Unemployment and employment dynamics in the Mexican segmented labor market[*]

Xavier JOUTARD[a]

GREQAM, Université de la Médierranée. Centre de la Vieille Charité, 2 Rue de la Charité 13236, Marseille Cedex 02, France

Luis A. I. SAGAON TEYSSIER[b]

GREQAM, Université de la Médierranée. Centre de la Vieille Charité, 2 Rue de la Charité 13236, Marseille Cedex 02, France

May 2006

Abstract

This paper analyses unemployment and employment (formal and informal sectors) dynamics in the urban Mexican labour market. We use a method to distinguish between the duration dependence effects and unobserved heterogeneity. Cohort effects are added and identified within the dependent concurrent risks model. We consider groups stratified by sex and education level. It turns out that for all groups of unemployed there is nonmonotonous duration dependence. The transitions between sectors show a primacy of the formal sector over the informal one especially for males and the more educated and, some groups holding informal employment show heterogeneous rates of return to unemployment.

JEL Classification: C41, J21, J42, J64, R23

Keywords: Unemployment, Employment, Unemployment duration, Employment duration, Unobserved heterogeneity, Cohort effects, Segmentation

Introduction

Unemployment in Mexico shows very low rates compared to those in other Latin-American countries. Additionally, during 15 years, unemployment rate has slowly improved. One even observes a reduction during the analyzed period. The rate of unemployment passed from 4.4% in first quarter of 1987 to 2.53% in the fourth quarter of 2001: it is quite impervious to both conjuncture variations (except during the 1995 crisis, when the unemployment rate reached 7.4% in the third quarter and remaining around 6% until the third quarter of 1996) and numerous structural changes that occurred during the 80s and 90s (economic opening, privatisations, and economic restructuring). Quite remarkably, the unemployment rate has not reacted more to increasing participation in the labour market during those last years: the labour force increases in Mexico from 2 to 3% annually (Fleck and Sorrentino, (1994)) and whereas most Latin-American countries experienced a decrease in their total employment during the 90s, Mexico has experienced at the same time an increase in the employment participation rate (going from 50.3% in 1990 to 55.1% in 2000). Thus, the urban labour market has increased in 5.8 millions of workers during this period[1].

Compared to the length of unemployment observed in Europe or in the United States, urban unemployment in Mexico shows very short durations: at the beginning of 90s, the mean for unemployment duration in Mexico is 5.7 months for males and 7.2 months for females (Revenga and Riboud (1993)). Manipulating the same surveys, we calculate that the mean for unemployment duration in Mexican urban areas between the third quarter of 1994 and the fourth quarter of 2001 is 5.97 months. We can also note that 50% of those unemployed stay less than 5 months in this state.

One often tries to explain those phenomena as well as the absence of the social cover and unemployment insurance by appealing to the coexistence of two employment segments and, particularly, the presence of a large segment of informal jobs: the informal sector plays an important role in Mexico, representing 44.5%, 52%, and 47.1% of total employment respectively in 1987, 1995 and 2000, and it has been widely developed during the 90s, increasing 4.6% on average between 1988 and 1996 (Hernandez-Laos *et al.* (2000)).

In a traditional explanatory schema, the informal sector would propose the jobs to which individuals having difficulties to find a job in the formal sector have recourse; it would be used in those cases as an adjustment sector, especially when the country goes through a recession, and it would mitigate the conjuncture chocks on the Mexican employment. The price is then less security in employment for weaker wage-earners and the absence of social protection within a labour market where "formal" jobs benefit, for their part, with legislation that provides for minimum wages, syndicates presence, social security, holidays rights, pension and job security. With this dual vision of the labour market, one find the traditional concept of segmentation where two sectors coexist and are opposed, the first providing rationed jobs with high wages and the second supplying secondary jobs following a traditional competitive mechanism.

This traditional conception of labour market segmentation, in the case of Mexico, has nevertheless been questioned by Maloney (1999) ("I argue that the traditional conflation of issues of formality and dualism is probably conceptually inappropriate…") who suggests the

---

[1] Since the 80s, those jobs have been created essentially in the urban areas of the country within the micro-enterprises (Hernandez-Laos *et al.* (2000)). We will refer to Llamas *et al.* (2003) for the employment provisions of the Mexican labour market.

presence of symmetric and competitive formal and informal sectors. In this alternative approach, there are more productive workers in one sector or in another; the informal sector is then chosen by workers obtaining in this sector the most important wage (Heckman and Sedlacek (1985)). The segmentation question is generally tackled by analyzing the employment sector choice determinants and estimating different earning functions: the purpose is then to test the equality of earning functions (Heckman and Sedlacek (1985)), or the adoption of an entrance barrier test (Magnac, 1991). Moreover, Gong and Van Soest (2002), and Navarro-Lozano (2002) suggest and carry out a segmentation test for Mexican labour market from earning functions comparisons, retaining an alternative conception of symmetric and competitive sectors chosen on the basis of comparative advantages.

In this paper, the segmentation question is tackled in a different way, through the explanation that segmentation can justify the very unusual unemployment situation in Mexico: the very weak unemployment rates with brief unemployment durations that are quite insensible to both activity evolution and market mutation (participation increase, restructuring, economic opening,…). Generally, in her traditional conception, market segmentation would generate unemployment and employment dynamics principally distinguished by the following facts:

- Most fragile populations (less qualified, females) would most likely be confronted with the formal sector barriers, making it difficult and, sometimes impossible, for them to find a job in this sector (Dickens and Lang, 1985). Then, these populations would have recourse to the informal sector, the only available part of the labour market.
- If one finds a job in the informal sector, it may mean greater precariousness and a more important mobility: holding a job in the informal sector, one can fall into unemployment while trying to have access to the formal sector.
- On the other hand, obtaining a job in the formal sector would have to discourage the mobility going from formal towards informal (which is in fact either nonexistent or less frequent than mobility in the opposite way).
- The recourse to the informal sector would have to be more massive at the time of crisis: exit rates out of unemployment would have to be more sensitive when it is necessary to hold a job in the informal sector.

From this perspective, carrying out a complete decomposition of both unemployment and employment dynamics within a dualistic market formed by two segments of employment becomes crucial.

Van den Berg and his co-authors have several times analysed unemployment dynamics by way of proportional hazards model applied to aggregated American, English or French data (Abbring, van den Berg and van Ours (2002) ; Van den Berg and van Ours (1994, 1996) ; Van den Berg, van Lomwel, and van Ours (2003)); the interest of this approach is to be able to estimate simultaneously the unobserved heterogeneity and the unemployment duration dependence shapes with a non-parametric specification in both cases. Additionally, while preserving a (quasi) non-parametric specification, different cycle effects are defined: on one hand, a calendar time function interacts with the duration function to take into account the pure conjuncture effects intervening through the episode; on the other hand, cohort effects show the possibility that according to the year of entry into unemployment and to the prevailing conditions in this period, the unemployment inflow composition may be different and formed by job seekers exposed in advantage to longer unemployment durations (that means to weaker exit hazards out of unemployment in the aggregate).

This "non-parametric" approach has recently been extended to the dependent concurrent risks where the exit out of unemployment is decomposed into two states, employment and non-participation (Van den Berg, van Lomwel, and van Ours (2003)).

In our analysis we use this methodology: It becomes natural in the Mexican labour market case and according to the segmentation question to consider two concurrent risks from unemployment: hold a job either in the formal sector or in the informal one. This non-parametric approach of concurrent risks also allows us to identify whether the employment segments can be treated independently in the unemployment duration analysis and thus to contribute to the better description of the importance of each sector in the Mexican labour market; the presence of exit-specific unobserved heterogeneity factors that may be correlated constitute in fact an additional richness in the model. The direction of this duration (in) dependence allows us to know if the unobserved determinants of transition rates depend to each other.

On the methodological plan, we add and identify the cohort effects within the dependent concurrent risks model while keeping the other components of dynamics.

By this decomposition method, we try to describe the exit from unemployment mechanisms differenced according to the employment sector and the mobility processes between sectors as well as the recall into unemployment mechanisms from each employment sector of the Mexican urban market. The sector distinction, particularly their position as well as their specific role in the labour market, would have to be manifested by the different decomposition of the unemployment and employment dynamics, particularly with:

- Different cohort effects and different unemployment (employment) exit-specific duration dependence, and
- On the level of the presence in each sector, by the asymmetric behaviours with different unemployment recall rates and the asymmetric mobility between sectors.

Additionally, analysis will be done on several groups of workers defined according to the gender or education of the individuals.

Concerning the segmentation criterion choice, several definitions have been proposed in the case of the Mexican labour market[2]. Fleck and Sorrentino (1994) show different informal work concepts that respect the ILO directives. A first definition takes into account the domestic employees, the self-employed, and the non-remunerated workers (avoiding a double computation of domestic workers who are at the same time self-employed). A second approach classifies as informal workers those without remuneration and those whose earnings are under the fixed minimum wage. Another definition considers the workers in firms with 5 or fewer workers. Nevertheless, whereas all those definitions about informal work are based on Labour Law normative rules, Levenson and Maloney (1998) classify as informal workers those who do not receive any social security benefit[3]. This informal work definition has often

---

[2] The International Labour Office (ILO) in its XVth conference of 1993 considered several criteria: the essential characteristics of the formal sector are the stability and the safety of the work, guaranteed by normative rules to which this sector is subjected. On the other hand, the work conditions of the informal sector are defective and the mobility opportunities of workers often limited.

[3] One understands by social security benefits those provided by the Social Security Mexican Institute (IMSS), the Institute of Social Security to the service of the state workers (ISSSTE), as well as the Christmas bonuses, the

been used in the analysis of Mexican labour market. Different studies show that the use of one or another definition does not modify considerably the proportions of both formal and informal workers. In his analysis of transitions between sectors Gong (2000) compares the two labour market segments according to three different definitions (also that based on social security benefits) and finds that the transition behaviours are similar. Navarro-Lozano (2002) considers different definitions of informal work and finds that the proportions of workers in both sectors does not change more than 3%, and he uses for his study the definitions based on social security benefits. Similarly, Hernandez-Laos *et al.* (2000) and Calderon-Madrid (2000) use the same definition of informal work. According to different studies, the informal work definition choice does not modify the behaviour of two segments in the analysis of the Mexican urban labour market.

In agreement with the compensatory wage differentials theory, in the Mexican urban labour market, the wages of individuals not covered by SS are higher than those who are covered. That shows that covered individuals give a more important value to the social security benefits. Garro *et al.* (2002) compute the wage differentials between workers covered by the Social Security Mexican Institute (IMSS) and those who are not covered. The authors find in the aggregate that workers give a more important value to the IMSS benefits: Those covered accept relatively lower wages, and the substitution elasticity between workers not covered and those covered by the IMSS is important (2.41). Given that the right to social security is one of the principal implicit characteristics of formal jobs, we consider as informal those jobs in which workers cannot receive any social security benefit.

The remainder of this article is organized in the following way: In section II we detail the model that we estimate in this study. Section III describes the data of the Urban Employment National Survey in which we apply the different models. Then, in section IV we show the results of the econometric estimations and discuss them. Finally, section V shows the implications of the model applied to the Mexican urban labour market data and the conclusions resulting from this analysis.

II. Duration and cycle model on aggregated data in the concurrent risks framework

We estimate an unemployment duration model suggested by Van den Berg *et al.* (2003) that corresponds to the discrete time application of a Mixed Proportional Hazard Model in the concurrent risks framework. This model is an extension of the model proposed by Van den Berg and Van Ours (1996). The exits from unemployment are distinguished according to whether the employment is recovered in the formal or informal sector. However, we take into account other types of transitions: formal towards informal sector or unemployment, and informal towards formal sector or unemployment. This generalization allows the measure of the cycle and dependence effects with respect to the unemployment duration for both types of recovered employment as well as the composition of the origin state inflow (cohort effects). This generalization also allows us to estimate the moments of the joint distribution of spell/exit-specific heterogeneity factors and, finally, the possibility of testing the concurrent risks dependence in a non-parametric specification. The cohort effects are specified after the manner of Abbring *et al.* (2002) as an adaptation to the concurrent risks framework. The individual exit probability from unemployment into formal or informal employment after *t*

---

paid-leaves, participation in the company's benefits, System of Saving for Retirement (SAR), appropriation for housing, particular medical assurance or Health Insurance.

periods, at the date τ and conditionally to the unobserved characteristics synthesized in v is defined by:

$$\theta_r(t|\tau,v_r) = \psi_{1r}(t) \cdot \psi_{2r}(\tau) \cdot \psi_{3r}(\tau-t) \cdot v_r \tag{1}$$

with $(r = Formal, Informal)$, $(r = Informal, Unemployment)$ or $(r = Formal, Unemployment)$

The functions ψ_1, ψ_2 and ψ_3 represent respectively the duration dependence, the cycle effects (calendar time dependence) and the cohort effects. The arguments of these functions are the duration periods t and the calendar time τ where both t and τ are discrete variables measured on the same scale (quarterly) apart from the difference in origin. The functions are positives and uniformly upper bounded. The heterogeneity term v that regroups all unobserved individual factors is invariant across the unemployment episode (formal or informal employment). The distribution of heterogeneity factors will have to be such for all t and τ, $P(0 < \sum_r \theta_r(t|\tau,v_r) < 1) = 1$[4]. The possibility to separate ψ_{3r} allows the control of the seasonal effects and the influence of the inflow composition (Abbring *et al.* (2002)).

Thus, $\psi_{3r} = \exp(\omega_{3r}(z) + \alpha_{3r}(y))$ where z is the season and y is the year for which the coefficient is estimated. In this study, the time is measured quarterly; thus, $z=1,2,3,4$ and $y=1,\ldots,14$.

With the t and τ crossed effects and the presence of calendar time on the exit from unemployment (or the exit from one type of employment), the functions ensure the identification of the moments of v_r distribution.

We obtain the general formula to compute the spell/exit rate from unemployment, with duration t at the calendar time τ taking into account the cohort effects function[5]:

$$\theta_r(t|\tau) = \frac{\psi_{1r}(t) \cdot \psi_{2r}(\tau) \cdot \psi_{3r}(\tau) \cdot E_{v_r v_s}\left[v_r \prod_{i=1}^{t}\left[1-\psi_{1r}(t-i)\cdot\psi_{2r}(\tau-i)\cdot\psi_{3r}(\tau-t)\cdot v_r - \psi_{1s}(t-i)\cdot\psi_{2s}(\tau-i)\cdot\psi_{3s}(\tau-t)\cdot v_s\right]\right]}{E_{v_r v_s}\left[\prod_{i=1}^{t}\left[1-\psi_{1r}(t-i)\cdot\psi_{2r}(\tau-i)\cdot\psi_{3r}(\tau-t)\cdot v_r - \psi_{1s}(t-i)\cdot\psi_{2s}(\tau-i)\cdot\psi_{3s}(\tau-t)\cdot v_s\right]\right]} \tag{2}$$

with $r \neq s$.

---

[4] Complementary assumptions (distribution of v_r does not vary during unemployment, either formal or informal employment, and the function ψ_{2r} does change with τ) will guarantee the non-parametric model identification when cohort effects are not specified. The introduction of the function ψ_{3r} into the concurrent risks framework implies taking into account other additional assumptions: i) function ψ_{3r} acts by way of the shape of the distribution of v_r in the inflow composition; ii) ψ_{2r} and ψ_{3r} are additively separable in seasonal and yearly terms; and iii) the cohorts of the unemployment inflow (formal or informal employment) change with τ. The last assumption ensures that observed duration dependence is different between cohorts and reinforces the unobserved heterogeneity identification.

[5] See Van den Berg *et al.* 2003 for more details on the construction of the general formula.

II.1.2 Functional parameters estimation

The estimation strategy suggested by Van den Berg *et al.* consists in building non-linear regression equations from (the logarithm of) the average exit rate out of the specific-state ratios (unemployment, formal or informal employment) intervening at the same moment but evaluated for the successive durations. The number of equations to be estimated depends then on the number of classes that the data enable us to build. In these equations, the conditional (aggregated) exit probabilities are evaluated in their observable counterparts. Defining $U(t|\tau)$ as the number of unemployed individuals (employed in the formal or informal sector) in the duration class t at the end of the quarter τ, then the exit rate observed in τ across the quarter t is given by

$$\theta_r(t|\tau) = \frac{U(t|\tau-1) - U(t+1|\tau)}{U(t|\tau-1)} P_r(t|\tau)$$

where the second factor represents the part of exits from the initial state towards the specific-sector r for the t-duration episodes concluding at the date τ.

In our study, we have the possibility of observing the exit probability for three duration classes of unemployment. From the general expression (2), we infer the three first for an exit intervening in the date τ. Considering the ratio of the two first average exit rates, we get an expression where the functional parameter measuring the cycle effect intervening in τ disappears. For example, we show the first nonlinear regression for the first (period 0) and second (period 1) quarter of unemployment obtained by transforming this ratio by the logarithm[6]:

$$\ln\left(\frac{\theta_r(1|\tau)}{\theta_r(0|\tau)}\right) = \ln(\eta_{1r}) + \ln\left(\frac{\psi_{3r}(\tau-1)}{\psi_{3r}(\tau)}\right) + \ln\left(\frac{1 - \gamma_{2r}\theta_r(0|\tau-1) - \kappa_{11}\theta_s(0|\tau-1)}{1 - \theta_r(0|\tau-1) - \theta_s(0|\tau-1)}\right) \quad (3)$$

The parameters $\eta_{1r} = \frac{\psi_{1r}(1)}{\psi_{1r}(0)}$ represent the duration dependence pattern for each destination state r: $\eta_{1r} = \frac{\psi_{1r}(1)}{\psi_{1r}(0)}$ .The coefficients $\gamma_{2r} = \frac{\mu_{2r}}{\mu_{1r}^2}$ and $\kappa_{11} = \frac{\mu_{1r1s}}{\mu_{1r}\mu_{1s}}$ (with $r \neq s$) are combination of (crossed) moments of the unobserved heterogeneity distribution. All these parameters are identified with the empiric counterpart of the employment-specific aggregated exit rates. With the proportionality of risk assumption, we observe again the disappearance of the functions measuring the cycle effects. The ratio $\ln\left(\frac{\psi_{3r}(\tau-1)}{\psi_{3r}(\tau)}\right)$ allows the estimation of parameters that represent the seasonal and annual cohort effects: $\omega_{3r}(z)$ and $\alpha_{3r}(y)$. The identification of the latter terms is ensured by the normalisation of

---

[6] Two other nonlinear regression equations can be deduced from the two ratios $\theta_r(2|\tau)/\theta(1|\tau)$, *et* $\theta_r(2|\tau)/\theta(0|\tau)$: they are in appendix 1.

$\omega_{3r}(4) = 0$ and $\dfrac{1}{N}\displaystyle\sum_{y=1}^{Y_N}\alpha_{3r}(y) = 0$. The latter restriction imposes orthogonality of cohort effects on a linear trend Y_N[7].

We add in these regressions additive error terms which represent the specification errors, assumed identically distributed across the equations and across the exit spells/dates. The errors are assumed independent across the exit dates, but these can be correlates between the error terms of the different equations for the same date.

We use the Iterative Seemingly Unrelated Nonlinear Regression (ITSUNR) as technique of estimation[8].

II.1.3 Parameters analysis and specification

It must be noted that such ratios depend on calendar time only in the presence of unobserved heterogeneity: in the case of the first ratio, $\theta_r(1|\tau)/\theta_r(0|\tau)$ depends on τ through the presence of the observed rate $\theta_r(0|\tau-1)$ if and only if $\gamma_{2r} \neq 1$. Given $\gamma_{2r} = 1 + \dfrac{\mathrm{var}(v_r)}{\mu_{1r}^2}$, the last condition will be verified if and only if unobserved heterogeneity exists ($\mathrm{var}(v_r) \neq 0$). In addition, it is important to observe that γ_{2r} would have to be greater than or equal to 1 from the point of view of the validation of the model specification.

In the concurrent risks framework the relation between v_r and v_s is important from the point of view that it brings us the necessary information about the validity of independence between sectors (implying the possibility of censoring a sector in the analysis of another one). In our study, the condition $\kappa_{11} = 1$, $\kappa_{12} = \gamma_{2s}$ and $\kappa_{21} = \gamma_{2r}$ with $r \neq s$, $\kappa_{12} = \dfrac{E\left[v_r, v_s^2\right]}{\mu_{1r}\mu_{1s}^2}$ and $\kappa_{21} = \dfrac{E\left[v_r^2, v_s\right]}{\mu_{1r}^2\mu_s}$ is necessary to decide that the exit-types r are independent[9].

---

[7] The interest of this approach is to be able to eliminate part of the functional parameters, those related to the calendar dimension (regarded here as harmful effect functions), and to solve thus the problem of incident parameters posed by the great number of observations related to the number of duration classes. The whole of values for t and τ and their combinations provide then a sufficient number of observations, allowing the functional parameter estimation of the model related to the durations effects and to the moments of the distribution v_r.

[8] Based on those different parameters, several specification tests can be carried out validating at the same time the crucial assumption of concurrent risks and the existence of a positive support point distribution for v_r (Van den Berg and Van Ours, 1996). We can test $\gamma_2 \geq 1$ if only one equation is estimated, $\gamma_3 \geq \gamma_2^2$ if we estimate two equations, and $(\gamma_4 - \gamma_2^2)\cdot(\gamma_2 - 1) \geq (\gamma_3 - \gamma_2)^2$ if we estimate three equations. These assumptions imply particularly the possibility of finding a discrete distribution with a finite number of support points able to generate those normalized moments.

[9] If we take into account only the equation (3), we can say that duration analysis can be done separately for each sector if κ_{11} is equal to 1 (and then $\mathrm{cov}(v_r, v_s) = 0$). If the condition to decide the independence of the two sectors is verified, the transitions towards both formal and informal sectors can be analysed in a simple duration model framework as proposed by Van den Berg and Van Ours (1996).

Continuing the parameter interpretation, a coefficient significantly higher than one for η_{tr}, implies positive unemployment duration dependence between the quarters t-1 and t ($\psi_{1r}(t) > \psi_{1r}(t-1)$) and negative for a coefficient significantly lower than 1 during the corresponding period ($\psi_{1r}(t) < \psi_{1r}(t-1)$). Cohort effects can be interpreted as the unemployment inflow composition effects (formal or informal employment). Therefore, a high exit probability for individuals entering in a given year can be viewed as evidence that inflow in this year contains a relatively higher quantity of individuals with more important unobserved characteristics. Cohort effects estimation also makes possible to observe the difference between inflow composition at the bottom of the cycle and inflow composition at the top of the cycle.

III. Data

We use quarterly data for Mexico from the National Survey of Urban Employment (ENEU) between 1987 and 2001. The survey is conducted by the *Instituto Nacional de Estadistica, Geografia e Informatica* (INEGI, Mexican Statistical Institute) so that the same individual can be followed through five quarters. This survey is a rotating panel drawn in 32 Mexican cities, and it is the only urban quarterly household panel survey in Mexico. The survey provides detailed information on the economic activities of all household members older than 12, such as job characteristics, working hours and labour income, but no information on non-labour income. In this survey we are able to compute the number of individuals in each state across a given wave and the number of individuals who stay in the same state during each wave in the four remaining quarters. According to the official definition of occupation and unemployment we use data on an economically active population that includes all individuals at least 12 years old. We have constructed 56 five quarter panels where the number of observed individuals increases through the time. For example, the panel constructed from the first quarter of 1987 to the first quarter of 1988 includes 2582 individual observations. However, the number of individuals observed in the IV-2000 to IV-2001 panel is 24833[10]. The individuals for whom the computation of the employment or unemployment duration was not possible have been removed.

In spite of the sample size, we found inconsistent exit probabilities (lower than 0) in some groups. We have replaced the inconsistent exit probabilities with the mean of observed probabilities for the corresponding quarters. For example, the inconsistent observation in the second quarter 1995 in the duration class t=1 is replaced by the mean of consistent exit probabilities in all second quarters observed for the same duration class[11].

---

[10] The number of individuals in each wave was made taking into account the length of unemployment before the first interview by carrying out a shift of observations according to the time each individual spent unemployed before the first interview. For example, for two individuals interviewed for the first time during the first quarter 1995, one declared that he had spent between 0 and 11 weeks unemployed, while the other was unemployed between 12 and 23 weeks. While the first will remain counted as an observation in the first quarter 1995, the second will be treated as an observation for the fourth quarter 1994. Unfortunately, if the origin state is formal or informal employment, no information on the employment length before the first interview is available.

[11] Van den Berg and Van Ours (1996) confronted by the same problem, adopt as a solution the exclusion of those observations lower than 0.05. This arbitrary restriction does not modify the results in a significant way, even with restrictions with different bounds.

Three aggregated exit probabilities for each sector ($\theta_r(0|\tau), \theta_r(1|\tau)$ *and* $\theta_r(2|\tau)$) and their ratios are computed in the database that we have constructed; they provide observations for the dependent variables in selected models. These probabilities have been computed for groups defined by gender and instruction level, according to the exit type. Finally, we corrected the seasonality of the time series constructed with the exit probabilities using the *Filter Census* X11 (Shiskin, Young and Musgrave, 1976)[12].

The description of the data will be done twice: initially, we describe the aggregated exit probabilities from unemployment towards formal or informal employment. In the second sub-section, we show the probabilities of leaving one segment for a different segment in the labour market or to fall into unemployment.

III.1 Unemployment towards formal or informal employment

In this sub-section we describe and compare the aggregated exit probabilities (averaged over the year) from unemployment according to the specific destination by different individual characteristics of unemployed. The two possible exit destinations are the formal or the informal sector of the Mexican labour market. We show the exit rates evolution towards both sectors according to the gender and instruction level[13].

We observe in table 1 that males move towards informal sector more than towards formal: the conditional exit probability mean towards the informal sector during the first, second and third unemployment quarter is respectively equal to 11%, 35% and 28% whereas it is limited to 9% 29% and 23% for the formal sector.

Table 1

Mexico. Urban areas. Exit rate means out of unemployment towards formal and informal sectors by gender and instruction level. I-1987 to IV-2000

	Formal sector			Informal sector		
Groups	$\theta(0\|\tau)$	$\theta(1\|\tau)$	$\theta(2\|\tau)$	$\theta(0\|\tau)$	$\theta(1\|\tau)$	$\theta(2\|\tau)$
Males	0,086	0,285	0,225	0,108	0,348	0,280
Females	0,117	0,289	0,255	0,101	0,256	0,222
Between 0 and 9 years of instruction	0,088	0,282	0,235	0,110	0,359	0,297
10 years of instruction and more	0,283	0,301	0,224	0,108	0,269	0,229

Source: Computed from the National Survey of Urban Employment (ENEU).

This informal sector predominance for females is not as important as for males: we even remark mean exit rates very similar towards both formal and informal sectors (10%, 26%, and 22%, in the informal sector side and 12%, 29%, and 25% for the respective exit rates towards formal sector). In fact, the exit probability out of unemployment by the way of formal sector is much more important for females than males during the first three quarters, especially during the first and third quarters.

---

[12] After the correction of the seasonality in the time series we do not introduce the terms which control the seasonal effects. Therefore, we specify only the terms which enable us to control the cohort effects ($\psi_{3r} = \exp(\alpha_{3r}(y))$).

[13] We show rates by instruction level in appendix 2.

Figure 1 shows the evolution across time of quarterly aggregated exit probabilities according to gender towards both destinations by duration class. Note that the flat shape of exit rates out of unemployment during the first quarter contrasts with the fluctuations during second and third quarters of unemployment and the overall growing trend of rates. This can be attributed principally to the correction made to the stock sampling procedure and to taking into account the unemployment length of individuals in the beginning of the longitudinal follow up.

In addition, even if the exit probability behaviour in the formal and informal sectors appears overall nearly as strong for males as for females (and even for the other population categories), several differences emerge and the identification condition, essential to the estimation of concurrent risks correlation, is verified in this study.

According to the figure 1, a differential of rates between two sectors is manifested at the beginning of 1993; it decreases after 1997, and one can even observe, from there, a convergent behaviour of exit rates out of unemployment towards both formal and informal sectors. We remark that this convergence of two rates beyond 1997 can also be observed when we decompose the population by education level (between 0 and 9 years of instruction, and 10 years of instruction and more[14]).

It seems in fact that this phenomenon can be explained partly by the structural changes at the beginning of the 90s, the consequence of the economic opening, privatisations, and the economy restructuring, also indicating the importance of these changes to the Mexican Social Security reforms (published by the Social Security Mexican Institute, IMSS) implemented in 1997.

Let us recall that the definition of formal and informal sectors applied in this study is based on Social Security norms. However, this norm has been reformed during 1997: certain modifications having a direct relationship with the labour market operation can explain, partly, the probability particularities observed since 1997. According to the new Law, domestic workers, micro-enterprises owners, agricultural workers, and workers in Federal public decentralized administrations can voluntary belong to the obligatory regime[15].

The structural changes in the Mexican economy at the beginning of 90s and during the 1995 crisis as well as the gap between exit rates out of unemployment towards both formal and informal sector between 1993 and 1997 justify the cohort effects specification in our model. They will allow us to carry out the possible difference between the unemployment inflow at the bottom and the unemployment inflow at the top of the business cycle, contributing to the explanation of the exit rates out of unemployment towards both considered employment types.

---

[14] An exception appears in the first quarter of unemployment for most educated. The representations of exit rates from unemployment for the most educated group of individuals clearly show the divergence of the exit probability series during the first quarter of unemployment. In the same way, we remark that exit probability (during the first quarter of unemployment) towards the formal sector is more important than towards the informal sector for the most educated. In the remaining series, we observe the same convergence situation from 1997.

[15] The obligatory regime handles issues of work risks, diseases and maternity, handicaps and life insurance, pensions, day nursery and national insurance benefits. Individuals in this regime are bounded by a work contract with other individuals, members of cooperative production societies, and individuals determined by decree under the conditions and terms signalled by Law. See http://idse.imss.gob.mx/imss/documentos/Ley001.pdf for further information about the Social Security Law.

Figure 1. Mexico. Urban areas. Males and females. Quarterly exit probabilities (yearly moving averages*) by unemployment duration class according to the destination sector. I-1987 to IV-2000
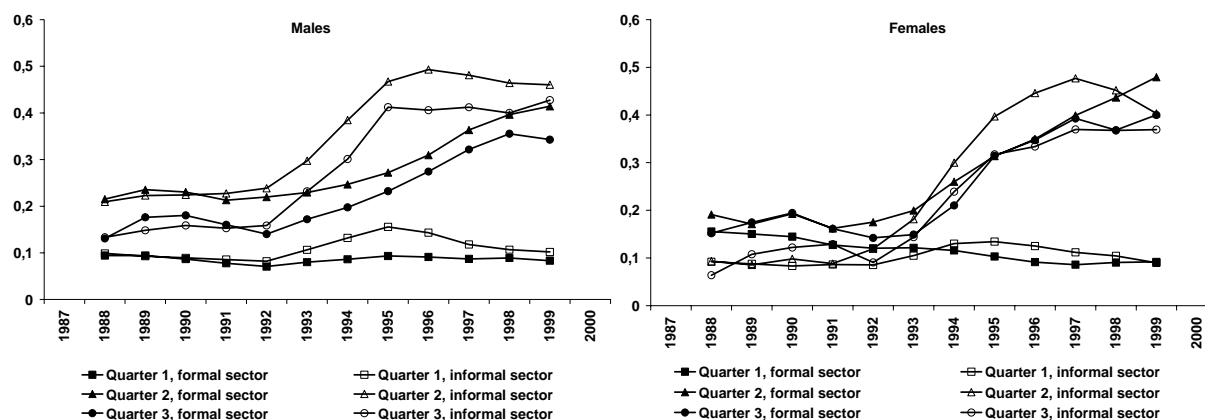
Source: Computed from the National Survey of Urban Employment (ENEU)
* MA(3)

III.2 Formal and informal employment: Transitions between sectors and towards unemployment

We first show the elements about mobility rates between both employment segments (formal and informal) and second the exit rates out both sectors towards unemployment. This formal and informal employment duration analysis is done for the same groups studied in the preceding sub-section. Nevertheless we show only the figure for gender groups; the figures for groups by education level are in the appendix 3.

Figure 2 shows the transition behaviour between two sectors for 3 duration classes among males and females, from either the formal sector or the informal sector. For both groups, transition rates show a growing trend during the first quarter of employment, which shows flat or only slight growth during the second and third quarter of employment (groups defined by instruction level show flat trends, which decreases in some cases).

We observe moreover that mobility rates between sectors are overall relatively weak for all groups. However, following the direction of the mobility and the period taken into account, many differences emerge regarding the traditionally dual conception of the Mexican labour market.

Corroborated with the mean of the transition rates between sectors (table 2), males, and the less educated have the largest probability to move from the formal towards the informal sector for all duration classes. For females, and the more educated, on the contrary, the transition from informal employment towards formal employment dominates (on average) the sector mobility. This analysis confirms the greater correlation of males with the informal segment of employment. For at least one part of population, it is difficult to restrict the informal employment role as an important route to the formal employment segment.

However, we observe that transition rates towards the informal sector is more sensitive to the business cycle for people engaged in this type of employment: first males and finally the less educated: the mobility rates curve from the formal segment towards the informal shows more important fluctuations than those observed in the mobility rates curve for the opposite way. It

is particularly true during 90s where the curves gap increases from 1991 to 1997[16]. It is additionally striking that during the 1995 crisis the mobility rate towards informal sector is the highest (and the most important mobility rate gap with the opposite way). The informal sector represents not only an alternative for staying employed through periods of recession, but also of adapting better to crisis periods for concerned populations. One indeed has to note that the mobility rates gap between sectors is much smaller for females and the more educated.

Figure 2. Mexico. Urban areas. Males and females. Quarterly transition probabilities (yearly moving averages*) between sectors by employment duration class. I-1987 to IV-2000
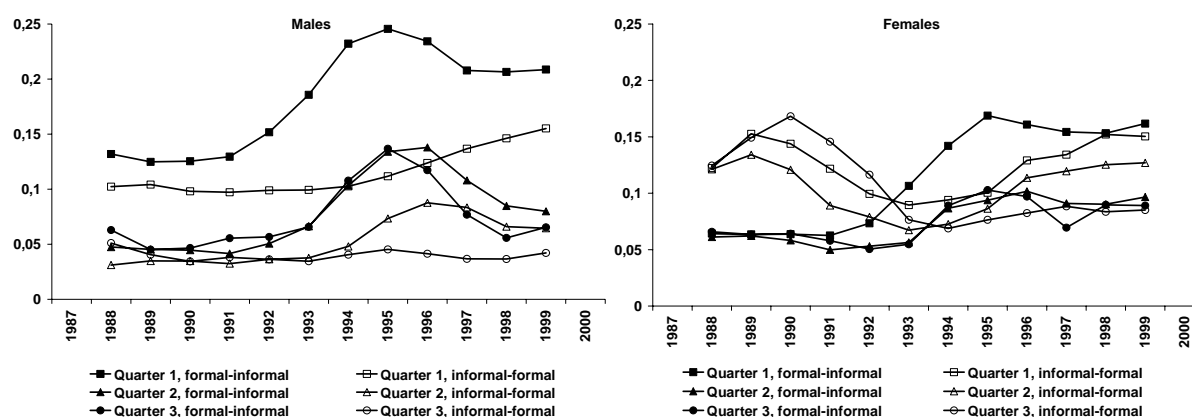
Source: Computed from the National Survey of Urban Employment (ENEU)
* MA(3)

Table 2

Mexico. Urban areas. Transition rate means between sectors by gender and instruction level.

I-1987 to IV-2000

Groups	Formal employment => Informal employment			Informal employment => Formal employment		
	$\theta(0\mid\tau)$	$\theta(1\mid\tau)$	$\theta(2\mid\tau)$	$\theta(0\mid\tau)$	$\theta(1\mid\tau)$	$\theta(2\mid\tau)$
Males	0,182	0,077	0,074	0,118	0,052	0,041
Females	0,116	0,076	0,075	0,125	0,105	0,103
Between 0 and 9 years of instruction	0,211	0,094	0,090	0,128	0,063	0,058
10 years of instruction and more	0,161	0,085	0,078	0,170	0,085	0,094
Groups	Formal employment => Unemployment			Informal employment => Unemployment		
	$\theta(0\mid\tau)$	$\theta(0\mid\tau)$	$\theta(0\mid\tau)$	$\theta(0\mid\tau)$	$\theta(1\mid\tau)$	$\theta(2\mid\tau)$
Males	0,163	0,022	0,025	0,127	0,020	0,019
Females	0,139	0,025	0,034	0,086	0,032	0,031
Between 0 and 9 years of instruction	0,234	0,039	0,033	0,168	0,027	0,026
10 years of instruction and more	0,240	0,050	0,059	0,163	0,031	0,034

Source: Computed from the National Survey of Urban Employment (ENEU)

Concerning transitions towards unemployment, we observe in figure 3 that most transitions take place during the first quarter of employment in both formal and informal sectors. In general, the probability to fall into unemployment from the formal sector is more important

---

[16] We can consider this evolution as the consequence of the adjustment to structural changes (the consequence of the economic opening, privatisations, and the restructuring) suffered by the Mexican economy between the late 80s and early 90s.

that from the informal sector, especially during the first quarter of employment, as can be observed in table 2, which shows the transition rates mean towards unemployment for groups that we analyse.

IV. Results

IV.1 Unemployment: Transition towards formal and informal sectors

In this sub-section we carry out the complete decomposition of the unemployment dynamics by differentiating the employment sectors: the dependence form of the exit rates with respect to the unemployment length, the control and the display of individual unobserved heterogeneity factors, and the composition effects of the individual cohorts coming into unemployment will be analyzed successively while controlling, without identifying them, the pure effects of the cycle during the episode.

The dependence function in relation to the unemployment duration

In the table 3, we show the estimation results that take into account the destination at the moment of the unemployment exit. First of all we note that duration dependence is non-monotonous for all destinations and for all the groups considered in this analysis: The exit rate out of unemployment thus shows positive duration dependence between the first and the second quarters of unemployment while this dependence becomes negative between the second and the third quarters. If the non-monotonous character of this dependence is present for both sectors, the identified forms of dependence can differ considerably according to the individual profiles.

For males, the duration dependence of the exit rate from unemployment with respect to the duration is nevertheless similar in both employment sectors, at least during the first three quarters of unemployment. Between the first and the second quarters, the probability of finding a job in any sector increases approximately 43.5%. For both sectors, the probability of finding employment decreases by 29% between the second and the third quarters of unemployment.

On the other hand, the increase in the probability of finding a job in the formal sector between the first and the second quarters of unemployment is greater than the one for the informal sector in the case of females: this increase in probability of finding a job in the formal sector is about 21%, and only 12% to find a job in the informal one. However there is an inversion of the direction of the dependence between the second and third quarters of unemployment: a reduction of about 15% (vs. -8.7% for the informal sector) in the exit probability makes more difficult for females to find employment in the formal sector than in the informal one during the third quarter. The situation of the most educated people is, moreover from this point of view, the opposite to that of females.

If the unemployment duration dependence being systematically positive between the first and the second quarter is the consequence of the correction made to the stock sampling procedure, then the systematically negative dependence in relation to the unemployment duration would reveal the deterioration of the exit rate with the time spent in unemployment for those who have not yet found a job at the end of the second quarter. This negative relation between the exit rate and the unemployment duration can be interpreted by the unemployment duration

stigmatization theory: for the Mexican firms, an unemployment duration exceeding 6 months would then be the signal of a low qualified worker (Berkovitch, 1985). This explanation would more or less be applied according to the categories of workers and the concerned employment sectors: thus for the females, this negative dependence grows weaker when the question regards informal employment[17].

The unobserved heterogeneity

The estimations of parameters κ_{11} indicate that the unobserved heterogeneity factors in the formal and informal sectors are uncorrelated. Owing to the fact that coefficient values are very close to 1, this implies that $cov(v_{formal}, v_{inf\,ormal}) = 0$; however, this is not to say that both formal and informal sectors can be treated as independent sectors. First, it is necessary that following restrictions are checked: $\kappa_{11}{=}1$, $\kappa_{12}{=}\gamma_{2informal}$ and $\kappa_{21}{=}\gamma_{2formal}$. Thus, we also estimate the restricted models for all groups and we carry out the Wald statistic to test the null hypothesis that assumes the independence between formal and informal sectors (the statistic values for the test are shown in the tables of estimations) [18]. According to our results, the independence null hypothesis is systematically rejected. That means in all groups, that unemployment durations before the transition towards formal or informal sectors are dependent. For these groups, the unemployment duration analysis must be done, taking into account both sectors, that justify our model specification in the dependent concurrent risks framework.

Let us notice (in table 3) nevertheless that γ_2 parameters in both sectors are very close to 1 in all cases. This implies that $var(v_r) = 0$ for both formal and informal sectors and that the marginal distribution of v_r cannot be accurately described by a discrete distribution (Shohat and Tamarkin, 1963). In our analysis, non-correlation is not equivalent to independence due to the fact that unobserved heterogeneity functions of both formal and informal sectors cannot be described by a discrete distribution[19].

Cohort effects

In the males group of individuals the only significant cohort effects appears in the first years of the analysis period in the formal sector; and in the last year of the analysis period in the informal one. It seems in fact that unemployment inflow composition tends to evolve as the years go by (at least in the informal sector where we observe a significant positive cohort effect in the year 2000) without an important difference according to the employment sector. This evolution does not seem related to a particular cyclic behaviour, and it was not disturbed by the 1995 crisis[20]. In the females' case, it is striking that the only positive cohort effects are

---

[17] Other explanations could then be proposed: a relatively important non-pecuniary utility of being unemployed in the short-run for females and youngest in the informal sector, that is, the increase of transitions between unemployment and non-participation of females and youngest who hope to become formal workers (Van den Berg and Van Ours, 1996), could contribute to this sector adjustment of the duration dependence.

[18] Only unrestricted models are presented for unemployment durations. According with the results of the Wald's test, we reject the independence null hypothesis for all groups. The critical value of the $\chi^2(3)$ is 6.25 for the 10% confidence interval.

[19] In fact, Van den Berg *et al.* (2003) observe that for the case of discrete bivariated distributions with two distribution points of support, non-correlation is equivalent to independence.

[20] A linear regression of GDP and cohort effects (eventually with the control of a dummy variable applied on the crisis particular period) does not reveals in the males' case any countercyclical or procyclical behaviour that is statistically significant.

observed just before and during the peso crisis. During the years preceding the crisis, the unemployment inflows contained a more significant quantity of female workers with more important rates of return to employment (we do not observe an important difference between sectors).

One does not find in most of the groups the mechanism described by Darby *et al.* (1985) at the origin of procyclical phenomena; at the recession time the unemployment inflow contains a relatively significant number of individuals with low exit probabilities. A notable exception appears nevertheless in the group of more educated workers for the exit towards formal sector: the unemployment inflow composition during the crisis years (1994-1996) is well constituted by workers with relatively unfavourable characteristics. This coincidence between cohort effect and cycle effect is no more verified in the exit towards informal sector.

In spite of those last effects, we do not find over this period a significant difference in the unemployment inflow composition through the years and the sectors. It appears that in the two segments of Mexican labour market, the business cycle shows the same effect, even an absence of effect in the unemployment inflow composition.

The first results, obtained from the analysis of the unemployment dynamics where the two sectors of the labour market are distinguished, do not enable us to conclude that both formal and informal sectors play a specific role, but neither do they show a dynamic or specific behaviour; with similar cohort effects and different duration dependences, the sectors appear symmetrical. However, we must yet explore the existence of symmetrical characteristics between sectors in the employment phenomenon.

Table 3. Mexico. Urban areas. Unemployment duration. Unrestricted concurrent risks models estimation by gender and instruction level.

	Gender				Instruction level			
	Males		Females		Between 0 and 9 years of instruction*		10 years of instruction and more**	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Unobserved heterogeneity distribution								
$\gamma_{2formal}$	1,00	0,00	0,99	0,00	1,00	0,00	1,01	0,00
$\gamma_{3formal}$	0,92	0,03	0,98	0,02	1,05	0,03	1,05	0,02
$\gamma_{2informal}$	1,00	0,00	0,99	0,00	1,00	0,00	1,01	0,01
$\gamma_{3informal}$	1,03	0,02	0,97	0,03	0,98	0,01	1,05	0,03
κ_{11}	1,00	0,00	0,99	0,00	1,00	0,00	0,98	0,01
κ_{12}	0,96	0,02	0,98	0,02	1,02	0,01	0,98	0,02
κ_{21}	1,06	0,02	0,97	0,02	0,96	0,02	0,98	0,02
Duration dependence								
$\eta_{1formal}$	1,44	0,02	1,21	0,04	1,33	0,02	1,16	0,04
$\eta_{2formal}$	0,71	0,01	0,85	0,03	0,78	0,01	0,86	0,03
$\eta_{1informal}$	1,43	0,02	1,12	0,04	1,36	0,02	1,28	0,04
$\eta_{2informal}$	0,71	0,01	0,91	0,04	0,76	0,01	0,79	0,02
Formal sector: Unemployment inflow composition cycle								
1987.I-1987.IV	-0,07	0,04	-0,20	0,06	-0,10	0,04	0,07	0,01
1988.I-1988.IV	-0,07	0,03	-0,11	0,05	-0,08	0,04	0,07	0,02
1989.1-1989.IV	-0,03****	0,03	-0,07****	0,04	-0,06	0,03	0,00****	0,02
1990.I-1990.IV	-0,02****	0,02	0,02****	0,03	-0,04****	0,03	-0,01****	0,02
1991.I-1991.IV	-0,03****	0,02	0,02****	0,03	-0,03****	0,02	-0,04	0,02
1992.I-1992.IV	0,00****	0,02	0,10	0,02	0,04	0,02	-0,02****	0,01
1993.I-1993.IV	0,00****	0,02	0,13	0,02	0,05	0,02	-0,05	0,01
1994.I-1994.IV	0,01****	0,02	0,17	0,02	0,06	0,02	-0,06	0,01
1995.I-1995.IV	0,02****	0,02	0,13	0,03	0,06	0,02	-0,03	0,01
1996.I-1996.IV	0,03****	0,02	0,05****	0,03	0,06	0,02	0,00****	0,01
1997.I-1997.IV	0,04****	0,02	0,01****	0,04	0,05	0,03	0,00****	0,01
1998.I-1998.IV	0,04****	0,03	-0,02****	0,04	0,03****	0,03	0,02****	0,02
1999.I-1999.IV	0,03****	0,03	-0,08	0,05	0,00****	0,04	0,03****	0,02
2000.I-2000.IV	0,06****	0,04	-0,15	0,06	-0,03****	0,04	0,03****	0,02
Informal sector: Unemployment inflow composition cycle								
1987.I-1987.IV	-0,07	0,04	-0,21	0,06	-0,10	0,04	0,07	0,01
1988.I-1988.IV	-0,07	0,03	-0,12	0,05	-0,08	0,03	0,08	0,02
1989.1-1989.IV	-0,03****	0,03	-0,07****	0,04	-0,05	0,03	0,01****	0,02
1990.I-1990.IV	-0,02****	0,02	0,03****	0,03	-0,03****	0,02	0,02****	0,02
1991.I-1991.IV	-0,02****	0,02	0,04****	0,03	-0,02****	0,02	-0,01****	0,02
1992.I-1992.IV	0,01****	0,02	0,11	0,03	0,03	0,02	0,02****	0,02
1993.I-1993.IV	0,00****	0,02	0,14	0,02	0,04	0,02	0,01****	0,01
1994.I-1994.IV	0,01****	0,02	0,17	0,02	0,06	0,02	0,02	0,01
1995.I-1995.IV	0,01****	0,02	0,12	0,03	0,06	0,02	0,00****	0,01
1996.I-1996.IV	0,03****	0,02	0,05****	0,03	0,05	0,02	-0,03	0,01
1997.I-1997.IV	0,03****	0,02	0,01****	0,04	0,04	0,02	-0,02****	0,02
1998.I-1998.IV	0,04****	0,03	-0,03****	0,04	0,03****	0,03	-0,03	0,02
1999.I-1999.IV	0,03****	0,03	-0,09	0,05	0,00****	0,03	-0,06	0,02
2000.I-2000.IV	0,06	0,04	-0,15	0,06	-0,03****	0,04	-0,08	0,03
Objective value								
	6,3		6,9		6,6		6,3	
Wald statistic*** for the restrictions $\kappa_{11}=1$, $\kappa_{12}=\gamma_{2informal}$ and $\kappa_{21}=\gamma_{2formal}$								
	34,0		14,4		6,5		38,6	

Source: Computed from the National Survey of Urban Employment (ENEU).

* Individuals with an instruction level between 0 and 9 years.

** Individuals with an instruction level higher or equal to 10 years.

*** The critical value of the $\chi^2(3)$ statistic at the 10% confidence interval is equal to 6.25. H$_0$: There is independence between exits.

**** Non significant coefficients at the 10% confidence interval.

IV.2 Employment: Transition between sectors and towards unemployment

We now study the employment dynamics in each segment. Continuing in the same direction as in the preceding section, individual formal or informal employment durations, once aggregated, will contribute to the estimation of a non-parametric dependent concurrent risks model; two forms of transitions are considered here: an employment mobility towards another sector (let us recall that the changes of employment within the same segment are not indicated) or a return to unemployment. In the tables 4 and 5 we show the results respectively for the formal-employment and informal-employment durations. Here we still take the same individual characteristics used in the unemployment duration analysis: gender and instruction level.

The dependence function in relation to the employment duration

Concerning the transition rates between sectors, we observe in the males' case a negative dependence during the first three quarters of employment for the transition coming from the formal sector. This dependence is monotonous, increasing at least through the first three quarters of employment. In the case of the transition coming from the informal sector, the duration dependence is nonmonotonous: between the first and the second quarters the instantaneous probability decreases; next between the second and the third quarters, the mobility risk shows weak positive duration dependence (the probability increases only 5%). Between the first and the second quarters, the sector mobility risk decreases much more strongly with the cumulated employment length when this mobility goes from the formal sector towards the informal one. In fact, the instantaneous probability of a move from formal to informal decreases by 27.2% between the first and the second quarters while this decrease is about 22.9% for the transition in the opposite way. While the probability of a move from informal to formal sector increases between the second and the third quarters, the transition rate in the opposite way decreases more than 20%.

The dependence function shows, for females, a nonmonotonous behaviour with more contrast according the mobility direction. The transition rate from the formal sector to the informal one shows a negative dependence between the first and the second quarters of employment (decreasing by 23.9%) while it increases by 31.7% between the second and the third quarters. On the other hand, a significant dependence of the mobility rate does not seem to exist during the first three quarters in the transition from informal employment to formal with respect to the informal employment duration.

For the more instructed[21], the transitions between sectors show in both directions a non-monotonous dependence with respect to the employment duration: negative between the first and the second quarters (the probability of a move coming from the formal sector decreases about 27%; and about 31% in the opposite way), positive between the second and third quarters; nevertheless one can note that the increase in the sector-mobility rate between the second and the third quarters increases more significantly when the mobility is from informal towards the formal sector (increase near of 44%) than in the opposite direction (28.9%).

---

[21] Even if the dependence shape of the less educated group of individuals is comparable (for the mobility between sectors) to that of the more educated, we observe that the differences between sectors are much less pronounced. In both sectors the mobility rate decreases by 30% between the first and the second quarters. Between the second and the third quarters of employment, the probability of a move increases by 33% coming from the formal sector, and by 37% coming from the informal one.

The transition rates between the second and the third quarters of employment show a less negative dependence for some groups or a positive dependence for others. In both cases, that implies that transitions between sectors are more important after the first quarter of employment. These results are in agreement with the remarks made by Calderon-Madrid (2000) who observes a more important mobility of workers after the first quarter of employment.

With those shapes of dependence, one finds a primacy of the formal sector over the informal one for some categories of workers, especially males and the more educated: an asymmetrical mechanism within the formal sector thus seems to take place with the employment length in this sector, keeping those workers within the same type of employment.

Second, we compare the dependence shapes with respect to the employment duration of transitions towards unemployment. Between the first and the second quarters of employment, the probabilities of a transition towards unemployment decreases in all sectors of the labour market. Nevertheless, for females and the less educated, this decrease is more accentuated when employment comes from the formal sector. Between the two following quarters, the probabilities of returning to unemployment differ greatly according to the categories of workers and the origin sectors[22].

The unobserved heterogeneity

According to the employment type, the presence of unobserved heterogeneity is not always proven: in the formal-employment duration analysis, most of the parameters γ_2, whatever the destination state, are very close to 1. The transition risks from formal employment, that is to say mobility between sectors or a return to unemployment are homogeneous within the majority of categories of workers. Only females show γ_2 parameters with values suggesting the (weak) presence of unobserved heterogeneity either for a transition towards the informal sector, or to fall into unemployment.

However, the exit rates from informal employment are very different: regarding the mobility between sectors from informal to formal, unobserved heterogeneity is not present in any group. The workers holding informal employment and regrouped according the gender criterion and the more instructed show rates of return to unemployment significantly heterogeneous: the distribution of those factors of unobserved heterogeneity could be represented in those different cases by a bivariated distribution with two support points.

One notes in the formal employment the absence of correlations between the exit-specific unobserved heterogeneity factors for individuals regrouped according gender criterion (κ_{11} coefficient very close to 1); one notes also that only for males and females the rejection of the null hypothesis of independence. In the informal employment the same phenomenon is observed for females and the more instructed[23]: For these groups formal and informal employment duration analysis cannot be done independently of the exit type.

---

[22] For example, for males, if an additional quarter of employment in the formal sector decreases the rate of return to unemployment, there is a reversal when the nature of employment is informal; for this case, the probability of returning to unemployment between the second and the third quarters of informal employment increases significantly. It is in fact difficult to draw conclusions from those mechanisms of nonmonotonous dependence.

[23] In the males' case the correlation between the exit-specific unobserved heterogeneity factors is present and the null hypothesis of independence is also rejected.

Cohort effects

Relative to the mobility between sectors, the formal employment inflow composition of the more educated workers has the tendency to be deeply transformed: while at the end of 80s, it was constituted of workers with characteristics and/or with behaviours that promote a mobility towards the informal sector, it tends (according to our estimations since 1991) to obstruct the access of workers with more mobility and in advantage capable of coming to the informal employment sector; in 1998, educated workers coming to the formal sector show a mobility rate between sectors almost four times less important than in 1987. Let us note that this movement can be closely linked to the respective transformations of the two sectors not only with economy mutations (economic opening) but also with legislative modifications.

The mobility in the opposite direction (coming from the informal sector) of more educated workers is not, on the other hand, characterized by comparable cohort effects: the only effects that modify the informal employment inflow composition relatively to a sector relocation are situated during the year preceding the crisis; the educated worker cohorts in the informal employment coming just before the crisis show a significantly higher mobility rate towards formal sector. That can be simply the result of prudent behaviour by educated workers who, faced with the crisis, preferred to hold more stable employment.

Being the rates of returns to unemployment, the cohort effects negative especially between 1993 and 2000. Thus the educated workers, accepting formal or informal employment at this period, show a return to unemployment lower than that observed for workers attached to another cohort. Additionally, the more educated workers coming into the formal sector during the 1995 crisis, shows the lowest rate of return to unemployment in relation to other cohorts.

One notes a tendency for males before and after the crisis: The cohorts preceding 1995 are characterized by a higher permeability between informal employment and unemployment, which is not apparently the case for rates of return to unemployment from formal employment. Before the crisis, "the bulk-heading" is not made, as one would expect, between informal employment and unemployment, but between formal employment and unemployment (at least for males). After the crisis, males are retained in the informal sector and permeability towards unemployment is reduced.

Table 4. Mexico. Urban areas. Formal employment. Unrestricted concurrent risks models estimation by gender and instruction level.

| | Gender | | | | Instruction level | | | |
| | Males | | Females | | Between 0 and 9 years of instruction* | | 10 years of instruction and more** | |
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Unobserved heterogeneity distribution								
$\gamma_{2informal}$	1,02	0,01	1,10	0,03	0,99	0,01	1,01	0,01
$\gamma_{3informal}$	1,20	0,07	2,91	0,45	0,88	0,09	0,90	0,13
$\gamma_{2unemployment}$	1,01	0,02	1,04	0,05	1,00	0,02	1,00	0,01
$\gamma_{3unemployment}$	0,39****	0,38	-0,24****	1,21	0,99	0,06	0,91	0,08
κ_{11}	1,00	0,01	1,00	0,02	1,00	0,01	0,99	0,01
κ_{12}	1,35	0,15	2,58	0,44	0,98	0,04	0,97	0,05
κ_{21}	0,69	0,10	0,01	0,29	1,03	0,04	0,94	0,04
Duration dependence								
$\eta_{1informal}$	0,73	0,01	0,76	0,03	0,70	0,02	0,73	0,04
$\eta_{2informal}$	0,80	0,01	1,32	0,06	1,33	0,05	1,30	0,07
$\eta_{1unemployment}$	0,58	0,01	0,48	0,02	0,45	0,02	0,55	0,02
$\eta_{2unemployment}$	0,68	0,01	1,96	0,09	1,92	0,09	1,64	0,08
Informal sector: Formal employment inflow composition cycle								
1987.I-1987.IV	-0,02****	0,02	0,12	0,02	0,08	0,04	0,26	0,04
1988.I-1988.IV	-0,02****	0,01	0,10	0,02	0,06	0,03	0,13	0,04
1989.1-1989.IV	-0,02****	0,01	0,08	0,01	0,05	0,03	0,09	0,03
1990.I-1990.IV	-0,04	0,01	0,05	0,01	0,04****	0,02	0,06	0,02
1991.I-1991.IV	0,01****	0,01	0,03	0,01	0,03****	0,02	-0,03****	0,02
1992.I-1992.IV	0,01****	0,01	-0,01****	0,01	0,03****	0,02	-0,04	0,02
1993.I-1993.IV	0,01****	0,01	-0,01****	0,01	0,02****	0,02	-0,05	0,02
1994.I-1994.IV	0,00****	0,01	-0,02	0,01	0,01****	0,02	-0,04	0,02
1995.I-1995.IV	0,00****	0,01	-0,04	0,01	-0,03****	0,02	-0,08	0,02
1996.I-1996.IV	0,00****	0,01	-0,04	0,01	-0,06	0,02	-0,09	0,02
1997.I-1997.IV	0,01****	0,01	-0,05	0,01	-0,06	0,02	-0,05	0,02
1998.I-1998.IV	0,01****	0,01	-0,06	0,01	-0,07	0,03	-0,07	0,03
1999.I-1999.IV	0,02****	0,01	-0,07	0,02	-0,05****	0,03	-0,05****	0,03
2000.I-2000.IV	0,03	0,02	-0,09	0,02	-0,05****	0,04	-0,04****	0,04
Unemployment: Formal employment inflow composition cycle								
1987.I-1987.IV	0,00****	0,03	0,22	0,04	0,09****	0,08	0,36	0,07
1988.I-1988.IV	0,01****	0,03	0,16	0,04	0,05****	0,07	0,22	0,06
1989.1-1989.IV	0,02****	0,03	0,10	0,04	0,03****	0,06	0,18	0,06
1990.I-1990.IV	-0,04****	0,02	0,07	0,03	0,05****	0,05	0,12	0,04
1991.I-1991.IV	0,00****	0,02	0,04****	0,02	0,06****	0,04	-0,01****	0,04
1992.I-1992.IV	0,00****	0,02	0,00****	0,03	0,06****	0,04	-0,01****	0,03
1993.I-1993.IV	0,01****	0,01	0,00****	0,01	0,07	0,04	-0,07****	0,03
1994.I-1994.IV	-0,01****	0,01	-0,04	0,02	0,03****	0,03	-0,09	0,03
1995.I-1995.IV	-0,01****	0,02	-0,07	0,00	-0,04****	0,04	-0,16	0,03
1996.I-1996.IV	-0,01****	0,02	-0,05	0,03	-0,10	0,04	-0,15	0,04
1997.I-1997.IV	-0,01****	0,02	-0,06	0,04	-0,10	0,05	-0,09	0,04
1998.I-1998.IV	0,00****	0,02	-0,10	0,04	-0,12	0,06	-0,12	0,05
1999.I-1999.IV	0,01****	0,03	-0,12	0,04	-0,05****	0,07	-0,08****	0,06
2000.I-2000.IV	0,03****	0,03	-0,12	0,05	-0,04****	0,08	-0,10****	0,07
Objective value								
	6,7		6,8		7,3		6,5	
Wald statistic* for the restrictions $\kappa_{11}=1$, $\kappa_{12}=\gamma_{2unemployment}$ and $\kappa_{21}=\gamma_{2informal}$**								
	13,1		18,5		1,8		4,2	

Source: Computed from the National Survey of Urban Employment (ENEU).

* Individuals with an instruction level between 0 and 9 years.

** Individuals with an instruction level higher or equal to 10 years.

*** The critical value of the $\chi^2(3)$ statistic at the 10% confidence interval is equal to 6.25. H_0: There is independence between exits.

**** Non significant coefficients at the 10% confidence interval.

Table 5. Mexico. Urban areas. Informal employment. Unrestricted concurrent risks models estimation by gender and instruction level.

	Gender				Instruction level			
	Males		Females		Between 0 and 9 years of instruction*		10 years of instruction and more**	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Unobserved heterogeneity distribution								
$\gamma_{2formal}$	0,80	0,14	1,01	0,03	0,98	0,02	1,02	0,01
$\gamma_{3formal}$	-1,71****	1,81	1,23	0,23	0,84	0,25	1,30	0,07
$\gamma_{2unemployment}$	1,13	0,23	1,14	0,08	1,01	0,05	1,15	0,04
$\gamma_{3unemployment}$	6,39	2,84	1,85****	1,12	1,36	0,67	4,35	1,35
κ_{11}	1,10	0,16	1,05	0,04	1,03	0,02	0,97	0,01
κ_{12}	2,50****	1,97	2,00	0,49	1,18	0,29	1,50	0,22
κ_{21}	5,07	1,55	1,14	0,26	1,17	0,15	0,59	0,12
Duration dependence								
$\eta_{1formal}$	0,77	0,05	0,96	0,03	0,71	0,03	0,69	0,03
$\eta_{2formal}$	1,05	0,05	1,03	0,03	1,37	0,05	1,44	0,06
$\eta_{1unemployment}$	0,56	0,05	0,73	0,03	0,47	0,02	0,54	0,02
$\eta_{2Unemployment}$	1,38	0,08	1,35	0,05	1,93	0,10	1,71	0,07
Formal sector: Informal employment inflow composition cycle								
1987.I-1987.IV	0,06****	0,10	0,08	0,02	0,01****	0,03	-0,02****	0,02
1988.I-1988.IV	0,05****	0,08	0,06	0,02	0,02****	0,02	0,00****	0,01
1989.1-1989.IV	0,01****	0,07	0,03	0,01	0,00****	0,02	0,01****	0,01
1990.I-1990.IV	-0,02****	0,06	0,01****	0,01	0,00****	0,02	0,00****	0,01
1991.I-1991.IV	0,10	0,04	-0,01****	0,01	0,01****	0,01	0,00****	0,01
1992.I-1992.IV	0,07	0,04	-0,02	0,01	0,01****	0,01	0,00****	0,01
1993.I-1993.IV	0,07	0,04	-0,01	0,01	0,02	0,01	0,00****	0,01
1994.I-1994.IV	0,04****	0,04	-0,02	0,01	0,02	0,01	0,02	0,01
1995.I-1995.IV	-0,05****	0,04	-0,02	0,01	0,00****	0,01	0,01****	0,01
1996.I-1996.IV	-0,11	0,05	-0,03	0,01	-0,02****	0,01	0,00****	0,01
1997.I-1997.IV	-0,12	0,06	-0,01****	0,01	-0,02****	0,02	-0,01****	0,01
1998.I-1998.IV	-0,07****	0,07	-0,02	0,01	-0,03****	0,02	0,00****	0,01
1999.I-1999.IV	-0,08****	0,08	-0,01****	0,01	-0,01****	0,02	0,00****	0,01
2000.I-2000.IV	0,05****	0,09	-0,02****	0,02	-0,01****	0,03	0,00****	0,01
Unemployment: Informal employment inflow composition cycle								
1987.I-1987.IV	0,11****	0,15	0,12	0,04	0,03****	0,07	0,09****	0,06
1988.I-1988.IV	0,08****	0,13	0,08	0,03	0,04****	0,06	0,10	0,05
1989.1-1989.IV	0,02****	0,11	0,05****	0,03	0,00****	0,05	0,15	0,04
1990.I-1990.IV	0,00****	0,09	-0,01****	0,02	0,01****	0,04	0,08	0,03
1991.I-1991.IV	0,11	0,07	-0,04	0,02	0,03****	0,04	0,05	0,03
1992.I-1992.IV	0,10	0,06	-0,06	0,02	0,04****	0,03	0,01****	0,02
1993.I-1993.IV	0,11	0,06	-0,03	0,02	0,08	0,03	-0,01****	0,02
1994.I-1994.IV	0,04****	0,06	-0,03	0,02	0,07	0,03	-0,04****	0,02
1995.I-1995.IV	-0,10****	0,06	-0,03	0,02	0,01****	0,03	-0,09	0,03
1996.I-1996.IV	-0,17	0,07	-0,04	0,02	-0,04****	0,03	-0,11	0,03
1997.I-1997.IV	-0,19	0,09	-0,02****	0,02	-0,07	0,04	-0,12	0,03
1998.I-1998.IV	-0,11****	0,10	-0,01****	0,03	-0,08	0,05	-0,02****	0,04
1999.I-1999.IV	-0,12****	0,12	0,01****	0,03	-0,06****	0,06	-0,03****	0,05
2000.I-2000.IV	0,11****	0,13	0,00****	0,04	-0,05****	0,06	-0,06****	0,05
Objective value								
	6,2		7,5		7,3		6,8	
Wald statistic*** for the restrictions $\kappa_{11}=1$, $\kappa_{12}=\gamma_{2unemployment}$ and $\kappa_{21}=\gamma_{2formal}$								
	10,5		6,4		2,0		15,4	

Source: Computed from the National Survey of Urban Employment (ENEU).

* Individuals with an instruction level between 0 and 9 years.

** Individuals with an instruction level higher or equal to 10 years.

*** The critical value of the $\chi^2(3)$ statistic at the 10% confidence interval is equal to 6.25. H_0: There is independence between exits.

**** Non significant coefficients at the 10% confidence interval.

V. Implications and conclusions

In this paper, using quarterly data on Mexican urban unemployment and employment between 1987 and 2001, we have decomposed the dynamics of the exit rates from unemployment and employment in the dependent concurrent risks framework: the genuine duration dependence function is nonparametrically identified by isolating the unobserved heterogeneity factors effect and controlling the cycle and cohort effects. From the data we compute aggregated time series of the exit probabilities from unemployment and employment where the formal and informal sectors of labour market are distinguished.

A simulation exercise will help us to appreciate the relevance of the effects and to synthesize the main results. It also enables us to evaluate both the role of each sector in the labour market and the pertinence of a dualistic labour market conception.

In this exercise, we neutralize the cycle effect supposing a stationary environment ($\psi_{2r}(\tau) = \psi_{2r}$). In order to take into account the evolution differences of the exit rates between groups and between sectors, we simulate the rates $\theta_r(1|\tau)$ then $\theta_r(2|\tau)$ from the equations defining the ratios $\theta_r(1|\tau)/\theta_r(0|\tau)$ and $\theta_r(2|\tau)/\theta_r(1|\tau)$ (equation (7) and equation defined in appendix 1) and using the mean of $\theta_r(0|\tau)$ observed through the period: insofar as they are statistically significant, we integrate successively the duration dependence effects in the segment, then the effects related to the unobserved heterogeneity presence taking account of the possible dependence between the concurrent risks.

We relax in some way the assumption of stationary having account of the possible cohort effects differential between 1994 and 1995[24]. That will enable us to observe whether the peso crisis, even outwards of the direct effect of the business cycle, could modify the inflow composition in the states (unemployment, formal employment and informal employment).

The figures in the appendix 4 illustrate a first result: males move on average more to the informal sector than towards the formal one. The exit rates evolution from unemployment – particularly through the unemployment duration dependence effects- does not question this predominance which is even maintained after four quarters of employment search. One notes thus that unemployed males never have "priority" to access to the jobs in the formal sector. Contrary to all expectations, females are those who re-cover an employment in the formal sector rather than in the informal one. In the females' case, it is interesting to note that they are on the other hand more sensitive to the cohort effects around the recession period: even after having controlled the direct effects related to the business cycle, one note that the females falling into unemployment during 1994 have exit rates which are more than 9.8% higher than those of females belonging to the crisis cohort (1995).

When one decomposes the population according to the qualification criterion, one finds nevertheless the priority order expected in the access between sectors: for the more qualified group of individuals (10 years of qualification and more), the exit rate from unemployment between the first and the second quarter for an employment in the formal sector is on average about 138% higher than that of an employment in the informal sector!! But there again, the dynamics and its effects do not modify the observed gap.

---

[24] That implicitly amounts to set the origin of simulation at the last quarter of 1994.

In fact, the dynamics evolution of the exit rates from unemployment is not in any case different between the sectors. However a traditional dual conception should impact differently the exit rates evolution according to the nature of recovered employments (particularly through the duration dependence functions): it presents in fact on one hand, the existence of possible barriers to get a job in the formal sector, and in the other hand the dual labour market idea supposes an easier access to the informal sector, all the more considered as a recourse sector that research in the formal one proves to be unfruitful. Nevertheless, the dualistic view of the labour market is not a good description and the mechanisms of the access to the employment into two sectors from unemployment, do not seem differ even if they can be addressed to different groups.

In spite of the significant differences showed by the employment duration dynamics, we are not able to validate in any way the dualistic approach of the Mexican labour market.

In that concerning the mobility between sectors, we are able to extend the preceding result for males: the last have on average at the beginning of the employment episode a higher mobility risk in the direction Formal/Informal. But the mobility risk decreases with the employment length more strongly than in the opposite direction (the probability of a move from formal to informal sector decreases by 42% between the first and the third quarters, whereas the probability of a move in the opposite way decreases only 19%), in such a way that after 3 quarters of employment, the mobility between sectors is more probable in the direction Informal/Formal. A similar evolution of mobility rates is also observed in the case of less qualified group of individuals.

For females the movement is in the opposite direction: whereas the mobility rate between sectors coming from the formal is stable between the first and the third quarters, the positive duration dependence of the formal employment is not enough to compensate the unobserved heterogeneity effect at the origin of the declining of more than 2.9% in the mobility rate from the formal sector to the informal one. This result illustrates the importance of decomposing the different effects of the rates dynamics and to take account of the combined effects. In the direction Informal/Formal the mobility rates are not heterogeneous. Additionally, females are more sensitive to the cohort effects around the recession period: transition rates for females coming into the informal sector during 1994 are 1.3% more important than those observed for females coming into the informal sector during the crisis period.

In that concerning the return to unemployment, the individuals employed in the formal sector show on average an important risk in the course of the first months of the employment episode: 22% of variation with respect to the informal sector in the case of males, and 32% in the case of most qualified. On the one hand, by the strict effect of the negative employment duration dependence, one observes nevertheless that the reductions of the mean transition rates towards unemployment are systematically more important for males in the formal sector: at the end of the third quarter of employment, the mobility rate towards unemployment is 54% more important in the informal sector than in the formal one. On the other hand, it is interesting to observe in the case of the more educated group of individuals that the gap between formal and informal remains stable at least during the first three quarters of employment. In contrast, informal-employment duration dependence is not enough to compensate the effect of the unobserved heterogeneity, which is at the origin of the declining of 10% in the mobility rate.

There still, the implications drawn from the joint effects of the employment dynamics do not confirm the specific roles traditionally reserved to the formal and informal sectors: in the formal sector side, one does not find in those results a stable employment sector where the mobility between sectors in the direction formal/informal is uncommon and where the return rates to unemployment remain always quite lower than those which come from an employment in the informal sector, specially when the employment length increases. The opposition with a secondary or precarious and not very enthralling informal sector also does not work.

The exercise can be concluded while reconsidering the decomposition of the evolution dynamics of the exit rates from two sectors of employment: it is striking to note that in spite of the strong aggregation of data, the workers holding an informal employment and regrouped according to qualification (the more educated) or gender criteria, also present significantly heterogeneous return rates to unemployment; in the case of the mobility between sectors coming from the formal, one also notes the presence of heterogeneity within the females' group, which contrasts with the absence of unobserved heterogeneity in the direction informal/formal. Even if one notes the absence of correlations between these specific heterogeneity factors in each exit state from informal employment for females and the more educated (and for females and young people in the formal employment), one always rejects the null hypothesis of independence between the latent employment durations[25].

It is difficult to synthesize the whole of cohort effects playing a role in the rates evolution even when the cycle effect is precisely controlled without to be able to be identified. It seems nevertheless that the formal employment inflow composition of the more educated workers has the tendency to be deeply transformed. This composition tends to obstruct the access of workers with more mobility and capable in advantage of coming to the informal employment sector. These effects show probably (for the more educated group of individuals) the transformation of a sector which, by the 90s, appears more and more being playing the role of primary sector with entrance barriers. The formal and informal employment dynamics for the more educated individuals seems to be well described by the dualistic vision of labour market. The same conclusion is given by Gong and Van Soest (2002) and Maloney (1999). In contrast, the dynamics of the Mexican labour market suggest that the dualistic vision is not a good description for the remaining groups.

References

- Abbring, Jaap H., Gerard J. van den Berg and Jan C. van Ours. 2002. The anatomy of unemployment dynamics. *European Economic Review*, no. 46:1785-1824.

- Berkovitch, Elazar. 1985. Reputation Effect in Equilibrium Search and Bargaining: A stigma Theory of Unemployment Duration. Discussion Paper no. 668, Northwestern University, Center for Mathematical Studies in Economics and Management Science.

- Calderon-Madrid, Angel. 2000. Job Stability and Labour Mobility in Urban Mexico: A Study Based on Duration Models and Transition Analysis. Working Paper, R-419, November. Inter-American Development Bank, Research Network.

---

[25] Only males show both, significant correlation between specific heterogeneity factors and the rejection of the null hypothesis of independence of employment durations.

- Darby, Michael R., John C. Haltinwanger, and Mark W. Plant. 1985. Unemployment rate dynamics and persistent unemployment under rational expectations. *American Economic Review,* no. 75:614-637.

- Dickens, W. T. and K. Lang. 1985, A Test of Dual Labour Market Theory", T*he American Economic Review* 75 (September), no. 4:792-805.

- Fleck, S., and C. Sorrentino. 1994. Employment and Unemployment in Mexico's Labour Force. *Monthly Labour Review* (November):3-31.

- Garro Bordonaro, N., J. Mélendez Barron, and E. Rodriguez-Oreggia. 2005. Un modelo del mercado laboral Mexicano con trabajo con o sin seguro social (IMSS). Fondo editorial de la Universidad Iberoamericana,Instituto de Investigaciones sobre Desarrollo Sustentable y Equidad Social IIDSES, Série de Documentos de Investigacion.

- Gong, X., A. van Soest and E. Villagomez. 2000. Mobility in the Urban Labour Market: a panel data analysis for Mexico. Center Discusion Paper, Tilburg University.

- Gong, X. and A. van Soest. 2002. Wage differentials and mobility in the urban labour market: a panel data analysis for Mexico. *Labor Economics*, no. 9:513-529.

- Heckman, J., and G.Sedlacek. 1985. Heterogeneity, aggregation and market wage functions: an empirical model of self-selection in the labour market. *Journal of Political Economy*, no. 93:1077-1125.

- Hernández-Laos, E.,N. Garro Bordonaro and I. Llamas. 2000. *Producitividad y mercado de trabajo*. México: Editorial Plaza y Valdéz.

- Maloney, W. F., and A. R. Levenson. 1998. The informal sector, firm dynamics and institutional participation. Policy Research Working Paper Series, The World Bank.

- Llamas Huitrón, I., E. Hernández Laos y N. Garro Bordonaro. 2003. El mercado de trabajo en México.Diagnóstico, proyecciones y políticas al año 2010. En *México 2010 Pensar y decidir la próxima decada*, tomo 2: 364-403. Colección Reflexión y Análisis: Noriega editores, Centro de Estudios Estratégicos Nationales, Instituto Politécnico Nacional y Universidad Autónoma Metropolitana.

- Magnac, Th. 1991. Segmented or Competitive Labour Markets. *Econometrica*. 59, (January) no. 1:165-187.

- Maloney, W. 1999. Does informality imply segmentation in urban labour markets? Evidence from sectoral transitions in Mexico. *The World Bank Economic Review* 2, no. 13:275-302.

- Navarro-Lozano, S. 2002. The importance of being formal: Testing for segmentation in the Mexican labour market. The University of Chicago.

- Revenga, A., and M. Riboud. 1993. Unemployment in Mexico: Its Characteristics and Determinants. Policy Research Working Paper no. 1230 (December), The World Bank.

- Shiskin, J., A.H. Young and J.C. Musgrave. 1976. The X-11 variant of the census method II seasonal adjustment program. *Technical paper no*. 15, *Bureau of the Census, U.S. Department of Commerce,*.

- Shohat, J.A. and J.D. Tamarkin. 1963. *The problem of moments*. Providence: American Mathematical Society,

- Intituto Nacional de Estadística Geografía e Informática (INEGI). 1987-2001. Urban Employment National Survey, (ENEU). Quarterly Databases, Mexico.

- Van den Berg, G.J. and J.C. van Ours. 1994. Unemployment Dynamics and Duration Dependence in France, the Netherlands and the United Kingdom. *The Economic Journal* 104 (March), no. 423:432-443.

- Van den Berg, G.J. and J.C. van Ours. 1996. Unemployment Dynamics and Duration Dependence. *Journal of Labor Economics* 14 (January), no. 1:100-125.

- Van den Berg, G.J., A.G.C. van Lomwel, and J.C. van Ours. 2003. Non parametric Estimation of a Dependent Competing Risks Model for Unemployment Durations. Discussion Paper Series no. 4120 (November), Centre for Economic Policy Research.

- Instituto Mexicano de Seguridad Social (IMSS). Ley mexicana de la Seguridad Social. Ultima reforma 2005. http://idse.imss.gob.mx/imss/documentos/Ley001.pdf/.
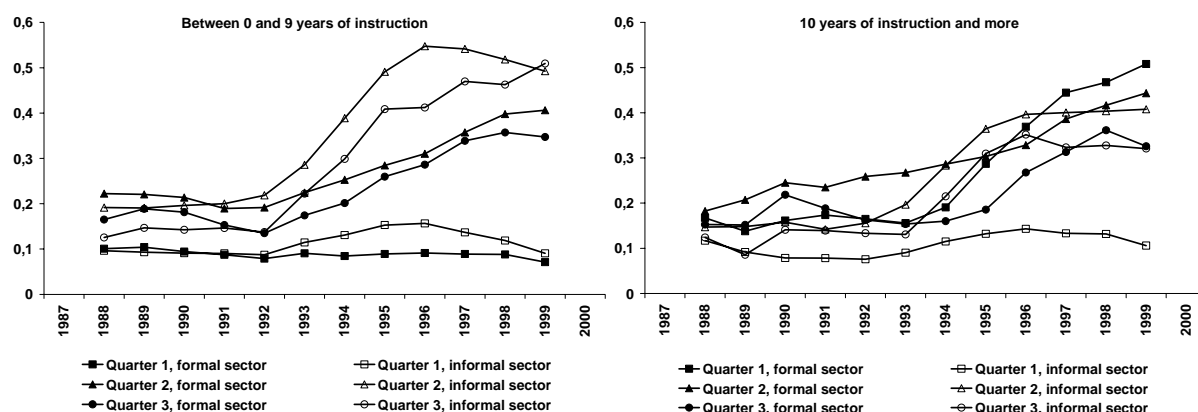
Appendix 1

The two other equations considered in this study are:

$$\frac{\theta_r(2|\tau)}{\theta_r(1|\tau)} = \eta_{2r} \cdot \frac{\psi_{3r}(\tau-2)}{\psi_{3r}(\tau-1)} \cdot \frac{1-\theta_r(0|\tau-1)-\theta_s(0|\tau-1)}{1-\gamma_{2r}\theta_r(0|\tau-1)-\kappa_{11}\theta_s(0|\tau-1)}\{B\} \qquad \text{And:} \quad \frac{\theta_r(2|\tau)}{\theta_r(0|\tau)} = \eta_{2r} \cdot \frac{\psi_{3r}(\tau-2)}{\psi_{3r}(\tau)}\{B\}$$

Where B is equal to:

$$\left\{\frac{\begin{bmatrix}1-\gamma_{2r}\theta_r(0|\tau-2)-\kappa_{11}\theta_s(0|\tau-2)-\gamma_{2r}\theta_r(1|\tau-1)+\gamma_{3r}\theta_r(1|\tau-1)\cdot\theta_r(0|\tau-2)+\kappa_{21}\theta_r(1|\tau-1)\cdot\theta_s(0|\tau-2)\\-\kappa_{11}\theta_s(1|\tau-1)+\kappa_{21}\theta_s(1|\tau-1)\cdot\theta_r(0|\tau-2)+\kappa_{12}\theta_s(1|\tau-1)\cdot\theta_s(0|\tau-2)\end{bmatrix}}{\begin{bmatrix}1-\theta_r(1|\tau-1)-\theta_s(1|\tau-1)-\theta_r(0|\tau-2)+\gamma_{2r}\theta_r(1|\tau-1)\cdot\theta_r(0|\tau-2)+\kappa_{11}\theta_s(1|\tau-1)\cdot\theta_r(0|\tau-2)\\-\theta_s(0|\tau-2)+\kappa_{11}\theta_r(1|\tau-1)\cdot\theta_s(0|\tau-2)+\gamma_{2s}\theta_s(1|\tau-1)\cdot\theta_s(0|\tau-2)\end{bmatrix}}\right\}$$

Appendix 2. Mexico. Urban areas. Groups by instruction level. Quarterly exit probabilities (yearly moving averages*) by unemployment duration class according to the destination sector. I-1987 to IV-2000

Source: Computed from the National Survey of Urban Employment (ENEU).
* MA(3)

Appendix 3. Mexico. Urban areas. Groups by instruction level. Quarterly transition probabilities (yearly moving averages*) between sectors by employment duration class. I-1987 to IV-2000
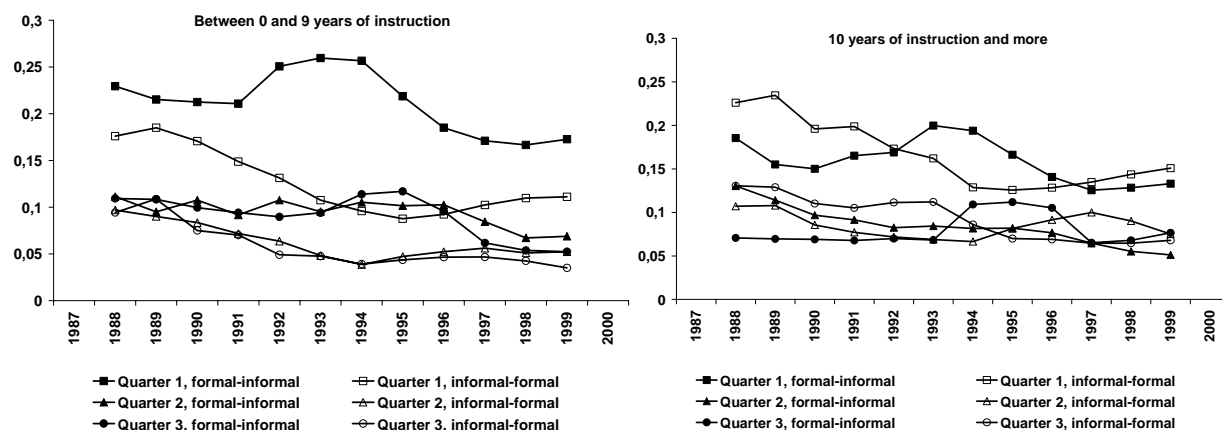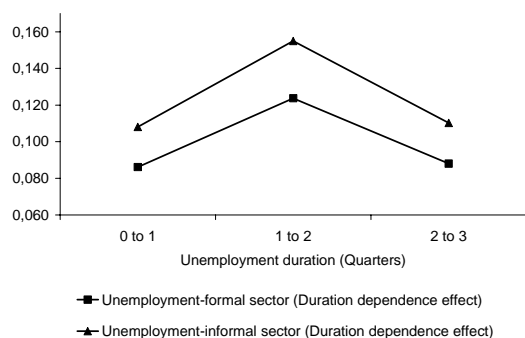

Source: Computed from the National Survey of Urban Employment (ENEU).
* MA(3)
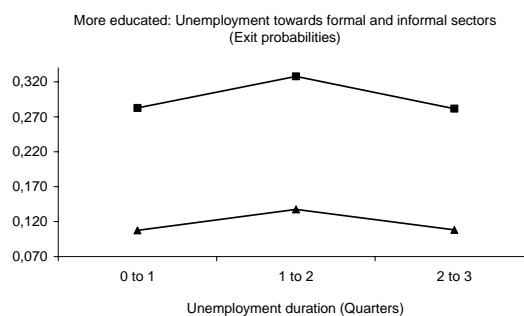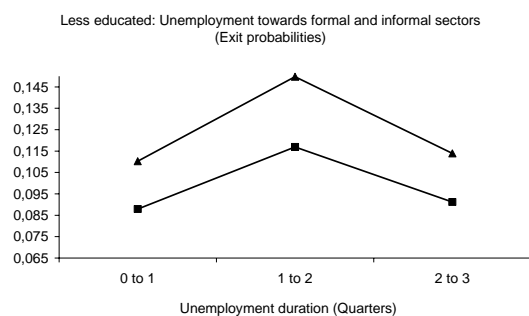
Appendix 4. Implications and conclusions

Transitions from unemployment to formal and informal sectors

Less educated: Unemployment towards formal and informal sectors
(Exit probabilities)

More educated: Unemployment towards formal and informal sectors
(Exit probabilities)

Unemployment duration (Quarters)

Unemployment duration (Quarters)

■ Unemployment-informal sector (Duration dependence effect)
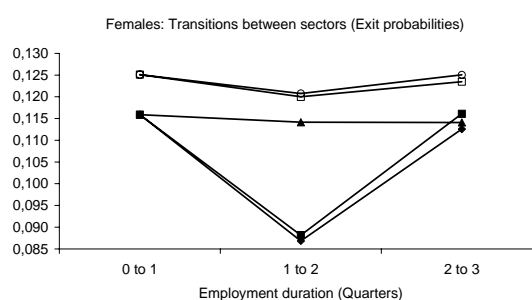▲ Unemployment-informal sector (Duration dependence effect)

■ Unemployment-formal sector (Duration dependence effect)
▲ Unemployment-informal sector (Duration dependence effect)

Source: Computed from the National Survey of Urban Employment (ENEU).

Transitions between sectors

Males: Transitions between sectors (Exit probabilities)

Females: Transitions between sectors (Exit probabilities)

Employment duration (Quarters)

Employment duration (Quarters)
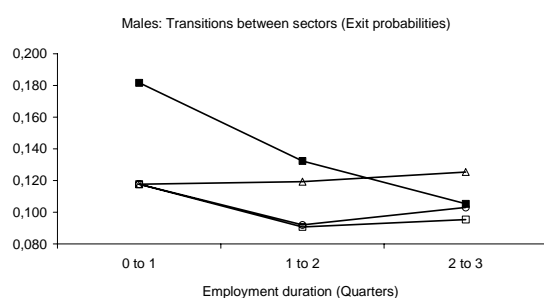
■ F to I: Duration dependence effect
□ I to F: Duration dependence effect
△ I to F: Unobserved heterogeneity effect
⊖ I to F: Duration dependence and unobserved heterogeneity combined effects
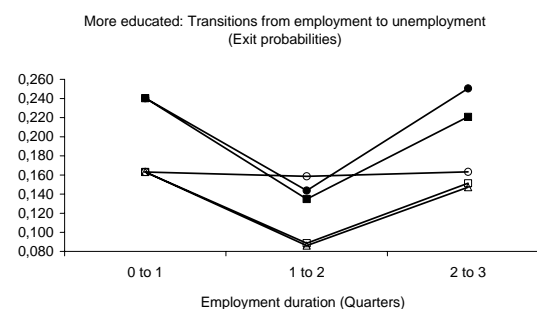
■ F to I: Duration dependence effect
▲ F to I: Unobserved heterogeneity effect
◆ F to I: Duration dependence and unobserved heterogeneity combined effects
□ I to F: Duration dependence effect
⊖ I to F: Duration dependence and cohort combined effects

Source: Computed from the National Survey of Urban Employment (ENEU).

Transitions from formal and informal employment to unemployment

Males: Transition from employment to unemployment (Exit probabilities)

More educated: Transitions from employment to unemployment
(Exit probabilities)

Employment duration (Quarters)

Employment duration (Quarters)

■ F to U: Duration dependence effect
□ I to U: Duration dependence effect
△ I to U: Unobserved heterogeneity effect
⊖ I to U: Duration dependence and unobserved heterogeneity combined effects

■ F to U: Duration dependence effect
● F to U: Duration dependence and cohort combined effects
□ I to U: Duration dependence effect
⊖ I to U: Unobserved heterogeneity effect
△ I to U: Duration dependence and unobserved heterogeneity combined effects

Source: Computed from the National Survey of Urban Employment (ENEU).