Increasing Wage Dispersion and the Changes in Relative Employment and Wages in Mexico's Urban Informal Sector: 1987-1993

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Abstract

This study analyzes the role of changes in informal/formal relative employment, wage levels and wage inequality in explaining increasing wage dispersion in Mexico during the 1987-1993 period. From 1987 to 1993, the variance of the log of hourly wages for Mexican workers increased more than 50 percent. Using data from the *Encuesta nacional de empleo urbano* we find that this increase in the overall wage dispersion was mainly driven by increasing wage dispersion in the formal sector coupled with a faster growth in formal sector employment as a percentage of total employment. However, compression in the distribution of wages within the informal sector contributed to substantially slow down the increasing overall wage inequality. About 60 percent of the 1987-1993 4.65 percentage point reduction in the informal sector share of total employment is explained by changes in the structure that determines sectoral employment; the rest is explained by changes in the composition of the labor force, particularly increases in the sectoral education gap and a change in the regional relative share of sectoral employment. Also, from 1987 to 1993 the sectoral wage ratio increased from 0.59 to 0.63. It seems that a relative improvement in unobserved skills in the informal sector helped to close the wage differential but this effect was partially offset by an increase in the relative prices of both observed and unobserved skills, as well as increases in relative observed skills in the formal sector, particularly education. JEL Codes: J23-Employment Determination; J31-Wage Level and Structure; J38-Public Policy.

Introduction

During the late 1980s and early 1990s, the Mexican labor market experienced profound structural changes as a result of economic opening, privatization, deregulation and the restructuring of its economy (Maloney and Azevedo, 1995; Siggel, 1996). Although Mexican workers experienced substantial increases in real wages and employment in the last decade, wage inequality significantly increased (Cragg and Epelbaum, 1996). However,

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these changes in the level of wages, earnings dispersion and employment were not homogenous across the formal and informal sectors. While the relative employment share of the informal sector fell from 15.15 percent in 1987 to 10.15 percent in 1993, the dispersion of wages within the formal sector increased whereas it fell in the informal sector during the same period. Moreover, the informal/formal sector wage ratio increased from 0.59 in 1987 to 0.63 in 1993.

This study attempts to assess the role of the 1987-1993 structural changes in the informal sector in explaining increasing wage dispersion. This time period is particularly interesting since the Mexican economy experienced an increase in opening to trade and foreign direct investment, and a fast increase in the wages of skilled labor compared to unskilled labor (Feliciano, 1993). From 1985 to 1987, Miguel de la Madrid's government began a major restructuring of the external sector. The discussion of both the North American Free Trade Agreement and the petition of Mexico to join the GATT were indications that the government was committed to economic reform and that it was interested in industry-specific export promotion policies. As a result of these policies Mexico's manufacturing sector grew at 3.5% between 1985 and 1991 after growing at only 0.1% during the 1981-1985 period (Siggel, 1996). Also, although the relative size of the informal economy decreased during this period, these changes were not equal across different types of labor. Informal employment increased for piece-rate workers but it decreased for wage and salary workers. Moreover, informality within the industrial sector increased while it decreased for those in technical and related occupations (Judisman, 1995).

From an economic development perspective, understanding the causes and the consequences of increasing wage inequality may help policy makers develop strategies to foster economic growth and increase the standard of living in Mexico. In order to assess the relative role of the changes in employment and wages in the informal sector, in explaining the recent changes in wage inequality, we utilize 1987 and 1993 data from the *Encuesta nacional de empleo urbano* (National Urban Employment Survey; ENEU) to decompose the variance of the log of wages into components that capture the relative roles of inequality within each sector, employment shares, and differences in formal/informal sector mean wages. Our findings suggest that most of the increase in overall wage dispersion can be attributed to increasing wage dispersion within the formal sector coupled with a rise in the share of formal sector employment during the period.

Wage dispersion would have increased almost 17 percent from 0.2239 to 0.2614 log-points but this increase in inequality was mitigated by a drastic reduction in wage dispersion within the informal sector. Wage compression within the informal sector may have resulted from a reduction in the sector's employment share even in the face of increasing overall wage growth. The reduction in the informal/formal sector wage ratio from 1987 to 1993 contributed to mitigate wage dispersion albeit its contribution was relatively small.

During the 1987-1993 period, the share of the informal sector in total employment fell from 15.15 percent in 1987 to 10.15 percent in 1993. 1987-1993 employment sector probit models were estimated and decomposed to analyze the socioeconomic factors that contributed to the decrease in the role of the informal sector in total employment. We find that most of the reduction in the relative size of the informal sector (i.e., about 60 percent)

is explained by changes in the labor market structure that determines informal/formal sector employment and about 40 percent is explained by changes in the composition of the Mexican labor force.

The causes for the four percentage point decrease in the wage gap between the formal and informal sectors (i.e., an increase in the informal/formal wage ratio) is analyzed using the wage decomposition technique due to Juhn, Murphy and Pierce (1991) (JMP). The JMP wage decomposition suggests that increases in *both* observed and unobserved prices coupled with changes in relative skills across sectors would have dramatically increased the sectoral wage gap by pushing formal sector wages up; however, this widening of the gap is mostly offset by changes in unobserved characteristics of the sample that benefitted workers in the informal sector.

The results from this work suggest that during the 1987-1993 period the diminishing role of the informal sector in total employment coupled with a substantial decrease in the within sector wage inequality contributed to slow down increasing wage dispersion in Mexico.

The paper is organized as follows. Sections 2 and 3 discuss the increases in wage inequality during the 1987-1993 period taking into account formal-informal relative changes in employment shares, wages and within sector wage inequality. Section 4 analyzes the factors that help explain the decrease in the role of the informal sector in total employment and Section 5 explains the causes for the 1987-1993 decrease in the formal-informal sector wage differential using the JMP wage decomposition. Section 6 provides concluding remarks and public policy implications.

Increasing Wage Dispersion and Mexico's Urban Informal Sector

During the mid to late 1980s, the Mexican economy was characterized by sustained economic growth, increasing wage dispersion, and a reduction in the relative size of the informal sector. From 1988 to 1991, when the gross domestic product grew at an average annual rate of 3.8 percent, the informal sector grew at a rate of 2.5 percent compared to a 5.0 percent growth rate for the formal sector (Judisman, 1995)[1]. During the 1987-1993 period, overall wage dispersion increased more than 50 percent and the wages of skilled labor grew faster than those of unskilled labor (Celtek and Pagán, 1997). For example, from 1986 to 1990 the wages of manufacturing workers in the 90th percentile of the wage distribution increased by 16% relative to those in the 10th percentile (Feliciano, 1993).

A possible source for the increase in wage inequality is that institutional changes resulting from economic and political reform have created new opportunities for entrepreneurs. If the labor supply elasticity of these workers is relatively low then their wages may grow significantly faster (Cragg and Epelbaum, 1996). Thus, shifts in government spending resulting from economic reforms and government restructuring may have generated changes in relative labor demand that in turn may have resulted in increasing wage dispersion.

It may also be possible that part of the increase in wage inequality is the result of the unique relationship between capital and labor. That is, if capital and skilled labor are complements and capital and unskilled labor are substitutes then large infusions of capital

1. Although the relative share of the informal sector substantially fell during the 1987-1993 period, from 1991 to 1993, when the rate of growth of gross domestic product fell to an average of 1.6 percent annually, informal sector employment grew 5.9 percent annually compared to a growth rate of 1.8 percent for the formal sector (see Judisman, 1995).

affect labor demand differently. Indeed, there is some evidence that more capital intensive firms tend to hire a higher proportion of skilled labor and pay higher wages (see the discussion by Cragg and Epelbaum, 1996: 100). Some researchers have suggested that rent dissipation resulting from increasing economic competition may also be an important factor in explaining increasing wage inequality. However, Cragg and Epelbaum (1996) find that rent dissipation during the 1987-1993 period had only a small impact on wages and actually contributed to a reduction in wage dispersion.

Growth-induced structural changes in the informal sector will most likely have a tangible effect on wage inequality. For example, if economic growth results in more employment opportunities in the formal sector then it is possible that relatively qualified informal sector workers may find employment in the formal sector. These sectoral employment shifts resulting from self-selection essentially have two impacts: they compress wages in the informal sector while, at the same time, disperse wages in the formal sector. Thus, in a period characterized by changes in the rate of economic growth, the informal sector may play an important role in determining the evolution of the overall wage structure.

The informal sector is usually defined according to the causes leading to its existence: government regulations, high tax rates, illegality of the trade, prohibitions, etc. Three operational definitions are commonly employed in the economic development literature: "underground economy" (Tanzi, 1983a), "production rationale" (Guergil, 1988) and "market rationale" (Benton, Castells and Portes, 1989). The "underground economy" essentially refers to the "legal aspects" of labor in the economy. Under this definition, the informal sector encompasses any type of labor practice that generates income not reported to the fiscal

authorities. In the case of Mexico, this implies being employed in a firm not affiliated to the National Social Security System (IMSS). Under the "production rationale" falls all of the labor force that has not been incorporated to the formal sector because of an excess supply of labor. This generally includes very small economic units where entry is relatively easy since capital requirements are nil, and their main objective is subsistence. The "market rationale" typically includes that part of the labor force that is under-employed in the formal sector. Under this view, the informal sector solely exists because it provides goods and services to the formal sector at a lower price than formal sector units of production.

These definitions are not mutually exclusive but their boundaries are important to understand the dispersion of wages between and within sectors. For instance, under the "production rationale", the informal sector is composed of all the labor that has not been incorporated into the formal sector. Given overall labor market equilibrium, we would expect this type of labor to be the less productive, since it has been estimated that labor productivity in the informal sector is about two-thirds of that in the formal sector (de Soto, 1987).

In this sense, the labor force that remains classified as "informal" would tend to include those workers in the left tail of the earnings distribution. Thus, under the production rationale, earnings dispersion in the informal sector would be relatively lower than that in the formal sector.

In our case, when we talk about the informal sector we are basically referring to the "underground economy". This operational definition is the one proposed by Roubaud (1995), where the informal sector is defined according to whether or not a worker is

employed in an "unregistered" or "registered" firm. It is reasonable to believe that in some sense most of the informal sector employment is characterized by an "illegal" element[2]. Thus, we expect that the relative sectoral wage dispersion under this definition would be very similar to that from the "productive rationale".

The existence of an informal sector has important effects on the overall economic structure. Among the most important are the issues of equality, efficiency and economic policy (Tanzi, 1983a). On the one hand, it is generally believed that changes in both equality and efficiency occur if only a portion of the population pays income taxes, particularly if the formal sector is highly sensible to changes in the tax rates. Since the size of the informal sector responds inversely to changes in the tax rates, some policy-makers have suggested that an "inflation tax" would be desirable on the grounds of equality and efficiency, particularly if sectoral transactions occur mainly in cash (Lerner, 1970; Tijerina, 1992). On the other hand, the informal sector seems to provide the labor market flexibility necessary to take advantage of profits in small markets. Thus, it is not clear that economic policy oriented to reduce the size of the informal sector is always desirable.

Log-Wage Variance Decompositions

To better understand the causes and consequences of increasing wage dispersion, we begin by decomposing the variance of the log of hourly wages for 1987 and 1993 (third quarter) samples of the *Encuesta nacional de empleo urbano* (National Urban Employment

2. Notice that there may be some firms that are registered, but that have elements as small size, easy entry and so on, to be classified as “normal”.

Survey, ENEU). The ENEU contains comprehensive information on employment status, earnings, usual hours and weeks worked, occupation, region of residence, education and other demographic information for a random sample of the Mexican urban population. For consistency purposes across years, we employ the metropolitan areas included in both 1987 and 1993 (16, although the 1993 ENEU surveys 37 metropolitan areas). The sample consists of those individuals between the ages of 16-65 who reported positive earnings and hours of work and were employed in either the formal or the informal sectors[3]. We employ the informal sector definition proposed by Roubaud (1995), where informal sector employment is defined as being employed in a non-registered firm[4]. Our final sample consisted of 28,768 (formal sector) and 5,136 (informal sector) individuals for 1987 and 44,320 (formal sector) and 5,199 individuals (informal sector) for 1993.

Following Margo and Finegan (1995), the variance of the log of hourly wages between two sectors (in this case, the formal and informal sectors) can be decomposed as:

$$\sigma^2(lnY) = \beta_F \sigma_F^2 + \beta_I \sigma_I^2 + \beta_F \beta_I \left[ln(\mu_F/\mu_I)\right]^2 \quad (1)$$

where F = formal sector, I = informal sector, j = share of workers in the jth sector $(j = F, I;\ \beta_F + \beta_I = 1)$ and $[ln(\mu_F/\mu_I)]$ is the log of the formal-informal mean wage ratio. Equation (1) decomposes the variance of the overall log-wage ratio (and, hence, wage inequality) into three components: The first two terms capture the overall variance in wages

3. Real wages were adjusted to 1993 Nuevos Pesos.

4. There is wide disagreement on a universally accepted definition of the informal sector in the economic development and labor literature (e.g., Tijerina-Guajardo, 1997). We utilize the definition suggested by Roubaud (1995) for Mexico's ENEU because it captures the standard view of the informal economy as the total income that is no included in the national accounts (see also Tanzi, 1983). Our definition of the informal sector as those firms that are not officially registered also allows us to compare our results with previous studies, particularly that of Roubaud (1995) for the Mexico City metropolitan area.

accounted for by the jth sectoral variance (or inequality) and weighted by the employment share of the jth sector. The third term explains the magnitude of the overall wage variance accounted for by the log gap in mean wages. This last term implies, for example, that wage inequality may increase as the gap in mean wages across sectors increases.

The relative role of the changes in each of these sectoral components in explaining the growth in overall wage inequality can be better understood when we decompose the log-wage variance change (say from 1987 to 1993) into inter-period changes for each of the three components of (1). For example, if the relative share of formal sector employment increases and wage dispersion is also higher in this sector, we would expect that overall wage inequality will increase.

Table 1

1987-93 Urban Formal-Informal Sector Log Wage Variance Decompositions

Components	1987	1993
σ^2	0.3812	0.5892
σ_F^2	0.3174	0.5907
β_F	0.8485	0.8950
σ_I^2	0.5020	.03811
β_I	0.1515	0.1050
$[1n(\mu_F/\mu_I)]^2$	0.1155	0.1597
Variance Decomposition	**1987**	**1993**
$\beta_F \sigma_I^2$	0.2693	0.5287
$\beta_I \sigma_I^2$	0.0760	0.0400
$\beta_F \beta_I [ln(\mu_F/\mu_I)^2]$	0.0148	0.0150
1987-1993 Changes in the Decomposition	**Percent Explained**	
$\Delta\ \sigma^2$	0.2236	
$\Delta \{\beta_F \sigma_F^2\}$	0.2594	116.01
$\Delta \{\beta_I \sigma_I^2\}$	-0.0360	-16.10
$\Delta \{\beta_F \beta_I [ln(\mu_F/\mu_I)^2]\}$	0.0002	0.09

Table 1 presents the log wage variance decompositions for both 1987 and 1993 ENEU samples. Note that the log wage variance increased from 0.3812 in 1987 to 0.5892 in 1993. Note, however, that the variance in the formal sector increased from 0.3174 to 0.5907 log-points from 1987 and 1993 whereas it decreased in the informal sector from 0.5020 to 0.3811 log-points during the same period. The same qualitative results arise from looking at the weighted variance in the second part of Table 1. These differing sectoral changes in the log wage variance coupled with the decrease in the relative share of informal sector employment suggest that the 1987-1993 0.2236 log-point increase in the variance of the overall log of wages would have been about 16.10 percent higher if we only took into

account the relative increase in formal sector employment and the growth of wage inequality within this sector. Interestingly, changes in the weighted log wage gap played an insignificant role in changing the overall wage dispersion (see bottom of Table 1). This is evident in the increase of by 0.0002 log points.

Changes in Relative Employment Shares: Formal vs. Informal Sectors

Our findings from the log wage variance decomposition suggest that most of the increase in wage dispersion can be explained by increases in wage inequality within the formal sector coupled with an increase in relative employment in this sector. The informal sector actually contributed to slow down increasing wage dispersion by experiencing wage compression and a reduction in relative employment and the sectoral wage ratio. But, what factors help explain the substantial decrease in the relative employment share of the informal sector? To address this issue, we proceed in two steps: First, we look at the likelihood of whether an individual is employed in the informal and formal sectors in both 1987 and 1993. The determinants of the propensity to be employed in the formal/informal sector may be specified as

$$I_{it}^{*} = X_{it}\beta_{t} + \varepsilon_{it} \qquad (2)$$

where $I_{it}^{*} > 0$ and $I_{it}^{*} < 0$ indicate employment in the informal and formal sector, respectively, for individual i in time period (year) t. X_t represents the factors posited to affect the employment sector choice, and β_t represents the vector of coefficients for (2). Factors in X_t include years of education and labor market experience, occupation, region of residence, sex, marital status, etc. Using (2), we can estimate a probit model of the propensity of informal sector employment:

$$Pr(I_{it} = 1|X_{it}) = \Phi(X_{it}'\beta_t) \quad (3)$$

where Φ is the cumulative density function of a standard normal random variable.

Table 2 presents the definition of variables and Table 3 the descriptive statistics for the urban formal and informal sectors for the 1987 and 1993 ENEU samples. Before discussing the estimated probit models, note that the mean educational level in the informal sector is much lower than in the formal sector. In 1987 formal sector workers averaged about 4.70 years more in education that their informal sector counterparts. The educational gap became smaller in 1993 when it dropped to 4.20 years. The experience gap is also large, amounting to slightly more than four years of potential experience favorable to the informal sector[5]. Informal sector workers also tend to be relatively younger and less than two fifths are married compared to about half of those employed in the formal sector. Interestingly, the proportion of females employed in the informal sector grew from 34.31 percent in 1987 to 48.70 percent in 1993. In the formal sector, however, the share of women remained about the same at about 33 percent of total employment.

Table 2

Definition of Variables

5. In some sense, this tends to confirm the idea of a favorable shock on average to the formal sector during these years.

Variable		
LNWAGE	=	natural log of hourly wages
EDU	=	number of years of formal schooling
EXPER	=	age minus years of schooling minus 6
EXPER2	=	EXPER squared divided by 100
MARIED	=	1 if married; 0 otherwise
FEMALE	=	1 if female; 0 otherwise
PTINE	=	1 if part time; 0 otherwise
MANPROF	=	1 if occupation managerial/professional; 0 otherwise
TECH	=	1 if occupation technical; 0 otherwise
PROFSERV	=	1 if occupation professional services; 0 otherwise
SALES	=	1 if occupation sales; 0 otherwise
NONSERV	=	1 if occupation non-professional services; 0 otherwise
TRANSP	=	1 if occupation transportation; 0 otherwise
PROD	=	1 if occupation production; 0 otherwise
OPERATOR	=	1 if occupation operator; 0 otherwise
BORDER	=	1 if region of residence is border states of Mexico; 0 otherwise
NORTH	=	1 if region of residence northern states of Mexico; 0 otherwise
CENTER	=	1 if region of residence central states of Mexico; 0 otherwise
SOUTH	=	1 if region of residence is southern states of Mexico; 0 otherwise
MEXCITY	=	1 if region of residence is Mexico City; 0 otherwise

Table 3

Descriptive Statistics (Standard Deviations in Parentheses)

	1987		1993	
Variable	**Formal Sector**	**Informal Sector**	**Formal Sector**	**Informal Sector**
LNWAGE	1.2487	0.7210	1.5885	1.1204
	(0.5634)	(0.7085)	(0.7686)	(0.6173)
EDU	9.0285	5.3372	9.8753	5.6794
	(4.1955)	(3.4414)	(4.1533)	(3.4016)
EXPER	17.2366	21.4519	17.1175	21.2862
	(12.6209)	(14.6825)	(12.21148)	(14.3764)
EXPER2	45.4199	67.2155	44.0497	65.6415
	(61.0141)	(79.5664)	(57.9672)	(77.1915)
MARRIED	0.5082	0.3937	0.5240	0.3781
	(0.4999)	(0.4886)	(0.4994)	(0.4850)
FEMALE	0.3274	0.3431	0.3310	0.487
	(0.4693)	(0.4748)	(0.4706)	(0.4999)
PTIME	0.1177	0.1622	0.1240	0.225
	(0.3223)	(0.3687)	(0.3296)	(0.4177)
MANPROF	0.2294	0.0095	0.2741	0.0079
	(0.4204)	(0.0972)	(0.4461)	(0.0885)
TEC	0.0469	0.0055	0.0542	0.0038
	(0.2115)	(0.0736)	(0.2265)	(0.0619)
PROFSERV	0.1074	0.0113	0.0944	0.0044
	(0.3096)	(0.1057)	(0.2924)	(0.0664)
SALES	0.1103	0.0680	0.1237	0.0527
	(0.3133)	(0.2517)	(0.3293)	(0.2235)
NONSERV	0.0884	0.3234	0.0800	0.5036
	(0.2839)	(0.4678)	(0.2713)	(0.5000)
TRANSP	0.0531	0.0567	0.0579	0.0085
	(0.2243)	(0.2312)	(0.2336)	(0.0916)
OPERATOR	0.0448	0.1725	0.0597	0.1835
	(0.2068)	(0.3779)	(0.237)	(0.3871)
BORDER	0.4183	0.3549	0.4207	0.4164
	(0.4933)	(0.4785)	(0.4937)	(0.4930)
NORTH	0.0785	0.0596	0.1025	0.0914
	(0.2690)	(0.2367)	(0.3034)	(0.2882)
CENTER	0.3116	0.4264	0.2939	0.3114
	(0.4631)	(0.4946)	(0.4555)	(0.4631)
SOUTH	0.0517	0.0561	0.0404	0.0442
	(0.2215)	(0.2301)	(0.1968)	(0.2056)
N	28,768	5,136	44,320	5,199

Part-time employment rates tend to be higher in the informal sector, and they significantly increased during the 1987-1993 period from 16.22 percent in 1987 to 22.50 percent in 1993; however, they remained at about 12 percent in the formal sector in both

years. Most of those employed in the informal sector are employed in nonprofessional services and as operators. Interestingly, the share of informal sector workers employed in nonprofessional services increased from 32.34 percent in 1987 to 50.36 percent in 1993; less than one tenth of formal sector workers are employed in this occupational category. Also, informal sector employment grew faster in the border and northern Mexican states, perhaps as a result of increasing internal migration due to the growth in employment opportunities along the U.S.-Mexico border region[6].

The results from estimating equation (2) are reported in Table 4. For ease of interpretation, we also report the partial derivatives, which capture the impact of a change in an independent variable on the probability of being employed in the informal sector [these are evaluated at the sample means, i.e. for the jth variable , $\partial I_t / \partial X_{jt} = \Phi(\bar{X}_t' \beta_t)\beta_j$ (Greene: 1997). The probability of employment in the informal sector is negatively related to educational levels and labor market experience (but at an increasing rate) as we would expect. For example, in 1987 an additional year of education decreases the probability of being employed in the informal sector by 2.56 percentage points. Note also that married individuals are more likely to be employed in the formal sector as well as those that are employed part-time as compared to full-time.

Table 4

Probit Parameter Estimates 1987 & 1993 (Informal = 1; Formal=0)

	1987		1993	
Variable				

6. The regions were defined using the distribution suggested by Hanson (1997: 121).

	Parameter Estimates	Partial Derivatives	Parameter Estimates	Partial Derivatives
CONSTANT	2.6979***		2.9393***	
	(0.049)		(0.043)	
EDU	-0.0986***	-0.0256	-0.0819***	-0.0161
	(0.003)		(0.002)	
EXPER	-0.0501***	-0.0130	-0.0554***	-0.0109
	(0.002)		(0.002)	
EXPER2	000064***	0.0017	0.0074***	0.0015
	(0.001)		(0.001)	
MARRIED	-01828***	-0.0475	-0.1024***	-0.0201
	(0.0021)		(0.018)	
FEMALE	0.0021	0.0005	-0.1828***	-0.0360
	(0.021)		(0.018)	
PTIME	-0.1594***	-0.0414	-0.1723***	-0.0339
	(0.029)		(0.023)	
MANPROF	-0.8850***	-0.2298	-0.8098***	-0.1594
	(0.027)		(0.025)	
TECH	-1.2754***	-0.3311	-1.0951***	-0.2155
	(0.041)		(0.034)	
PROFSERV	-1.5300***	-0.3972	-1.6598***	-0.3267
	(0.034)		(0.030)	
SALES	0.7135***	0.1852	1.0223***	0.2012
	(0.049)		(0.062)	
NONSERV	-0.4581***	-0.1189	-0.4787***	-0.0942
	(0.031)		(0.030)	
TRANSP	-0.2781***	-0.0722	-0.2513***	-0.0494
	(0.040)		(0.040)	
OPERATOR	-0.2026***	-0.0526	-0.1485***	-0.0292
	(0.043)		(0.042)	
BORDER	0.2038***	0.0529	0.2706***	0.0532
	(0.026)		(0.022)	
NORTH	-0.0704	-0.0183	-0.0883***	-0.0174
	(0.037)		(0.029)	
CENTER	0.1823***	0.0473	0.1333***	0.0262
	(0.027)		(0.024)	
SOUTH	-.0864*	-0.0224	0.0761	0.0150
	(0.041)		(0.040)	
N	33,904		49,519	
Chi-squared	10,647.62		13,564.17	

Notes: (i) PROD is the reference occupation and MEXCITY is the reference region
(ii) *, ** and *** indicate the significance levels at the 10, 5 and 1 percent respectively, using two-tailed tests.
(iii) Standard errors in parentheses.

Those in the production and sales occupational categories are more likely to be employed in the informal sector when compared to the other occupational categories. Also, both in 1987 and 1993, those residing in the border and central states are more likely to be

employed in the informal sector than those in Mexico City. For example, those residing in a border state are more than five percentage points more likely to be employed in the informal sector when compared to individuals employed in Mexico City.

From 1987 to 1993, the share of informal sector employment fell from 15.15 to 10.15 percent. To understand the causes for this decrease in relative employment, we can desegregate the 1987-1993 change in the informal sector employment share into components that account for the type of worker employed in each sector as well as the changes in labor market structure (i.e., the probit model coefficients). To do this, we employ the ordered probit decomposition proposed by Jones and Makepeace (1996) to the dichotomous choice case (e.g., Pagán, 1997). This is similar to the decomposition technique for linear regression models first proposed by Oaxaca (1973); namely,

$$\bar{I}_{93}-\bar{I}_{87} = [\Phi(\bar{X}'_{93}\beta_{87}) - \Phi(\bar{X}'_{87}\beta_{87})] + [\Phi(\bar{X}'_{93}\beta_{93}) - \Phi(\bar{X}'_{93}\beta_{87})] \quad (4)$$

where $\bar{I}$ represents the mean share of informal sector employment for either 1987 or 1993, $\bar{X}$ is a vector of the control variables' means previously used in (3) and the β's are the estimated coefficients for either 1987 or 1993.

The first bracketed component on the right-hand side of (4) explains the changes in the mean share of informal sector employment due to 1987-1993 changes in the mean characteristics of those employed in the labor market. The second term in equation (4) captures the changes in 1987-1993 relative informal sector employment share due to changes in the estimated coefficients. Thus, this term captures the changes due to solely changes in the labor market structure during this time period (i.e., changes in the coefficients that show

increases or decreases in the likelihood of informal sector employment according to the level of education, potential experience, region of residence, etc.).

It is possible to further disaggregate the two components of (4) into j subcomponents to understand the role played by changes in either each individual variable or coefficient on informal sector employment. Although a simple decomposition is not possible given the nonlinearity inherent in the probit model, Even and Macpherson (1990) devised a probit decomposition technique that multiplies each component of (4) by a term that captures the role of changes in the X's or β's. The fraction of the first term due to changes in the jth variable can be written as:

$$\Delta X_j = [\Phi(\bar{X}'_{93}\beta_{87}) - \Phi(\bar{X}'_{87}\beta_{87})][(\bar{X}_{93j} - \bar{X}_{87j})\beta_{87j})]/[(\bar{X}_{93} - \bar{X}_{87})'\beta_{87}] \quad (5)$$

Similarly, the fraction of the second term due to changes in the jth coefficient is given by:

$$\Delta \beta_j = [\Phi(\bar{X}'_2\beta_2) - \Phi(\bar{X}'_{93}\beta_{87})][(\beta_{93j} - \beta_{83j})\bar{X}_{93j}]/[(\beta_{93} - \beta_{87})'\bar{X}_{93}] \quad (6)$$

In the above equations we use the symbols ΔX_j and $\Delta\beta_j$ to define the jth component of each part of (4).

Table 5 reports the decomposition of the changes in the informal sector employment share. About 40 percent of the 4.65 percentage point drop in the informal sector employment share is explained by changes in the characteristics of those who reported being employed in either sector in the two years. Changes in the labor market structure explain about 60 percent of the drop in the informal sector employment share.

Table 5

Decomposition of 1987-1993 Changes in the Urban Informal Sector Employment Sector Share

	1987	1993
	$\bar{I}_{87} = 0.1515$	$\bar{I}_{93} = 0.1050$
Change in Employment Share:	$\bar{I}_{93} - \bar{I}_{87}$	-0.0465
Change due to changes in X's:	$[\Phi(\bar{X}'_{93}\beta_{87}) - \Phi(\bar{X}'_{87}\beta_{87})]$	-0.0186
Change due to changes in β's:	$[\Phi(\bar{X}'_{93}\beta_{93}) - \Phi(\bar{X}'_{93}\beta_{87})]$	0.0278
Disaggregation into j components	ΔX_j	$\Delta\beta_j$
CONSTANT	0	-0.0328
EDU	-0.0114	-0.0026
EXPER	0.0006	0.0264
EXPER2	-0.0007	-0.0130
MARRIED	-0.0003	0.0032
FEMALE	0.00003	0.0052
PTIME	0.0007	0.0010
MANPROF	-0.0066	0.0002
TECH	-0.0007	-0.0005
PROFSERV	0.0010	-0.0016
SALES	-0.0004	-0.0016
NONSERV	0.00003	0.0004
TRANSP	-0.00001	-0.005
OPERATOR	0.0007	-0.0006
BORDER	0.00003	-0.0001
NORTH	-0.0001	0.0003
CENTER	-0.0012	-0.0010
SOUTH	-0.0004	-0.0004

Further disaggregating (4) into (5) and (6) suggests that most of the changes in the X's are explained by the increase in the educational gap between workers employed in the formal vs. the informal sector. That is, the fact that more educated workers are less likely to be employed in the informal sector coupled with the increase in the education gap across

sectors (see Table 3) would have contributed by itself to lower the share of informal sector employment by 0.0114 percentage points. The other important factor that explains the drop in informal sector relative employment is the change in the regional share of informal/formal sector employment which accounts for a 0.0017 percentage point drop in employment[7]. Note, however, that changes in the distribution of occupations across sectors contributed to mitigate the increase in formal sector employment; i.e., the occupational terms would have increased the share of informal sector employment by 0.0060 percentage points.

Most of the 1987-1993 change in the coefficients of the probit models (i.e., changes in the structure of formal/informal sector employment) are explained by changes in the coefficients for the occupation controls (0.0042 percentage points) followed by a drop in the importance of education in determining informal sector employment and changes in the regional impact of the probability of being employed in the informal sector. Changes in the impact of labor market experience coupled with inter-period changes in the likelihood of female employment in the informal sector would have, on the other hand, contributed to increase the share of the informal sector in total employment.

Changes in the 1987-1993 Informal/Formal Sector Wage Differential

In table 1 of Section 2 we showed that the 1987-1993 decrease in the weighted sectoral wage differential contributed to lower wage dispersion but only by 0.0002 log points. In 1987, the wage ratio between those employed in the informal and formal sectors in

7. Calculated as the sum of the region of residence terms in Table 5.

Mexico was 0.59 but the wage ratio increased to 0.63 by 1993. Which factors account for this relatively small change in the sectoral wage gap even in the face of increasing wage inequality and a fall in the informal sector employment share? To answer this question, we decompose the 1987-1993 change in the sectoral difference of the log of wages using the Juhn, Murphy and Pierce (1991) methodology[8]. The JMP decomposition allows us to account for 1987-1993 changes in both observed and unobserved characteristics of the sample as well as the 'prices' of these characteristics.

Let the log-wage Y_{itF} for the ith worker employed in the formal sector in year t be given by:

$$Y_{itF} = X_{itF}\ \beta_{tF} + \theta_{itF}\ \sigma_{itF} \qquad (7)$$

where X_{itF} and β_{tF} represent the worker's human capital characteristics and the returns to those characteristics, θ_{itF} is a standardized residual (i.e., $\theta_{it} = e_{it} / \sigma_{it}$), and σ_{itF} is the standard deviation of residual earnings in year t.

The year t log-wage differential D_t can be written as:

$$D_t \equiv Y_{tF} - Y_{tI} = \Delta X_t\ \beta_{tF} + \Delta\theta_t\ \sigma_{tF} \qquad (8)$$

where Δ represents the average inter-sectoral difference for the subsequent variable(s). Using equation (8), we can decompose the changes in the inter-sectoral log-wage differential between 1987 and 1993 as:

$$D_{93} - D_{87} = (\Delta X_{93} - \Delta X_{87})\ \beta_{87F} + \Delta X_{93}\ (\beta_{93F} - \beta_{87F}) + (\Delta\theta_{93} - \Delta\theta_{87})\text{-}\sigma_{87F} + \Delta\theta_{93}\ (\sigma_{93F} - \sigma_{87F}). \qquad (9)$$

The first right-hand side term of (9) captures the 1987-1993 change in the inter-sectoral wage differential that can be explained by differences in observed characteristics.

8. For other applications of the JMP Model (Blau and Kahn: 1992, 1994, 1997; Margo: 1995 and Dávila, Pagán and Viladrich: 1977).

The second term measures the portion of the log-wage gap change explained by changes in the observed human capital endowment prices, evaluated at the 1993 inter-sectoral differences in characteristics. The third term reflects the 1987-1993 change in the residual wage position of informal sector workers relative to formal sector workers, evaluated at the residual standard deviation of informal sector log-wages in 1987. The last term captures the 1987-1993 changes in the returns to unobservable skills. Once again, the advantage of using (9) to analyze relative wage changes is that it allows us to account for changes in both observed (or measurable) as well as unobserved individual characteristics and the returns to those characteristics.

We estimated equation (7) for both formal and informal sector workers for 1987 and 1993 ENEU samples. The results from these regressions are presented in Table 6. Controls in X_t included years of education, experience, experience squared, and marital status, female, part-time status, occupation and regional dummies. Note that the wage structure differs both across years and across sectors. The rate of return to an additional year of education (once we have controlled for occupation) increases from 6.05 percent in 1987 to 8.82 percent in 1993. For the informal sector, however, we observe that not only the rate of return is relatively low but it slightly fell from 2.96 to 2.50 percent during the same period. The rates of return to experience are surprisingly similar both across sectors and years. Interestingly, the wage premium commanded by those who are married increased in the formal sector but it fell in the informal sector. The ceteris paribus wage underpayment experienced by females is much higher in the informal sector in both years, but it significantly fell in the informal

sector from 35.15 percent in 1987 to 17.06 percent by 1993[9]. It is noteworthy to point out that the opposite occurred in the formal sector where the gender gap increased from 6.95 to 12.40 percent during this same period. Also, the occupational controls have reasonable signs, and wages were significantly higher in the border states and Mexico City when compared to all other states, except for the informal sector in 1993 where the northern states commanded the highest ceteris paribus wage premium. It is also clear from the regional dummy variables' coefficients that regional wage convergence occurred during this period[10].

Table 6
Wage Function Estimates 1987 & 1993: Urban Formal vs. Informal Sectors

Variable	Formal		Informal	
	1987	1993	1987	1993

9. The percentages were calculated as [exp (β)-1]100. (Kennedy: 1981)

10. Some related evidence on regional economic growth and per capita income covergence in Mexico is presented by Tijerina Guajardo: 1997.

CONSTANT	0.378***	0.1749***	0.5221***	1.0400***
	(0.0014)	(0.0148)	(0.0472)	(0.0422)
EDU	0.0605***	0.0882***	0.0296***	0.0250***
	(0.0009)	(0.0009)	(0.0031)	(0.0028)
EXPER	0.0270***	0.0361***	0.0254***	0.0205***
	(0.0008)	(0.0008)	(0.0023)	(0.0021)
EXPER2	-0.0035***	-0.0443***	-0.0033***	-0.0031***
	(0.0002)	(0.0002)	(0.0004)	(0.0004)
MARRIED	0.0936***	0.1505***	0.1287***	0.1070***
	(0.0064)	(0.0067)	(0.0191)	(0.0176)
FEMALE	-0.0720***	-0.1283***	-0.4331***	-0.1871
	(0.0063)	(0.0065)	(0.0282)	(0.0257)
PTIME	0.4319***	0.5001***	0.4241***	0.4584***
	(0.0096)	(0.0094)	(0.0217)	(0.0180)
MANPROF	0.0631***	0.2024***	0.1255	0.1924**
	(0.0083)	(0.0088)	(0.0812)	(0.0835)
TECH	0.1043***	0.0716***	0.1379	-0.0097
	(0.0137)	(0.0137)	(0.1064)	(0.1182)
PROFSERV	0.0110	0.0489***	-0.1961***	0.1098
	(0.0110)	(0.0012)	(0.0746)	(0.1098)
SALES	-0.1795***	-0.1602***	-0.1074***	-0.2697***
	(0.0094)	(0.0098)	(0.0333)	(0.0362)
NONSERV	-0.1647***	-0.2133***	-0.3920***	-0.3266***
	(0.010)	(0.0114)	(0.0293)	(0.0278)
TRANSP	-0.0331***	-0.0566***	0.0047	-0.2188***
	(0.0126)	(0.0290)	(0.0355)	(0.0800)
OPERATOR	-001590***	-0.1957***	-0.2292***	-0.3766***
	(0.0135)	(0.0127)	(0.0237)	(-0.0233)
BORDER	0.0478***	0.0529***	0.0876***	-0.00390*
	(0.0083)	(0.0086)	(0.0279)	(0.0226)
NORTH	-0.1791***	-0.0628***	-0.2610***	0.2077***
	(0.0119)	(0.0011)	(0.0401)	(0.0310)
CENTER	-0.1281***	0.0001	-0.1863***	-0.1597***
	(0.0086)	(0.0009)	(0.0274)	(0.0235)
SOUTH	-0.1584	-0.1402***	-0.2723***	-0.2797***
	(0.0137	(0.0016)	(0.0410)	(0.0397)
N	8,768	44,320	5,136	5,199
Adjusted R^2	0.316	0.4200	0.3857	0.2878

Notes: (*i*) PROD is the reference occupation and MEXCITY is the reference region.
(*ii*) *, **, and *** indicate the significance levels at the 10, 5, and 1 percent, respctively, using two-tailed tests.
(*iii*) Standard error in parentheses.

Table 7 presents the decomposition of the 1987-1993 changes in the inter-sectoral log-wage gap [(See equation (9)]. The log-wage differential fell from 0.5277 to 0.4681, or 0.0597 log points. That is, wages in the informal sector grew slightly faster that those in the

formal sector. The decomposition of the differential suggests that changes in observed characteristics and (observed and unobserved) returns to those characteristics would have significantly increased the sectoral wage differential. Changes in observed prices, ceteris paribus, would have resulted in a 0.786 log point wage differential and this effect is compounded by the impact of changes in observed characteristics and unobserved prices, which would have increased the differential by an additional 0.0786 and 0.0793 log points, respectively. However, these effects were more than offset by changes in the unobserved characteristics of the sample which, ceteris paribus, would have resulted in a 0.3444 log-wage differential.

The unobserved characteristics effect is particularly interesting since it explains why the inter-sectoral wage gap actually fell. The standardized log-wage residual went from -0.5866 in 1987 to 0.0018 log-points in 1993. For a given standard deviation of wages, this result implies that the position of informal sector workers within the formal sector log-wage residual distribution substantially improved. In other words significant improvements in the unobserved skills of informal sector workers when compared to formal sector workers explains why the inter-sectoral wage gap fell, even when we account for changes in the prices of skills and observed characteristics. On the other hand, the increase in the standard deviation of the log wage residual from 0.4501 to 0.5853 during this same period had the opposite effect since it pushed informal sector workers even further out to the left tail of the log-wage residual distribution.

Table 7

Decomposition of 1987-1993 Changes in Wages: Urban Formal vs. Informal Sectors

Log-Wage Differential		
1987		0.5277
1993		0.4681
Standarized Residual		
1987		-0.5866
1993		0.0018
Standard Deviation of Error		
87F		0.4501
93F		0.5853
Decomposition of the Differences in the 1987-1993 Log Wage Differential		
Differential		-0.0597
1. Observed Characteristics:	$(\Delta X_{93} - \Delta X_{87})\ \beta_{93F}$	0.0786
2. Observed Prices:	$\Delta X_{87}\ (\beta_{93\,F-}\ \beta_{87F})$	0.1269
3. Unobserved Characteristics	$(\Delta \theta_{93} - \Delta \theta_{87})\ \sigma_{93F}$	-0.3444
4. Unobserved Prices:	$\Delta \theta_{87}\ (\sigma_{93F} - \sigma_{87F})$	0.0793
Disaggregation of 1 and 2 into j terms	$(\Delta X_{93} - \Delta X_{87})\ \beta_{93F}$	$\Delta X_{87}\ (\beta_{93F} - \beta_{87F})$
EDU	0.0445	0.1021
EXPER	0.0017	-0.0382
EXPER2	-0.0009	0.0199
MARRIED	0.0047	0.0065
FEMALE	0.0180	0.0009
PTIME	-0.0283	-0.0030
MANPROF	0.0094	0.0306
TECH	0.0006	-0.0014
PROFSERV	-0.0003	0.0047
SALES	-0.0046	0.0008
NONSERV	0.0402	0.0014
TRANSP	-0.0030	0.0001
OPERATOR	-0.0008	0.0047
BORDER	-0.0031	0.0003
NORTH	0.0005	0.0022
CENTER	0.00001	-0.0147
SOUTH	-0.0001	-0.0001

With regard to measurable skills, an increase in the inter-sectoral educational gap (see the education variable in Table 3) followed by changes in the relative sectoral share of individuals in each occupation mostly explain the positive sign of the observed characteristics effect. On the other hand, the increase in the rate of return to education in the formal sector during the period, followed by changes in the occupational premiums, explains

most of the changes in the prices of characteristics. Changes in relative experience levels and regional wage premiums, however, had the opposite effect and contributed to close the informal/formal sector wage gap.

Concluding Remarks

This paper analyzes the role of changes in relative employment, wage levels and wage inequality between the formal and informal sectors in explaining increasing wage dispersion in Mexico during the 1987-1993 period. Using data from the *Encuesta nacional de empleo urbano* we find that the observed increase in the overall wage dispersion during this period is mainly driven by increasing wage dispersion in the formal sector coupled with a faster growth of formal sector employment as a percentage of total employment. However, a significant compression in the distribution of informal sector wages contributed to slow down the growth of increasing wage inequality in Mexico.

When we looked at the possible causes for the 1987-1993 decrease in the relative share of the informal sector in total employment we found that about 60 percent of this decrease is explained by changes in the labor market structure that determines sectoral employment. However, about 40 percent is explained by changes in the characteristics of the employed sample, particularly the increase in the education gap and a change in the regional relative share of sectoral employment.

The log-wage gap decomposition suggests that the four percentage point increase in the informal/formal sector wage ratio (i.e., a decrease in the gap) would have been substantially larger if we only looked at the improvement in the relative position of informal

sector workers within the formal sector residual wage distribution. Thus, a relative improvement in unobserved skills would have closed the sectoral gap even more but this effect was offset by an increase in the relative prices of both observed and unobserved skills, as well as increases in relative observed skills in the formal sector, particularly education.

Our results point out that the diminishing role of the informal sector in total employment, coupled with a substantial decrease in the within sector wage inequality, contributed to slow down increasing wage dispersion in Mexico during the 1987-1993 period. It remains to be seen if this trend in wage dispersion has been significantly altered by the substantial increases in the share of informal sector employment that has been evident after the 1994 crisis.

References

Benton, Lauren A., Manuel Castells and Alejandro Portes (1989). *The informal economy. Studies in advanced and less developed countries.* Baltimore, MD John Hopkins University Press.

Blau, Francine D., and Lawrence M. Kahn. (1992). "The Gender Earnings Gap: Learning from International Comparisons," *American Economic Review Papers and Proceedings,* 82 (2), 533-8.

_____. (1994). "Rising Wage Inequality and the U.S. Gender Gap," *American Economic Review Papers and Proceedings,* 84 (2), 23-8.

_____. (1997). "Swimming Upstream: Trends in the Gender Wage Differential in the 1980s," *Journal of Labor Economics*, 15 (1), 1-42.

Celtek, Serkan B., and José A. Pagán. (1997). "1987-1993 Changes in Wage Inequality in Mexico: The Role of Structural Changes in the Private and Public Sectors." Unpublished manuscript, Department of Economics and Finance, The University of Texas-Pan American.

Cragg, M. I., and M. Epelbaum. (1996). "Why has Wage Dispersion Grown in Mexico? Is it the Incidence of Reforms or the Growing Demand for Skills?" *Journal of Development Economics,* 51, 99-116.

Dávila, Alberto, José A. Pagán, and Montserrat Viladrich-Grau. (1997). "The Impact of IRCA on the Job Opportunities and Earnings of Mexican-American and Hispanic-American Workers," *International Migration Review*, forthcoming.

De Soto, Hernando (1987). *El otro sendero. La revolución informal*. Editorial El Barranco, Lima. Reeditado por Diana, México.

Even, William E. and Macpherson, David A. (1990). "Plant Size and the Decline of Unionism," *Economics Letters*, 32, 393-8.

Feenstra, Robert C., and Gordon H. Hanson. (1995a). "Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras," Unpublished Manuscript, National Bureau of Economic Research.

_____. (1995b). "Foreign Investment, Outsourcing and Relative Wages," R.C. Feenstra and G.M. Grossman, eds., *Political Economy and Trade Policy: Essays in Honor of Jagdish Bagwati*, Cambridge, MA: MIT Press.

Feliciano, Z. (1993). "Workers and Trade Liberalization: The Impact of Trade Reforms in Mexico on Wages and Employment," Mimeo, Harvard University.

Greene, William H. (1997). *Econometric Analysis*. Upper Saddle River, NJ: Prentice Hall.

Guergil, Martine. (1988). "Algunos alcances sobre la definición del sector informal". *Revista de la CEPAL*, No. 15, agosto.

Hanson, Gordon H. (1997). "Increasing Returns, Trade and the Regional Structure of Wages," *The Economic Journal,* 107, 113-33.

INEGI (1990). *Encuesta Nacional de Economía Informal.* Aguascalientes, Ags.

Jones, David R., and Gerald H. Makepeace. (1996). "Equal Worth, Equal Opportunities: Pay and Promotion in an Internal Labor Market," *The Economic Journal*, 106, 401-9.

Judisman de Bialostozky, Clara. (1995). *Tendencias de la estructura económica y el sector informal en México (1988-1993).* Cuadernos de Trabajo, No. 10. Secretaría de Trabajo y Previsión Social.

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. (1991). "Accounting for the Slowdown in Black-White Wage Convergence,' M. Kosters, ed., *Workers and their Wages*, Washington, DC: American Enterprise Institute, 107-43.

Kennedy, Peter. (1981). "Estimation with Correctly Interpreted Dummy Variables in Semilogarithm Equations," *American Economic Review*, 71, 802.

Lerner, Abba. (1970). "On Optimal Taxes with an Untaxable Sector," *American Economic Review*, 284-94.

Maloney, W. F., and R. R. Azevedo. (1995). "Trade Reform, Uncertainty, and Export Promotion: Mexico 1982 88," *Journal of Development Economics,* 48, 67-89.

Margo, Robert A., and T. Aldrich Finegan. (1995). "Changes in the Distribution of Wages, 1940-1950: The Public vs. the Private Sector," *NBER Working Paper Number 5389,* National Bureau of Economic Research, Cambridge, MA, December.

Margo, Robert A. (1995). "Explaining black-white wage convergence, 1940-1950," *Industrial and Labor Relations Review,* 48, April, 470-481.

Oaxaca, Ronald. (1973). "Male-Female Wage Differentials in Urban Labor Markets," *International Economic Review*, 14(1), 693-709.

OIT. (1987). Informe General presentado a la Decimacuarta Conferencia de Estadígrafos del Trabajo. Ginebra, Suiza. (International Labour Office).

Pagán, José A. (1997). ""Changes in Attrition Rates from the U.S. Navy's Delayed Entry Program during the 1987-1997 Period." Unpublished manuscript. U.S. Navy Personnel Research and Development Center and Department of Economics and Finance, The University of Texas-Pan American.

Roubaud, Francois. (1995). *La economía informal en México: de la esfera doméstica a la dinámica macroeconómica*. Fondo de Cultura, INEGI y ORSTOM. México.

Siggel, Eckhard. (1996). "Trade Reform and Industrial Sector Growth in Mexico: 1960-1991," *Canadian Journal of Economics,* 29, *S*417-22.

Tanzi, Vito. (1982). *The Underground Economy in the United States and Abroad*. Lexington books.

_____. (1983a)"The Underground Economy," *Finance and Development*, 20(4), 10-3.

_____. (1983b). "The Underground Economy in the United States: Annual Estimates, 1930-1980," *International Monetary Fund Staff Papers*, 30 (2), 283-305.

Taubman, Paul and Michael L. Wachter. (1986). "Segmented Labor Markets," in Ashenfelter, Orley and Richard Layard, eds., *Handbook of Labor Economics*, Vol. II, Chapter 21. North Holland, 1184-1217.

Tijerina-Guajardo, José Alfredo. (1992b). "Finanzas públicas y la cantidad óptima de dinero: el papel del sector informal," *El Economista Mexicano*, 121-36, enero-marzo.

_____. (1997a). "Beneficios y costos del sector informal en la economía," *Entorno Económico*, 35 (206).

_____. (1997b). "Efecto de la migración interna en el crecimiento económico de las entidades federativas de México, 1970-1990." Unpublished Manuscript. Centro de Investigaciones Económicas, Universidad Autónoma de Nuevo León, Monterrey, NL, México.