observed characteristics (Magnac 1991, Arias and Khamis, 2007). They focus on the question of why do ostensibly homogenous unemployed individuals end up working at different job status? None of them, however, has ventured related *hypotheses* about search intensities for formal and informal jobs, or if discouragement on the searching behavior for formal employment might reflect a behavioral response of job seekers, in turn reflecting labour market segmentation.

The prior theoretical hypothesis of this paper must, by the nature of the questions addressed here, come from a nonstationary environment framework. For example,

two non-stationary *hypotheses* related to changes in job-seeker's *criterium* with the duration of unemployment are a) that the reservation wage of a person entering unemployment is not necessarily equal to his reservation wage after a number of weeks of unsuccessful search for a job or b) that there is a 'systematic search' where individuals first look at the locations that are best according to a prior, and if those are unsuccessful, they proceed to other locations, typically lowering their reservation wage along the way (Rogerson *et. al.* 2004).

This last hypothesis help us understanding one of the results of this paper. This is that unemployed individuals that were formal workers require more time to find an informal job than individuals with similar characteristics, but that were informal in their last job. This result is consistent with the contention that a subset of workers displaced from the formal sector fails to obtain acceptable job proposals from employers in the formal sector; as time passes by, these workers face a trade-off between reducing their reservation wage for a formal job while continue searching for their preferred job status or starting to look for an informal job. They opt for searching in the informal segment of the job market because their subjective probability of getting a job offer there is higher. This is in contrast to hypotheses derived from frameworks in which formal and informal segments of the labor market are integrated -e.g. Maloney, 1999. These last ones would posit that workers that have worked in the formal sector accept an informal job because a wage premium over what they could expect

earning in a formal job is offered to them.

To show that formal job seekers that become informal employees do not earn more than what they would have earned if they had remained in the formal sector, we proceed to explicitly test the hypothesis. For this purpose, we use statistical matching methods to 'pair' individuals with similar characteristics whose previous job was in the formal sector. With this procedure we have two groups which are not statistically different from each other. One of them is composed by those that find jobs in the formal sector and the other one those that become informal employees. A matching procedure is conducted along similar lines of the study by Pratap and Quintin (2006) to obtain counterfactual earnings that would have been paid to workers that became informal employees, if they had instead remain in the formal sector.

This paper is structured in seven sections, in addition to this introduction. Section 2 briefly discusses relevant theoretical developments as a background for our empirical work. Section 3 describes the main features of Mexican labor market and Section 4 the data set. Section 5, in turn, presents the statistical model applied to workers displaced from a job that go through an unemployment spell before incorporating again into another job. This is based on methods to analyze time-to-event data (survival analysis models or competing risks hazard functions) to estimate determinants of exit duration out of unemployment to four different and mutually exclusive destinations: formal and informal paid jobs, self employment and out of the labour force. Section

6, discusses the empirical results and Section 7 presents concluding remarks.

## 2 Theoretical background

The models aiming to understand why some workers in developing countries are employed in the formal sector, while others have informal jobs are commonly classified in two groups: on the one hand, those assuming that formal and informal labor markets are integrated and on the other hand those assuming dualism or that labor markets are segmented. In the latter models, "good" jobs (those in the formal sector) are rationed and workers are in the informal sector involuntarily- this is an implication resulting from assuming efficiency wages in the formal sector or barriers to enter into it. That is, in these models, informal workers would like to have a formal job but get no proposals from employers in that sector; this is in spite of the fact that other workers with same potential productivity enjoy a formal job status at a wage they would be willing to accept. By contrast, in the former models, formal and informal labor markets are integrated and an unemployed worker is indifferent between earning a reservation wage at a formal job and this reservation wage plus a compensation or "wage premium" at an informal job. (This differential in wages compensates for non-pecuniary benefits associated to being formal that a worker will not have, if a job is accepted in the informal sector<sup>2</sup>).

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<sup>2</sup> *Viz.* labor legislation rights, access to a bundle of institutional social security services, which include health care, life insurance along with work liability and disability insurance, day care centers

Recently deployed models for understanding labor markets in developing countries have incorporated features that extend the approach initially put forth in Mortsen-Pissaridis, 1994. A main component of them is to explicitly model that it takes time and resources for workers to find appropriate jobs and for firms to find appropriate workers. In these new models (Boeri and Garibaldi, 2006, Albrecht *et. al.*, 2006 and Galiani and Weinschelbaum, 2006), search strategies of workers and employers determine matches in the formal and informal sectors, given exogenously-determined job creation and destruction rates in each sector. Implicit in them is the assumption that, in a stationary environment, formal and informal labor markets are integrated.<sup>3</sup>

For example, in the analysis by Albrecht *et. al.*, 2006, workers' search behaviour takes place in an environment with formal and informal jobs. They derive conditions under which a worker is indifferent between searching for a job in the formal and informal sectors. In their stationary analysis, the inclusion of an assumption of heterogeneity of workers in terms of potential productivity implies that workers whose potential productivity is below a threshold would only be informal job searchers, those above a second threshold only formal job searchers and those whose potential productivity is within these two thresholds would be "switchers" between formal and informal jobs. In their model threshold changes result from exogenous shocks.

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for children and retirement pension and housing funds

<sup>3</sup>That is, as in the case of Khandker 1998, the search model to allows unemployed workers maximize utility rather than income.

None of these models have incorporated elements that would make a non stationary environment scenario more relevant for empirical hypothesis, for example the following ones: search efforts affecting the job arrival rate, as in Ljungqvist and Sargent (1998); search strategies -and not only reservation wages- that change as unemployment time passes; depletion of resources to finance their search or searching cost that increase as the worker fails to obtain an acceptable offer from his closest and better known potential working places.

Our study also assesses effectiveness of different search methods in finding formal and informal jobs, a topic previously addressed for developing countries by Márquez *et. al.* 2004, Woltermann, S. 2003 and Calvo Armengo and Ioannides, 2005.

### **3 Unemployment and Informality in Mexico**

An unemployed is defined as an individual without job but looking for one; individuals without job and not looking for one are identified as being out of the labor force. Relative to figures in developed countries, open unemployment rates in Mexico are low. Lack of unemployment insurance and very low levels of workers' savings make unemployment unaffordable for most participants in the labor market. By contrast, the share of informal salaried workers and of the self-employed in the Mexican urban labor force (around 28 and 30 percent, respectively) is relatively large for a middle-income emerging economy.

Formal workers have access to a bundle of institutional social security services, which they partly finance with payroll taxes. These services include health care, life insurance along with work liability and disability insurance and retirement pension.<sup>4</sup> Non-wage costs of formal jobs (taxes, non-wage costs and administrative procedures), often seen as a major cause of a large informal sector, can represent up to 30% the wage bill.

In this paper, a formal employee is therefore defined as a wage-earning person registered in public social security agencies or in retirement pension fund agencies. Informal salaried employees, in turn, are defined as employees not registered in them, while the self-employed are non-wage earners working on their own (including business owners with less than three employees).

Mexico shares with many developing countries a labor code that fixes job separation severance payments. The severance payment is equivalent to three months' pay plus 20 days of salary per year of service. If the employee has remained with the same employer for 15 years, he/she will not receive a seniority premium. To help unemployed job searchers Mexico has programs providing them a lump-sum financial help and employment agency services.

The majority of informal salaried employees works in informal firms, which tend to be small in size; the remainder may have a working relationship with a formal

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<sup>4</sup>In Mexico there is an official agency in charge of operating housing funds for formal employees.

firm that fails to register all of their workers in the social security agency and evades other obligations that it should be meeting by law. Informal salaried workers cannot exercise their labor rights because they are unable to offer evidence of a working relationship with their employers and have no access to health care services or pension and housing funds administered by the government for formal workers.

Figures obtained from household surveys for 12 Latin American countries, in which the existence or absence of social security contributions is registered for each employee in the sample, indicate that the degree of formalization of salaried workers in Mexico is below average. In contrast to Chile, Uruguay, Brazil and Argentina, where more than half of salaried workers hold formal jobs, only 42 percent of employees in Mexico are formally employed. This figure is slightly above countries with much lower levels of development, such as Peru, Bolivia and Ecuador (Galiani and Weinschelbaum, 2006).

#### **4 The Data**

During many years the Mexican National Institute of Statistics, Geography and Informatics (INEGI) conducted a panel-linked quarterly employment survey (ENEU). This survey did not lend itself to a formal analysis of unemployment duration and job search strategies. The information concerning precise time required for finding a job was unavailable and how unemployed individuals look for a job was also not part

of the information asked to respondents. In the first quarter of 2005, the questionnaire was modified and a more complete employment survey (*Encuesta Nacional de Ocupación y Empleo – ENOE*) has since been conducted.

This new survey is a rotating panel of workers that substitutes 20 percent of interviewed persons each quarter and during the second quarter of each year incorporates additional questions that enable us to measure the effective time required by each worker that found a job, after an unemployment spell. We worked with three sets of two-quarters balanced panel data set. This implies an attrition of 20% of individuals interviewed in the first quarter of each year, namely those that were in their fifth interview (likewise we do not include those incorporated after the first interview of the year).

When individuals are unemployed at the date of their first interview of the year, they are asked for how long have they been searching for a job. During their subsequent interview in the second quarter of that year, they are asked job tenure in their current job. This information is required to measure precise exit time of unemployment for those that found a job before their second interview. In addition, for individuals employed at the time of the first and second interviews of the year, it is possible to identify if they went through an unemployment spell during the second quarter of the year. If they did, it is possible to calculate its duration. This is done by means of two questions of the second quarter's complement of the questionnaire:

their job tenure in current job and when did they left their previous job.

We restrict our analysis to unemployed male workers between 18 and 65 years old. The cohorts correspond to first quarter of 2005, 2006 or 2007 and total initial number of respondents is 6322. For those of them finding a job in a subsequent date, we have not only information regarding time required by each of them to find it, but also what kind of status this job is (formal and informal salaried or self-employment). If they are not employed in subsequent quarters, we have two cases: going out of the labor force and still searching a job. Among other questions they answer if, in their previous job, they had access to a bundle of institutional social security services, partly financed with their payroll taxes. That is, if they had a formal or informal job. They also responded if the reason for leaving that last job was that they were laid off or they left voluntarily.

In Table 1, a transition matrix captures the structure of the dataset. Columns in this table indicate destinations in subsequent quarters and rows classify individuals according to their previous employment job status (their new status in subsequent quarter can be formal or informal employee, self-employed, out of the labor force or if they are still unemployed. In turn, job status in employment before their unemployment spell can be one of two types: formal or informal, including in this latter ones are non-formal wage earners and self-employed). This table shows that while 44% of previous formal workers found a new job in the same status, 26% ended up as

formal employees and 5% as self-employed. Stated differently, out of the totality of unemployed workers that were previously formal and that found a job, 31% of them move to the informal sector.

In Table 2, the distribution of characteristics of respondents, among them age, levels of education achievement, marital status (we grouped them in three: single, married with children under 18 and married with no children or with children older than 18) and if they are located in an urban or rural area, are presented.

For those of them finding a job, how they contacted their new employer is classified in one out of five mutually exclusive categories (if he attended to the establishment; an advertisement for a job in internet, newspaper or radio; if he asked his family or friends to recommend him in a job or to keep him informed about any; if the job was offered to him or if he got it through a government employment service, private employment agency or other similar method). Two variables were constructed in order to capture if unemployed individuals are able to finance a longer job search to obtain a better job match. The first one captures if other adults in the household are working, the second one if they received a lump-sum payment for separation of their previous job.

Individuals are also classified according to length of unemployment at the day of they interviewed in the first quarter of the year. We classified their responses in four categories: less than a month; more than one month but less than two; between two

and four months and more than four months. The distribution of search method and these other variable also represented in Table 2.

TABLE 1 & 2

Graph 1

TABLE 3

Graph 1 and Table 3 show how GDP real levels grew with respect to its level the same quarter one year before. As it is clear from this graph, the year 2006 captures an economic expansion. Specially during the first quarter of the year, GDP grew twice as fast as the rate of growth of the first quarters of 2005 and 2007.

TABLE 4

Time of unemployment spells (length of unemployment at the day of they interviewed in the first quarter of the year plus additional weeks required to exit unemployment) of individuals in our data sets is represented in Table 4. Our interest is in how quickly individuals escape unemployment, which is implicitly given by the evolution of survival rates over time in this state. One way to visualize this is by means of the so-called 'Kaplan Meir estimator' of the survivors. It is an actuarial non-parametric estimator commonly used in the elaboration of life tables by demographers. It represents the exits out of unemployment state as a percentage of individuals "at risk", as part of this latter subset it incorporates information provided by those that remain

in unemployment at the time of the last interview and are identified as "right-hand censored data" (Kiefer 1998)

## 5 Statistical Models for Survival Analysis

### 5.1 Hazard functions

The point of departure of survival analysis is the definition of a non-negative continuous random variable  $T$ , which represents the spell duration (duration of unemployment) with a density function  $f(t)$  and a cumulative distribution function,  $F(t)$ . This latter one is defined as the probability that an unemployment spell lasts less than  $t$  units of time. The survival function,  $S(t)$ , equal to  $1 - F(t)$ , is defined as the probability that the unemployment spell will equal or exceed a period of length  $t$ :

$$S(t) = \Pr(T \geq t) \tag{1}$$

For any specification of  $t$  in terms of a density function, there is a mathematically equivalent hazard function,  $h(t)$ , which is the conditional density of  $T$  given  $T > t > 0$ ; *viz*:

$$h(t) = \left( \frac{f(t)}{1 - F(t)} \right) \tag{2}$$

In this relationship,  $h(t)$  may be interpreted, for an individual, as an exit rate or escape rate from unemployment, because it is the limit (as  $\Delta t$  tends to zero) of the probability that a spell terminates in interval  $(t, t + \Delta t)$ , given that the spell

has lasted  $t$  periods. Notice that the hazard can alternatively be expressed as the logarithm change of the survival function and, conversely, that the hazard function allows us to estimate the survival function by:

$$S(t) = \exp\left[-\int_0^t h_u du\right] \quad (3)$$

**5.1.1 Censored data** If we exclude individuals with unfinished spells from our estimations, we throw away part of the data set and introduce a serious bias against people with longer spells in unemployment. Censored survival times correspond to individuals that started a spell of unemployment and are still in the same status when they are last interviewed. Hazard functions have the distinct advantage of being able to handle censored data effectively in their estimations.<sup>5</sup>

## 5.2 Competing risks specification

A competing risks specification of hazard functions is required for the case in which there is only one unemployment duration spell, but more than one possible destination out of unemployment (Van den Berg, 2001). To specify them, let there be  $M$  possible job status destination out of unemployment. For example in the case analyzed in next section, a person who is unemployed can find a job as a formal or informal employee, become self-employed or go out of the labor force. Then, there are  $M$

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<sup>5</sup>These would constitute a problem for a standard regression model where the dependent variable was the length of the spell.

random variables,  $t_{uj}$ , associated with each state, where  $M$  is the set of possible destinations, indexed by  $m$ . That is, when an individual is unemployed there are  $M$  "latent exit times", where  $f_{um}(t_{uj})$  is the density function of exit times from unemployment into state  $j$ .

$$h_{um}(t_{uj}) = f_{um}(t_{uj}) / \exp\left[-\int_{t_{uj0}} h_{um}(u) du\right] \quad (j = 1, \dots, M; \quad j \neq u)$$

An individual exits from state  $u$  to state  $j$  if the  $j$ 'th first passage time is the smallest of the  $M$  potential first passages of times, *i.e.*, if:

$$t_{uj} = \text{Min}\{t_{um} | m \in M\}$$

Total of survivals in  $t$ , that leave unemployment is the sum on  $m$  of those who leave this state in order to go to the destiny  $m$ . In formula with  $h_{um}(t_{uj})$  defined as the associated hazard function or failure rate to a specific destiny, we have:

$$h(t) = \sum_{m=1}^M h_{um}(t_{uj}) \quad (j = 1, \dots, M; \quad j \neq u)$$

where the hazard function conditional on survival up to time  $t$  is given by:

$$h_{um}(t_{uj}) = f_{um}(t_{uj}) / \exp\left[-\int_{t_{uj0}} h_{um}(u) du\right] \quad (j = 1, \dots, M; \quad j \neq u)$$

**5.2.1 Censored data** As part of the censored data set, in the estimations presented in the following section we include departures to a different state than the

estimated hazard. This procedure is valid on to estimate competing risks hazard functions on the assumption that unobserved determinants of the transition rates to the possible destinations are mutually independent.<sup>6</sup>

### 5.3 Hazard function specifications

For estimation purposes, in the following section we work with ‘mixed proportional hazard’ specifications -also called Cox proportional hazards- as functions of individual’s observed co-variates and year and location specific dummies. This type of specification has two parts: a ‘baseline’ hazard (which captures time dependence in a common way to all individuals) and a ‘systematic part’. This latter takes form of an exponential function and depends on a number of observed co-variates,  $X$ . Thus, the hazard rate is multiplicative in all the separate elements of the covariates:

$$h_{um}(t_{um}) = h(t; x) = h_0(t) \exp(\beta' x) \quad (j = 1, \dots, M; \quad j \neq u) \quad (4)$$

where  $x$  is the vector of measured explanatory variables for the  $i$ th individual and  $\beta$  is the vector of unknown regression parameters associated with the explanatory variables (this vector is assumed to be the same for all individuals). The parameters in  $\beta$  are estimated with maximum likelihood methods, which accounts for censored survival times. The baseline hazard,  $h_0(t)$ , captures the common hazard among indi-

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<sup>6</sup>If this assumption does not apply, the right-censored is dependent, and a more elaborate estimation is required. *Cfr.* Heckman and Singer (1985).

viduals in the population. The hazard ratios, computed by calculating the exponential of the parameter coefficients, are useful in interpreting the results. If the hazard ratio of a prognostic factor is larger than 1, an increment in the factor increases the hazard rate. If the hazard ratio is less than 1, an increment in the factor decreases the hazard rate. Because length of time before exiting unemployment refers to one of four mutually exclusive destinations (formal or informal employee, self-employed or out of the labor force) four estimations, each one with an especification given by () are obtained.

In these estimations, length of unemployment in the hazard refers to calendar time after the first interview of the individual (first quarter of corresponding year), hence previous length of unemployment at the day of the interviewed in the first quarter of the year is included as a co-variate.

**5.3.1 Co-variables representing observed determinants** The vector  $x$  of measured explanatory variables for the  $i$ th individual is constituted by a set of dummy variables that equal one if a requirement is fulfilled and zero otherwise. These are defined according to the following groups, which have been previously discussed in section 4.

In our estimations, length of unemployment in the hazard refers to calendar time after the first interview of the individual (first quarter of corresponding year), hence previous length of unemployment at the day of the interviewed in the first quarter of

the year is included as a co-variate. Although different specifications were estimated, in the preferred version, three, out of four, dummy variables were incorporated in the hazard specification. These were more than one month but less than two; between two and four months and more than four months. The dummy omitted was less than a month in unemployment.

Co-variates of our estimated hazard functions are the following dummy variables: five for age (18 to 22, 23 to 28, 29 to 35, 36 to 44 and 45 to 65 years old); four for education (less than secondary school, secondary school, high school and more than high school); three for civil status (single, married with children under 18 and married with children over 18 or no children at home); five for search method (if he attended to the establishment, if he found an advertisement for a job in internet, newspaper or radio; if he asks his family or friends to recommend him in a job or to keep him informed about any, if the job was offered to him, if they attended an employment agency); two for previous job status (formal or either informal employee or selfemployed) and two for reason why last job was left and three dummy variables to control for year to which the cohort belonged. To capture financial resources to search for longer and adequate job we included a dummy equal one if another member of the household is working, zero otherwise and a dummy variable equal one if the individual received a payment associated to separation from his previous job, zero otherwise. Table 2 presented the distribution of these variables.

**5.3.2 Unobserved heterogeneity** In the specification (4), sources of observed heterogeneity are captured with the vector  $x$ , which is constituted by measured explanatory variables. Incorrect results might be obtained if unobserved sources of heterogeneity that are not readily captured by covariates in  $x$ . Bias in the estimation are originated because, on average individuals with relatively high hazard rates for unobserved reasons leave unemployment first, so that samples of survivors are selected. Differences between such samples at different times reflect behavioural differences as well as this selection effect. Hence, if unobserved individual heterogeneity (or ‘frailty’) is important, this must be adequately dealt with.

Following Meyer (1990) and Jenkins (200x) in the specification of unobserved heterogeneity across individuals, in this paper we assume that, if this is present, it is independent of the covariates in  $x$ , that its distribution has a gamma mixture that can be approximated with two points of support and that it enters the hazard function multiplicatively. Hence, we define the random variable  $\Omega_i$  and specified the hazard function as:

$$h_{umm}(t_{um}) = h(t; x, \Omega_i) = h_0(t)\Omega_i \exp(\beta'x) \quad (j = 1, \dots, M; \quad j \neq u) \quad (5)$$

It is important to check if our results are not incorrect because of the presence of unobserved heterogeneity. Most notably, negative duration dependence at the individual level and unobserved heterogeneity both lead to negative duration dependence of the observed hazard rate, but they have different policy implications. Negative dura-

tion dependence implies that emphasis should be put on the prevention of long-term unemployment (usfulness of policies aimed at intervening long before individuals have become long-term unemployed). This type of policy, however, will be inadequate if unobserved heterogeneity is the cause of negative duration dependence of the observed transition rate. In this case, policy should be aimed at screening of newly unemployment.

## **6 Results**

### **6.1 Determinants of job search duration**

Tables 5 and 6 report hazard function results for specifications in (4) and (5) and for different job status destinations. That is for escape rates from unemployment to formal and informal salaried jobs, to self employment and out of the labor force, for specifications assuming no unobserved heterogeneity and for specifications assuming it.

TABLE 5 & 6

#### *time dependency of hazard rates*

Hazard rates to formal and informal salaried jobs and to self employment, as implied by figures in columns 1, 2, and 3 of Table 5 have negative time duration: the

longer they spend searching for a job, the lower their hazard rates are.<sup>7</sup> This could be due to two reasons: unobserved heterogeneity biasing specification results or worker and employers behaviour changing over time (for example, search intensity of workers that decreases with the length of unemployment or job offers arriving less frequently the longer a worker is unemployed because employers may taking the view that too long a period of unemployment sends a bad "signal" or because their productive ability effectively declines).

Comparison of Tables 5 and 6 indicates that negative time duration prevails when unobserved heterogeneity is incorporated as part of the specification. That is, after comparing figures obtained when estimations are based on the model in (5) (which incorporates unobserved sources of heterogeneity that are not readily captured by covariates in  $x$ ) with those obtain in (4) (which does not incorporate them), we reject the hypothesis that negative time duration is attributed to unobserved heterogeneity biasing specification results and cannot reject the one positing that it is attributed to negative duration dependence at the individual level. This highlights usefulness of policies aimed at intervening long before individuals have become long-term unemployed.

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<sup>7</sup>Table 8, relegated to the appendix, presents previous length in unemployment in an alternative way. Instead of introducing this co-variate as dummy variables; it is introduced in units of two weeks, its squared value and its value at the third power. Results were not substantially different than those in Table 5.

*hazard rates and economic cycle*

Results are consistent with the contention that during years in which GDP growth accelerates, formal job offers arrive faster to unemployed workers. As shown in Table 4, relative to corresponding rates in 2005 and 2007 -which are the years with slow growth- the average of GDP growth rates during the first two quarters of 2006 is almost twice as fast. In turn, the last two rows of the first column of Table 5 implies that workers' escape rate from unemployment to formal jobs was, in 2006, 16% higher than that of 2005 and 2006.<sup>8</sup>

Conversely, results in the fourth column of table 5 state that during periods of economic expansion, individuals search for longer before opting out of the labor market: as it is apparent in the last two rows of the third column of Table 5, in the years of slow economic growth unemployed individuals go faster to the non-participation state (the counterpart of high hazard rates to the non-participation state is longer spells of job search).

The result associated to exits to formal employment is consistent with suggestions that public funding to active labor market intermediation in this segment of the market should be countercyclical: As the economy slows down more time is required by individuals to find a formal job offering them an acceptable wage. A related remark is

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<sup>8</sup>Results also indicate that exit rates to informal employment and self-employment are not statistically significantly related to the dummy variables representing years with different rates of growth of GDP.

valid for individuals opting out of the labor force: net gains for potential participants in training programs target at the unemployed are larger, since opportunity costs for individuals to be in the labor market during that phase of the cycle are lower.

*hazard rates and search methods*

Those searching a formal job *via* newspapers, radio and internet escape unemployment faster than those relying on their social and family networks. It is not surprising that these two search methods are relatively more efficient than attending to the establishment directly (factory, shop, plant, etc). However it is surprising that these methods are relatively more efficient than searching a job via the government employment service, by a governmental program of temporary job or in a private employment agency.

This result suggests that, in Mexico, these intermediation services must be subject to revision and improvement. They might help individuals in finding a job, but not in finding one faster.<sup>9</sup>

In turn, as expected (Calvó Armengol and Ioannides 2005), those relying on family and social networks to be informally employed escape faster than those having to search via different methods.

*age, education and hazard rates*

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<sup>9</sup>A different interpretation is also possible, namely that the result is not because of the efficiency of the search method, but because of a self-selection of individuals with low potential productivity for this method.

As shown in the fourth row of columns 1 and 2, relative to younger persons, individuals take longer to be employed when their age is between 44 and 65 years old.<sup>10</sup> Moreover, in the case of exits to formal jobs, individuals with less than secondary education have longer unemployment spells. These results would not contradict *hypotheses* stating that formal firms tend to replace expensive older workers with more educated younger workers willing to accept lower wages.

In turn, the fourth column of table 5 indicates which individuals are more likely to decide to take outside opportunities if the labor market is not attractive enough. The first ones to get discouraged of the possibility of receiving an acceptable job offer are youngsters under 23 years old and senior workers over 44 indicate. By contrast, individuals over 36 years old spend less time in unemployment before starting to work as self-employed.

We focus our attention now on how education levels affects unemployment duration according to different job status destinations. From figures in the fifth row of columns 1 and 2 of Table 5, follows that, relative to individuals with less than secondary school, those of them who achieved this level require 30% less time to find formal jobs and 17% less time to become informal employees. That is, it is apparent

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<sup>10</sup>For unemployed individuals older than 44 years old

A distinguished feature of labor Mexican legislation may jeopardize their prospects of exiting unemployment. This is that, once in a job, there is no age for retirement and hence, if layoff they have to be indemnized.

that, those with levels below secondary education (corresponding to the omitted dummy variable in the estimated hazard) become informal employees faster than more educated unemployed workers. By contrast, and also relative to the rest, individuals with low education levels require longer job search spells for formal jobs.

These results can be related to two contentions. The first one, that in economies with high non-wage costs of formal jobs, as it is the case of the Mexican, formal employers will be willing to incur them if they are able to transfer them to workers in the form of lower salaries. The second one, that heterogeneity of workers skills affect the types of jobs firms create.

Workers at the bottom of the payment scale -those with less education- might have less preference for social benefits cost to be transferred to them. That is, they might be less willing or less likely to be able than more educated workers to afford to pay for the benefits associated with formality: at low levels of income, their discount rates are so high that the perceived benefits do not match the cost of giving up actual levels of consumption. In turn, formal job offer rates for them are low because most firms requiring workers with low levels of skills self-select into the informal sector. That is, into the sector in which the relative less productive jobs can be created only if it is possible to escape specific labor costs associated to formality.

*signalling*

In contrast to what happens in the search for informal jobs, workers who leave their previous job voluntarily become formal employees faster than than workers who left it involuntarily. This suggest that job dismissals do not constitute an adverse signalling in informal jobs, whereas for formal jobs they are. They might suggest to potential employers that, relative to workers who voluntarily left their previous job, their productivity is lower.

*escaping to formal jobs*

Regarding determinants of duration in unemployment for those that find a formal job, from the first column of table 5 it is possible to infer profiles of individuals requiring shortest searching time. These are individuals located in urban areas, that enter unemployment for a reason different than being laid off, that are formal workers in their last job, younger than 44 years old, with secondary education or more and that contact their new employer *via* newspaper, radio or internet. In addition, it also states that relative to single workers, married ones with children cannot afford to look as long for a suitable job or that, alternatively these latter ones receive more wage offers.

Finally as it follows from row 18, when a person with these characteristics has no resources provided by a lump-sum payment for job separation from his previous employment, he is employed faster. This is because, relative to those that count with a "financial cushion" to finance their job search, they cannot look for so long a job

with desired characteristics.

*escaping to selfemployment*

Becoming self-employed requires financial capital and job experience. This could explain why, in the third column of Table 5, young unemployed individuals take longer to become self employed and why human capital captured by education level and being between 23 and 44 years old, helps them find a job faster.

An interesting result is related to the statistical significance of the variable that captures that the individual is not the only person in the household earning an income. If another member of the household works as well, individuals take longer to exit from unemployment to self-employment.

*escaping to non-participation*

Figures in Table 1 indicate that a non-negligible share of job seekers opt out of the labor market in Mexico and that the share is larger for those whose previous employment was informal. This stylized fact has been previously pointed out – for Mexico and other Latin American countries- by Pages *et al* 2000x. These authors estimated determinants of the likelihood of these transitions. Our approach differs from them in that it estimates instead how long it takes to those in unemployment to lose hope of finding a job; our results allows us to state that, workers whose previous job was informal search for a shorter period before moving out of the labor force. and to quantify how much longer a worker with a previous formal job experience will

persist in his search for a job.

## **6.2 Escaping to informal salaried jobs and the controversy of labor market segmentation**

In the previous subsection a difference in behaviour between ostensibly homogenous unemployed individuals, that only differ in their previous job status, was highlighted. This was regarding their persistence in searching for an acceptable job, before moving out of the labor force: relative to those whose previous experience is in an informal job, individuals whose job experience before transiting to unemployment is the formal sector search jobs for longer. Why would the latter do not opt out to non participation in the labor force as quickly as the former do? One answer to this question could be that they have higher expectations of receiving an acceptable job offer because they signal to prospective employers a higher potential productivity.

Another implication of signalling to prospective employers a higher potential productivity would be that a previously formal worker is expected to exit unemployment faster than a similar worker whose previous job was informal. Our results indicate that, controlling for other determinants of unemployment duration, this is indeed the case of hazards out to formal employment, but not out to informal salaried jobs.<sup>11</sup>

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<sup>11</sup>Informal workers that search for informal employment are more likely to rely on social and family networks as a job search method, the majority of them are without a 'financial cushion' to smooth their consumption and to search for an adequate job match (lump sum payments from

Figures in rows corresponding to previous job status in columns 1 and 2 in Table 5 indicate a) that relative to those who were previously formal, those that were in an informal job status require longer search periods to find a formal job; b) that those that were formal workers in their last job require more time to find an informal job than individuals with similar characteristics, but that were informal in their last job. That is, that relative to those that remain informal workers, those changing from formal to informal job status took longer to find their job. Why would a previously formal worker take longer to find an informal job than an individual with the same observed characteristics, except that he was informal employee before entering unemployment?<sup>12</sup>

*Unsegmented labor markets*

A first hypothesis, of why this occurs, is along the lines of reasoning implicit in frameworks suggesting integrated formal and informal labor markets. Workers shifted voluntarily their job status because a compensating wage premium above formal wages was offered to them. They might take longer to find a job, because previous job separation). These two variables, whose effect is controlled for, imply that individuals escape unemployment faster to informal jobs.

<sup>12</sup>An alternative answer, is that the effect of the work experience might be different and could depend on the sector in which the worker has been occupied (Woltermann, 2004). That is, while formal job experience is required for formal jobs, informal job experience is preferred for informal jobs.

their knowledge of informal labor market conditions is not as good as that of workers that were there before their unemployment spell.

Table 7 compares two groups' average discrepancies in hourly salaries. On the one hand, unemployed workers that are formal in both, their previous and their new job status and the other hand, formal workers changing status to informal employment after an unemployment spell. A statistical test rejects the hypothesis of a wage premium in moving from the formal to the informal sector after an unemployment spell.

As opposed to what happens with workers with similar characteristics that, after their unemployment spell remain formal, individuals that were formal in their previous jobs are worst off in terms of salary if their new job status is informal employment. The counterfactual estimates of hourly earnings if job status switchers had remain formal were obtained by means of kernel matching methods, whose specification is relegated to the appendix. These use propensity score based on the probit models, also relegated there.

#### *segmented labor markets*

Another hypothesis to address the question of why would a previously formal worker take longer to find an informal job than an individual with the same observed characteristics, except that he was informal employee before entering unemployment? is the following one: in an attempt to remain formal, workers firstly look for jobs

in this sector but their search intensity decreases with the length of unemployment period, as they fail to receive an acceptable job offer; after some threshold, search intensity for an informal job increases.<sup>13</sup> This hypothesis states that informal sector is not their first choice and due to information asymmetries and wage inflexibility -or as a result of labor segmentation due to entry barriers- they opt for an informal job status. Total period spent in unemployment is longer for them, relative to workers whose previous job was informal. However, once search time for formal job is subtracted, time required to find an informal job might be shorter, since they can signal to prospective employers a higher potential productivity.<sup>14</sup>

This interpretation is not contrary to the *hypotheses* that states that formal em-

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<sup>13</sup>Results from studies for economies with no informal labor markets that counted with information on effective time spent on job search activities and intensity of them, suggest that search intensity decreases with the length of unemployment period (Barron and Gilley, 1979). Our hypothesis could be consider an extension of this line of reasoning.

<sup>14</sup> A complementary explanation of why

they take longer to move out of the labor force is that unemployed workers with formal experience firstly search for employment in the same sector; if, after some period they do not find it, they search for an informal job. Only after individuals with formal job experience realize that also in the informal segment of the market the likelihood of receiving an acceptable job offer is low, they opt out to non-participation in the labor market. Hence searching in two, as opposed to only one sector, is more time consuming.

ployers may take the view that too long a period of unemployment sends a bad "signal" about their potential skills or that workers' productive ability effectively declines. Hence, the dominant strategy of discouraged unemployed individuals is, after some time, instead of continue searching for a formal job, concentrate on searching for informal employment.<sup>15</sup> .

In order to formally address this and other *hypotheses* about search intensity in formal and informal jobs, one would require that employment surveys capture related information. With a more complete information set about search behaviour one could answer if workers search simultaneously for formal and informal jobs or if do they do so sequentially;<sup>16</sup> if it is the case that their search is sequential, is it after being discouraged of their preferred job status, that previously formal workers start searching for an informal job?

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<sup>15</sup>A related explanation could be suggested for young unemployed individuals that become self-employed. Relative to older workers with more working experience it takes them longer to become self-employed because that this was not their preferred job status. They initially spent time looking for salaried employment.

<sup>16</sup>One would like to have answers to the question: given that your new job is as informal employee, did you also searched for a formal job. If so, for how long? With this additional information, a multi-spell variation of a hazard function could be applied, as in in Van den Berg 2001 and Calderón-Madrid and Trejo, 2002. In this framework searching for a formal job and searching for an informal job can be estimated as different spells that occur one after the other.

## 7 Concluding Remarks

How to help individuals escape unemployment is not the only concern in the design of active labor market policies in developing countries

Since it takes time and resources for workers to employment and for firms to find appropriate workers, another concern is how to help them to find appropriate jobs. Moreover, in view of imperfect information problems and segmentation that prevail in these countries' labor markets, another concern is how to avoid workers ending up in non-preferred job status or in informal jobs that are less preferred than formal ones. In this paper, we presented empirical evidence of unemployed individuals' job searching behaviour in Mexico. We worked with individuals' unemployment spells and their duration determinants for different job status exit destinations.

Our results are consistent with the contention that a subset of workers displaced from the formal sector fails to obtain job proposals from employers in the formal sector. As time passes, they face a trade-off between reducing their reservation wage for a formal job while continuing their search for their preferred job status or starting to look for an informal job, knowing that there might not be a wage premium over what they could be earning in a formal job, but that the informal sector implies a higher probability of getting a job offer.

A number of implications for an improvement in the design of active labor market programs can be derived from this study. Public funding to active labor market

programs in the formal segment of the market should be countercyclical: as the economy slows down, more time is required by individuals to find a formal job offering them an acceptable wage. A related remark is valid for individuals opting out of the labor force: net gains for potential participants in training programs target at the unemployed are larger, since opportunity costs for individuals to be in the labor market during that phase of the cycle are lower. In turn, a search for employment in Mexico, via the government employment service, a public program of temporary job or a private employment agency might help individuals find a job, but not to find it faster than it is the case via other methods (they escape unemployment faster searching for a formal job via newspapers, radio and internet and for informal employment via social and family networks). This suggest room for improvement of effectiveness of active labor market intermediation.

Due to the lack of information regarding how individuals search between formal and informal jobs only indirect inference was advanced regarding how desirable the informal sector resulted for some of them. A stylized fact of the cohorts of unemployed workers was that one out of three individuals that found a job as informal employee was a formal worker before his unemployment spell. We estimated how does time to become informal salaried worker by individuals in this set compares to time required by similar individuals, but with a history of a previous informal job. We found the job search time required for the former was longer that for the latter.

To obtain this result, we relied on time-to-event statistical methods that allowed us to control for effects attributed to social networks and other search methods, for financial resources provided by previous job separation and for other determinants of unemployed durations. A formal test was conducted to reject the hypothesis of switching job sector because wages in informal sector were higher for them. Based on a counterfactual estimate of earnings of what would have happened to them if they have remained formal after their unemployment spell, we rejected the hypothesis of mobility induced by wage compensation.

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## **8 Appendix**

### **Kernel Matching Estimator**

The kernel matching estimator of the average discrepancy in earnings of these

sets,  $\tau^K$ , is given by:

$$\tau^K = \frac{1}{NT} \sum_{i \in T} \left\{ Y_i^T - \frac{\sum_{j \in C} Y_j^C G\left(\frac{p_j - p_i}{h_n}\right)}{\sum_{k \in C} G\left(\frac{p_k - p_i}{h_n}\right)} \right\} \quad (6)$$

where  $G$  is a kernel function and  $h_n$  is a bandwidth parameter, the number of units in the movers group is denoted by  $N^T$  and  $p_i$  is the propensity score of the individual  $i$ . Under standard conditions on the bandwidth and kernel,

$$\frac{\sum_{j \in C} Y_j^C G\left(\frac{p_j - p_i}{h_n}\right)}{\sum_{k \in C} G\left(\frac{p_k - p_i}{h_n}\right)} \quad (7)$$

is a consistent estimator of the counterfactual outcome we are interested in estimating.

The standard errors for statistical testing are obtained by bootstrap.

**TABLE 1**  
**Unemployed male during the first quarter of each year.**  
**Transition matrix**

	<b>Job status in new employment after unemployment spell</b>					<b>Number of Observations</b>
	<b>Formal</b>	<b>Informal</b>	<b>Self- employment</b>	<b>Out of the labor force</b>	<b>Remained unemployed</b>	
<b>TOTAL</b>	1551	2856	359	745	811	6,322
Job status in previous employment before unemployment spell:						
Formal	44.75%	26.05%	5.36%	6.70%	17.15%	1,866
Informal or Self-employment	16.07%	53.19%	5.81%	13.91%	11.02%	4,456
<b>2005</b>						
Job status in previous employment before unemployment spell:						
Formal	40.67%	27.39%	5.21%	6.22%	20.50%	595
Informal or Self-employment	16.03%	51.69%	6.67%	14.38%	11.24%	1,335
<b>2006</b>						
Job status in previous employment before unemployment spell:						
Formal	48.66%	25.83%	3.94%	6.46%	15.12%	635
Informal or Self-employment	16.27%	55.55%	5.93%	12.11%	10.15%	1,586
<b>2007</b>						
Job status in previous employment before unemployment spell:						
Formal	44.65%	25.00%	6.92%	7.39%	16.04%	636
Informal or Self-employment	15.90%	52.05%	4.95%	15.37%	11.73%	1,535

The rows sum 100%

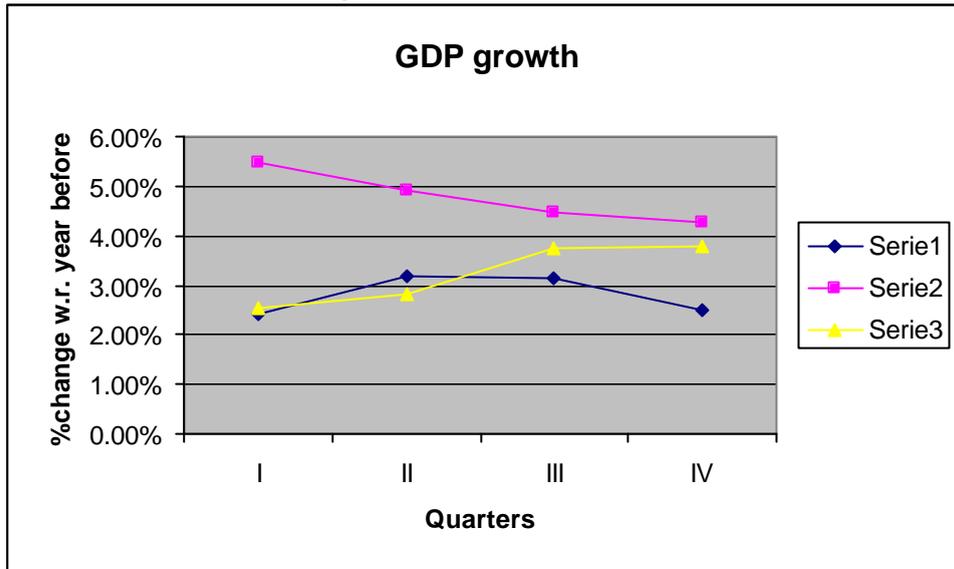
**TABLE 2**  
**Unemployed male workers**  
**Descriptive statistics**

	Remained unemployed	Formal salaried	Informal salaried	Self- employment	Out of labor force
Age					
18 to 22 years old	21.58%	26.95%	22.76%	7.80%	36.78%
23 to 28 years old	26.76%	26.43%	20.17%	17.55%	19.46%
29 to 35 years old	15.41%	20.89%	20.48%	21.17%	8.05%
36 to 44 years old	16.15%	14.44%	18.03%	26.18%	7.65%
45 to 65 years old	20.10%	11.28%	18.56%	27.30%	28.05%
Education					
Elementary school	12.70%	17.15%	47.69%	33.70%	20.27%
Secondary school	23.43%	38.10%	31.09%	28.13%	23.36%
High school	20.47%	23.15%	11.97%	15.32%	25.50%
More than high school	43.40%	21.60%	9.24%	22.84%	30.87%
Marital status & children					
Single	58.57%	43.39%	34.03%	17.83%	63.76%
Married or head of household & children under 18	20.72%	35.14%	43.84%	56.27%	12.21%
Married or head of household without children or children older than 18	20.72%	21.47%	22.13%	25.91%	24.03%
Worker in the household					
No	27.00%	30.37%	38.31%	48.47%	21.21%
Yes	73.00%	69.63%	61.69%	51.53%	78.79%
Search strategy followed					
Attending to the establishment directly	73.04%	28.24%	27.24%		
By newspaper, radio or internet	10.79%	23.21%	5.57%		
By friends or family members	6.32%	42.23%	48.35%		
Job was offered to you	-	3.68%	17.65%		
Gov. emp. service, private emp. agency and others	9.86%	2.64%	1.19%		
Previous job was formal					
No	60.54%	46.16%	82.98%	72.14%	83.22%
Yes	39.46%	53.84%	17.02%	27.86%	16.78%
Reason why last job was left					
Other	54.99%	68.02%	50.91%	64.62%	83.49%
Lay off	45.01%	31.98%	49.09%	35.38%	16.51%
Urban area					
No	12.95%	14.83%	40.34%	25.91%	13.83%
Yes	87.05%	85.17%	59.66%	74.09%	86.17%
Lump-sum job separation payment					
No	95.07%	96.13%	97.97%	94.43%	87.65%
Yes	4.93%	3.87%	2.03%	5.57%	12.35%
Previous length of unemployment					
0 to 30 days	41.80%	75.24%	84.21%	79.39%	42.82%
More than 30 to 60 days	25.40%	13.93%	8.26%	12.26%	29.80%
More than 60 to 120 days	18.37%	6.90%	5.22%	4.74%	16.91%
More than 120 days	14.43%	3.93%	2.31%	3.62%	10.47%
Number of observations	811	1551	2856	359	745

**TABLE 3**  
**Evolution of real level of GDP**  
**(percentage change with respect to**  
**level the same quarter the previous year)**

Quarter	2005	2006	2007
I	2.42%	5.49%	2.55%
II	3.17%	4.90%	2.80%
III	3.14%	4.47%	3.75%
IV	2.49%	4.27%	3.78%

**GRAPH 1**



**Table 4**  
**Kaplan Meir Tables**  
**unemployed workers**

Interval	Unemployed to employed			
	Total	Deaths	Lost	Survival
4 6 weeks	6322	205	0	0.9676
6 8 weeks	6117	2584	0	0.5588
8 10 weeks	3533	299	0	0.5115
10 12 weeks	3234	738	0	0.3948
12 14 weeks	2496	240	4	0.3568
14 16 weeks	2252	238	283	0.3166
16 18 weeks	1731	147	405	0.2861
18 20 weeks	1179	96	225	0.2604
20 22 weeks	858	44	180	0.2455
22 24 weeks	634	36	111	0.2302
24 26 weeks	487	14	77	0.223
26 28 weeks	396	22	46	0.2098
28 30 weeks	328	9	19	0.2039
30 32 weeks	300	12	30	0.1953
32 34 weeks	258	9	20	0.1882
34 36 weeks	229	9	20	0.1805
36 38 weeks	200	8	5	0.1732
38 40 weeks	187	6	18	0.1674
40 42 weeks	163	3	14	0.1641
42 44 weeks	146	1	8	0.163
44 46 weeks	137	4	12	0.158
46 48 weeks	121	2	7	0.1553
48 50 weeks	112	0	5	0.1553
50 52 weeks	107	2	6	0.1523
52 54 weeks	99	2	6	0.1492
54 56 weeks	91	12	4	0.129
56 58 weeks	75	14	5	0.1041
58 60 weeks	56	0	3	0.1041
60 62 weeks	53	7	2	0.0901
62 64 weeks	44	1	4	0.088
64 66 weeks	39	2	37	0.0794

**TABLE 5**  
**Hazard functions for unemployed male workers**  
**(Cox Proportional Model)**  
**(Time of unemployment after interview in days)**

Variable	Hazard			
	Formal	Informal	Self-employment	Out of the labor force
Age				
23 to 28 years old	1.1221 [0.0778]*	0.9899 [0.0514]	1.9350 [0.4527]***	0.6550 [0.0681]***
29 to 35 years old	1.0788 [0.0860]	0.9351 [0.0524]	2.0554 [0.4930]***	0.5951 [0.0892]***
36 to 44 years old	0.9544 [0.0877]	0.8849 [0.0531]**	2.6592 [0.6338]***	0.5303 [0.0838]***
45 to 65 years old	0.6967 [0.0709]***	0.7509 [0.0461]***	2.3858 [0.5982]***	0.9296 [0.1325]
Education				
Secondary school	1.4742 [0.1107]***	0.8344 [0.0330]***	1.1990 [0.1706]	0.9978 [0.1176]
High school	1.5120 [0.1282]***	0.6536 [0.0388]***	1.2440 [0.2245]	1.0237 [0.1199]
More than high school	1.2166 [0.1083]**	0.4559 [0.0318]***	1.3240 [0.2150]*	0.8981 [0.0967]
Married or head of household & children under 18	1.3244 [0.0968]***	1.2771 [0.0638]***	3.1429 [0.5613]***	0.7242 [0.1033]**
Married or head of household without children or children older than 18	1.2508 [0.0895]***	1.1554 [0.0598]***	2.2905 [0.4228]***	0.9940 [0.1226]
Worker in the household	1.0595 [0.0599]	0.9922 [0.0354]	0.7298 [0.0814]***	1.1119 [0.0962]
Search Method				
By newspaper, radio or internet	3.2566 [0.2370]***	1.3057 [0.1096]***		
By family or friends	2.3504 [0.1510]***	2.4380 [0.1067]***		
They offered you a job	1.1648 [0.1672]	2.7228 [0.1413]***		
Gov. emp. service, private emp. agency and others	1.1023 [0.1851]	0.6405 [0.1135]**		
Previous job was formal & left his previous job voluntary	1.9075 [0.1160]***	0.7214 [0.0458]***	0.8322 [0.1332]	0.6229 [0.0660]***
Previous job was informal & lay off	0.5231 [0.0494]***	1.3534 [0.0506]***	0.7082 [0.0986]**	0.6194 [0.0675]***
Previous job was formal & lay off	1.7946 [0.1187]***	0.7613 [0.0507]***	0.7383 [0.1252]*	0.2596 [0.0466]***
Urban area	1.3761 [0.1004]***	0.8178 [0.0293]***	1.1270 [0.1491]	1.1578 [0.1339]
Lump-sum job separation payment	0.7090 [0.0942]***	0.6747 [0.0846]***	0.7210 [0.1761]	1.8150 [0.2348]***
Previous length of unemployment				
More than 30 to 60 days	0.8342 [0.0652]**	0.6348 [0.0437]***	0.6383 [0.1088]***	1.1137 [0.0950]
More than 60 to 120 days	0.6628 [0.0685]***	0.6819 [0.0578]***	0.3735 [0.0948]***	1.0972 [0.1096]
More than 120 days	0.5386 [0.0717]***	0.4638 [0.0581]***	0.4237 [0.1252]***	0.9631 [0.1119]
Year (2006=1)	1.1637 [0.0702]**	1.0343 [0.0416]	0.9883 [0.1294]	0.8224 [0.0728]**
Year (2007=1)	1.0065 [0.0614]	0.9822 [0.0396]	0.9507 [0.1235]	1.1312 [0.0933]
Controls for Mexican states (dummy variables)				
Observations	6322	6322	6322	6322

Standard errors are in parentheses. One, two and three asterisks indicate significance at the 10%, 5% and 1% significance level respectively.

**TABLE 6**  
**Hazard functions for unemployed male workers**  
**(Cox Model with unobservable heterogeneity)**  
**(Time of unemployment after interview in days)**

Variable	Hazard		
	Formal	Informal	Out of the labor force
Age			
23 to 28 years old	1.2144 [0.1444]	0.8656 [0.0721]*	0.5400 [0.0996]***
29 to 35 years old	1.1173 [0.1521]	0.8179 [0.0779]**	0.5226 [0.1175]***
36 to 44 years old	0.9058 [0.1345]	0.7365 [0.0759]***	0.8317 [0.2027]
45 to 65 years old	0.6566 [0.1044]***	0.5635 [0.0627]***	4.0602 [1.1134]***
Education			
Secondary school	1.9767 [0.2467]***	0.5642 [0.0448]***	1.2407 [0.2287]
High school	2.1535 [0.3026]***	0.4398 [0.0440]***	2.2930 [0.5134]***
More than high school	1.7434 [0.2418]***	0.3204 [0.0340]***	2.2075 [0.4809]***
Married or head of household & children under 18	1.3800 [0.1656]***	1.3925 [0.1170]***	0.1207 [0.0354]***
Married or head of household without children or children older than 18	1.3177 [0.1586]**	1.1134 [0.0921]	0.3123 [0.0710]***
Worker in the household	1.1706 [0.1093]*	0.9619 [0.0594]	1.2460 [0.1840]
Search Method			
By newspaper, radio or internet	7.4060 [1.7990]***	1.2689 [0.1328]**	
By family or friends	2.7572 [0.3252]***	3.8636 [0.3753]***	
They offered you a job	0.9533 [0.1710]	9.1609 [1.8887]***	
Gov. emp. service, private emp. agency and others	1.2089 [0.2692]	0.7234 [0.1390]*	
Previous job was formal & left his previous job voluntary	3.2202 [0.5182]***	0.4863 [0.0438]***	0.3427 [0.0734]***
Previous job was informal & lay off	0.4035 [0.0508]***	1.9553 [0.1596]***	0.2809 [0.0634]***
Previous job was formal & lay off	2.8894 [0.4383]***	0.5749 [0.0530]***	0.0988 [0.0339]***
Urban area	1.7162 [0.1923]***	0.6016 [0.0432]***	1.4231 [0.2312]**
Lump-sum job separation payment	0.6017 [0.1229]**	0.6476 [0.1056]***	8.3758 [3.1015]***
Previous length of unemployment			
More than 30 to 60 days	0.7691 [0.0922]**	0.5912 [0.0521]***	4.0450 [1.0397]***
More than 60 to 120 days	0.5629 [0.0896]***	0.6837 [0.0738]***	3.6436 [0.9590]***

More than 120 days	0.4266 [0.0896]***	0.4592 [0.0697]***	3.7826 [1.1276]***
Year (2006=1)	1.1802 [0.1146]*	0.9787 [0.0655]	0.9216 [0.1372]
Year (2007=1)	0.9613 [0.0958]	0.8651 [0.0594]**	1.4334 [0.2297]**
Controls for Mexican states (dummy variables)	x	x	x
Unobservable Heterogeneity	0.6374 [0.2865]**	-0.7274 [0.2990]**	1.3996 [0.3677]***
Observations	6322	6322	6322

Standard errors are in parentheses. One, two and three asterisks indicate significance at the 10%, 5% and 1% significance level

**TABLE 7**  
**Unemployed male during the first quarter of each year.**  
**Transition from formal to informal jobs**

	<b>KERNEL</b>				
	Treated Formal - Formal	Control Formal - Informal	Difference	S.E.	T-stat
<b>Income Changed Rate</b>					
2005	1.06	0.89	0.16 ***	0.0451	3.66
2006	1.06	0.91	0.15 ***	0.0410	3.56
2007	1.07	0.96	0.11 ***	0.0458	2.43
<b>Time of unemployment (days)</b>					
2005	73.75	73.18	0.57	5.7868	0.10
2006	64.02	63.06	0.96	5.6148	0.17
2007	51.24	61.92	-10.68 *	5.7583	-1.86

Standard errors are in parentheses. One, two and three asterisks indicate significance at the 10%, 5% and 1% significance level respectively. Formal-Informal observations are 242 in 2005, 309 in 2006 and 284 in 2007 and Formal-Formal observations are 163 in 2005, 164 in 2006 and 159 in 2007.

**TABLE 8**  
**Hazard functions for unemployed male workers**  
**(Cox Proportional Model)**  
**(Time of unemployment after interview in two weeks period)**

Variable	Hazard			
	Formal	Informal	Self-employment	Out of the labor force
Age				
23 to 28 years old	1.1154 [0.0724]*	0.9872 [0.0458]	1.9534 [0.4554]***	0.7480 [0.0601]***
29 to 35 years old	1.0865 [0.0819]	0.9615 [0.0470]	2.1330 [0.5069]***	0.7064 [0.0844]***
36 to 44 years old	0.9598 [0.0835]	0.9233 [0.0486]	2.8016 [0.6608]***	0.6689 [0.0860]***
45 to 65 years old	0.7243 [0.0702]***	0.7868 [0.0422]***	2.6008 [0.6449]***	1.1059 [0.1271]
Education				
Secondary school	1.5100 [0.1080]***	0.8466 [0.0287]***	1.2195 [0.1707]	0.9296 [0.0794]
High school	1.5224 [0.1215]***	0.6712 [0.0361]***	1.2928 [0.2310]	1.0404 [0.0892]
More than high school	1.2640 [0.1075]***	0.4840 [0.0316]***	1.4526 [0.2333]**	0.8826 [0.0706]
Married or head of household & children under 18	1.2459 [0.0867]***	1.1952 [0.0525]***	2.7487 [0.4892]***	0.6192 [0.0702]***
Married or head of household without children or children older than 18	1.1998 [0.0823]***	1.0992 [0.0503]**	2.0989 [0.3828]***	0.8328 [0.0803]*
Worker in the household	1.0652 [0.0565]	0.9833 [0.0304]	0.7433 [0.0824]***	1.0907 [0.0756]
Search Method				
By newspaper, radio or internet	3.0628 [0.2097]***	1.2416 [0.0979]***		
By family or friends	2.1973 [0.1350]***	2.2565 [0.0899]***		
They offered you a job	1.0669 [0.1491]	2.4757 [0.1107]***		
Gov. emp. service, private emp. agency and others	1.1026 [0.1769]	0.6620 [0.1139]**		
Previous job was formal	1.8450 [0.1068]***	0.6939 [0.0412]***	0.7834 [0.1233]	0.6751 [0.0583]***
Lay off	0.5110 [0.0479]***	1.2902 [0.0424]***	0.6707 [0.0927]***	0.6229 [0.0573]***
Previous job was formal & Lay off	1.7771 [0.1110]***	0.7388 [0.0466]***	0.7254 [0.1221]*	0.2800 [0.0462]***
Urban area	1.3972 [0.0979]***	0.8416 [0.0255]***	1.1512 [0.1501]	0.9493 [0.0816]
Lump-sum job separation payment	0.6994 [0.0881]***	0.6969 [0.0814]***	0.7748 [0.1864]	1.6878 [0.1469]***
Previous length of unemployment (in two weeks period)	0.9294 [0.0391]*	0.8349 [0.0293]***	0.6998 [0.0694]***	1.0860 [0.0400]**
Previous length of unemployment (in two weeks period) ^ 2	1.0026 [0.0052]	1.0110 [0.0044]**	1.0238 [0.0121]**	0.9924 [0.0040]*
Previous length of unemployment (in two weeks period) ^ 3	1.0000 [0.0002]	0.9998 [0.0001]	0.9996 [0.0003]	1.0002 [0.0001]
Year (2006=1)	1.1444 [0.0654]**	1.0034 [0.0356]	0.9641 [0.1242]	0.9571 [0.0641]
Year (2007=1)	1.0079 [0.0585]	0.9471 [0.0338]	0.9262 [0.1196]	1.1343 [0.0721]**
Controls for Mexican states (dummy variables)				
Observations	6322	6322	6322	6322

Standard errors are in parentheses. One, two and three asterisks indicate significance at the 10%, 5% and 1% significance level respectively.