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UNEMPLOYMENT AND EMPLOYMENT DYNAMICS IN THE MEXICAN SEGMENTED LABOUR MARKET

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Unemployment and employment dynamics in the Mexican segmented labour market*

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Abstract

This paper analyses unemployment and employment dynamics in the urban Mexican labour market. We use a method to distinguish between the effects of duration dependence and unobserved heterogeneity. Cohort effects are added and identified within the dependent concurrent risks model. We consider the exit from unemployment to the formal and informal sector; the transitions between sectors; and the transitions from the two types of employment to unemployment. The model is estimated on quarterly urban Mexican aggregated data over the period 1987-2001 stratified by sex, age, and education level. It turns out that for all groups of unemployed there is nonmonotonous duration dependence. Unobserved heterogeneity is not found in all groups of unemployed individuals. The first results, obtained from the analysis of the unemployment dynamics 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. The transitions between sectors show shapes of dependence, where we find 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. Between the two following quarters, the probabilities of returning to unemployment differ greatly according to the categories of workers and the origin sectors. It is difficult to draw conclusions from those mechanisms of nonmonotonous dependence in the analysis of transitions from employment to unemployment. The transition risks from formal employment, that is to say mobility between sectors or a return to unemployment are overall homogeneous within the different categories of workers. The exit rates from informal employment are very different. Regarding the mobility between sectors from informal to formal, the presence of heterogeneity is systematically significant (except for the less educated workers). Rather than pure cyclical effects, it seems nevertheless that cohort effects make account of the labour market mutations and of the transformations and particularly of the role of employment sectors.

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

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

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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 period¹.

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 (Revenge 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.* (2000a)).

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.* (2000a)). 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)), especially 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 (young, 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 quarter 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 of 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, age or education of the individuals.

Concerning the segmentation criterion choice, several definitions have been proposed in the case of the Mexican labour market². 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 (1997) classify as informal workers

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.

those who do not receive any social security benefit³. This informal work definition has often 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 based on social security benefits available 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.* (2000a) 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. Section V shows the implications of the model applied to the Mexican urban labour market data. Finally, in section VI we show 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

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

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 periods, at the date \mathbf{t} and conditionally to the unobserved characteristics synthesized in ν is defined by:

$$\mathbf{q}_r(t|\mathbf{t}, \mathbf{n}_r) = \mathbf{y}_{1r}(t) \cdot \mathbf{y}_{2r}(\mathbf{t}) \cdot \mathbf{y}_{3r}(\mathbf{t} - t) \cdot \mathbf{n}_r \quad (1)$$

with $(r = \text{Formal}, \text{Informal})$, $(r = \text{Informal}, \text{Unemployment})$ or $(r = \text{Formal}, \text{Unemployment})$

The functions \mathbf{y}_1 , \mathbf{y}_2 and \mathbf{y}_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 \mathbf{t} where both t and \mathbf{t} 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 ν 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 \mathbf{t} , $P(0 < \sum_r \mathbf{q}_r(t|\mathbf{t}, \mathbf{n}_r) < 1) = 1$.

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

The possibility to separate \mathbf{y}_{3r} allows the control of the seasonal effects and the influence of the inflow composition (Abbring *et al.* (2002)). Thus,

$$\mathbf{y}_{3r} = \exp(\mathbf{w}_{3r}(z) + \mathbf{a}_{3r}(y))$$

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 $y=1, \dots, 14$.

With the t and \mathbf{t} 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 ν_r distribution.

We can then deduce the individual exit from unemployment probability towards employment-specific sector r during the quarter t , given the unemployment inflow in $\mathbf{t} - t$ conditionally to v_r :

$$\begin{aligned} & P(T = t, D = r | \text{Inflow at the date } \mathbf{t} - t, v_r) \\ &= \mathbf{q}_r(t | \mathbf{t}, v_r) \cdot \prod_{i=1}^t [1 - \mathbf{q}_F(t - i | \mathbf{t} - i, v_F) - \mathbf{q}_I(t - i | \mathbf{t} - i, v_I)] \end{aligned} \quad (2)$$

where D represents the variable indicating the destination state.

Insofar as the term v_r is never observable, the only observable empirical counterparts are the aggregated exit rates from unemployment (formal or informal employment) for different values of t and \mathbf{t} , denoted $\mathbf{q}_r(t | \mathbf{t})$ and defined

$$\begin{aligned} & \mathbf{q}_r(t | \mathbf{t}) \\ & \equiv \frac{P(T = t, D = r | \text{inflow at } \mathbf{t} - t)}{pr(T \geq t | \text{inflow at } \mathbf{t} - t)} \\ & = \frac{E_{n_r, n_s} [P(T = t, D = r | \text{inflow at } \mathbf{t} - t, \mathbf{n}_r, \mathbf{n}_s)]}{E_{n_r, n_s} [P(T \geq t | \text{inflow at } \mathbf{t} - t, \mathbf{n}_r, \mathbf{n}_s)]} \end{aligned} \quad (3)$$

If we substitute (1) and (2) in (3) we obtain the general formula to compute the spell/exit rate from unemployment, with duration t at the calendar time \mathbf{t} (Van den Berg *et al.* 2003):

$$\mathbf{q}_r(t | \mathbf{t}) = \frac{\mathbf{y}_{1r}(t) \cdot \mathbf{y}_{2r}(t) \cdot \mathbf{y}_{3r}(t) \cdot E_{v_r, v_s} \left[v_r \prod_{i=1}^t [1 - \mathbf{y}_{1r}(t - i) \cdot \mathbf{y}_{2r}(t - i) \cdot \mathbf{y}_{3r}(t - i) \cdot v_r - \mathbf{y}_{1s}(t - i) \cdot \mathbf{y}_{2s}(t - i) \cdot \mathbf{y}_{3s}(t - i) \cdot v_s] \right]}{E_{v_r, v_s} \left[\prod_{i=1}^t [1 - \mathbf{y}_{1r}(t - i) \cdot \mathbf{y}_{2r}(t - i) \cdot \mathbf{y}_{3r}(t - i) \cdot v_r - \mathbf{y}_{1s}(t - i) \cdot \mathbf{y}_{2s}(t - i) \cdot \mathbf{y}_{3s}(t - i) \cdot v_s] \right]} \quad (4)$$

with $r \neq s$.

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 exit rate out of the specific-state ratios (unemployment, formal or informal employment) intervening at the same moment but evaluated for the successive durations: $\log((\mathbf{q}_r(t | \mathbf{t}) / (\mathbf{q}_r(t - 1 | \mathbf{t})))$. 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 $U(t | \mathbf{t})$ as the number of unemployed individuals (employed in the formal or informal sector) in the duration class t at the end of the quarter \mathbf{t} , then the exit rate observed in \mathbf{t} across the quarter t is given by

$$\mathbf{q}_r(t|\mathbf{t}) = \frac{U(t|\mathbf{t}-1) - U(t+1|\mathbf{t})}{U(t|\mathbf{t}-1)} P_r(t|\mathbf{t})$$

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 \mathbf{t} .

In our study, we have the possibility of observing the exit probability for three duration classes of unemployment. From the general expression (4), we infer the two first for an exit intervening in the date \mathbf{t} ⁴:

For $t = 0$ (1st quarter)

$$\mathbf{q}_r(0|\mathbf{t}) = \mathbf{y}_{1r}(0) \cdot \mathbf{y}_{2r}(\mathbf{t}) \cdot \mathbf{y}_{3r}(\mathbf{t}) \cdot \mathbf{m}_{1r} \text{ where } \mathbf{m}_{kr} = E[v_r^k], \quad k = 1, 2. \quad (5)$$

For $t = 1$ (2nd quarter)

$$\mathbf{q}_r(1|\mathbf{t}) = \mathbf{y}_{1r}(1) \cdot \mathbf{y}_{2r}(\mathbf{t}) \cdot \mathbf{y}_{3r}(\mathbf{t}-1) \cdot \frac{\mathbf{m}_{1r} - \mathbf{q}_r(0|\mathbf{t}-1) \frac{\mathbf{m}_{2r} - \mathbf{q}_s(0|\mathbf{t}-1) \frac{\mathbf{m}_{1r1s}}{\mathbf{m}_{1s}}}{\mathbf{m}_{1r}^2}}{1 - \mathbf{q}_r(0|\mathbf{t}-1) - \mathbf{q}_s(0|\mathbf{t}-1)} \text{ where}$$

$$\mathbf{m}_{1r1s} = E[v_r v_s] = \text{cov}(v_r, v_s) + \mathbf{m}_{1r} \mathbf{m}_{1s} \quad (6)$$

where \mathbf{m}_{jr} represents the j -moment of the variable v_r ($\mathbf{m}_{jr} = E[v_r^j]$).

Considering the ratio of these two exit rates, we get an expression where the functional parameter measuring the cycle effect intervening in \mathbf{t} disappears. Transforming this ratio by the logarithm and including an additive error term, a first nonlinear regression is obtained:

$$\ln\left(\frac{\mathbf{q}_r(1|\mathbf{t})}{\mathbf{q}_r(0|\mathbf{t})}\right) = \ln(\mathbf{h}_{1r}) + \ln\left(\frac{\mathbf{y}_{3r}(\mathbf{t}-1)}{\mathbf{y}_{3r}(\mathbf{t})}\right) + \ln\left(\frac{1 - \mathbf{g}_{2r} \mathbf{q}_r(0|\mathbf{t}-1) - \mathbf{k}_{11} \mathbf{q}_s(0|\mathbf{t}-1)}{1 - \mathbf{q}_r(0|\mathbf{t}-1) - \mathbf{q}_s(0|\mathbf{t}-1)}\right) \quad (7)$$

where the parameters $\mathbf{h}_{1r} = \frac{\mathbf{y}_{1r}(1)}{\mathbf{y}_{1r}(0)}$, $\mathbf{g}_{2r} = \frac{\mathbf{m}_{2r}}{\mathbf{m}_{1r}^2}$ and $\mathbf{k}_{11} = \frac{\mathbf{m}_{1r1s}}{\mathbf{m}_{1r} \mathbf{m}_{1s}}$ are identified (with $r \neq s$)

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 $\ln\left(\frac{\mathbf{y}_{3r}(\mathbf{t}-1)}{\mathbf{y}_{3r}(\mathbf{t})}\right)$ allows the estimation of parameters that

represent the seasonal and annual cohort effects: $\mathbf{w}_{3r}(z)$ and $\mathbf{a}_{3r}(y)$. The identification of the latter terms is ensured by the normalisation of $\mathbf{w}_{3r}(4) = 0$ and $\frac{1}{N} \sum_{y=1}^{Y_N} \mathbf{a}_{3r}(y) = 0$. The latter restriction imposes orthogonality of cohort effects on a linear trend Y_N .

⁴ The expression of the exit rates becoming more complex with the duration class, we analyze those concerning the third quarter of unemployment (formal or informal employment) in appendix 1.

Two other nonlinear regression equations can be deduced from the two ratios $q_r(2|t)/q(1|t)$, et $q_r(2|t)/q(0|t)$ (the last ratio increases the identification of the cohort effects like in Turon (2002)): they are also discussed in appendix 1.

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 \mathbf{t} 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 . More precisely, the latter correspond to the normalized moments of the unobserved heterogeneity distribution ($\mathbf{g}_{r+1,r}$), to the duration dependence function ($\mathbf{h}_{t,r}$), and to the parameters of the cycle and seasonal inflow composition.

The additive error terms in these regressions 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 (ITUNR) as technique of estimation.

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, $q_r(1|t)/q_r(0|t)$ depends on \mathbf{t} through the presence of the observed rate $q_r(0|t-1)$ if and only if $\mathbf{g}_{2r} \neq 1$. Given $\mathbf{g}_{2r} = 1 + \frac{\text{var}(v_r)}{\mathbf{m}_r^2}$, the last condition will not be verified if and only if unobserved heterogeneity exists ($\text{var}(v_r) \neq 0$). In addition, it is important to observe that \mathbf{g}_{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). Thus, if \mathbf{k}_{11} in the equation (7) is equal to 1, and then $\text{cov}(v_r, v_s) = 0$ implies that duration analysis can be done separately for each sector.

However, the introduction of the equation concerning the ratio between $q_r(2|t)/q_r(1|t)$ implies also the analysis of $\mathbf{k}_{12} = \frac{E[v_r, v_s^2]}{\mathbf{m}_r \mathbf{m}_s^2}$ and $\mathbf{k}_{21} = \frac{E[v_r^2, v_s]}{\mathbf{m}_r^2 \mathbf{m}_s}$; therefore, the independent sectors notion can not be checked with only \mathbf{k}_{11} . To decide that the exit-types r are independent, it is necessary that $\mathbf{k}_{11} = 1$, $\mathbf{k}_{12} = \mathbf{g}_{2s}$ and $\mathbf{k}_{21} = \mathbf{g}_{2r}$ with $r \neq s$. In this case, 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 h_{tr} , implies positive unemployment duration dependence between the quarters $t-1$ and t ($\mathbf{y}_{1r}(t) > \mathbf{y}_{1r}(t-1)$) and negative for a coefficient significantly lower than 1 during the corresponding period ($\mathbf{y}_{1r}(t) < \mathbf{y}_{1r}(t-1)$). 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 season can be viewed as evidence that inflow in this season contains a relatively higher quantity of individuals with more important unobserved characteristics. Cohort effects estimation also makes it possible to observe the difference between inflow composition at the bottom of the cycle and inflow composition at the top of the cycle.

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 $\mathbf{g}_2 \geq 1$ if only one equation is estimated, $\mathbf{g}_3 \geq \mathbf{g}_2^2$ if we estimate two equations, and $(\mathbf{g}_4 - \mathbf{g}_2^2) \cdot (\mathbf{g}_2 - 1) \geq (\mathbf{g}_3 - \mathbf{g}_2)^2$ 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.

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 Estadística, Geografía e Informática* (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. The individuals for whom the computation of the employment or unemployment duration was not possible have been removed.

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.

In spite of the sample size, we found inconsistent exit probabilities (lower than 0) in some groups. 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. In this study 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. 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 ($q_r(0|t)$, $q_r(1|t)$ and $q_r(2|t)$) 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, age and instruction level, according to the exit type (formal and informal employment for unemployment duration analysis; informal employment and unemployment for formal employment duration analysis; and formal employment and unemployment for informal employment duration analysis). Finally, we corrected the seasonality of the time series constructed with the exit probabilities using the *Filter Census X11* (Shiskin, Young and Musgrave, 1976).

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 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, age and instruction level⁵, computed using the database containing quarterly observations of the number of individuals who, at the end of their unemployment episodes, find employment in the formal or informal sector of the Mexican labour market.

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.

⁵ We show exit rates by age and instruction level in appendices 2 and 3.

Table 1. Mexico. Urban areas. Exit rate means out of unemployment towards formal and informal sectors by gender, age, and instruction level. I-1987 to IV-2000

Groups	Formal sector			Informal sector		
	q(0 t)	q(1 t)	q(2 t)	q(0 t)	q(1 t)	q(2 t)
<i>Males</i>	0,086	0,285	0,225	0,108	0,348	0,280
<i>Females</i>	0,117	0,289	0,255	0,101	0,256	0,222
<i>From 12 to 24 years old</i>	0,104	0,295	0,244	0,099	0,284	0,177
<i>25 years old and more</i>	0,159	0,287	0,257	0,132	0,348	0,290
<i>Between 0 and 9 years of instruction</i>	0,088	0,282	0,235	0,110	0,359	0,297
<i>10 years of instruction and more</i>	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 found to be 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.

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 first of observed males 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 age class (between 12 and 24 years old, and 25 years old and more) and by education level (between 0 and 9 years of instruction, and 10 years of instruction and more⁶).

The representations of exit rates from unemployment for the two groups defined by age and instruction level 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 divergence situation from 1997.

⁶ An exception appears in the first quarter of unemployment for most educated.

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. Thus, the SS enrolees are classed in the formal sector and those not able to enrol in SS in the informal one. 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 regime⁷.

It should also be stated that sanctions have been strengthened with respect to entrepreneurs and wage-earners in some cases: i) No payment of SS contributions for six months or longer, ii) No declaration of new registrations or false declarations, and iii) No declaration during the deadline established by Law about workers' retained quantities. Since this reform, firms are strongly encouraged to update their declarations and contributions. Thus, the consideration of adding new categories to the obligatory Social Security regime as well as making sanctions heavier are probably at the origin of the significant increase of the number of wage-earners employed in the formal sector from 1997, perhaps explaining the growth of the exit probability towards this sector and the rates convergence, in some cases, beyond 1997.

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 analyse the seasonal composition of the unemployment inflow. We will also be able 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.

⁷ 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.

Figure 1. Mexico. Urban areas. Males and females. Quarterly exit probabilities by unemployment duration class according to the destination sector. I-1987 to IV-2000



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

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 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 analysis for groups by age and by education level are in appendices 4 to 7.

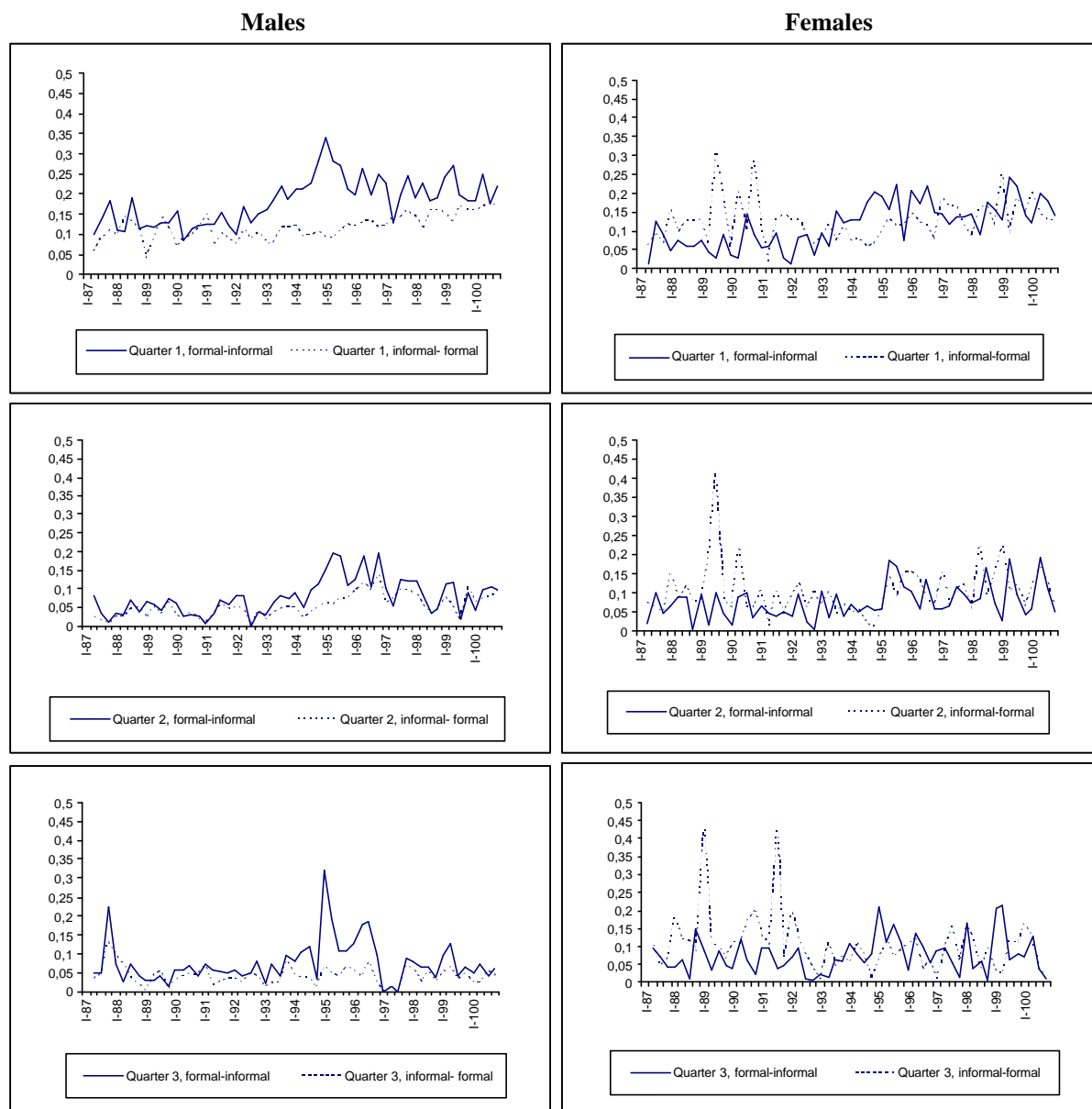
Figure 2 shows the transition behaviour between two sectors for 3 duration classes among males and females, from either the formal sector or the informal sector. For both groups, transition rates show a growing trend during the first quarter of employment, which shows flat or only slight growth during the second and third quarter of employment (groups defined by age and 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, males, the individuals having at least 25 years old and the less educated have the largest probability to move from the formal towards the informal sector for all duration classes. For females who are 12 to 24 years old 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, then older people, 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. 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. 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). For instance, in the males' case (females'), the transition rate towards the informal sector during the first quarter of employment is 27.6% (16.1%), whereas transition towards formal sector in the same duration class shows a rate of 10.5% (11.5%). 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, the young, or the more educated.

Figure 2. Mexico. Urban areas. Males and females. Quarterly transition probabilities between sectors by employment duration class. I-1987 to IV-2000



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

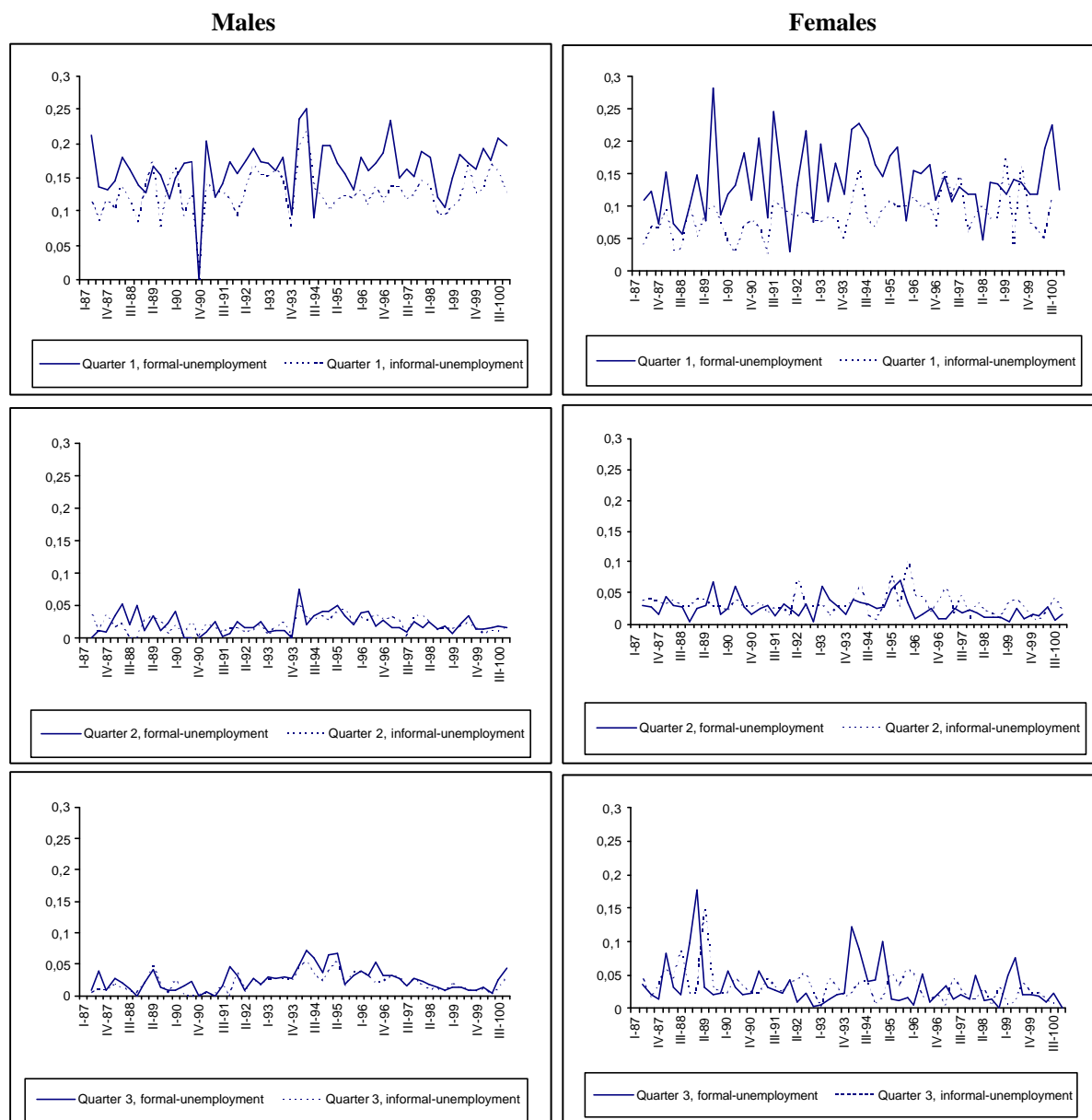
Table 2. Mexico. Urban areas. Transition rate means between sectors by gender, age, and instruction level. I-1987 to IV-2000

Groups	Formal employment => Informal employment			Informal employment => Formal employment		
	q(0 t)	q(1 t)	q(2 t)	q(0 t)	q(1 t)	q(2 t)
<i>Males</i>	0,182	0,077	0,074	0,118	0,052	0,041
<i>Females</i>	0,116	0,076	0,075	0,125	0,105	0,103
<i>From 12 to 24 years old</i>	0,149	0,084	0,085	0,169	0,113	0,083
<i>25 years old and more</i>	0,248	0,109	0,149	0,112	0,054	0,050
<i>Between 0 and 9 years of instruction</i>	0,211	0,094	0,090	0,128	0,063	0,058
<i>10 years of instruction and more</i>	0,161	0,085	0,078	0,170	0,085	0,094

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. During the second and third quarter of employment, transitions towards unemployment show very similar rates. Nevertheless, a difference between transitions towards unemployment is observed in the first duration class. The transition from the formal sector to unemployment shows more important changes than those observed for the transition from informal sector towards unemployment through all groups. For both males and females, transition rates show flat trends or slightly growing, whereas the trends for groups by age and instruction level are slightly decreasing. In general, the probability to fall into unemployment from the formal sector is more important than from the informal sector, especially during the first quarter of employment, as can be observed in table 3, which shows the transition rates mean towards unemployment for groups that we analyse.

Figure 3. Mexico. Urban areas. Males and females. Quarterly transition probabilities towards unemployment by employment duration class. I-1986 to IV-2000



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

Table 3. Mexico. Urban areas. Exit rate means out of employment towards unemployment by gender, age, and instruction level. I-1987 to IV-2000

Groups	Formal employment => Unemployment			Informal employment => Unemployment		
	q(0 t)	q(0 t)	q(0 t)	q(0 t)	q(1 t)	q(2 t)
<i>Males</i>	0,163	0,022	0,025	0,127	0,020	0,019
<i>Females</i>	0,139	0,025	0,034	0,086	0,032	0,031
<i>Between 12 and 24 years old</i>	0,189	0,036	0,035	0,157	0,044	0,037
<i>25 years old and more</i>	0,298	0,032	0,054	0,173	0,027	0,024
<i>Between 0 and 9 years of instruction</i>	0,234	0,039	0,033	0,168	0,027	0,026
<i>10 years of instruction and more</i>	0,240	0,050	0,059	0,163	0,031	0,034

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

According to figure 3, the business cycle's influence on the transition rates towards unemployment does not appear clearly. To examine this, we divide our observations into three sub-periods: i) before crisis, ii) during crisis (1995), and iii) after crisis. We observe that the mean of the rate of return to unemployment from the formal sector is higher than this move from informal sector through three sub-periods. It appears that for most groups, the cycle effect on transition rates towards unemployment is similar for both formal and informal sectors. In fact, the transition rates are less important during a recession year than before and after; during a recession year, workers tend to stay in their employment, either formal or informal, rather than return to unemployment. For older individuals, this diminution is about 20 percentage points in relation to the rate mean in the period before crisis (38.3%). In the informal sector, the decrease of the transition rate mean towards unemployment is more homogenous: rate means for younger, older, and less educated reduce about 9 percent points between the two periods. We also observe during the recession year that transition rates towards unemployment showed by both sectors are closer than before the crisis. In other words, the gap between transition rates from formal and informal sector is shorter in 1995 than that observed in the previous sub-period. After 1995 the gap between transition rates towards unemployment is the shortest of three sub-periods.

Thus, the business cycle has a more important effect in the formal sector, which appears in a sharp decrease in the transition rate towards unemployment during a recession. Despite this decrease, those employed in the formal sector are more likely to return to unemployment than those in the informal sector.

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 4, 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 a 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 39%. For both sectors, the probability of finding employment decreases by 27% 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 an job in the formal sector is about 19%, and only 11% to find a job in the informal one. The inversion of the direction of the dependence between the second and third quarters of unemployment is, on the other hand, greater this time for the informal sector: among those females still unemployed at the end of the second quarter, it becomes even more difficult to find employment in the formal sector than in the informal one during the third quarter. For females, these reductions of probability are respectively about 14.7% and 8.2% in the formal and informal sectors.

The situation of young people is, moreover from this point of view, very similar to that of females and the opposite in all cases of that of older people; the 25 years old and more, for whom the fall of the rate of return to employment between the second and third quarters is much more significant in the direction to the formal sector than in the direction to the informal one (respectively, -18.8% and 12.9%). Finally, the same statement can be made for the most qualified between the second and third quarters.

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 and the youngest, this negative dependence grows weaker when the question regards informal employment. 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.

The unobserved heterogeneity

The estimations of parameters \mathbf{k}_{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 $\text{cov}(v_{\text{formal}}, v_{\text{informal}}) = 0$; 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: $\kappa_{11}=1$, $\kappa_{12}=\gamma_{2\text{informal}}$ and $\kappa_{21}=\gamma_{2\text{formal}}$. 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)⁸. We note that except for the case of the more educated, Wald statistics are always higher than the critical value of the $\mathbf{c}^2(3)$ distribution equal to 6.25 with 10% as the confidence interval. According to our results, the only group for whom the independence null hypothesis is accepted is for the more educated individuals. That means that in the cases of males, females, younger, older, and less educated, the 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, to justify our model specification in the dependent concurrent risks framework. For the more instructed, the unemployment duration analysis can be treated in the framework of a simple duration model that would mean that formal and informal sectors represent independent sub-markets in the Mexican urban labour market.

With the exception of the more educated group of individuals, we analyse the estimations resulting from the unrestricted model. Let us notice nevertheless that \mathbf{g}_2 parameters in both sectors are very close to 1 in all cases. This implies that $\text{var}(v_r) = 0$ 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 fact, Van den Berg *et al.* (2003) observe that for the case of discrete bivariate distributions with two distribution points of support, non-correlation is equivalent to independence. 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.

⁸ The estimations of the restricted models for unemployment durations appear in appendix 8.

Cohort effects

Cohort effects (appendix 9) are less pronounced for females than for males. In this last group, it seems in fact that unemployment inflow composition tends to be degraded as the years go by without an important difference according to the employment sector: males, coming into unemployment in 1987, show on average an exit rate two times that of the average of exit rates shown by those coming into unemployment in the last 90s indifferently of the sector for the job. This evolution does not seem related to a particular cyclic behaviour, and it was not disturbed by the 1995 crisis⁹. In the females' case, it is striking that the only cohort effects are observed just before the peso crisis. In addition the observed cohort effects are appreciably pronounced for the formal sector exit; during the years preceding the crisis, the unemployment inflows contained a more significant quantity of female workers with a more important rates of return to employment (formal employment).

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 than the exit towards informal sector.

In spite of this last effect, 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.

⁹ 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.

Table 4. Mexico. Urban areas. Unemployment duration. Unrestricted concurrent risks models estimation by gender, age, and instruction level. (Standard deviations are in lower font size)

	Gender		Age		Instruction level							
	Males	Females	From 12 to 24 years old	25 years old and more	Between 0 and 9 years of instruction*	10 years of instruction and more**						
<i>Unobserved heterogeneity distribution</i>												
g2 _{2formal}	0,997	0,003	0,994	0,005	0,965	0,006	0,989	0,007	0,998	0,002	1,003	0,002
g3 _{2formal}	0,891	0,041	1,026	0,045	0,792	0,061	0,796	0,091	0,994	0,020	1,018	0,009
g2 _{2informal}	0,998	0,002	0,985	0,004	0,971	0,005	1,006	0,005	0,997	0,001	1,004	0,004
g3 _{2informal}	1,045	0,019	0,894	0,032	0,890	0,041	1,045	0,048	1,001	0,009	0,986	0,027
k ₁₁	0,997	0,003	0,987	0,004	0,978	0,006	0,999	0,006	0,994	0,001	0,996	0,003
k ₁₂	0,939	0,022	0,952	0,030	0,849	0,048	0,937	0,047	0,974	0,010	1,011	0,010
k ₂₁	1,080	0,031	0,909	0,031	0,898	0,053	1,097	0,058	0,992	0,013	0,984	0,009
<i>Duration dependence</i>												
h _{1formal} (Between the first and the second quarters of unemployment)	1,389	0,023	1,191	0,044	1,231	0,050	1,133	0,029	1,309	0,022	1,175	0,040
h _{2formal} (Between the second and the third quarters of unemployment)	0,729	0,013	0,853	0,035	0,812	0,037	0,870	0,025	0,786	0,016	0,845	0,031
h _{1informal} (Between the first and the second quarters of unemployment)	1,385	0,024	1,109	0,048	1,147	0,050	1,317	0,028	1,342	0,026	1,277	0,041
h _{2informal} (Between the second and the third quarters of unemployment)	0,730	0,014	0,918	0,045	0,871	0,042	0,774	0,018	0,768	0,017	0,796	0,029
<i>Formal sector: Unemployment inflow composition cycle</i>												
1987.I-1987.IV	0,096	0,019	-0,105	0,125	0,138	0,029	-0,008	0,019	-0,020	0,061	0,071	0,015
1988.I-1988.IV	0,073	0,021	-0,047	0,109	0,147	0,033	-0,009	0,028	-0,013	0,054	0,071	0,025
1989.I-1989.IV	0,074	0,021	-0,027	0,092	0,112	0,033	-0,030	0,039	0,000	0,047	0,020	0,062
1990.I-1990.IV	0,062	0,021	0,015	0,073	0,118	0,033	0,099	0,066	0,006	0,039	0,011	0,052
1991.I-1991.IV	0,027	0,020	0,008	0,054	0,049	0,032	0,078	0,055	-0,017	0,033	-0,028	0,041
1992.I-1992.IV	0,036	0,019	0,062	0,037	0,076	0,030	0,085	0,043	0,044	0,026	-0,007	0,031
1993.I-1993.IV	0,005	0,019	0,089	0,024	0,033	0,028	0,079	0,032	0,035	0,022	-0,037	0,021
1994.I-1994.IV	0,001	0,017	0,118	0,023	0,049	0,027	0,059	0,023	0,078	0,020	-0,054	0,013
1995.I-1995.IV	-0,004	0,016	0,054	0,036	-0,017	0,028	0,014	0,015	0,065	0,023	-0,032	0,011
1996.I-1996.IV	-0,025	0,018	0,007	0,053	-0,040	0,028	-0,016	0,015	0,046	0,030	-0,022	0,018
1997.I-1997.IV	-0,042	0,020	-0,009	0,071	-0,056	0,031	-0,041	0,023	0,000	0,038	-0,022	0,027
1998.I-1998.IV	-0,069	0,023	-0,020	0,092	-0,131	0,041	-0,067	0,034	-0,037	0,048	0,001	0,037
1999.I-1999.IV	-0,097	0,030	-0,044	0,112	-0,241	0,048	-0,102	0,046	-0,072	0,059	0,010	0,048
2000.I-2000.IV	-0,135	0,036	-0,100	0,133	-0,238	0,064	-0,141	0,060	-0,115	0,070	0,019	0,059
<i>Informal sector: Unemployment inflow composition cycle</i>												
1987.I-1987.IV	0,085	0,017	-0,175	0,115	0,140	0,028	-0,018	0,018	-0,096	0,057	0,057	0,017
1988.I-1988.IV	0,067	0,019	-0,119	0,100	0,144	0,031	-0,047	0,027	-0,078	0,050	0,084	0,026
1989.I-1989.IV	0,072	0,020	-0,079	0,085	0,118	0,031	-0,076	0,037	-0,050	0,043	-0,082	0,064
1990.I-1990.IV	0,060	0,020	-0,007	0,068	0,118	0,031	0,163	0,063	-0,031	0,036	-0,050	0,053
1991.I-1991.IV	0,028	0,019	-0,007	0,051	0,055	0,030	0,119	0,053	-0,038	0,030	-0,055	0,043
1992.I-1992.IV	0,036	0,018	0,049	0,036	0,083	0,028	0,114	0,042	0,021	0,024	-0,028	0,033
1993.I-1993.IV	0,006	0,017	0,078	0,024	0,040	0,027	0,092	0,032	0,025	0,020	-0,016	0,023
1994.I-1994.IV	0,001	0,016	0,118	0,023	0,051	0,025	0,050	0,022	0,083	0,018	0,017	0,015
1995.I-1995.IV	-0,002	0,016	0,049	0,035	-0,017	0,027	0,011	0,015	0,077	0,021	0,016	0,013
1996.I-1996.IV	-0,024	0,017	0,022	0,049	-0,043	0,026	-0,021	0,014	0,073	0,027	0,009	0,020
1997.I-1997.IV	-0,043	0,018	0,022	0,066	-0,071	0,029	-0,045	0,022	0,040	0,035	0,024	0,029
1998.I-1998.IV	-0,068	0,022	0,036	0,085	-0,147	0,039	-0,085	0,033	0,016	0,044	0,029	0,040
1999.I-1999.IV	-0,093	0,028	0,024	0,104	-0,233	0,046	-0,117	0,045	-0,006	0,054	0,018	0,050
2000.I-2000.IV	-0,125	0,034	-0,009	0,124	-0,236	0,060	-0,140	0,059	-0,035	0,065	-0,022	0,062
<i>Formal sector: seasonal unemployment inflow composition</i>												
Quarter I (January-March)	0,006	0,015	-0,001	0,033	0,021	0,028	0,004	0,023	-0,013	0,016	0,035	0,020
Quarter II (April-June)	0,004	0,004	0,003	0,011	0,001	0,007	0,013	0,007	0,003	0,007	-0,001	0,006
Quarter III (July-September)	-0,012	0,015	-0,004	0,031	-0,004	0,028	-0,009	0,022	-0,016	0,015	0,032	0,019
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
<i>Informal sector: seasonal unemployment inflow composition</i>												
Quarter I (January-March)	0,023	0,015	-0,047	0,031	0,029	0,029	0,030	0,022	-0,021	0,015	0,009	0,021
Quarter II (April-June)	0,004	0,004	-0,001	0,010	0,003	0,006	0,020	0,007	-0,004	0,006	-0,006	0,006
Quarter III (July-September)	0,007	0,015	-0,042	0,028	0,004	0,029	0,014	0,021	-0,018	0,014	0,019	0,020
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
<i>Residual covariance matrix (SUNR) S=(s_{ij})</i>												
s ₁₁ (Equation 1 formal, Equation 1 formal)	0,085	0,177	0,176	0,146	0,113	0,089						
s ₁₂ (Equation 2 formal, Equation 1 formal)	0,038	-0,020	-0,058	0,010	0,028	-0,020						
s ₁₃ (Equation 3 formal, Equation 1 formal)	0,303	0,390	0,321	0,375	0,356	0,168						
s ₁₄ (Equation 1 informal, Equation 1 formal)	0,080	0,179	0,199	0,104	0,098	-0,003						
s ₁₅ (Equation 2 informal, Equation 1 formal)	0,035	-0,055	-0,141	0,038	0,039	-0,020						
s ₁₆ (Equation 3 informal, Equation 1 formal)	0,284	0,315	0,180	0,338	0,343	-0,055						
s ₂₂ (Equation 2 formal, Equation 2 formal)	0,062	-0,018	0,124	0,012	0,041	0,132						
s ₂₃ (Equation 2 formal, Equation 3 formal)	0,243	0,402	0,147	0,278	0,170	0,256						
s ₂₄ (Equation 2, formal, Equation 1 informal)	0,037	0,207	-0,054	0,100	0,022	-0,013						
s ₂₅ (Equation 2 formal, Equation 2 informal)	0,047	-0,088	0,111	0,033	0,038	0,068						
s ₂₆ (Equation 2 formal, Equation 3 informal)	0,203	0,307	0,128	0,320	0,147	0,125						
s ₃₃ (Equation 3 formal, Equation 3 formal)	1,338	0,193	1,203	0,148	1,313	0,999						
s ₃₄ (Equation 3 formal, Equation 1 informal)	0,289	-0,018	0,392	0,012	0,303	-0,038						
s ₃₅ (Equation 3 formal, Equation 2 informal)	0,199	0,070	-0,110	0,038	0,189	0,106						
s ₃₆ (Equation 3 formal, Equation 3 informal)	1,196	0,122	0,764	0,117	1,223	0,150						
s ₄₄ (Equation 1 informal, Equation 1 informal)	0,079	-0,088	0,231	0,033	0,091	0,101						
s ₄₅ (Equation 1 informal, Equation 2 informal)	0,029	0,140	-0,156	0,062	0,026	0,001						
s ₄₆ (Equation 1 informal, Equation 3 informal)	0,267	0,112	0,226	0,229	0,292	0,247						
s ₅₅ (Equation 2 informal, Equation 2 informal)	0,061	0,031	0,207	0,181	0,059	0,138						
s ₅₆ (Equation 2 informal, Equation 3 informal)	0,216	1,077	0,081	1,090	0,205	0,322						
s ₆₆ (Equation 3 informal, Equation 3 informal)	1,180	1,036	0,763	1,313	1,231	1,348						
<i>Objective value</i>	6,200	6,015	5,725	5,904	6,196	6,430						
<i>Wald statistic*** for the restrictions k₁₁=1, k₁₂=g_{2informal} and k₂₁=g_{2formal}</i>												
	33,030	12,400	23,590	20,450	23,550	4,330						

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.

H₀: There is independence between formal and informal sectors.

Non significant coefficients at the 10% confidence interval are in bold type.

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 5 and 6 we show the results respectively for the formal-employment and informal-employment durations¹⁰. Here we still take the same individual characteristics used in the unemployment duration analysis: gender, age, 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. This dependence is monotonous, decreasing at least through the first three quarters of employment. However, 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 28.2% between the first and the second quarters while this decrease is about 14.8% for the transition in the opposite way. While the probability of a move from formal to informal sector decreases more than 20% between the second and the third quarters, the transition rate in the opposite way does not change significantly.

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 24.6%) while it increases by 33.7% 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, 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, 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 (26.5%).

When the dependence shape of the less educated for transitions from the informal sector towards the formal one is compared to that for the more educated, we observe that the transition rates from formal to informal for the less educated decrease much more between the first and the second quarters (-42.4%) than between the second and the third quarters (-17.4%).

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

¹⁰ The restricted model estimations are in appendices 10 and 12.

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, the youngest 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. 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.

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 g_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 overall homogeneous within the different categories of workers.

However, for the exit rates from informal employment are very different: regarding the mobility between sectors from informal to formal, the presence of heterogeneity is systematically significant (except for the less educated workers). The workers holding informal employment and regrouped according both instruction and gender criteria show as well rates of return to unemployment significantly heterogeneous: the distribution of those factors of unobserved heterogeneity could be represented in those different cases by a bivariate distribution with two support points.

Even if one notes the absence of correlations between the exit-specific unobserved heterogeneity factors from informal employment for males, the youngest, and both education levels (k_{11} coefficient very close to 1), one always rejects the hypothesis of independence: The estimated Wald statistic for males, females, the younger, and both groups of instruction level are greater than the $\chi^2(3) = 6,25$ critical value, implying that the informal-employment duration analysis cannot be done independently of the exit type and justify the dependent concurrent risks approach.

Cohort effects

Appendices 11 and 13 illustrate the cohort effects evolution for the transitions between sectors, on one hand, and the transition towards unemployment, on the other. The cohort effects influencing the transitions are compared with the PDG (x10%) evolution. Rather than pure cyclical effects, it seems nevertheless that these cohort effects make account of the labour market mutations and of the transformations and particularly of the role of employment sectors.

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 do not promote a mobility towards the informal sector, by the late 90s it tends to integrate the workers with more mobility and in advantage capable of coming to the informal employment sector; in 2000, educated workers coming to the formal sector show a mobility rate between sectors nearly three times that in 1988.

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; it is moreover procyclical and seems to have slowed at the time of the 95 crisis. One finds again this trend in the older workers' group and, to a lesser measure that is naturally more attenuated, in the males' and females' groups.

The mobility in the opposite direction 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 crisis period or the preceding year; the educated worker cohorts in the informal employment coming during the crisis or just before 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.

For the younger group, it is interesting to note that cohort effects are overthrown after the 95 crisis: the informal employment inflows are formed by the young who show passage rates towards formal employment that systematically decrease each year beyond 1995. It seems that beyond this crisis period, the younger are more confined to informal employment and have less access to formal jobs.

Being the rates of returns to unemployment, the cohort effects appear above all around the year 1995. Thus the educated workers, accepting formal employment at the moment of the crisis, show a return to unemployment lower than that observed for workers attached to another cohort. For informal employment, the effect of a weaker rate of return to unemployment is observed as well not only in the crisis cohort but for the two consecutive cohorts.

One notes a tendency for the older workers even beyond the crisis years. The following cohorts are characterized by a higher permeability between formal employment and unemployment, which is not apparently the case for rates of return to unemployment from informal employment: "the bulk-heading" is not made, as one would expect, between formal employment and unemployment, but between informal employment and unemployment (at least for older workers).

Table 5. Mexico. Urban areas. Formal employment. Unrestricted concurrent risks models estimation by gender, age, and instruction level. (Standard deviations are in lower font size)

	Gender		Age		Instruction level							
	Males	Females	From 12 to 24 years old	25 years old and more	Between 0 and 9 years of instruction*	10 years of instruction and more**						
<i>Unobserved heterogeneity distribution</i>												
$\xi_{2informal}$	0,976	0,012	1,031	0,024	1,215	0,283	1,007	0,003	1,117	0,136	1,017	0,014
$\xi_{3informal}$	0,865	0,192	1,190	0,353	-1,351	6,011	1,058	0,027	4,110	2,124	1,074	0,103
$\xi_{2unemployment}$	1,015	0,018	1,031	0,064	0,915	0,191	1,005	0,003	0,994	0,123	0,986	0,015
$\xi_{3unemployment}$	0,865	0,192	2,999	1,760	3,795	5,469	0,981	0,027	-0,419	1,287	0,833	0,148
k_{11}	1,736	0,496	1,010	0,025	1,084	0,177	0,995	0,002	0,930	0,096	0,996	0,009
k_{12}	1,005	0,012	1,003	0,466	-1,046	4,049	1,014	0,020	2,187	1,310	1,105	0,087
k_{21}	1,092	0,291	1,042	0,310	5,829	4,381	0,970	0,018	-0,627	1,453	0,969	0,084
<i>Duration dependence</i>												
$h_{1informal}$ (Between the first and the second quarters of formal employment)	0,717	0,014	0,754	0,033	0,709	0,045	0,711	0,031	0,576	0,035	0,757	0,041
$h_{2informal}$ (Between the second and the third quarters of formal employment)	0,793	0,012	1,337	0,059	0,804	0,056	1,320	0,060	0,826	0,044	1,265	0,073
$h_{1unemployment}$ (Between the first and the second quarters of formal employment)	0,578	0,015	0,495	0,022	0,333	0,029	0,360	0,016	0,274	0,025	0,548	0,031
$h_{2unemployment}$ (Between the second and the third quarters of formal employment)	0,668	0,013	1,913	0,083	0,703	0,064	2,493	0,114	0,760	0,052	1,613	0,096
<i>Informal sector: Formal employment inflow composition cycle</i>												
1987.I-1987.IV	-0,005	0,010	-0,022	0,009	-0,013	0,158	-0,004	0,019	0,107	0,144	-0,022	0,034
1988.I-1988.IV	-0,014	0,004	-0,022	0,010	0,072	0,123	-0,062	0,023	0,096	0,117	-0,078	0,031
1989.I-1989.IV	0,000	0,006	-0,014	0,010	0,046	0,148	-0,073	0,023	-0,090	0,136	-0,060	0,029
1990.I-1990.IV	0,012	0,007	-0,025	0,010	0,375	0,159	-0,080	0,022	-0,071	0,145	-0,052	0,029
1991.I-1991.IV	-0,049	0,010	-0,026	0,010	0,501	0,158	-0,084	0,020	-0,161	0,148	-0,102	0,024
1992.I-1992.IV	-0,037	0,010	-0,042	0,010	0,277	0,154	-0,070	0,019	-0,084	0,143	-0,084	0,027
1993.I-1993.IV	-0,040	0,010	-0,023	0,009	0,245	0,145	-0,025	0,017	0,027	0,132	-0,078	0,022
1994.I-1994.IV	-0,031	0,008	-0,013	0,008	0,347	0,140	-0,004	0,016	-0,103	0,122	-0,036	0,018
1995.I-1995.IV	-0,014	0,004	-0,007	0,008	-0,425	0,133	-0,010	0,016	-0,200	0,117	-0,047	0,017
1996.I-1996.IV	0,007	0,005	0,015	0,008	-0,393	0,132	-0,005	0,017	-0,155	0,120	-0,005	0,020
1997.I-1997.IV	0,027	0,008	0,031	0,009	-0,271	0,145	0,068	0,020	0,055	0,133	0,085	0,027
1998.I-1998.IV	0,042	0,010	0,039	0,011	-0,137	0,170	0,079	0,024	0,103	0,158	0,105	0,025
1999.I-1999.IV	0,047	0,011	0,049	0,015	-0,254	0,208	0,100	0,029	0,237	0,181	0,168	0,044
2000.I-2000.IV	0,056	0,013	0,058	0,018	-0,371	0,252	0,169	0,035	0,240	0,231	0,207	0,053
<i>Unemployment: Formal employment inflow composition cycle</i>												
1987.I-1987.IV	-0,015	0,014	0,001	0,023	-0,254	0,227	0,044	0,030	-0,102	0,240	0,124	0,052
1988.I-1988.IV	-0,008	0,006	-0,024	0,026	0,033	0,148	-0,048	0,037	-0,005	0,176	0,046	0,049
1989.I-1989.IV	-0,001	0,008	-0,049	0,026	0,041	0,180	-0,078	0,037	-0,151	0,213	0,031	0,046
1990.I-1990.IV	0,004	0,010	-0,046	0,026	0,532	0,201	-0,092	0,035	0,031	0,228	0,022	0,047
1991.I-1991.IV	-0,021	0,015	-0,047	0,025	0,413	0,201	-0,120	0,032	0,090	0,230	-0,088	0,040
1992.I-1992.IV	-0,029	0,014	-0,059	0,023	0,076	0,195	-0,078	0,030	-0,139	0,222	-0,005	0,045
1993.I-1993.IV	-0,035	0,013	-0,009	0,022	0,102	0,185	-0,018	0,027	0,241	0,209	-0,057	0,038
1994.I-1994.IV	-0,041	0,011	-0,019	0,021	0,164	0,182	0,002	0,025	-0,095	0,195	-0,070	0,032
1995.I-1995.IV	-0,014	0,007	0,003	0,022	-0,542	0,168	-0,032	0,025	-0,146	0,186	-0,131	0,030
1996.I-1996.IV	0,006	0,007	0,042	0,021	-0,292	0,164	-0,040	0,027	-0,079	0,188	-0,084	0,034
1997.I-1997.IV	0,020	0,012	0,061	0,023	-0,221	0,179	0,070	0,032	-0,029	0,209	0,016	0,043
1998.I-1998.IV	0,030	0,014	0,047	0,028	-0,082	0,213	0,080	0,038	-0,200	0,246	0,013	0,056
1999.I-1999.IV	0,042	0,016	0,032	0,036	-0,083	0,284	0,110	0,046	0,271	0,297	0,101	0,071
2000.I-2000.IV	0,063	0,019	0,067	0,047	0,114	0,323	0,201	0,056	0,312	0,359	0,082	0,086
<i>Informal sector: seasonal formal employment inflow composition</i>												
Quarter I (January-March)	0,004	0,002	-0,073	0,030	-0,006	0,050	-0,031	0,034	0,014	0,060	-0,016	0,028
Quarter II (April-June)	0,009	0,004	-0,012	0,002	0,014	0,050	-0,012	0,004	-0,011	0,016	-0,022	0,005
Quarter III (July-September)	0,007	0,002	-0,064	0,030	-0,031	0,046	-0,016	0,034	0,032	0,047	0,000	0,028
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
<i>Unemployment: seasonal formal employment inflow composition</i>												
Quarter I (January-March)	0,006	0,004	0,019	0,036	0,002	0,059	-0,025	0,039	0,023	0,069	-0,060	0,052
Quarter II (April-June)	0,011	0,005	-0,011	0,006	0,000	0,069	-0,017	0,006	0,000	0,074	-0,017	0,009
Quarter III (July-September)	0,005	0,003	0,032	0,036	0,123	0,067	-0,008	0,038	-0,011	0,073	-0,052	0,051
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
<i>Residual covariance matrix (SUNR) $S = (S_{ij})$</i>												
S_{11} (Equation 1 informal, Equation 1 informal)	0,097	0,135			0,080	0,114			0,105	0,163		
S_{12} (Equation 2 informal, Equation 1 informal)	-0,116	-0,094			-0,012	-0,086			-0,010	-0,116		
S_{13} (Equation 3 informal, Equation 1 informal)	-0,276	0,103			0,021	0,083			-0,006	0,131		
S_{14} (Equation 1 unemployment, Equation 1 informal)	0,085	0,070			0,088	0,056			0,110	0,030		
S_{15} (Equation 2 unemployment, Equation 1 informal)	-0,059	-0,139			0,041	0,054			0,068	0,030		
S_{16} (Equation 3 unemployment, Equation 1 informal)	-0,143	-0,164			-0,043	0,277			-0,058	0,160		
S_{22} (Equation 2 informal, Equation 2 informal)	0,219	0,323			0,144	0,225			0,142	0,374		
S_{23} (Equation 2 informal, Equation 3 informal)	0,521	0,530			0,120	0,336			0,076	0,611		
S_{24} (Equation 2, informal, Equation 1 unemployment)	-0,148	-0,011			0,032	-0,034			0,072	0,064		
S_{25} (Equation 2 informal, Equation 2 unemployment)	0,151	0,369			0,139	0,140			0,092	0,120		
S_{26} (Equation 2 informal, Equation 3 unemployment)	0,364	0,860			0,028	0,271			-0,100	0,467		
S_{33} (Equation 3 informal, Equation 3 informal)	1,239	1,483			0,525	1,056			0,432	1,807		
S_{34} (Equation 3 informal, Equation 1 unemployment)	-0,356	0,142			-0,034	0,055			-0,036	0,238		
S_{35} (Equation 3 informal, Equation 2 unemployment)	0,364	0,531			0,037	0,542			-0,105	0,392		
S_{36} (Equation 3 informal, Equation 3 unemployment)	0,877	1,622			0,365	1,517			0,127	1,618		
S_{44} (Equation 1 unemployment, Equation 1 unemployment)	0,352	0,106			0,227	0,097			0,307	0,206		
S_{45} (Equation 1 unemployment, Equation 2 unemployment)	-0,369	-0,019			0,097	-0,105			0,066	-0,045		
S_{46} (Equation 1 unemployment, Equation 3 unemployment)	-0,876	0,214			-0,099	-0,009			-0,128	0,415		
S_{55} (Equation 2 unemployment, Equation 2 unemployment)	0,495	0,643			0,283	0,937			0,339	0,661		
S_{56} (Equation 2 unemployment, Equation 3 unemployment)	1,175	1,503			-0,002	2,073			-0,069	1,518		
S_{66} (Equation 3 unemployment, Equation 3 unemployment)	2,792	4,146			0,679	5,168			0,623	4,819		
<i>Objective value</i>												
	5,549	6,473			4,310	6,240			4,299	6,344		
<i>Wald statistic*** for the restrictions $k_{11}=1$, $k_{12}=\xi_{2unemployment}$ and $k_{21}=\xi_{2informal}$</i>												
	7,310	0,560			1,870	4,530			2,860	7,030		

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 formal and informal sectors.

Non significant coefficients at the 10% confidence interval are in bold type.

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 ($\mathbf{y}_{2r}(\mathbf{t}) = \mathbf{y}_{2r}$). In order to take into account the evolution differences of the exit rates between groups and between sectors, we simulate the rates $q_r(1|\mathbf{t})$ then $q_r(2|\mathbf{t})$ from the equations defining the ratios $q_r(1|\mathbf{t})/q_r(0|\mathbf{t})$ and $q_r(2|\mathbf{t})/q_r(1|\mathbf{t})$ (equation (7) and equation defined in appendix 1) and using the mean of $q_r(0|\mathbf{t})$ 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 1995¹¹. 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 14 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 10% 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 162% higher than that of an employment in the informal sector!! But there again, the dynamics and its effects do not modify the observed gap.

¹¹ 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 Informal/Formal. A similar evolution of mobility rates is also observed in the case of less qualified group of individuals.

For the most qualified 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 informal employment is not enough to compensate the unobserved heterogeneity effect at the origin of the declining mobility rate from the informal sector. This result illustrates the importance of decomposing the different effects of the rates dynamics and to take account of the combined effects.

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: 28% of variation with respect to the informal sector in the case of males, and 47% in the case of most qualified. 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 in the formal sector.

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 formal 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 or gender criteria, also present significantly heterogeneous return rates to unemployment; in the case of the mobility between sectors coming from the informal, one also notes the presence of heterogeneity which is systematically significant (with the exception of the less qualified workers). Even if one notes the absence of correlations between these specific heterogeneity factors in each exit state from informal employment for males

and the two groups defined by education level, one always rejects the null hypothesis of independence between the latent employment durations.

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 integrate the workers with more mobility and capable in advantage of coming to the informal employment sector. These effects show probably the transformation of a sector which, by the 90s, appears less and less being playing the role of primary sector with entrance barriers.

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Appendix 1

$$\mathbf{q}_r(2|t) = \mathbf{y}_{1r}(2) \cdot \mathbf{y}_{2r}(t) \cdot \mathbf{y}_{3r}(t-2) \{A\}$$

Where A is equal to:

$$\left[\begin{array}{l} \left[1 - \frac{m_{2r}}{m_r} \mathbf{q}_r(0|t-2) - \frac{m_{r1s}}{m_s} \mathbf{q}_s(0|t-2) - \frac{m_{2r}}{m_r} \mathbf{q}_r(1|t-1) + \frac{m_{3r}}{m_r} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_r(0|t-2) + \frac{m_{2r1s}}{m_r m_s} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right. \\ \left. - \frac{m_{r1s}}{m_s} \mathbf{q}_r(1|t-1) + \frac{m_{2r1s}}{m_r m_s} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_r(0|t-2) + \frac{m_{r2s}}{m_r m_s} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right] \\ \left[1 - \mathbf{q}_r(0|t-2) - \mathbf{q}_s(0|t-2) - \mathbf{q}_r(1|t-1) + \frac{m_{2r}}{m_r} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_r(0|t-2) + \frac{m_{r1s}}{m_s} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right. \\ \left. - \mathbf{q}_r(0|t-2) + \frac{m_{r1s}}{m_s} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_r(0|t-2) + \frac{m_{2s}}{m_s} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right] \end{array} \right]$$

Thus :

$$\frac{\mathbf{q}_r(2|t)}{\mathbf{q}_r(1|t)} = h_{2r} \cdot \frac{\mathbf{y}_{3r}(t-2)}{\mathbf{y}_{3r}(t-1)} \cdot \frac{1 - \mathbf{q}_r(0|t-1) - \mathbf{q}_s(0|t-1)}{1 - g_{2r} \mathbf{q}_r(0|t-1) - k_{11} \mathbf{q}_s(0|t-1)} \{B\}$$

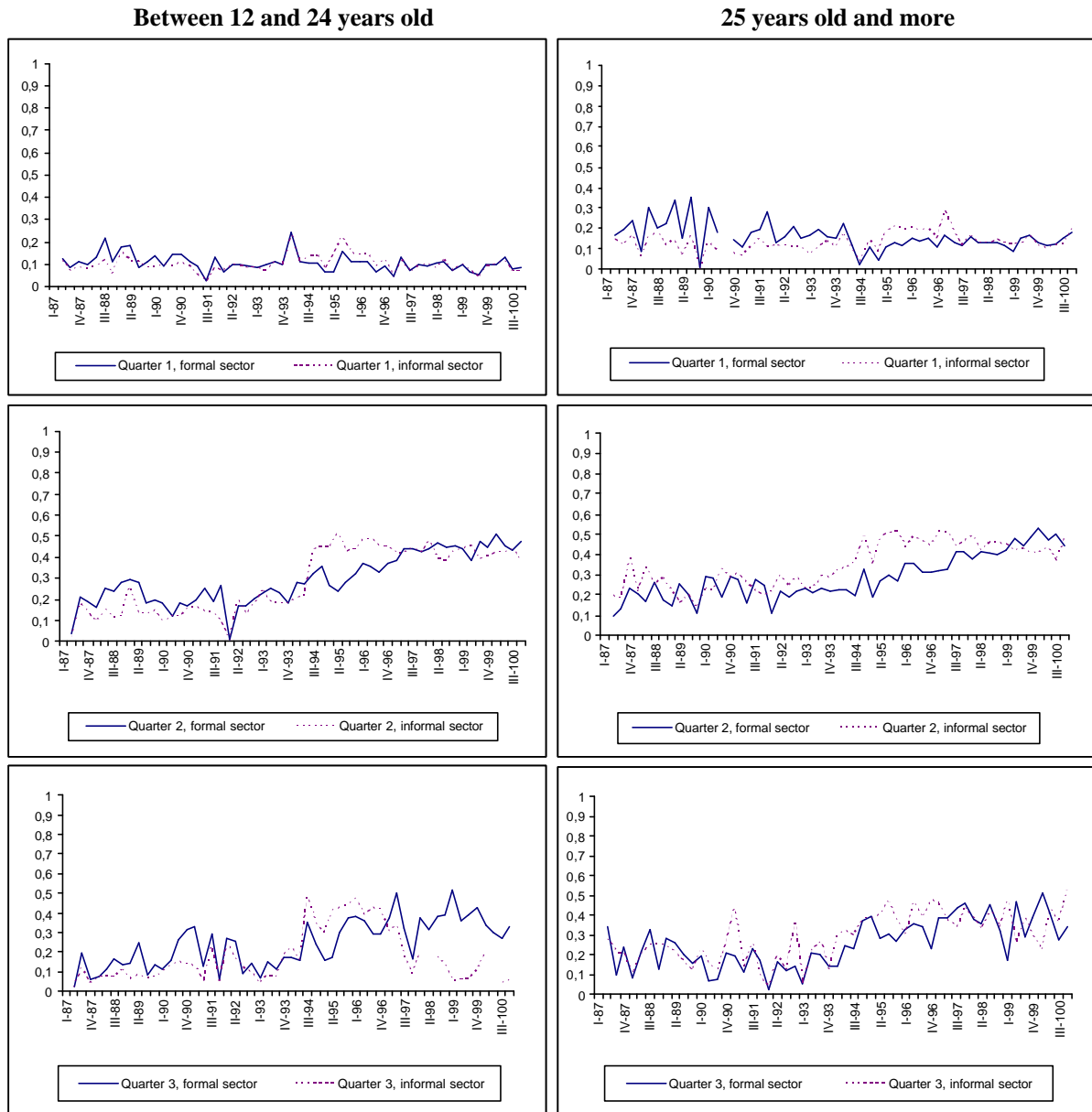
And:

$$\frac{\mathbf{q}_r(2|t)}{\mathbf{q}_r(0|t)} = h_{2r} \cdot \frac{\mathbf{y}_{3r}(t-2)}{\mathbf{y}_{3r}(t)} \{B\}$$

Where B is equal to:

$$\left[\begin{array}{l} \left[1 - g_{2r} \mathbf{q}_r(0|t-2) - k_{11} \mathbf{q}_s(0|t-2) - g_{2r} \mathbf{q}_r(1|t-1) + g_{3r} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_r(0|t-2) + k_{21} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right. \\ \left. - k_{11} \mathbf{q}_r(1|t-1) + k_{21} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_r(0|t-2) + k_{12} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right] \\ \left[1 - \mathbf{q}_r(0|t-2) - \mathbf{q}_s(0|t-2) - \mathbf{q}_r(1|t-1) + g_{2r} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_r(0|t-2) + k_{11} \mathbf{q}_r(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right. \\ \left. - \mathbf{q}_r(0|t-2) + k_{11} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_r(0|t-2) + g_{2s} \mathbf{q}_s(1|t-1) \cdot \mathbf{q}_s(0|t-2) \right] \end{array} \right]$$

Appendix 2. Mexico. Urban areas. Groups by age. Quarterly exit probabilities by unemployment duration class according to the destination sector. I-1987 to IV-2000

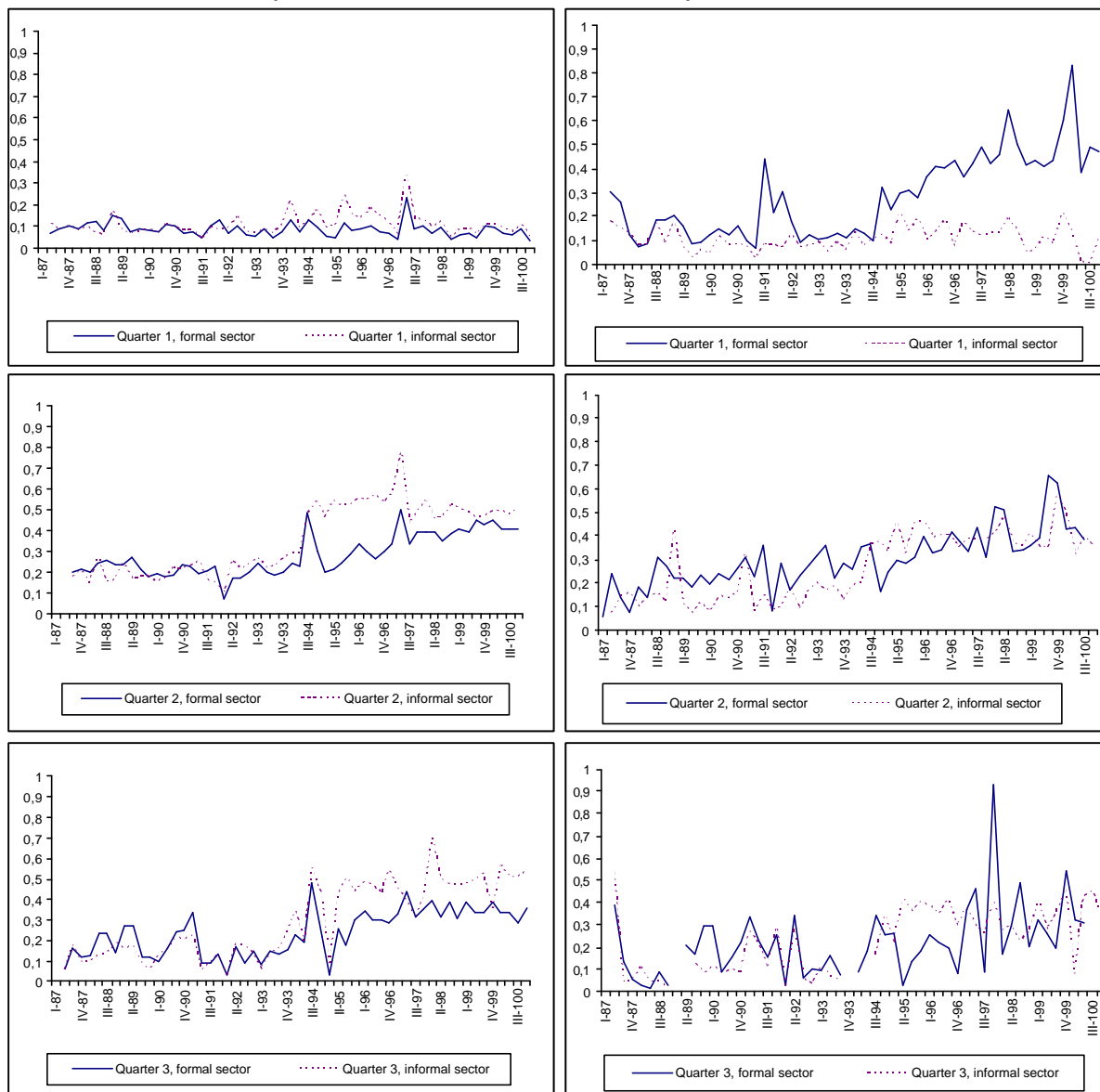


Source: Computed from the National Survey of Urban Employment (ENEU)

Appendix 3. Mexico. Urban areas. Groups by instruction level. Quarterly exit probabilities by unemployment duration class according to the destination sector. I-1987 to IV-2000

Between 0 and 9 years of instruction

10 years of instruction and more

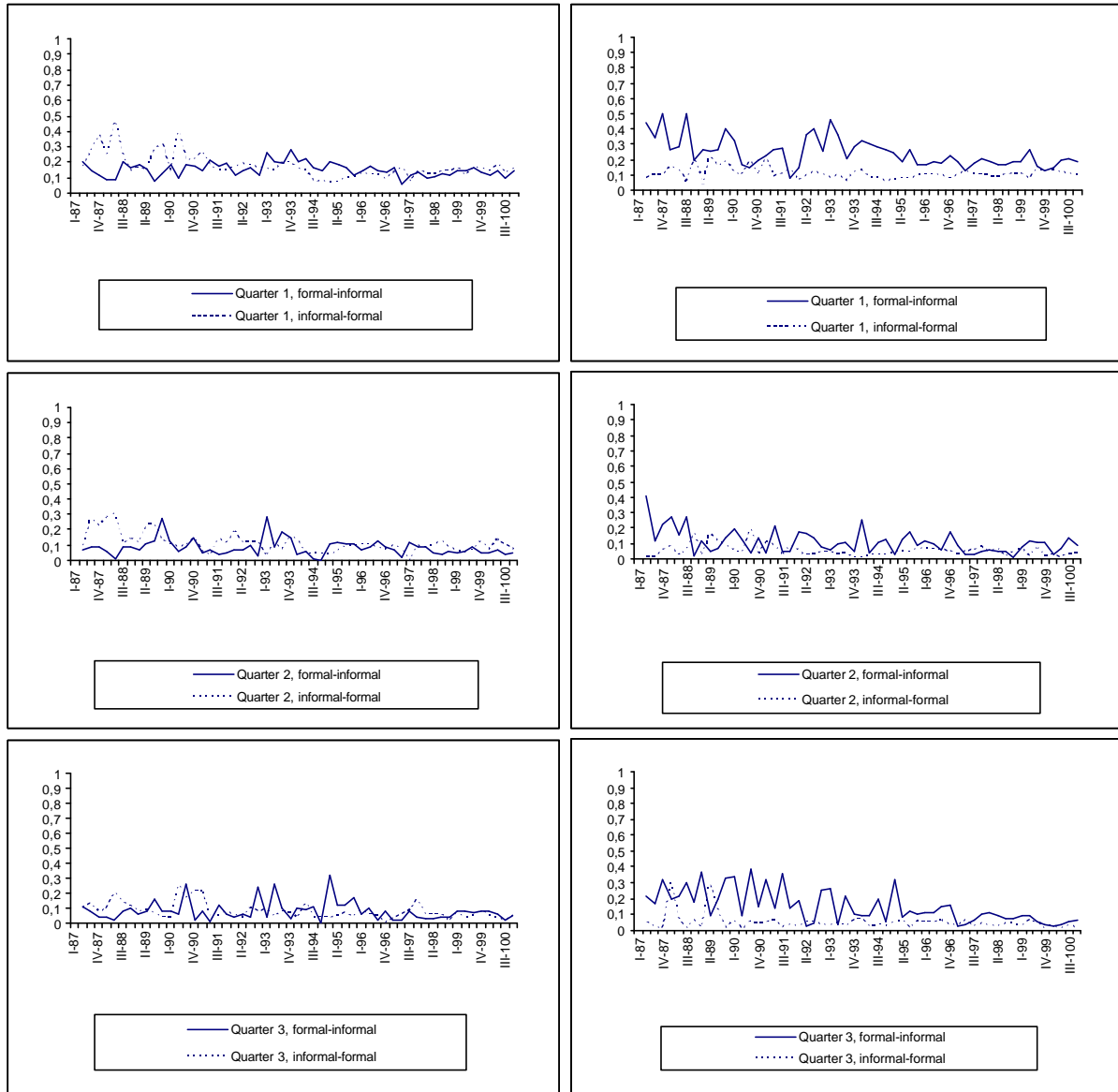


Source: Computed from the National Survey of Urban Employment (ENEU)

Appendix 4. Mexico. Urban areas. Groups by age. Quarterly transition probabilities between sectors by employment duration class. I-1987 to IV-2000

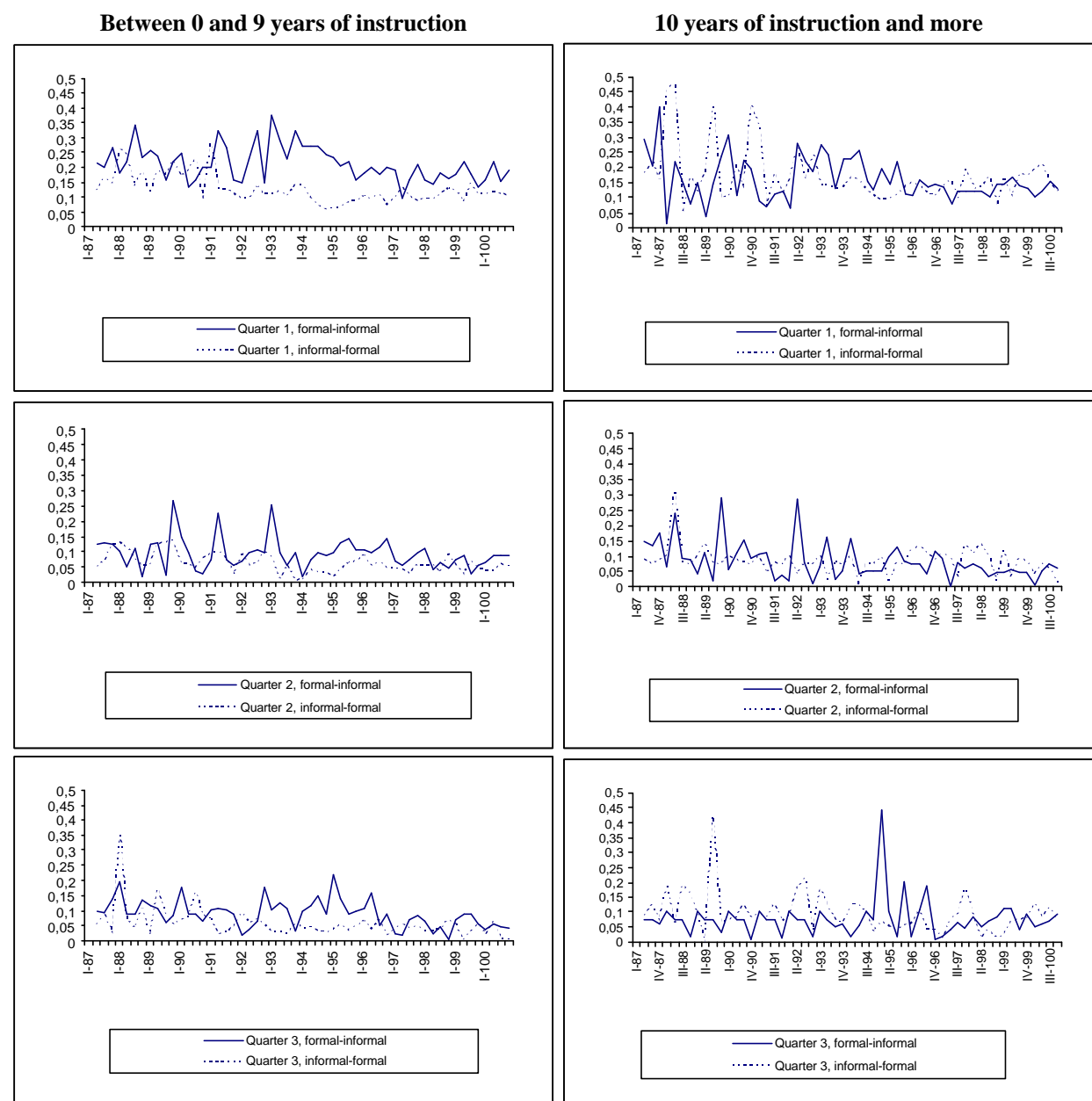
Between 12 and 24 years old

25 years old and more



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

Appendix 5. Mexico. Urban areas. Groups by instruction level. Quarterly transition probabilities between sectors by employment duration class. I-1987 to IV-2000

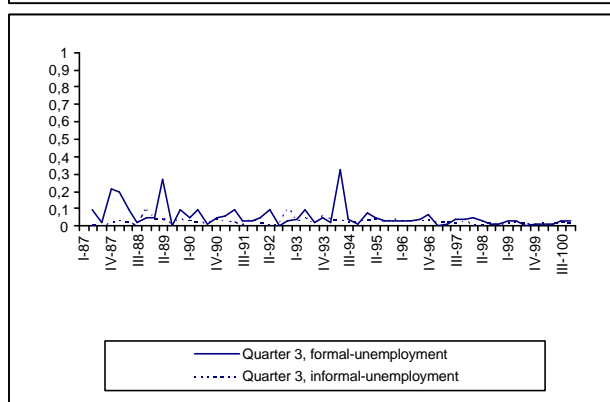
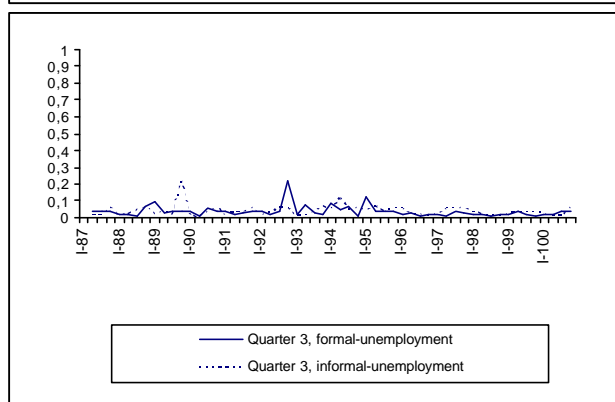
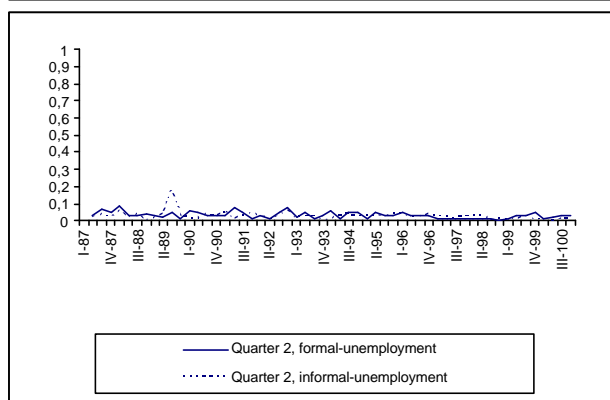
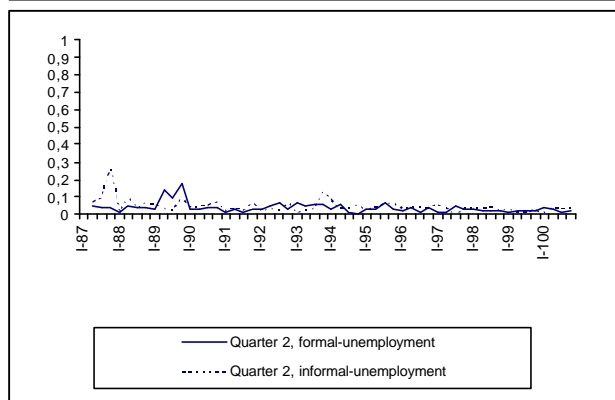
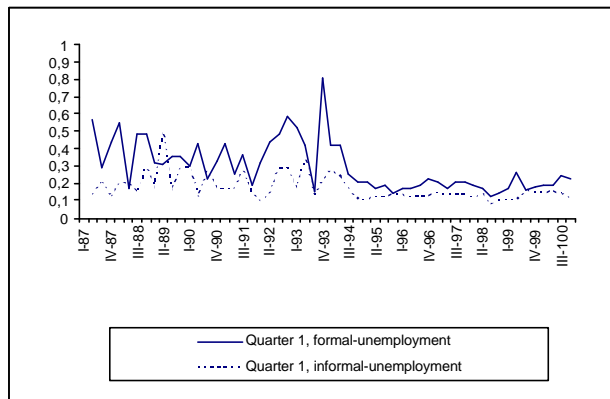
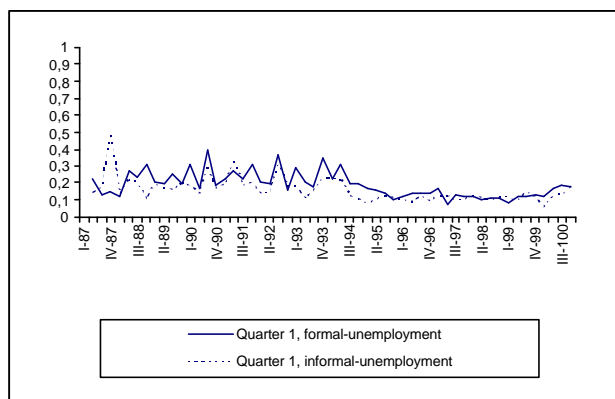


Source: Computed from the National Survey of Urban Employment (ENEU)

Appendix 6. Mexico. Urban areas. Groups by age. Quarterly transition probabilities towards unemployment by employment duration class. I-1986 to IV-2000

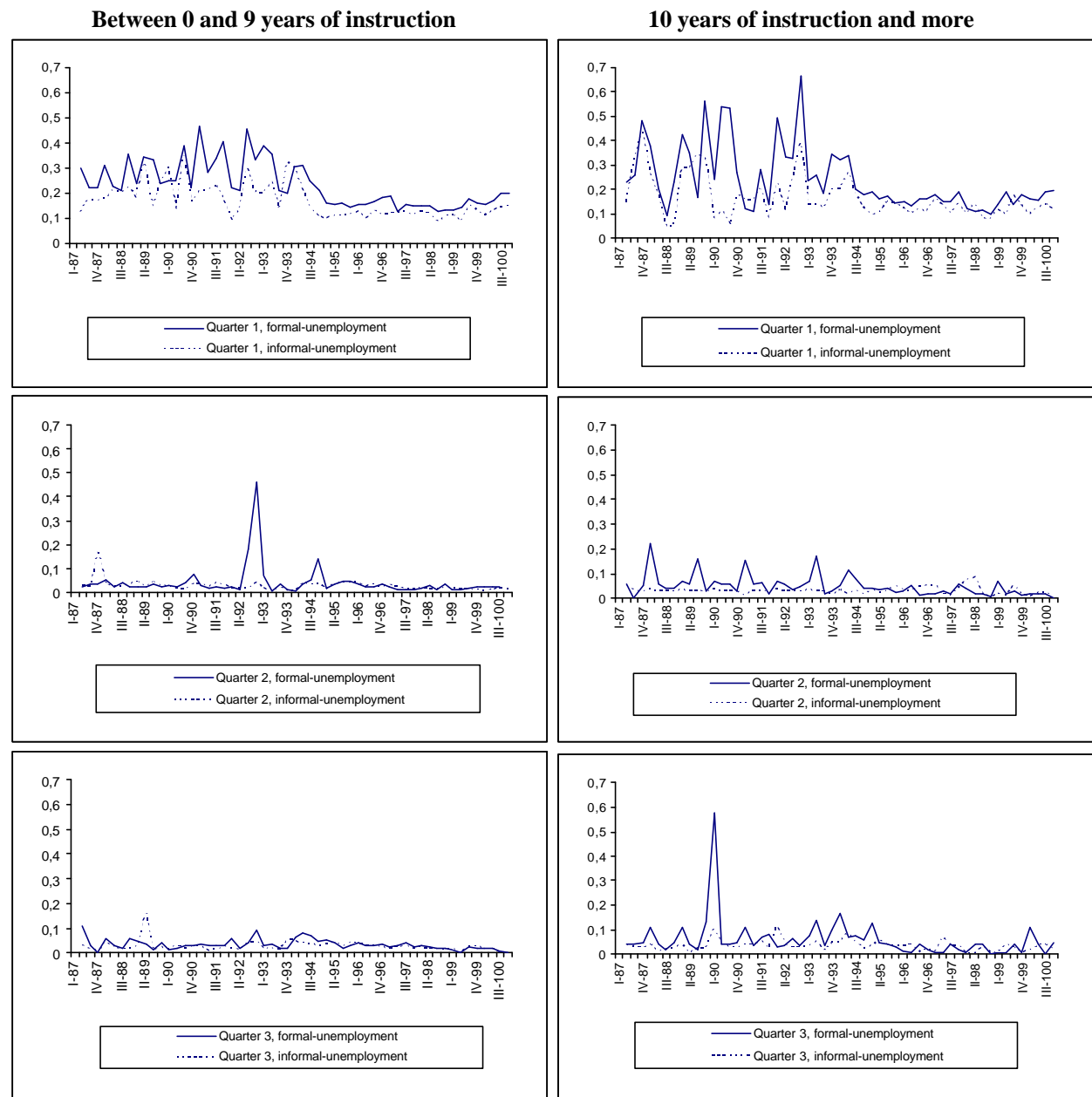
Between 12 and 24 years old

25 years old and more



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

Appendix 7. Mexico. Urban areas. Groups by instruction level. Quarterly transition probabilities towards unemployment by employment duration class. I-1986 to IV-2000



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

Appendix 8. Mexico. Urban areas. Unemployment duration. Restricted concurrent risks model estimations by gender, age, and instruction level. (Standard deviations are in lower font size)

	Gender		Age		Instruction level	
	Males	Females	From 12 to 24 years old	25 years old and more	Between 0 and 9 years of instruction*	10 years of instruction and more**
Unobserved heterogeneity distribution						
$\xi_{2\text{formal}}$	1,001	1,002	0,977	0,991	1,001	1,000
$\xi_{3\text{formal}}$	1,013	1,032	0,878	0,935	1,011	1,001
$\xi_{2\text{informal}}$	1,000	0,996	0,987	0,999	1,000	0,999
$\xi_{3\text{informal}}$	1,007	0,976	0,942	0,965	1,004	0,995
k_{11}						
k_{12}						
k_{21}						
Duration dependence						
$h_{1\text{formal}}$ (Between the first and the second quarters of unemployment)	1,388	1,192	1,236	1,117	1,306	1,174
$h_{2\text{formal}}$ (Between the second and the third quarters of unemployment)	0,732	0,854	0,812	0,899	0,786	0,850
$h_{1\text{informal}}$ (Between the first and the second quarters of unemployment)	1,383	1,110	1,152	1,305	1,339	1,278
$h_{2\text{informal}}$ (Between the second and the third quarters of unemployment)	0,733	0,920	0,871	0,780	0,769	0,797
Formal sector: Unemployment inflow composition cycle						
1987.I-1987.IV	0,062	-0,095	0,091	-0,004	-0,020	0,047
1988.I-1988.IV	0,050	-0,044	0,100	0,000	-0,011	0,059
1989.I-1989.IV	0,054	-0,029	0,080	-0,006	-0,003	-0,037
1990.I-1990.IV	0,048	-0,003	0,084	0,036	0,001	-0,035
1991.I-1991.IV	0,031	-0,002	0,042	0,028	-0,005	-0,054
1992.I-1992.IV	0,038	0,040	0,046	0,044	0,039	-0,031
1993.I-1993.IV	0,021	0,066	0,022	0,017	0,043	-0,041
1994.I-1994.IV	0,015	0,087	0,034	0,044	0,045	-0,042
1995.I-1995.IV	0,008	0,067	0,005	0,016	0,017	0,045
1996.I-1996.IV	-0,013	0,027	-0,019	-0,002	0,028	-0,002
1997.I-1997.IV	-0,035	0,007	-0,043	-0,019	0,009	0,008
1998.I-1998.IV	-0,060	-0,011	-0,087	-0,036	-0,020	0,032
1999.I-1999.IV	-0,091	-0,036	-0,170	-0,062	-0,057	0,049
2000.I-2000.IV	-0,128	-0,074	-0,185	-0,093	-0,095	0,065
Informal sector: Unemployment inflow composition cycle						
1987.I-1987.IV	0,054	-0,163	0,084	-0,019	-0,099	0,053
1988.I-1988.IV	0,045	-0,111	0,086	-0,043	-0,078	0,083
1989.I-1989.IV	0,051	-0,079	0,076	-0,072	-0,056	-0,119
1990.I-1990.IV	0,045	-0,034	0,076	0,131	-0,040	-0,086
1991.I-1991.IV	0,030	-0,025	0,042	0,093	-0,031	-0,081
1992.I-1992.IV	0,037	0,024	0,050	0,093	0,017	-0,049
1993.I-1993.IV	0,022	0,055	0,028	0,078	0,034	-0,029
1994.I-1994.IV	0,016	0,087	0,036	0,048	0,052	0,004
1995.I-1995.IV	0,008	0,068	0,005	0,017	0,060	0,015
1996.I-1996.IV	-0,012	0,049	-0,018	-0,008	0,058	0,020
1997.I-1997.IV	-0,033	0,045	-0,053	-0,028	0,052	0,040
1998.I-1998.IV	-0,057	0,043	-0,095	-0,060	0,035	0,055
1999.I-1999.IV	-0,087	0,030	-0,147	-0,098	0,011	0,055
2000.I-2000.IV	-0,119	0,010	-0,171	-0,133	-0,013	0,038
Formal sector: seasonal unemployment inflow composition						
Quarter I (January-March)	0,001	0,004	0,009	-0,012	-0,008	0,028
Quarter II (April-June)	0,005	0,001	0,002	0,007	0,003	-0,005
Quarter III (July-September)	-0,011	0,003	-0,007	-0,018	-0,013	0,031
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000
Informal sector: seasonal unemployment inflow composition						
Quarter I (January-March)	0,021	-0,051	0,015	0,023	-0,018	0,012
Quarter II (April-June)	0,005	-0,004	0,003	0,016	-0,004	-0,009
Quarter III (July-September)	0,010	-0,045	0,000	0,010	-0,016	0,024
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000
Residual covariance matrix (SUNR) $S = (s_{ij})$						
s_{11} (Equation 1 formal, Equation 1 formal)	0,085	0,174	0,173	0,152	0,114	0,088
s_{12} (Equation 2 formal, Equation 1 formal)	0,043	-0,012	-0,044	0,011	0,036	-0,019
s_{13} (Equation 3 formal, Equation 1 formal)	0,308	0,392	0,327	0,387	0,363	0,166
s_{14} (Equation 1 informal, Equation 1 formal)	0,081	0,176	0,195	0,110	0,099	-0,004
s_{15} (Equation 2 informal, Equation 1 formal)	0,039	-0,046	-0,124	0,040	0,046	-0,022
s_{16} (Equation 3 informal, Equation 1 formal)	0,288	0,317	0,190	0,354	0,350	-0,062
s_{22} (Equation 2 formal, Equation 2 formal)	0,067	0,101	0,120	0,049	0,045	0,129
s_{23} (Equation 2 formal, Equation 3 formal)	0,262	0,208	0,178	0,140	0,196	0,254
s_{24} (Equation 2, formal, Equation 1 informal)	0,041	-0,009	-0,038	0,009	0,029	-0,012
s_{25} (Equation 2 formal, Equation 2 informal)	0,051	0,067	0,098	0,034	0,042	0,068
s_{26} (Equation 2 formal, Equation 3 informal)	0,221	0,137	0,140	0,100	0,170	0,128
s_{33} (Equation 3 formal, Equation 3 formal)	1,362	1,438	1,246	1,248	1,348	0,986
s_{34} (Equation 3 formal, Equation 1 informal)	0,293	0,405	0,398	0,283	0,309	-0,039
s_{35} (Equation 3 formal, Equation 2 informal)	0,216	0,046	-0,079	0,175	0,211	0,104
s_{36} (Equation 3 formal, Equation 3 informal)	1,217	1,093	0,801	1,079	1,255	0,144
s_{44} (Equation 1 informal, Equation 1 informal)	0,080	0,204	0,227	0,104	0,091	0,100
s_{45} (Equation 1 informal, Equation 2 informal)	0,033	-0,078	-0,136	0,034	0,032	0,001
s_{46} (Equation 1 informal, Equation 3 informal)	0,270	0,311	0,237	0,328	0,298	0,242
s_{55} (Equation 2 informal, Equation 2 informal)	0,064	0,133	0,180	0,059	0,062	0,140
s_{56} (Equation 2 informal, Equation 3 informal)	0,231	0,125	0,087	0,221	0,225	0,327
s_{66} (Equation 3 informal, Equation 3 informal)	1,197	1,051	0,782	1,302	1,258	1,336
Objective value						
	6,796	6,104	5,790	6,052	6,517	6,632

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

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

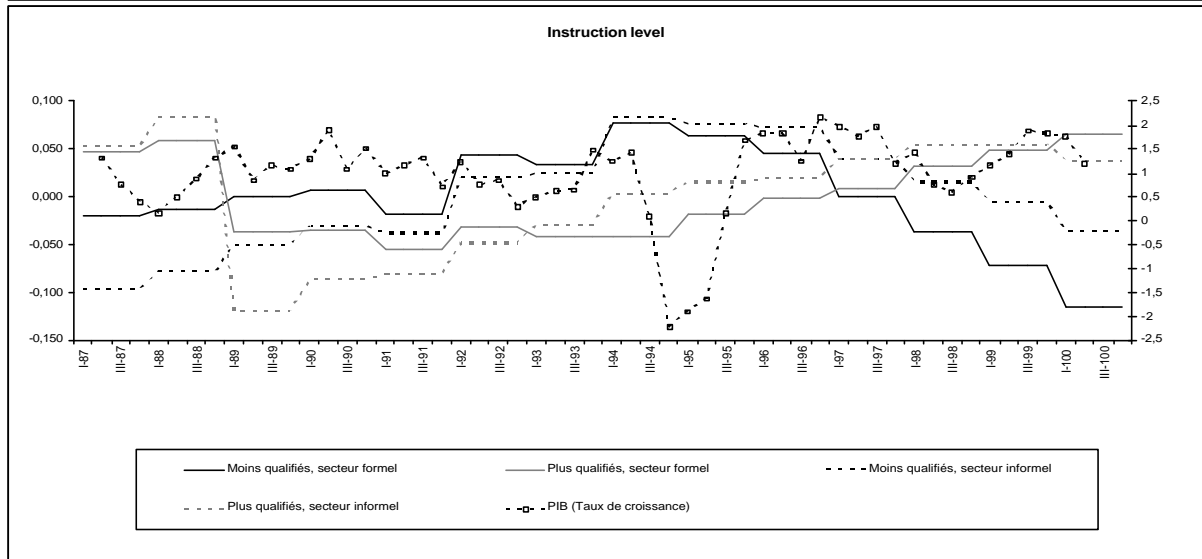
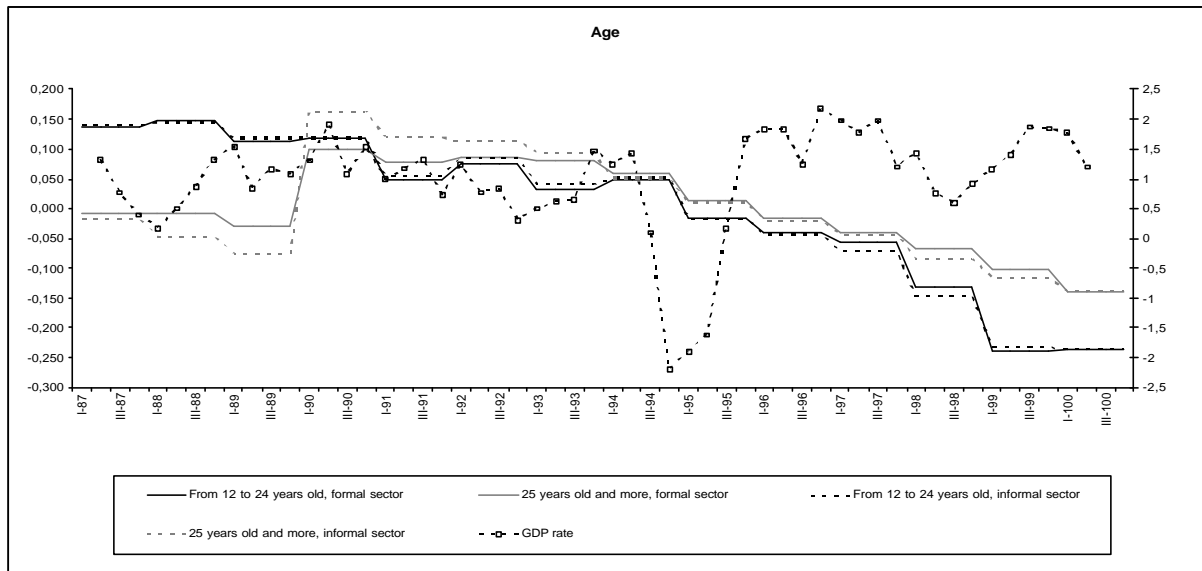
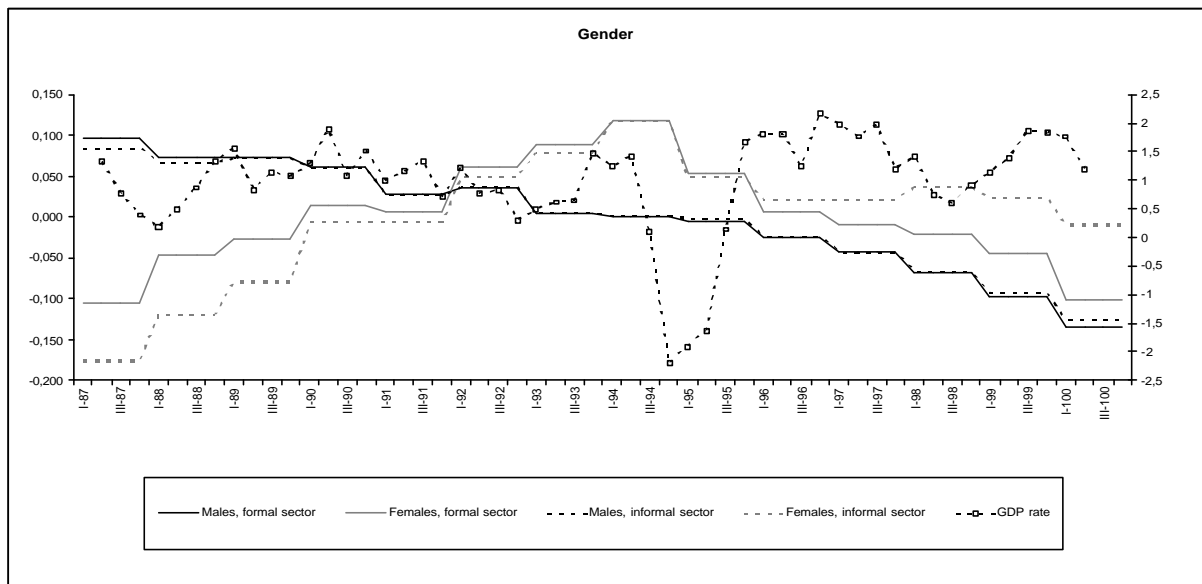
** Individuals with an instruction level higher or equal to 10 years.

*** 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 formal and informal sectors.

Non significant coefficients at the 10% confidence interval are in bold type.

Appendix 9. Mexico. Urban areas. Unemployment duration analysis. Cohort cycle and GDP (x10%).



Appendix 10. Mexico. Urban areas. Formal employment. Restricted concurrent risks model estimations by gender, age, and instruction level. (Standard deviations are in lower font size)

	Gender		Age			Instruction level						
	Males	Females	From 12 to 24 years old	25 years old and more	Between 0 and 9 years of instruction*	10 years of instruction and more**						
Unobserved heterogeneity distribution												
$\beta_{2in}^{informal}$	0,976	0,011	1,039	0,017	1,307	0,192	1,001	0,001	1,059	0,098	1,008	0,009
$\beta_{3in}^{informal}$	0,968	0,097	1,320	0,171	4,676	1,793	1,003	0,005	1,457	0,728	0,985	0,061
$\beta_{2un}^{unemployment}$	1,004	0,015	1,058	0,052	0,956	0,187	1,004	0,001	0,988	0,109	0,984	0,006
$\beta_{3un}^{unemployment}$	1,562	0,331	3,536	1,335	1,627	2,944	1,033	0,013	0,913	0,442	0,770	0,059
k_{11}												
k_{12}												
k_{21}												
Duration dependence												
$h_{1in}^{informal}$ (Between the first and the second quarters of formal employment)	0,718	0,014	0,751	0,032	0,705	0,043	0,723	0,032	0,580	0,034	0,763	0,041
$h_{2in}^{informal}$ (Between the second and the third quarters of formal employment)	0,797	0,012	1,332	0,058	0,826	0,049	1,314	0,059	0,846	0,043	1,269	0,071
$h_{1un}^{unemployment}$ (Between the first and the second quarters of formal employment)	0,580	0,015	0,497	0,021	0,330	0,025	0,364	0,016	0,281	0,022	0,556	0,031
$h_{2un}^{unemployment}$ (Between the second and the third quarters of formal employment)	0,675	0,013	1,912	0,082	0,737	0,058	2,489	0,113	0,758	0,050	1,644	0,094
Informal sector: Formal employment inflow composition cycle												
1987.I-1987.IV	-0,002	0,009	-0,018	0,007	0,000	0,152	0,006	0,016	0,075	0,142	-0,014	0,023
1988.I-1988.IV	-0,012	0,003	-0,019	0,008	0,070	0,119	-0,050	0,019	0,081	0,116	-0,049	0,022
1989.I-1989.IV	0,002	0,005	-0,016	0,008	0,026	0,143	-0,060	0,019	-0,080	0,135	-0,055	0,022
1990.I-1990.IV	0,014	0,006	-0,024	0,008	0,335	0,151	-0,065	0,018	-0,044	0,143	-0,053	0,021
1991.I-1991.IV	-0,041	0,009	-0,025	0,008	0,464	0,152	-0,072	0,017	-0,132	0,141	-0,085	0,018
1992.I-1992.IV	-0,028	0,008	-0,036	0,008	0,231	0,146	-0,057	0,015	-0,092	0,137	-0,075	0,018
1993.I-1993.IV	-0,030	0,008	-0,015	0,007	0,209	0,138	-0,018	0,014	0,039	0,130	-0,067	0,015
1994.I-1994.IV	-0,025	0,006	-0,010	0,006	0,309	0,132	0,000	0,013	-0,099	0,121	-0,032	0,013
1995.I-1995.IV	-0,014	0,004	-0,002	0,006	-0,437	0,127	-0,009	0,013	-0,202	0,116	-0,040	0,013
1996.I-1996.IV	0,004	0,004	0,016	0,006	-0,385	0,128	-0,007	0,014	-0,160	0,118	-0,001	0,015
1997.I-1997.IV	0,019	0,006	0,028	0,007	-0,244	0,140	0,053	0,016	0,041	0,131	0,070	0,019
1998.I-1998.IV	0,032	0,008	0,033	0,009	-0,097	0,163	0,062	0,020	0,090	0,155	0,090	0,025
1999.I-1999.IV	0,037	0,010	0,037	0,011	-0,190	0,196	0,081	0,024	0,237	0,188	0,142	0,030
2000.I-2000.IV	0,042	0,011	0,050	0,014	-0,292	0,237	0,135	0,028	0,247	0,228	0,170	0,036
Unemployment: Formal employment inflow composition cycle												
1987.I-1987.IV	-0,009	0,012	0,001	0,021	-0,235	0,229	0,043	0,029	-0,094	0,239	0,078	0,035
1988.I-1988.IV	-0,003	0,005	-0,020	0,024	0,065	0,148	-0,073	0,035	-0,010	0,174	0,030	0,036
1989.I-1989.IV	0,006	0,007	-0,045	0,023	0,067	0,181	-0,099	0,035	-0,169	0,211	-0,004	0,035
1990.I-1990.IV	0,012	0,008	-0,038	0,023	0,578	0,201	-0,102	0,033	-0,016	0,226	-0,021	0,035
1991.I-1991.IV	-0,004	0,011	-0,043	0,022	0,462	0,198	-0,121	0,031	0,034	0,226	-0,096	0,032
1992.I-1992.IV	-0,010	0,009	-0,053	0,020	0,134	0,192	-0,085	0,029	-0,184	0,219	-0,045	0,032
1993.I-1993.IV	-0,014	0,008	-0,005	0,018	0,090	0,183	-0,020	0,026	0,247	0,205	-0,076	0,029
1994.I-1994.IV	-0,022	0,007	-0,016	0,017	0,139	0,177	0,000	0,024	-0,077	0,192	-0,074	0,026
1995.I-1995.IV	-0,014	0,006	0,011	0,019	-0,580	0,165	-0,028	0,024	-0,117	0,184	-0,113	0,025
1996.I-1996.IV	-0,002	0,006	0,040	0,019	-0,335	0,162	-0,027	0,026	-0,054	0,187	-0,058	0,027
1997.I-1997.IV	0,002	0,007	0,054	0,021	-0,265	0,178	0,079	0,031	0,000	0,207	0,040	0,032
1998.I-1998.IV	0,009	0,009	0,040	0,025	-0,110	0,213	0,092	0,037	-0,174	0,244	0,054	0,040
1999.I-1999.IV	0,017	0,010	0,022	0,030	-0,111	0,262	0,127	0,044	0,288	0,294	0,145	0,049
2000.I-2000.IV	0,031	0,013	0,054	0,037	0,099	0,320	0,214	0,053	0,326	0,355	0,139	0,059
Informal sector: seasonal formal employment inflow composition												
Quarter I (January-March)	0,002	0,002	-0,063	0,031	-0,007	0,040	-0,063	0,032	0,011	0,045	-0,003	0,031
Quarter II (April-June)	0,008	0,003	-0,009	0,000	0,012	0,052	-0,009	0,003	-0,014	0,049	-0,019	0,004
Quarter III (July-September)	0,007	0,003	-0,054	0,032	-0,030	0,046	-0,051	0,032	0,034	0,070	0,010	0,031
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Unemployment: seasonal formal employment inflow composition												
Quarter I (January-March)	0,004	0,004	0,029	0,038	-0,001	0,057	-0,022	0,040	0,017	0,072	-0,049	0,052
Quarter II (April-June)	0,007	0,002	-0,007	0,001	-0,002	0,061	-0,018	0,006	-0,002	0,081	-0,019	0,008
Quarter III (July-September)	0,004	0,000	0,039	0,038	0,117	0,063	-0,001	0,040	-0,005	0,068	-0,038	0,052
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Residual covariance matrix (SUNR) $S=(s_{ij})$												
s_{11} (Equation 1 informal, Equation 1 informal)	0,097	0,136			0,075	0,120			0,104	0,162		
s_{12} (Equation 2 informal, Equation 1 informal)	-0,115	-0,094			-0,011	-0,088			-0,011	-0,106		
s_{13} (Equation 3 informal, Equation 1 informal)	-0,275	0,100			0,020	0,087			-0,005	0,144		
s_{14} (Equation 1 unemployment, Equation 1 informal)	0,087	0,070			0,084	0,055			0,112	0,035		
s_{15} (Equation 2 unemployment, Equation 1 informal)	-0,059	-0,141			0,041	0,074			0,064	0,035		
s_{16} (Equation 3 unemployment, Equation 1 informal)	-0,142	-0,170			-0,040	0,321			-0,060	0,179		
s_{22} (Equation 2 informal, Equation 2 informal)	0,216	0,317			0,140	0,231			0,070	0,362		
s_{23} (Equation 2 informal, Equation 3 informal)	0,513	0,521			0,119	0,342			-0,034	0,605		
s_{24} (Equation 2, informal, Equation 1 unemployment)	-0,149	-0,010			0,035	-0,030			0,303	0,070		
s_{25} (Equation 2 informal, Equation 2 unemployment)	0,149	0,363			0,135	0,131			0,066	0,118		
s_{26} (Equation 2 informal, Equation 3 unemployment)	0,358	0,846			0,025	0,256			-0,126	0,469		
s_{33} (Equation 3 informal, Equation 3 informal)	1,215	1,457			0,523	1,064			0,085	1,805		
s_{34} (Equation 3 informal, Equation 1 unemployment)	-0,356	0,142			-0,036	0,060			0,070	0,259		
s_{35} (Equation 3 informal, Equation 2 unemployment)	0,358	0,522			0,043	0,549			0,089	0,391		
s_{36} (Equation 3 informal, Equation 3 unemployment)	0,856	1,592			0,366	1,537			-0,097	1,635		
s_{44} (Equation 1 unemployment, Equation 1 unemployment)	0,357	0,106			0,230	0,102			0,066	0,210		
s_{45} (Equation 1 unemployment, Equation 2 unemployment)	-0,368	-0,017			0,097	-0,108			0,333	-0,031		
s_{46} (Equation 1 unemployment, Equation 3 unemployment)	-0,871	0,214			-0,094	-0,006			-0,064	0,450		
s_{55} (Equation 2 unemployment, Equation 2 unemployment)	0,487	0,640			0,284	0,941			-0,107	0,651		
s_{56} (Equation 2 unemployment, Equation 3 unemployment)	1,152	1,495			0,011	2,064			0,124	1,514		
s_{66} (Equation 3 unemployment, Equation 3 unemployment)	2,725	4,106			0,694	5,126			0,615	4,830		
Objective value												
	5,662	6,514			4,310	6,596			4,357	6,346		

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

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

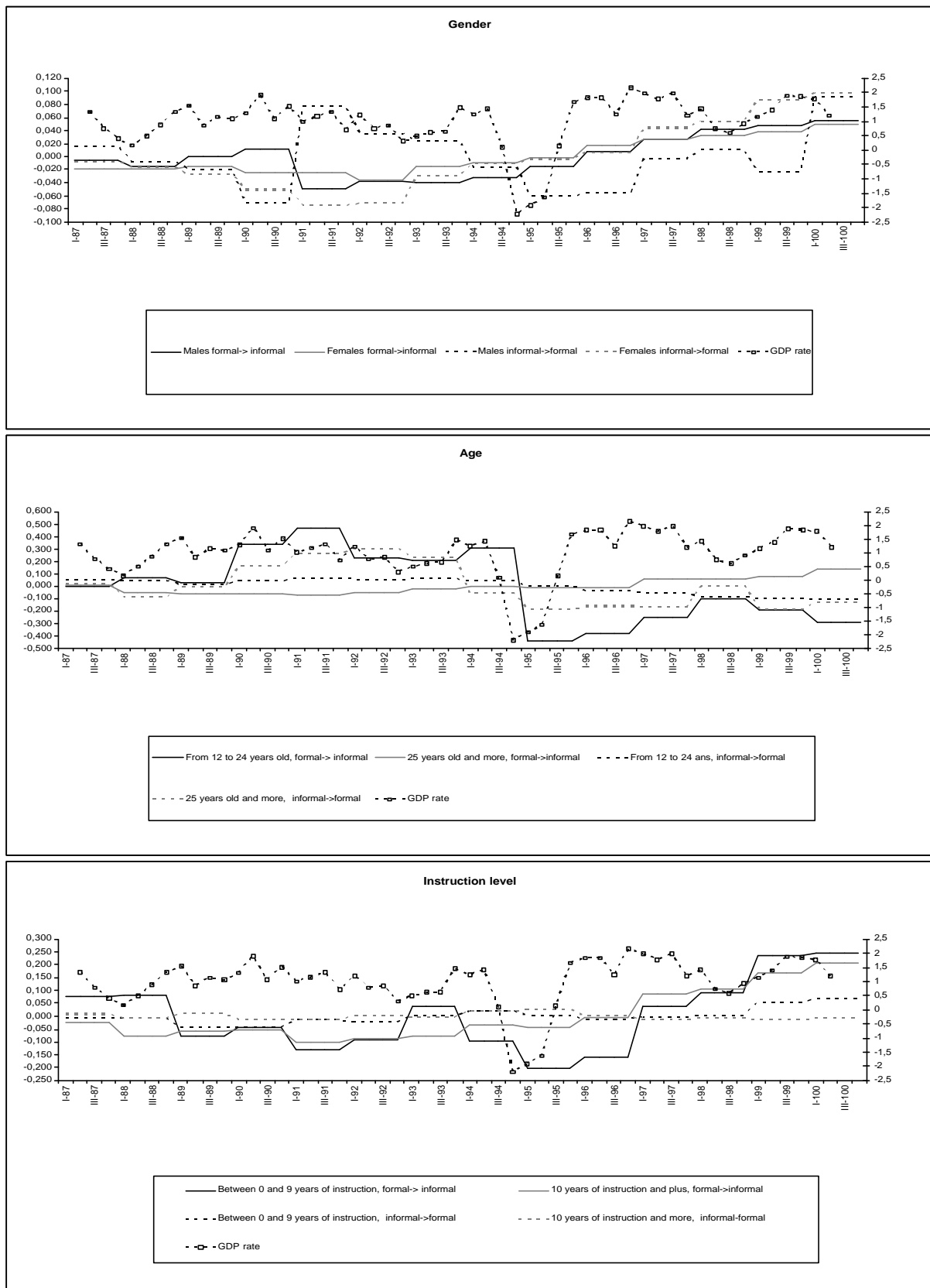
** Individuals with an instruction level higher or equal to 10 years.

*** 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 formal and informal sectors.

Non significant coefficients at the 10% confidence interval are in bold type.

Appendix 11. . Urban areas. Formal employment duration analysis. Cohort cycle and GDP (x10%).



Appendix 12. Mexico. Urban areas. Informal employment. Restricted concurrent risks model estimations by gender, age, and instruction level. (Standard deviations are in lower font size)

	Gender		Age		Instruction level							
	Males	Females	From 12 to 24 years old	25 years old and more	Between 0 and 9 years of instruction*	10 years of instruction and more**						
Unobserved heterogeneity distribution												
$\xi_{2\text{formal}}$	1,085	0,053	1,017	0,015	1,025	0,006	1,114	0,200	0,985	0,012	1,025	0,006
$\xi_{3\text{formal}}$	1,792	0,622	1,190	0,144	1,123	0,033	4,892	3,965	0,884	0,123	1,311	0,062
$\xi_{2\text{unemployment}}$	1,073	0,046	0,969	0,027	1,049	0,013	0,868	0,188	1,005	0,011	1,009	0,025
$\xi_{3\text{unemployment}}$	-0,677	0,797	0,396	0,469	1,153	0,124	-2,696	2,102	0,880	0,164	0,964	0,701
k_{11}												
k_{12}												
k_{21}												
Duration dependence												
$h_{1\text{formal}}$ (Between the first and the second quarter of informal employment)	0,829	0,037	0,967	0,028	0,793	0,030	0,603	0,036	0,728	0,027	0,689	0,027
$h_{2\text{formal}}$ (Between the second and the third quarter of informal employment)	1,085	0,049	1,025	0,031	1,235	0,048	0,777	0,047	1,304	0,050	1,427	0,056
$h_{1\text{unemployment}}$ (Between the first and the second quarters of informal employment)	0,582	0,027	0,700	0,028	0,534	0,026	0,274	0,024	0,483	0,024	0,542	0,022
$h_{2\text{unemployment}}$ (Between the second and the third quarters of informal employment)	1,470	0,072	1,386	0,058	1,779	0,089	0,708	0,052	1,842	0,095	1,726	0,071
Formal sector: Informal employment inflow composition cycle												
1987.I-1987.IV	0,021	0,029	-0,008	0,008	-0,013	0,011	0,022	0,154	-0,012	0,014	-0,007	0,007
1988.I-1988.IV	0,009	0,032	-0,015	0,008	-0,012	0,011	-0,086	0,120	-0,013	0,015	0,001	0,007
1989.I-1989.IV	-0,003	0,034	-0,022	0,009	-0,027	0,011	-0,006	0,154	-0,027	0,016	0,035	0,007
1990.I-1990.IV	-0,014	0,036	-0,031	0,009	0,003	0,011	0,167	0,173	-0,016	0,015	0,019	0,007
1991.I-1991.IV	0,074	0,035	-0,042	0,008	0,024	0,010	0,262	0,171	0,008	0,015	0,014	0,007
1992.I-1992.IV	0,067	0,032	-0,041	0,007	0,023	0,009	0,302	0,155	0,004	0,014	0,005	0,006
1993.I-1993.IV	0,065	0,029	-0,019	0,007	0,036	0,008	0,228	0,138	0,028	0,012	-0,003	0,006
1994.I-1994.IV	0,031	0,027	-0,010	0,006	0,031	0,008	-0,063	0,123	0,030	0,012	-0,003	0,005
1995.I-1995.IV	-0,030	0,026	-0,005	0,006	0,009	0,008	-0,184	0,119	0,006	0,011	-0,013	0,005
1996.I-1996.IV	-0,070	0,027	0,000	0,007	-0,007	0,009	-0,162	0,125	-0,014	0,012	-0,022	0,006
1997.I-1997.IV	-0,057	0,033	0,029	0,008	-0,010	0,010	-0,169	0,142	-0,018	0,014	-0,023	0,007
1998.I-1998.IV	-0,044	0,038	0,036	0,009	-0,019	0,012	0,003	0,172	-0,020	0,017	-0,001	0,008
1999.I-1999.IV	-0,062	0,045	0,060	0,011	-0,022	0,015	-0,188	0,207	0,019	0,020	-0,001	0,010
2000.I-2000.IV	0,013	0,054	0,068	0,013	-0,016	0,018	-0,127	0,255	0,024	0,024	-0,001	0,011
Unemployment: Informal employment inflow composition cycle												
1987.I-1987.IV	0,043	0,047	-0,015	0,016	-0,135	0,036	0,339	0,265	-0,034	0,031	-0,018	0,025
1988.I-1988.IV	0,032	0,051	-0,034	0,017	-0,103	0,035	0,322	0,196	-0,030	0,034	0,011	0,026
1989.I-1989.IV	0,006	0,055	-0,049	0,018	-0,098	0,033	-0,142	0,247	-0,066	0,035	0,075	0,029
1990.I-1990.IV	0,007	0,057	-0,072	0,017	0,000	0,030	0,038	0,259	-0,042	0,034	0,025	0,027
1991.I-1991.IV	0,104	0,056	-0,082	0,016	0,049	0,027	0,065	0,256	0,010	0,032	0,021	0,025
1992.I-1992.IV	0,105	0,051	-0,078	0,015	0,055	0,024	0,284	0,244	0,022	0,030	-0,012	0,025
1993.I-1993.IV	0,112	0,046	-0,037	0,014	0,104	0,021	0,209	0,228	0,074	0,028	-0,017	0,022
1994.I-1994.IV	0,041	0,043	-0,015	0,013	0,086	0,019	-0,177	0,212	0,068	0,026	-0,024	0,020
1995.I-1995.IV	-0,060	0,041	-0,008	0,013	0,039	0,020	-0,276	0,203	0,014	0,026	-0,063	0,020
1996.I-1996.IV	-0,121	0,044	0,008	0,014	0,011	0,023	-0,272	0,209	-0,028	0,027	-0,065	0,021
1997.I-1997.IV	-0,123	0,052	0,051	0,016	-0,002	0,029	-0,242	0,233	-0,039	0,031	-0,063	0,025
1998.I-1998.IV	-0,087	0,060	0,079	0,019	-0,006	0,035	0,085	0,276	-0,037	0,038	0,036	0,031
1999.I-1999.IV	-0,101	0,072	0,116	0,023	-0,013	0,043	-0,220	0,334	0,036	0,045	0,043	0,037
2000.I-2000.IV	0,042	0,085	0,135	0,028	0,014	0,051	-0,013	0,403	0,053	0,054	0,043	0,045
Secteur formel: Composition saisonnière du flux d'entrée dans l'emploi informel												
Quarter I (January-March)	0,059	0,034	-0,010	0,021	0,001	0,024	-0,088	0,049	-0,003	0,029	-0,132	0,025
Quarter II (April-June)	0,004	0,008	-0,010	0,002	0,006	0,002	-0,022	0,048	0,002	0,003	-0,001	0,001
Quarter III (July-September)	0,064	0,034	-0,009	0,021	-0,001	0,024	-0,013	0,051	0,002	0,029	-0,133	0,025
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Chômage: Composition saisonnière du flux d'entrée dans l'emploi informel												
Quarter I (January-March)	0,020	0,040	0,055	0,037	0,154	0,044	-0,223	0,083	0,011	0,048	-0,056	0,039
Quarter II (April-June)	0,007	0,012	-0,017	0,004	0,012	0,006	-0,011	0,088	0,004	0,007	-0,011	0,005
Quarter III (July-September)	0,026	0,040	0,056	0,037	0,154	0,044	-0,035	0,096	0,023	0,048	-0,050	0,039
Quarter IV (October-December)	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Residual covariance matrix (SUNR) $S=(s_{ij})$												
s_{11} (Equation 1 formal, Equation 1 formal)	0,164	0,055			0,077	0,135			0,076		0,089	
s_{12} (Equation 2 formal, Equation 1 formal)	-0,089	-0,032			-0,100	-0,030			-0,053		-0,139	
s_{13} (Equation 3 formal, Equation 1 formal)	0,221	0,057			-0,051	0,001			0,059		-0,117	
s_{14} (Equation 1 unemployment, Equation 1 formal)	0,085	0,034			0,064	0,155			0,081		0,032	
s_{15} (Equation 2 unemployment, Equation 1 formal)	0,144	0,031			-0,080	0,047			-0,047		-0,108	
s_{16} (Equation 3 unemployment, Equation 1 formal)	0,595	0,156			-0,037	-0,007			0,087		-0,185	
s_{22} (Equation 2 formal, Equation 2 formal)	0,289	0,163			0,309	0,152			0,242		0,479	
s_{23} (Equation 2 formal, Equation 3 formal)	0,490	0,308			0,497	0,052			0,461		0,799	
s_{24} (Equation 2 formal, Equation 1 unemployment)	0,063	0,006			-0,070	0,047			-0,020		0,021	
s_{25} (Equation 2 formal, Equation 2 unemployment)	0,052	0,103			0,358	0,131			0,335		0,411	
s_{26} (Equation 2 formal, Equation 3 unemployment)	0,311	0,257			0,702	-0,115			0,789		1,050	
s_{33} (Equation 3 formal, Equation 3 formal)	1,850	0,859			1,065	0,384			1,278		1,604	
s_{34} (Equation 3 formal, Equation 1 unemployment)	0,395	0,096			-0,011	-0,043			0,153		0,127	
s_{35} (Equation 3 formal, Equation 2 unemployment)	0,542	0,319			0,673	-0,085			0,713		0,721	
s_{36} (Equation 3 formal, Equation 3 unemployment)	2,477	0,990			1,616	0,228			2,179		2,057	
s_{44} (Equation 1 unemployment, Equation 1 unemployment)	0,184	0,111			0,122	0,395			0,154		0,104	
s_{45} (Equation 1 unemployment, Equation 2 unemployment)	0,066	-0,010			-0,115	0,052			-0,027		0,007	
s_{46} (Equation 1 unemployment, Equation 3 unemployment)	0,664	0,245			0,023	-0,089			0,323		0,268	
s_{55} (Equation 2 unemployment, Equation 2 unemployment)	0,388	0,326			0,769	0,365			0,618		0,571	
s_{56} (Equation 2 unemployment, Equation 3 unemployment)	1,179	0,752			1,593	-0,110			1,479		1,409	
s_{66} (Equation 3 unemployment, Equation 3 unemployment)	4,834	2,382			3,951	0,697			4,533		4,089	
Objective value												
	5,768	7,821			6,451	4,371			6,723		6,990	

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

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

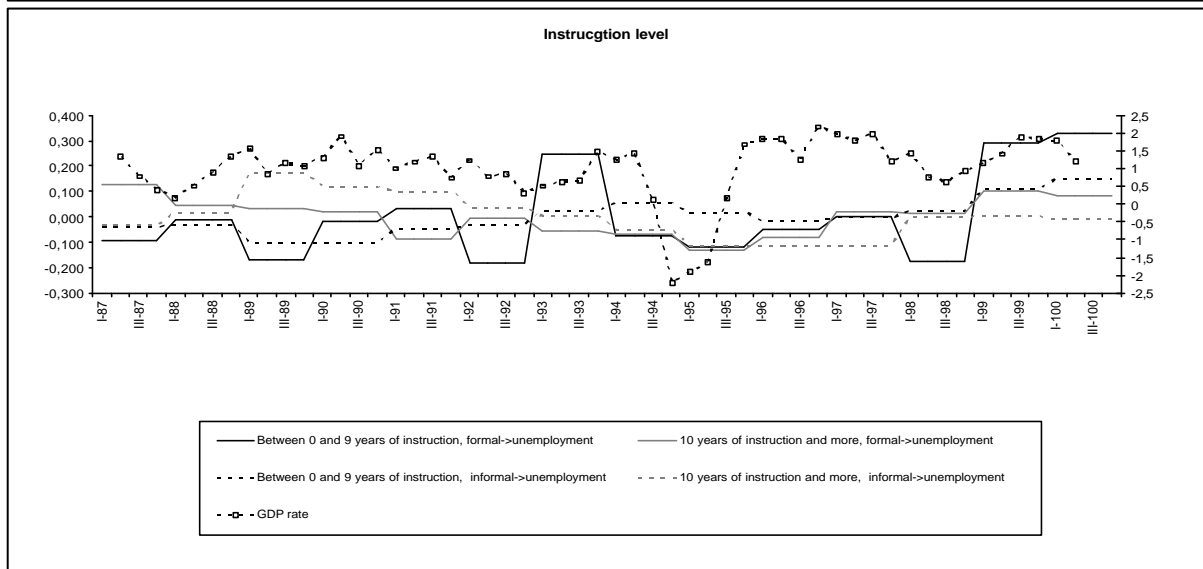
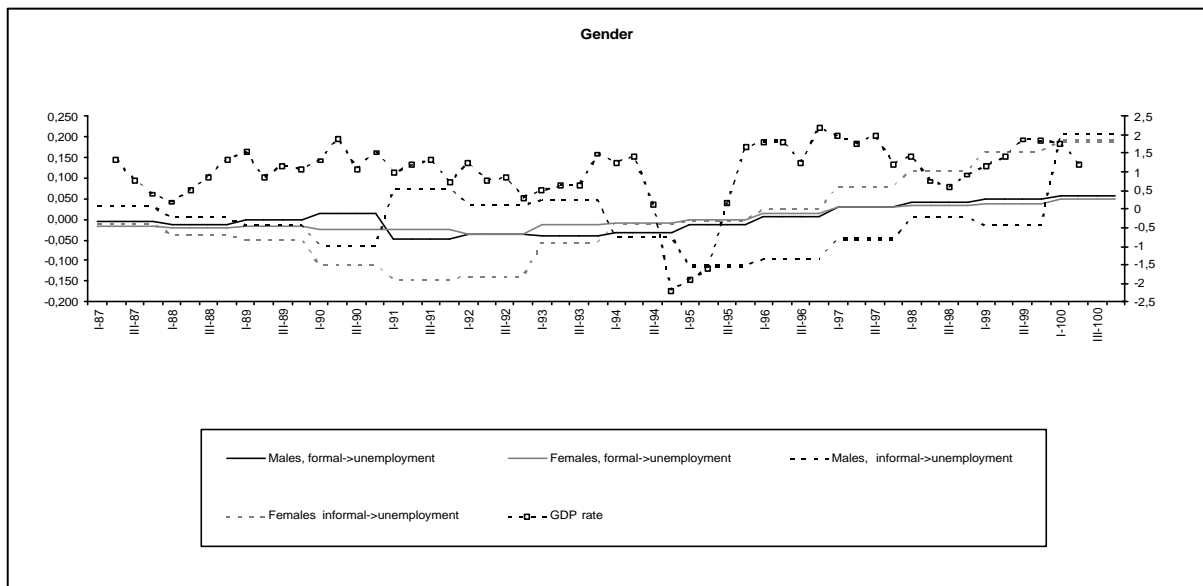
** Individuals with an instruction level higher or equal to 10 years.

*** 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 formal and informal sectors.

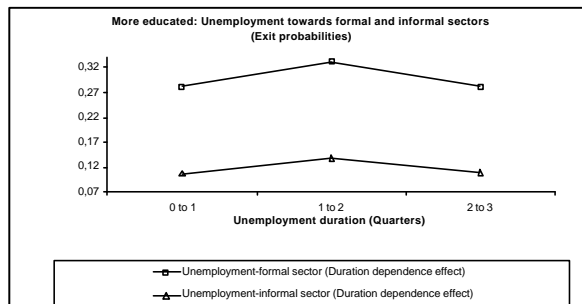
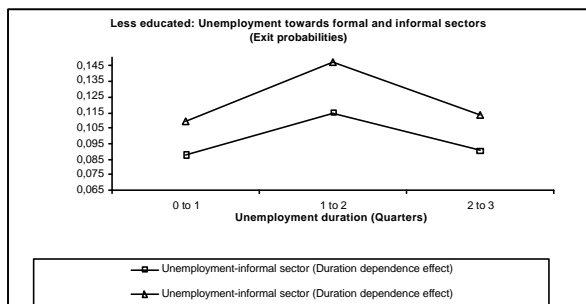
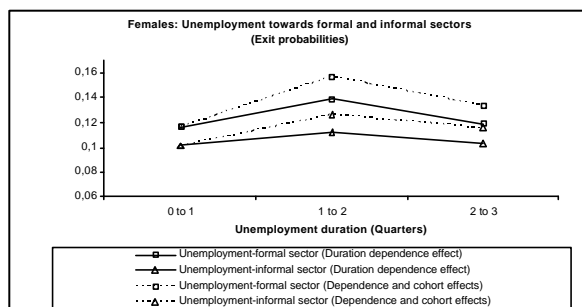
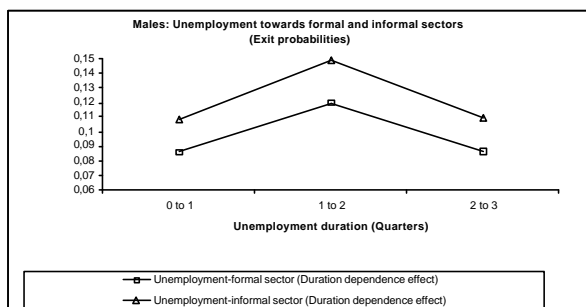
Non significant coefficients at the 10% confidence interval are in bold type.

Appendix 13. . Urban areas. Informal employment duration analysis. Cohort cycle and GDP (x10%).

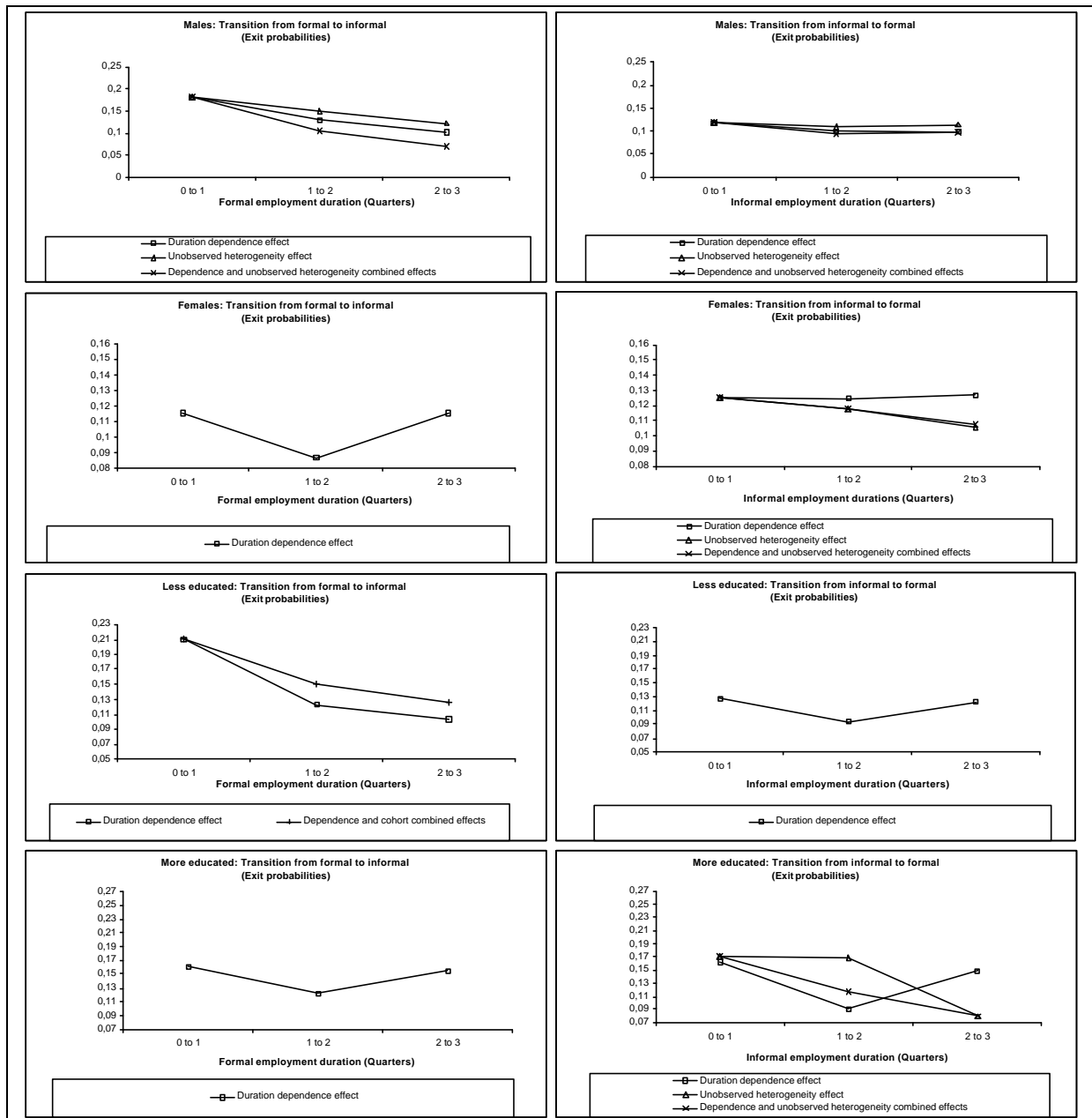


Appendix 14. Implications and conclusions

Transitions from unemployment to formal and informal sectors



Transitions between sectors



Transitions from formal and informal employment to unemployment

