Brazilian Journal of Political Economy, vol. 26, nº 3 (103), pp. 459-474 July-September/2006

Manufacturing Real Wages in Mexico

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In this paper we analyse the recent evolution and determinants of real wages in Mexico's manufacturing sector, using theories based on the assumption of imperfect competition both in the product and in the labour markets, especially wage-bargain theory, insider-outsider and mark-up models. We show evidence that the Mexican labour market does not behave as a traditional competitive market. The proposed explanation for this fact is that some workers benefit from advantages when compared with others, so that they can get a greater share of the proceedings of the productive process. Also, we find that changes in the degree of competition in the market for output influence the behaviour of real wages.

Key-words: real wages, Mexico, imperfect labour market, panel data, Generalized Method of Moments.

JEL Classification: E24, C51, J31.

INTRODUCTION

During the last quarter of century the Mexican economy has lived through different stages. The last stage, which is the one we are still living in, starts about 1987 and is characterized by the full working of a new strategy, based on the Washington consensus, whereby the state plays a very limited role and the domestic market is fully open to competition from imports. This last stage is divided by the crisis that erupted at the end of 1994, which caused GDP to fall about 7 percent in 1995 with respect to the previous year. However, from mid-1995 onwards growth resumed at a very fast rate. Rapid growth lasted until the beginning of the new century, when it came to a halt in unison with the end of the US economic boom.

During these stages the labour market has undergone also drastic changes,

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and the main objective of this paper is to analyse one particular aspect of the labour market, namely the evolution and determinants of real wages in the manufacturing sector,[1] during the last stage of Mexico's evolution. The paper is organized as follows. After this introduction, in the next section we consider the theoretical arguments developed in connection to wage determination. Then, in a third section we provide the basic information concerning the institutional details of the labour market, and we consider some aspects of Mexico's recent economic evolution which have an influence on this market. In the fourth section we carry out an econometric analysis, relying on panel data for all the 48 manufacturing branches for the period 1988-1999,[2] where we seek to explain the determinants of the real manufacturing wage in Mexico's recent evolution. The last section summarizes our results and conclusions.

THEORETICAL DISCUSSION

Typically labour market and wage studies relate the behaviour of wages with the evolution of employment because, according to a commonly held view, unemployment is the outcome of an exogenous (real) wage rate which exceeds the equilibrium wage rate. In this view, any persistent excess of labour supply is caused by the downward inflexibility of wages. In our research, we shall not study the causality link between real wages and employment. However, severing this causality link does not in the least diminish the importance of studying the labour market and the determinants of wages, as the latter are important by themselves, as well as for their influence on costs, on prices and inflation, and on income distribution.

When analysing real wages, it should be taken into account that the real wage is the outcome of two processes. The first one refers to how nominal wages are established. The second one has to do with the way (consumer) prices are set by firms. We begin our discussion with the first part of the real wage equation.

We recognize that there are many competing or complementary theories, and thus in our attempt to find the determinants of nominal wages in Mexico we shall use different theories, but relying mainly in those based on the assumption of imperfect labour markets, especially wage-bargain theory and insider-outsider models.[3] The reasons why we find these theories more appropriate for analysing the Mexican experience have to do with the institutional features of the labour market in this country.

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[1] It has to be noted that the so-called "maquila" sector, is not considered in our analysis.

[2] The considered period was determined by the availability of data.

[3] M. Piore (1985) wrote one of the pioneering studies referring to wage differentials between industrial sectors or among different groups of workers. He argued that wage rates define relationships between entrepreneurs and workers, as well as between different groups of workers and between different institutional entities. The same idea was taken up later by Lindbeck and Snower (1988).

Generally speaking, wage setting in Mexico can be understood through a non-competitive labour market model because in spite of the historical weakness of the worker's union they did have a certain degree of bargaining power at the political level. Accordingly, we can analyse wage bargaining utilizing a union's or an insider-outsider model, both of which purport to specify a situation where wages are settled through a bargaining process between employers and workers. In the first case, it can be argued, workers, government and firms bargain a certain wage level, according to which each single firm determines the numbers of employees that maximize its benefits[4]. The resulting combination between wage and employment will be that point in the labour demand curve that will maximize the union's goals (Lindbeck, 1993). The second type of model establishes that given the different types of rotation costs that generate rents and market power among insider workers, or, alternatively, due to situations where the entrepreneur fixes wages — that is, situations branded as moral hazardous or perceived as an adverse selection type— the settled wage will be above the reserve wage level of the outsiders (workers unemployed by those kind of firms).[5]

One way or the other, the bargained money wage rate will depend upon the monopolistic power of both, workers and entrepreneurs. In this way unions, on behalf of their members, will be concerned about the real wage, and in their bargain they will take into account the price expectations for the next period considered in the contract; which of course, cannot be certainly known a priori.[6] Given the expected price level, the wage specifically bargained for will depend upon a profusion of factors, of which labour productivity is one of them and the state of the labour market, and specially, the unemployment rate, is another one.

As is generally agreed, unions will be able to bargain a higher wage when unemployment is low, as any threat they pose (a strike threat, for instance) will be more credible and difficult to dismiss. If, simultaneously, the whole of the economy is riding a high peak, entrepreneurs will willingly concede wage hikes before risking a production halt. In a similar way, a high unemployment level weakens the unions' bargaining power.[7] As it is probable that some other member of the family is out of work, the income loss for a household related to a strike will be much more harmful as it will be more difficult to find a temporary job

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[4] These are the so-called "right to manage" models (Oswald, 1985). Of course, we need not assume that maximization of benefits is conducted with any degree of precision.

[5] Insiders are considered to be experienced workers whose positions are protected by labour costs, such as training, hiring and firing costs. Outsiders are those that are unemployed or labourers with labour labour security, as workers in the informal sector.

[6] Workers will try to hold on to at least the same purchasing power as the previous period.

[7] Other arguments, such as the efficient wages models (McDonald and Solow, 1981, Akerlof and Yellen, 1986) based on the decisions of firms (with absent unions) state that, for firms, a wage cut is not beneficial when facing involuntary unemployment due to the impact that this would bring on productivity and profits. So, in the case of wage cuts, it would be probable that workers reduce their effort to the point of negatively shifting productivity.

(this potential cost of striking rises further as the economy ebbs downwards). From the employer's perspective, the balance between the cost of a strike and a certain wage hike moves away favourably as unemployment rises, furthering resisting any salary hike petition.[8] From the point of view of insider-outsider models, a lower unemployment level will enhance the power of insider workers, which will push their wage rates above the market clearing level.[9]

With regard to the second part of the real wage equation, we have ample evidence that in Mexico prices are set by firms operating in imperfect competition markets (see e.g. Brown and Domínguez, 2001; López et. al., 2000). For that reason, we can follow Kalecki (1954) and assume that prices are set according to the following simple rule:

$$p = mu + n\rho \qquad (a)$$

where p is the price, u is unit prime costs and ρ is the average price prevailing in the market. Here coefficients *m* and *n* are positive and represent the firm's policy regarding price determination, reflecting the degree of competition which exists in its area of activity. Notice that if nominal wages rise prices will not rise in the same proportion for two reasons. First because wages are only one component of prime costs. Second, because the average price prevailing in the market may not rise.

Now, unlike in Kalecki's days, in the contemporary circumstances we should take into account the influence of foreign competition in the price equation, because foreign competition affects both the parameters *m* and *n*, as well as the average price r. Clearly, competing import prices directly affect r; but they influence also the price of intermediate goods, and through the latter channel they also affect the ratio of the wage bill cost to the aggregate cost of materials; i.e. this ration will rise (fall) if the domestic price of imports falls (rises). Furthermore, we may expect that a change in the ratio of the wage bill cost to the aggregate cost of materials will influence also the elasticity of the price to a given change in wages (i.e. *m* in equation a will vary), since the relative change in unit costs depends on this ratio.

Keeping the previous theoretical framework in mind, we shall now provide a description of Mexico's recent economic evolution, and of some institutional features of its labour market.

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[8] In Alogoskoufis (1988) the effect of a 1% increase in the unemployment rate upon real wage settlement was estimated for a set of industrialized economies, and the result was that unemployment is reduced from 0.7% in Italy followed by Denmark (0.9%), EEUU (0.9%), UK (1.1%), Belgium)1.6%), France (1.9%), Germany (2.1%), Netherlands (2.8%), Austria (3.7%), Switzerland (4.6%), Sweden (4.6%), Norway (7.5%) and Japan (14.7%).

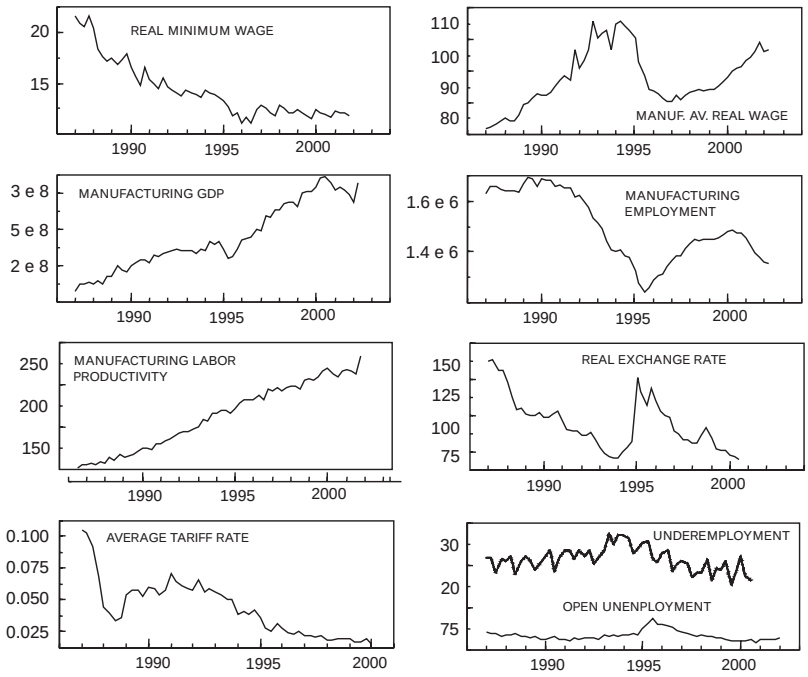
[9] In general, this is viewed as the unemployment benefit. Since these do not exist for the case of Mexico, we can proxie it as the minimal wage.

MEXICO'S LABOUR MARKET AND ITS RECENT ECONOMIC EVOLUTION

According to a recent comparative study (Marshall, 1999) Mexico's wage regime is in a somewhat intermediate position *vis-à-vis* other countries of the region considered in that research.[10] It has a permissive right to strike, its unionisation rate is intermediate, its bargaining level is a combination of firm and industry wide, tripartite bodies are of a permanent nature, and wage setting is not controlled by the government.

Regarding the quantitative aspects of the labour market and its determinants in Mexico's recent evolution, Graph 1 provides the basic information.

Graph 1 – The labour market and its determinants Mexico, 1975-2002



Source: Instituto Nacional de Estadística, Geografía e Informática (INEGI), México

Inspecting Graph 1 we notice that the real average manufacturing wage,[11] after falling drastically during the 1982-1987 period, rose at a relatively fast speed between 1987 and 1994, then it fell in the course of the 1994-1995 crisis; since 1996 it has progressively increased though it has yet to reach its maximum 1994 level. In

[10] The other countries considered were Argentina, Brazil, Chile, Colombia, Peru, Uruguay and Venezuela.

[11] The real wage has been obtained with the GDP deflator.

contrast, the real minimum wage has persistently fallen. On the other hand, manufacturing GDP and labour productivity have risen between 1987 and 2001 (with a brief interruption in 1995), while employment shows a downward trend, with an important decline about 1995, and later a recovery which, however, has not brought about a complete recuperation of employment to its previous peak. Open unemployment has remained stable, at a very low level.[12] This is probably due to the lack of unemployment insurance, which forces the potential workforce to accept whatever job they can get. Underemployment, which includes both open unemployment and workers employed for less than 35 hours per week (as a share of the workforce) has also remained stable, though naturally at a much higher level.

Finally, we may refer to two variables, the average import tariff and the real exchange rate, which play an indirect role in the evolution of real wages, through their impact on the domestic price of imports and hence on the degree of competition and on prices of consumer goods in the domestic market.[13] Here it must be mentioned that an important change took place in Mexico in the period under study, when the domestic market opened up to imports. On the one hand, the percentage of imports requiring permit was drastically reduced first in 1985, and then again in 1987, in a downward movement that went ahead until practically all imports were freed. On the other, in less than one decade, running from 1986 to 1992, average import tariffs fell from 41 percent to 14 percent.

Trade liberalization increased the degree of competition in practically all areas of activity. It also made the price setting process more dependent upon the evolution and fluctuation in the exchange rate, because the latter affects the price of imports, and hence the average price *r*. Now, as shown in the graph, the real exchange rate[14] has undergone violent fluctuations, which have affected the price of competing imports in the domestic market.

Since we shall use panel analysis in our econometric research, it seems necessary also to give the necessary information about the evolution of real wages in the different sectors of the economy, and in the different branches of the manufacturing sector. This is illustrated in Graph 2 below.

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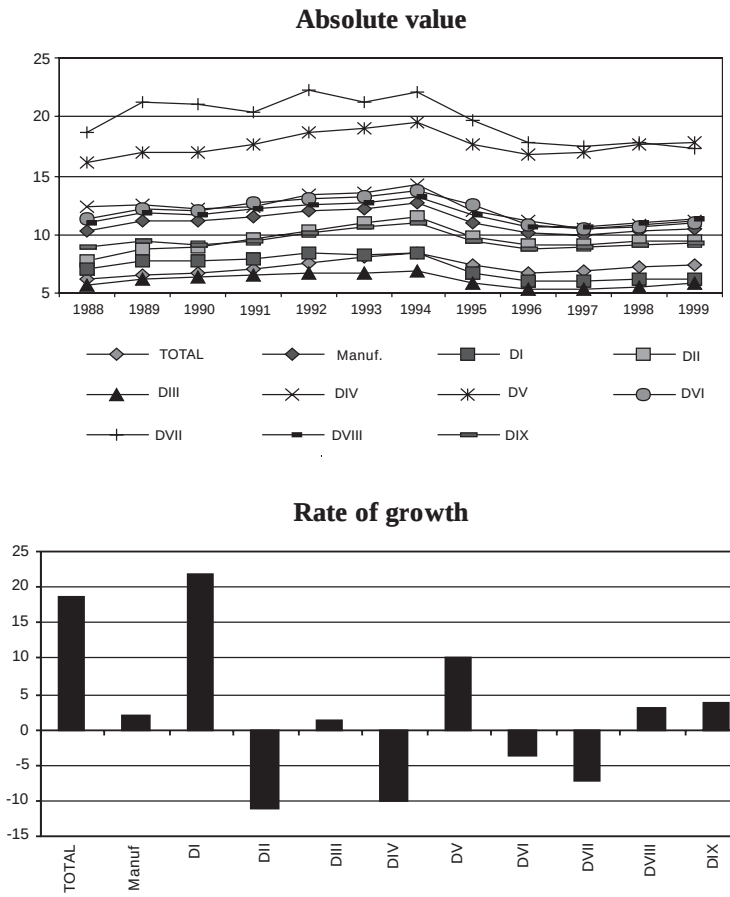
[12] People older than twelve years old are considered to have been employed whenever they: (i) worked at least one hour in exchange for a salary or benefit or where self-employed; (ii) took part as familiar or non-familiar unpaid workers; (iii) were temporally out of work due to sickness, voyage, holidays, studies or personal reasons, while receiving a payment; (iv) they did not work or receive any payment but are thinking either to start a new occupation or return to a previous job within a 4 week span. So, the Mexican definition for unemployment is much more narrower than the standard OECD-ILO definition. According to the OECD "adjusting the unemployment definition towards a standard measure would add 1 or 2 percentage points to the reported rate, but it would still be low according to OECD standards". See López (1999).

[13] The average import tariff has been obtained by PENDIENTE. The real exchange rate is equal to s(p*/p), where s is the nominal exchange rate, *p** is the GDP deflator in the U.S.A and *p* is the GDP deflator in Mexico.

[14] The real exchange rate RER is defined as $E^*(p^*/p)$, where *E* is the nominal exchange rate (pesos per unit of foreign exchange), p^* is the index of foreign prices, and p is the index of domestic prices. A rise in RER means an improvement in competitiveness, and a fall in RER means a real appreciation of the domestic currency.

Graph 2. – Manufacturing real wages per worker. Mexico, 1988-1999



Note: (i) Total: Total economy; (ii) Manuf: Manufacturing sector; (iii) DI: Food and Beverage; (iv) DII: Textiles and leather goods; v) DIII: Wood and products; (vi) DIV: Paper and printing; (vii) DV: Chemical substances, oil derivatives and plastics; (viii) DVI: Non metallic products, except oil derivatives and coal; (ix) DVII: Basic metal industries; (x) DVIII: Metal products, machinery and equipment; (xi) DIX: Other manufacturing industries.

Source: Instituto Nacional de Estadística, Geografía e Informática (INEGI), México.

From the evolution of wages among the different branches of the manufacturing industry it can be concluded that the Mexican labour market does not behave as a traditional competitive market. Indeed, as Graph 2 shows wages in each branch start from a different level and behave differently. On the one hand, the average manufacturing wage is well above the average wage for the whole economy. At the same time, the rate of growth of wages in different branches has been dissimilar among them so that the slow of average wages in the manufacturing sector is the result of some branches growing fast (food and oil and derivatives) and some others with negative rates (textile, paper and basic metal products). The *a priori* explanation for these facts is that some workers, i.e. those working

in the more productive sectors for instance, benefit from advantages when compared with others, so that they can get a greater share of the proceedings of the productive process.

The previous information allows us now to proceed to an econometric inquiry in order to find out which are the determinants of real manufacturing wages in Mexico.

MODELING REAL MANUFACTURING WAGES IN MEXICO

Estimation approach

In this work we propose a (real) wage equation that attempts to consider the factors behind the behaviour of imperfect labour and product markets. The real manufacturing wage, we argue, can be explained on the basis of the following functional form, which represents the starting point for our estimation:

$$(1) \qquad W_i = W_i\left(W_{i,t-1}, RWmin, Pv_i, Ni, U, P, ATI, XC_i, RER\right)$$

Where *Wi* is the average real wage in industry *i*, and is dependent upon its own lagged value, and the following additional variables.[15] First of all, the real minimum wage *RWmin* which we assume affects directely the average real wage; then, the productivity level (PV_i) and the level of employment (N_i) in each production branch. A rise in any of these variables is expected to bring about to a rise in the bargained real wage. We also include the overall unemployment rate (*U*),[16] assuming that there is a negative association between *U* and the real wage; this relationship can once more be explained within wage-bargaining models. Prices (*P*), as measured by the implicit GDP deflator, are also considered in this model, since the bargain takes place considering expectations of future prices, and any mismatch between expected and actual inflation will affect real wages. We have also included other variables, namely, the average tariff rate index (ATI) and the export coefficient (XC_i) to account for the effects of trade liberalisation.[17] While the first one refers to the whole economy — a reduction of ATI implies a greater liberalization — the second one varies for each industry and is computed as the coefficient of exports over GDP. The real exchange rate (RER) was also included and, since an increase of RER implies a higher relative price for imports,

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[15] It would have been important to include a variable related to union density or union bargaining power. Unfortunately, however, data on this subject do not exist for Mexico.

[16] Since the open unemployment rate gives a distorted picture of the actual situation of the labour market, here we have use the so called ratio of partial occupation, which includes both the open unemployed and people who are currently working less than 35 hours a week. In any case, we also tried the tried the open unemployment rate, but without results.

[17] The average import tariff was estimated as the ratio of import taxes over total imports. The export coefficient equals exports divided by GDP in real terms, all of them at the industry level.

and thus a lower competitive pressure from imports, we expect to find a negative association between RER and the real wage rate.[18]

Our estimated wage equation will be of the following kind:

$$(2) \qquad wi,t = \alpha 1 wi,t-1 + \beta'(L)X_{i,t} + \eta_i + v_1,t, \qquad \text{(i=1...N; t=2...T)}$$

Where all variables are expressed in logarithms, L is the polynomial lag operator and $w_{i,t}$ is the average real wage for sector i in year t. The vector $X'_{i,t}$ contains all the explanatory variables we mentioned before (see equation 1). On the other hand, η_i denotes the unobservable individual specific effect and η_{it} denotes the remainder disturbance[19].

The α_1 parameter measures the persistence or inertia of wages; i.e., it provides information about the dynamics of wage determination, once we have controlled for the presence of temporary and individual unobserved effects (λ_t and η_i respectively).[20] Additionally, we have included different fictional temporary dummies. The sufficient conditions to identify and estimate α_1 are: $(1)\, E(\eta_i) = E(v_{it}) = 0, E(\eta_i v_{it}) = 0, \forall$ i,t ; $(2)\, E(v_{it} v_{is}) = 0 \ \forall$ t ≠ i ; $(3)\, E(w_{it} v_{it}) = 0 \ \forall$ t=2,...,T [21]. That is, there is strict exogeneity of the lagged dependent variable and the error term.

The dynamic panel data regressions described in (2) is characterized by two sources of persistence over time. Autocorrelation due to the presence of a lagged dependent variable among the regressors and individual effects characterizing the heterogeneity among individuals.[22] This renders the OLS estimators inconsistent and biased.[23] So, the dynamic structure of the model, as well as the presence of predetermined variables in the right-hand side of equation (1) demand the use of an estimation method different from OLS. Accordingly, in this paper, we use the Generalized Moments Method (GMM) as proposed by Arellano and Bond (1991)

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[18] Data at the branch level have been estimated from the National Accounts System (SCN). The remaining variables have been taken from the National Statistics Institute (INEGI).

[19] Note that h_i is time-invariant. In this case we could think of it as the workers specific ability or bargaining power in each of the industries.

[20] The a_1 parameter could be inconsistent if temporal effects (λ_t) were to be excluded, a common problem faced by crossed-section models. Besides, the fixed individual effects introduce unobserved heterogeneity which implies that observed differences among wages may be permanent and not be random. This implies that different sectors of the manufacturing industry are initially endowed so that the level of wages is permanently affected.

[21] It is assumed that the perturbations are individually and identically distributed between individuals with a zero mean, but there still can be arbitrary forms of heteroskedasticity among individuals.

[22] Since w_{it} is a function of η_i, it immediately follows that $w_{i,t-1}$ is also a function of η_i. Therefore, a right hand regressor in (2) is correlated with the error term.

[23] The assumption of non-correlation among explaining variables and perturbations is broken, so that $E(x'\varepsilon) \neq 0$. Particularly, OLS estimation of a dynamic data panel model with individual effects introduces a downwards bias for the endogenous variable coefficient and increases the coefficient of the rest of the variables.

which is nothing more than a generalization of the standard method proposed by Anderson and Hsiao (AH,1982) to estimate dynamic models with fixed effects.[24] The GMM method yield unbiased estimation in dynamic models when the unobserved fixed effects are correlated with the regressors.[25] Even more, the GMM procedure is also more efficient than the AH estimator.

As an alternative, the two-steps GMM (2SGMM) and the combined systematic GMM estimators (SYS-GMM) were used. Briefly, the first one is only different from the GMM because it uses the residuals from an initial consistent estimator (GMM 1 step, for instance). It allows to raise the efficiency of the model in case that the errors are not homoskedastic. In the second one, the level equations are stacked on top of the transformed equation.[26] For comparative purposes, we also report the OLS coefficients, thought the results, in levels, have to be interpreted differently from the former models.

The estimation period is 1988-1999. The panel is balanced, so that we have the same number of observations for all branches and these observations correspond to the same periods for all cases. This gives us a total sample of 588 observations. Nevertheless, when estimating the equation using lags and differences we lose three sample periods. This is why strictly speaking the final estimated equations is for the 1991-1999 period with 441 observations.

Estimation results

In Table 1 we report the estimated coefficients for the real wage equation with the different estimation procedures: OLS estimates, the GMM in differences and in within groups transformation, the 2SGMM and the GMM-SYS.[27] We have also included a Wald test for the significance of the constant (WaldC), and time dummy variables (WaldT), as well as the Sargan test for overidentifying

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[24] The difference between the GMM and the instrumental variables method proposed by AH is that the first one considers the differenced structure on the residual disturbances (Δv_{it}) and makes use of all the available moment conditions.

[25] Nevertheless, there are some drawbacks in this procedure. Differencing, for instance, increases the variance of the error term and reduces the signal from the regressors. That is, the transformed error term has twice the variance of the untransformed error, $Var(\Delta v_{it}) = 2Var(v_{it})$. The signal is reduced because the variance of of the transformed regressors is less that the untransformed when they are positively autocorrelated, $Var(\Delta x)<Var(x)$ when $cov(x_t, x_{t-1})>0$. Both effects increase the standard errors of the estimators (See Wulfsberg, 1997).

[26] Arellano and Bover (1995) and Blundell and Bond (1998) show that mean stationarity in an AR(1) panel data model is sufficient to justify the use of lagged differences of the dependent variable as instruments for the equation in levels in addition to lagged levels as instruments for the equations in first differences. That is, the GMM-type instruments for the differenced equations are: $diag(w_{i,1}...w_{i,t-2}, x_{i,1}...x_{i,t-2})$ and the GMM-style instruments in the levels equation are the lagged differences: $diag\ (\Delta w_{i,t-1}, \Delta x_{i,t-1})$.

[27] Initially, we started with two lags of each variable and reduce to the final models presented in Table 1 in accordance to the significance of the variables, as well as the correct specification of the model. All the specifications include time dummy variables to capture the specificity of each year.

Table 1 – REAL WAGE DETERMINATION.
Mexico, 1988-1999

Variable	OLS levels		WG	Diff	Diff	Diff
		GMM	GMM	2SGMM	GMM-SYS	
RW_{-1}	0.268	0.799	0.592	0.731	0.948	
	(17.2)	(22.2)	(5.48)	(4.08)	(44.8)	
RMINW	0.120	0.021	0.022	0.021	0.075	
	(2.86)	(11.1)	(17.0)	(13.2)	(9.37)	
PV-1	0.399	0.040	0.140	0.109	0.035	
	(10.3)	(1.33)	(2.46)	(1.82)	(2.40)	
U	-0.051	-0.028	-0.024	-0.025	-0.019	
	(-1.89)	(-13.2)	(-8.41)	(-6.34)	(-1.39)	
N-1	-0.097	0.008	0.067	0.088	0.011	
	(-1.01)	(0.31)	(1.25)	(1.25)	(0.58)	
P	-0.028	-0.040	-0.032	-0.031	-0.037	
	(-1.93)	(-7.27)	(-16,2)	(-14.3)	(-7.92)	
P-1	-0.010	0.013	0.012	0.014	0.010	
	(-0.66)	(2.68)	(3,54)	(2.68)	(1.60)	
RER	0.086	-0.050	-0.074	-0.074	-0.012	
	(1.67)	(-18.5)	(-10.1)	(-6.91)	(-1.28)	
XC	0.085	-0.010	-0.022	-0.017	-0.005	
	(2.31)	(-1.33)	(-2.01)	(-1.98)	(-1.48)	
ATI-1	0.002	-0.001	-0.001	-0.001	-0.001	
	(6.69)	(-0.89)	(-3.00)	(-2.36)	(-1.08)	
Constant	0.028	-0.023	-0.019	-0.015		
	(2.31)	—	(-6.64)	(-3.62)	(-2.13)	
Wald (C)	369.6**	693.0**	642.1**	353.9**	376.4**	
Wald (T)	508.8**	693.0**	642.1**	353.9**	352.2**	
Sargan	—	55.24**	75.67**	28.43*	274.1**	
AR(1)	5.104**	-0.911	-3.661**	-3.034**	-3.914**	
AR(2)	4.981**	0.624	1.185	1.026	1.142**	

Note 1: t-values in parentheses.
Note 2: The GMM type instruments includes lags t-2 up to t-5 both, the 2SGMM includes lag t-1 and the GMM-SYS uses lag t-1 for the instruments in levels, and t-2 up to t-3 for the instruments in differences. All the estimations, including OLS, use all the predetermined and exogenous variables as instruments.
Note 3: ** (*) means significant at the 5% (10%)

restrictions. Finally, the tests for one order serial correlation, AR(1), and second order, AR(2) are shown in the same table.[28]

Turning to the results, as expected in the presence of the firm specific effects, the OLS levels appear to give a biased estimate on the coefficient of the lagged dependent variable.[29] With the other estimation methods the signs of the parameters are the same, and in most of the cases their size are similar. In what follows, we take as a basis for our analysis these estimation results.[30]

The first result we want to call attention to is the significant persistence on the determination of real wages. The coefficient associated to the lagged real wage ranges from 0, 27 in the OLS to 0,95 in the GMM-SYS and is significant in all the specifications. That is, the real wage is not independent from its own past history, as some authors have found in studies for other countries,[31] but much to the contrary, in Mexico's situation appears to be highly autoregressive.

Second, the minimum real wage appears as a significant variable in all our estimations, so that we can infer that its changes plays an important role on the evolution of the real wage. We think that the role of the minimum real wage comes from two channels. On the one hand, the minimum real wage sets the lower limit for the wage bargain, because it is the income workers could earn in the informal sector. On the other hand, since minimum wages are set by the government, and since wages in the public sector are normally adjusted at the same rate as the minimum wage, the latter gives workers and unions a point of reference as to the wage increase that the government is willing to accept.

In the third place, while the evolution of employment at the industry level does not seem to be playing an important role, the overall unemployment rate has a strong, negative effect on wage setting.[32] This would suggest, on the one hand, that the labour market is not industry-specific, which would explain why the level of employment at the industry level does not affect the real wage of the

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[28] The Sargan test is for the validity of the instruments and only that based on the 2SMGM is consistent to any kind of heteroscedasticity. On the other hand, if the disturbances v_{it} are not serially correlated, there should be evidence of significant negative first-order serial correlation in the differenced residuals and no evidence of second order correlation. As it can in the appendix, both, the GMM and the 2SGMM in differences present serial correlation while the WG model do not.

[29] In this sense, the OLS ignores the panel aspect of the data: as can be seen in Graph 2.4 in the appendix, the firm-specific effect is not picked up by the model. Besides, OLS residuals present first and second order serial correlation, which render the model misspecified.

[30] Besides the results we report below, please note that the coefficients of the time dummy variables are all statistically significant. We take this to mean that the specificities of any particular year undetected by our estimates have played an important role on the dynamics of the real wage. We also present in the appendix the graphical output for the actual and fitted values of all the models.

[31] Blanchflower and Oswald (1994), Bentolina and Jimeno (1998) to mention some.

[32] Τηε τερμ Δνis also known as the insider hysteresis effect. The idea is that the union cares about the insiders, assumed to be equal to last period's employment. Then, for a given wage, the probability of being laid off is lower the smaller the last period's employment. See, for instance, Blanchard and Summers (1986) and Nickel and Wadhwani (1990).

industry. On the other hand, a high overall unemployment rate weakens the bargaining power of workers and unions in all industries. In other words, a lower rate of unemployment enhance the power of insider workers.

Another variable that suggests the importance of the so called insider power is productivity. In this case, industries with higher productivity levels reach a higher real wage. This variable is not statistically significant in all of our estimates, but it always has the expected sign. Its lack of significance in the equations in differences may imply that the rate of change of productivity, as captured by the first difference of the log of the variable, is not as important as the level itself. Though the positive association between labour productivity and the real wage is a common finding in studies for developed countries, such a result is non-trivial for Mexico. We take it to mean that in spite of the huge rate of (real) unemployment, workers still have some bargaining power that allows them to reap a certain share of the rise in the output they generate.

On the other hand, our estimated equation suggests an association between the evolution of prices and the evolution of real wages. More precisely, we find that, overall, a higher rate of inflation tends to depress real wages. This can be taken to imply that nominal wages are not fully indexed to the consumer price index. But the dynamics of the association between wages and prices is also very illuminating, and we understand it as follows. Last year's inflation rate seems to be a variable taken into account when the real wage is settled. Indeed, wages are bargained with an eye on future prices, which are based on last's period evolution of prices. Nonetheless, when the current rate of inflation accelerates — i.e. when a "price surprise" occurs — then real wages fall, due to the mismatch between expectations and effective results. In conditions of high inflation such as have been common in Mexico's experience, the loss can be substantial indeed.

Turning to the results that account for the effects of trade, note that those industries with higher growth of the export coefficient, have real wages which tend to decrease. One possible explanation for this is that managers in highly exporter industries seek for gains in competitiveness on the basis of lowering wages.

Regarding the influence of competition from imports on real wages, we have found two very interesting results, that confirm what we expected on the basis theoretical arguments, in the sense that greater competitive pressure from imports tend to (indirectly) raise real wages.

In the first place, notice that the association between real wages and the (lagged) average import tariff is negative. This we may rationalize in the sense that when tariffs are reduced, and imports become cheaper, domestic producers can reduce prices because the cost of imported inputs fall, or are forced to reduce prices (or the rise in prices) due to pressure of foreign competition, or both. This tend to reduce the price level (or the rate of inflation), which makes it possible for real wages to rise.

In the second place, a depreciation in the real exchange rate is also associated with fall of the real wages. We take this to mean that the higher price of imports associated with a currency depreciation, on the one hand raises directly the

consumer price, and on the other hand makes it possible for domestic firms competing with imports to raise prices due to the higher price of competitive imports. In the case of exporting firms, a currency depreciation allows them to raise the domestic price in parallel with the rise of the price for foreign sales. Finally, in the case of firms that use imported inputs, they are forced to raise prices to defend their profit margins. In any event, the price hike negatively affect the real wage.

CONCLUSIONS

Using annual information for Mexico over a period of 11 years, and a panel dataset, we have studied the factors that account for the evolution of manufacturing real wages in Mexico, taking into account that market imperfections are an important feature of both product and labour markets in Mexico's manufacturing sector. Our most important results can be summarized as follows.

We have found, in the first place, strong persistence of wage determination, which point out to the importance of the recent past in explaining the evolution of real manufacturing wages. In the second place, we have found evidence to the effect that the minimum real wage has an important influence as regards the average real wage. In this sense, the persistent decline of the minimum real wage during the period under scrutiny has surely contributed to the average real wage fall.

In the third place, we found that the overall unemployment rate (but not the open unemployment rate) influences the evolution of the real wage. This is coherent with the existence of non competitive labour market and in particular, a norm of wage determination that is clearly linked to the bargaining power of workers and unions. In the same line, we found also that the evolution of productivity influences the evolution of the real wage.

On the other hand, we found that the evolution of prices also has an influence on real wages. By itself, a rising consumer price index tends to negatively affect real wages, which we take to imply that nominal wages are not fully indexed to the evolution of consumer prices. Besides that, we found that price surprises, i.e. acceleration of the rate of inflation, brings about a fall in real wages. It is highly likely that this factor was important in the decline in wages which took place after the 1995 crisis in Mexico.

Finally, the average import tariff and the real exchange rate affect the real wage. This is coherent with pervasiveness of imperfect product market in Mexico's manufacturing industry. More specifically, these results can be rationalized taking into account that both higher tariffs and a higher real exchange rate tend to raise costs and diminish the pressure of foreign competition. Thus they stimulate or force firms to raise their prices, or both, which negatively affects the real wage. The wage rise that occurred between 1988 and 1994 was probably the lagged result of the drastic tariff reduction between 1985 and 1987, and to the real appreciation of the peso during the 1988-1994 period.

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ERRATA

O artigo "Manufacturing real wages in Mexico", publicado no volume 26, nº 3 (103), julho/setembro 2006, saiu com alguns erros. A versão correta está publicada no site da nossa revista (htttp://www.rep.org.br)

O arquivo disponível sofreu correções conforme ERRATA publicada no Volume 26 Número 4 da revista.