

Factors Driving Changes in Income Distribution in Post-Reform Mexico

Gerardo Angeles - Castro

Abstract—After 1984 and following economic liberalisation, income inequality in Mexico increased. Some of the main factors that contributed to this trend are the relative expansion of the average income in the service sector in relation to the agricultural sector, which is consistent with arguments such as the rise of services and the reduction of rents in the traded sector, the increase in skill premium, which is in keeping with the skill enhancing trade hypothesis, and the fall in unionisation rates. On the other hand, between 1998 and 2002, inequality fell gradually and some of the factors driving this trend are the decrease in returns to skill and union premium, and the stabilisation of unionisation rates.

Keywords—Income Inequality, Economic Liberalisation.

I. INTRODUCTION

IN Mexico, the debt crisis of 1982 signalled the end of the import-substitution industrialisation model (ISI) and the predominance of protectionist policies. Since 1985 a number of structural reforms and market-oriented policies have been undertaken.

The evolution of income distribution in Mexico, during the era of market liberalism, has been a topic of widespread debate and has been documented in several studies from different perspectives. Most of the discussion concentrates on the labour market and wage dispersion (Hanson and Harrison, 1999; Feliciano, 2001; Cortez, 2001; Ros and Bouillon, 2002). The literature has also explored inequality at the household level (Panuco-Laguette and Szekely, 1996). The general consensus seems to be that income inequality has increased during the period of market openness. The literature concentrates on the period of rising inequality; however, there is some evidence that since the late 1990s inequality has levelled and even decreased slightly, but this change has been analysed in only a few studies (Airola and Juhn, 2005).

In this sense, the period of analysis in this paper is from 1984 to 2002; this timeframe allows us to examine the sub-period of rising inequality and the later sub-period in which inequality reverses.

The assessment is conducted applying parametric methods using micro-level data. The data source, the Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH), is a household income and expenditure survey produced by the

Mexican government's statistical office (INEGI). We explore three main arguments - The skill-enhancing trade hypothesis, the rise of service, and the reduction of rents in the traded sector - besides other issues as the effect of changes in labour unions on inequality.

We find that some of the factors that worsen inequality after liberalisation are the increase in skill premium, the expansion of the income gap between the service and the agricultural sectors, and the fall in unionisation rates. On the other hand, there is evidence that inequality decreases after 1998 and, potentially, the factors driving this trend are the decrease in returns to skill and union premium, and the stabilisation of unionisation rates.

The paper is organised as follows: Section two gives a discussion of theoretical issues supporting distributional effects under conditions of market openness and also discusses contesting arguments. Section three explores individual and wage inequality by using parametric methods. Finally concluding remarks are provided in section four.

II. THEORETICAL DEBATE AND COMPLEMENTARY ARGUMENTS

A. Standard Theory

Since the 1980s a number of developing countries, especially in the Meso-south American subcontinent, have adopted an economic model that places special emphasis on market forces. The model is intended to create preconditions for the expansion of trade and flow of investment across countries and finds theoretical support in familiar neoclassical theory (Jones, 1988: 30-33; Corden, 1993), which claims that trade, investment and the market mechanism in general boost growth and facilitate development.

Proponents of the model maintain that improvements in income distribution can be achieved for two main reasons. Firstly, emphasis on outward-looking growth fosters exports, employment and output, and thus provides additional resources for redistribution. Secondly, economic liberalisation facilitates the operation of market forces and the price mechanism, which allows resources to be allocated more efficiently.

The basis for tracing distributional effects of market liberalism in developing countries is the Stolper-Samuelson theorem (SST) (FitzGerald, 1996: 32; Litwin, 1998: 3). Within this two-factor (capital and labour) neoclassical model, liberalisation of foreign trade increases demand for the abundant factor, as exports and imports adjust according to the orthodox principle of comparative advantages, and redirects demand away from the scarce factor. This mechanism increases the return of the factor which is relatively most used in the export sector and which is also more abundant -this factor is conventionally assumed to be low-wage, unskilled

Manuscript received July 30, 2007. The author gratefully acknowledges financial support from Conacyt, Mexico, and helpful comments from Roger Vickerman, Yu Zhu, Amanda Gosling and Andy Dickerson.

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labour in developing countries- and leads toward factor price equalisation; by the same token income distribution improves.

B. Contesting Arguments

The skill-enhancing trade hypothesis. According to this proposition, increasing openness in developing countries can accelerate inflow of foreign technology due to a rise in imports and FDI. Robbins (1996) finds that the skill gap tends to widen in a sample of developing countries and shows that there is a high correlation between increasing demand for skill and imports of technology. He calls this effect 'skill-enhancing trade hypothesis (SETH)' and argues that trade liberalisation may sometimes widen wage dispersion instead of compressing relative wages, as more openness permits or encourages the acceleration of imported physical capital stock.

In this sense, Arbache et al. (2004: 76-77) argue that the new inflowing technology can be skill-biased because it is designed through relatively skill-intensive methods in more industrialised countries and because its implementation and operation involves new procedures and techniques. As a result, technological change can increase demand for skilled workers. Moreover, they point out that the reduction in demand for skilled labour predicted by orthodox theory can be surpassed by this process depending on the magnitude of the shift.

The rise of services. An alternative argument undermining basic predictions of neoclassical theory is the idea that the service sector, which has traditionally been considered a sector with higher wages than some of the conventional economic activities in developing countries, is likely to expand faster than other sectors under conditions of economic liberalisation and can also be considered skill-biased. This is because the globalisation and internationalisation of the economy brings with it increasing demand for financial, communication, IT, transport and business services among others. These activities clearly require workers relatively more qualified, on average, than workers in some of traditional economic activities in developing countries, such as primary production and labour-intensive manufacturing. Gordon and Gupta (2003) show that factors playing an important role in accelerating services growth are high income elasticity of demand, increased input usage of services by other sectors, and deregulation and economic reforms.

Sinha (2005) shows that although employment in the service sector in India during the 1990s remained steady, its share of GDP rose substantially. She also stresses that the pattern and composition of growth acceleration of services creates further inequality between rural and urban areas, and between the skilled and the unskilled.

Reduction of rents in the traded sector. Arbache et al. (2004) hold that the reduction or elimination of trade barriers and tariffs turns protected markets into more contestable ones, which induces lower prices and therefore a reduction of producer rents; if rents are shared with employees it is expected that wages fall after liberalisation. They show that contrary to the predictions of the SST, wages fell substantially in the traded sector after trade liberalisation in Brazil, consistent with the reduced rents argument, as industries faced greater competition.

III. ECONOMETRIC ANALYSIS WITH DISAGGREGATED DATA

We use data from INEGI from five periods 1984, 1989, 1994, 1998 and 2002. The selected sample comprises individuals reporting labour income, aged between 16 and 65 inclusive, and there are no restrictions for the number of hours employed in the corresponding economic activity. The hourly income is computed as monthly income in the respondent's main economic activity, divided by weekly hours employed in the corresponding economic activity multiplied by 4.33. The hourly income is deflected by the consumer price index based in 2002 pesos in order to obtain real hourly income.

Between 1984 and 1998 the Gini coefficient for individuals increased from 0.512 to 0.632 and then dropped to 0.560 between 1998 and 2002. To understand the forces driving this pattern we present a decomposition of income by educational levels and economic sectors and conduct a comparative analysis between the period of increasing inequality and the latter one. Due to the importance of unionisation in Mexico before the early 1980s and the significant transformation that has been experienced over the last twenty years or so, we also explore labour union changes. Furthermore, in the relevant literature, the decline of labour market institutions is considered an important explanation of inequality.

We use standard Mincerian earning functions, in which the log of real monthly wages are regressed on personal characteristics and different variables in order to analyse the effect of the skill premium, returns to labour by sector, and returns to unionisation on wage dispersion. So as to explore the effects of economic liberalisation over different stages in time, the analysis follows a before-after (liberalisation) approach as in Arbache et al. (2004), and also splits the sample in different periods. A (0,1) dummy variable is created; it takes a value of one for the post-liberalisation period, which is defined as after 1984. In addition, the impact of liberalisation is explored separately for the different sectors, and we also focus on the wage gap between union and non-union workers and returns to education pre- and post-liberalisation by applying the corresponding interactions.

A. Returns to Labour by Sectors

Column 1 of Table IA shows an OLS regression which decomposes the log wage between sectors (agriculture and manufacture vs services) and distinguishes trade regime. On average, workers in the agricultural and manufacturing sector were paid 50.80 per cent less and 6.37 per cent more respectively than those in the service sector before liberalisation.¹ However, in the post-liberalisation period average wages in agriculture and manufacturing fell more than those in services. In agriculture average wages dropped 21.31 per cent and in manufacturing they dropped 27.22, whereas they fell 14.06 per cent in services.²

Once age, gender, education attainment and unionisation are controlled for in column 2, we observe that higher human capital and higher unionisation rates in the service sector

¹ Figures computed as $(\exp(\beta) - 1) * 100$ where β is the coefficient on the corresponding sector dummy variable.

² The Change in average wages after liberalisation is computed as $(\exp(\beta_1 - \beta_2) - 1) * 100$, where β_1 and β_2 are the coefficients of the corresponding sector post- and pre- liberalisation respectively.

contribute to increase average wages compared to those in the other sectors. By comparing columns 1 and 2 we notice that before liberalisation the wage gap between the agricultural and service sectors changes from -50.80 per cent to -42.61 per cent and between the manufacturing and service sectors it changes from 6.37 per cent to 11.02 per cent. Moreover, after liberalisation the drop of average wages in the service sector is larger and the fall of average wages in the manufacturing sector is more moderate. Nevertheless, column 2 illustrates that average wages in services increase in relative terms, as the wage gap of agriculture widens slightly from -42.61 per cent to -44.10 per cent and the wage gap of manufacturing decreases from 11.02 per cent to 4.89 per cent, between the pre- and post liberalisation periods.³ This result is consistent with the *rise of services argument*.

We also observe that there is an inverted U-shaped age-earning profile with a peak at around 45 years, women earn 29.14 per cent less than men with similar age and education, union workers earn 32.80 per cent more than equivalent non-union workers, and returns to education increase with higher education level. This wage equation explains 37 per cent of total variation in earnings between workers.

Using the before and after methodology the post-liberalisation period is disaggregated in four sub-periods in order to examine any differential effect of liberalisation over time, results are presented from column 3 to column 6 in Table IB. The sharpest fall in wages in the immediate post-liberalisation period occurs in the manufacturing sector and the most moderate occurs in the agricultural sector. Over the subsequent periods wages continue to fall, there is some recovery in the manufacturing and service sectors between 1998 and 2002, but wages do not return to their pre-liberalisation levels in any of these two sectors. In the agricultural sector the fall is permanent.

B. Skill Premium

Table II focuses on the returns to education pre- and post-liberalisation. The first column illustrates the results obtained from the whole sample, and the last four columns show the results obtained once the post-liberalisation period is disaggregated over time. Three main findings emerge from this analysis. Firstly, average income tends to be lower in every level in the post-liberalisation periods and this is consistent with decreasing real wages as noted previously. Furthermore, average wages for the primary and secondary levels fall relative to the tertiary level. In the post-liberalisation period workers with primary and secondary education are paid 21.78 per cent and 26.09 per cent less respectively, whereas workers at the highest educational level are paid 8.58 per cent less.⁴

Secondly, the marginal returns to education –comparing each education level with those below– tend to be greater along the post-liberalisation periods only for high skill

workers or those with tertiary education, but not for those with secondary education. The point estimate of the marginal return to tertiary level rises from 119.10 per cent to 156.06 per cent and from 34.74 per cent to 66.65 per cent in relation to the primary and secondary levels respectively, between the pre- and post-liberalisation periods.⁵ This finding is in keeping with the *skill-enhancing trade hypothesis*.⁶ Finally, the marginal returns to tertiary education peak by 1994 and then decline but remain higher than in the pre-liberalisation period.

C. Unionisation

We now explore wage dispersion between union and non-union workers. Column 1 of Table IIIA distinguishes unionisation and trade regime. It indicates that, on average, union workers were paid 82.63 per cent more than non-union workers before liberalisation.⁷ Over the post-liberalisation period average wages paid to union workers decreased 11.80 per cent and those paid to non-union workers fell 15.93 per cent, which represents an increase of union wages in relation to non-union wages.⁸

Age, gender, sectors and educational attainment are controlled for in column 2. A comparison between columns 1 and 2 confirms that average wages paid to union workers are higher, but reveals that much of this is due to the higher human capital among these workers. In fact, the wage gap shrank from 82.63 per cent to 39.29 per cent before liberalisation. Moreover, the relative increase of union wages post-liberalisation seems to be the result of faster skill upgrading, as non-union wages fell by less than union ones. Accordingly, column 2 reveals that the wage gap of union workers in relation to non-union ones decreased from 39.29 per cent to 32.16 per cent between the pre- and post-liberalisation periods.⁹

Once the post-liberalisation period is disaggregated over time from column 3 to column 6 in Table IIIB, we can infer that the wage gap of union workers in relation to non-union ones dropped in the immediate post-liberalisation period, then increased and peaked around 1998, and was even higher in this period than its original level; however, after 1998 the wage gap decreased and returned to its pre-liberalisation level.

We also use the data-set comprising all income sources in the analysis of educational levels and sectors, and find that the general conclusions are similar to those using labour income only.

IV. CONCLUDING REMARKS

⁵ Marginal returns to education comparing two levels of education can be obtained as $(\text{Exp}(\beta_{\text{upper}} - \beta_{\text{lower}}) - 1) * 100$, where β_{upper} and β_{lower} are the coefficients on the education level dummy variable for the upper and lower level respectively for a specific period.

⁶ Note that the hypothesis applies to tertiary education in particular. This finding is similar to that obtained by Arbache et al. (2004) for the case of Brazil, as they conclude that the SETH applies to college-educated labour only.

⁷ Figures computed as $(\text{exp}(\beta) - 1) * 100$, where β is the corresponding coefficient.

⁸ Fall post-liberalisation is computed as $(\text{exp}(\beta_3 - \beta_4) - 1) * 100$, where β_3 and β_4 are the coefficients of the corresponding union status post- and pre-liberalisation respectively.

⁹ Wage advantage of union workers is computed as $(\text{exp}(\beta_1 - \beta_2) - 1) * 100$, here β_1 and β_2 are the union and non-union coefficients respectively for a specific period.

³ In the post-liberalisation period the wage gap of Agriculture and manufacturing in relation to services is computed as $(\text{exp}(\beta_1 - \beta_2) - 1) * 100$, where β_1 is the coefficient of the corresponding sector and β_2 is the coefficient of the service sector post-liberalisation.

⁴ Fall post-liberalisation is computed as $(\text{exp}(\beta_1 - \beta_2) - 1) * 100$, where β_1 and β_2 are the coefficients of the corresponding educational level post- and pre-liberalisation respectively.

Due to market-oriented reforms in Mexico since the mid-1980s, and on the basis of the SST we might expect a rise in the relative return to low-income, unskilled labour, or an increase in individual income in activities such as agriculture and labour-intensive manufacturing, and therefore a reduction of income inequality. However, in the post-liberalisation period skill premium expanded and relative income in agriculture and manufacturing dropped. Furthermore, overall individual inequality increased, although there is some evidence that has tended to decline after 1998. To some extent, these trends undermine orthodox theory and provide room for contesting arguments.

An important reason for income dispersion is the fact that marginal returns to education increased, which is consistent with the *SETH*. By analysing data for individuals we find that demand for skill (tertiary education) increased markedly, and faster than supply, whereas relative demand for unskilled individuals (primary education) fell at a faster rate than supply, and this is a possible explanation of this trend (see the Appendix). Note, however, that the *SETH* applies to tertiary education in particular. In the service sector relative income increased, even after controlling for education and other personal characteristics. By exploring data for individuals we also find that relative employment and demand for skill also increased in this sector. This pattern contributes to explain income dispersion, since the wage gap between the service and the agricultural sectors expanded. In this sense, the evidence corresponds with the *rise of service* argument.

Following the Arbache et al. (2004) industry classification, we can consider the agricultural and the manufacturing sectors as the traded industry and the service sector as the non-traded industry. Controlling for education, age and gender (and unionisation when only labour income is considered), we observe that, in general, income in the traded sector fell following liberalisation, and this is consistent with the view that market-oriented reforms increased the degree of competition and therefore reduced rents. Income also dropped in the non-traded industry, indicating either a degree of spillover, or the effect of other reforms such as privatisation or deregulation.¹⁰ However, the relevant finding is that income in the traded sector fell in relative terms, which is another reason of income dispersion.

The analysis of union premium indicates that changes in the wage gap between union and non-union workers can not contribute to explain an increase in income dispersion, as the gap decreases in the post-liberalisation period once we allow for education and other personal characteristics. On the other hand, we find that the unionisation rate dropped from 24.4 percent to 15.5 percent between 1984 and 1998 and the Gini coefficient is larger within the non-unionised sector. In this sense, the fact that a large number of workers moved away from unions and entered a non-union sector, characterised by diverse and flexible wages and higher Gini coefficient, represents a source of inequality (Cortez, 2001: 1915).

The rise in individual Gini coefficient reversed between 1998 and 2002. The factors that can explain this variation are summarised as follows. The upturn in skill premium started to reverse around 1994. The main reason for this is that the

increase in supply of skilled individuals accelerated, whereas the increase in skill demand slowed down; on the other hand, demand for unskilled individuals continued to fall but at a lower pace, and the fall in supply speeded up in relative terms (see the Appendix). Finally, around 1998 the wage gap between union and non-union workers peaked and fell afterwards and the fall in the unionisation rate stopped and reversed slightly.

Further research can be oriented to explain other causes of the mitigation of income inequality in recent years such as movements of individuals to higher income sectors, the effect of transfer income, and changes in the average number of members per household and the proportion of income receivers.

Some of the main policies implied are as follows: Firstly, to take strategic action to develop the agricultural sector; secondly, to facilitate access to education, especially to the vulnerable and those at low income levels. Furthermore, the evidence implies that the boost of employment in unskilled, labour-intensive activities, combined with the reduction of supply of unskilled individuals by increasing educational levels can encourage factor price equalisation. However, heavy reliance on low-wage employment is not a desirable long-term solution as it does not encourage domestic markets and sustained growth; in this context, gradual and strategic industrialisation can be a complementary strategy.

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¹⁰ Arbache et al. (2004) reached similar conclusions for the case of Brazil

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TABLE I
PERFORMANCE OF SECTORS (LABOUR INCOME)

Table 1A	(1)		(2)	
	Pre-lib	Post-lib	Pre-lib	Post-lib
Services		-0.152		-0.223
Agriculture	-0.709	-0.949	-0.555	-0.805
Manufacture	0.062	-0.256	0.105	-0.175
Age				0.079
Age ²				-0.001
Female				-0.344
Union				0.284
Secondary education				0.433
Tertiary education				0.931
Constant		8.215		6.571
Observations		57,832		57,832
R ²		0.10		0.37

Table 1B	(3) 84,89		(4) 84,94		(5) 84,98		(6) 84,02	
	Pre-lib	Post-lib	Pre-lib	Post-lib	Pre-lib	Post-lib	Pre-lib	Post-lib
Services		-0.113		-0.091		-0.375		-0.275
Agriculture	-0.593	-0.683	-0.536	-0.694	-0.523	-0.877	-0.552	-0.962
Manufacture	0.103	-0.059	0.117	-0.085	0.109	-0.308	0.099	-0.222
Age		0.083		0.083		0.084		0.080
Age ²		-0.001		-0.001		-0.001		-0.001
Female		-0.324		-0.345		-0.340		-0.328
Union		0.185		0.263		0.350		0.326
Secondary education		0.420		0.503		0.473		0.394
Tertiary education		0.770		1.045		0.988		0.868
Constant		6.538		6.469		6.461		6.567
Observations		16,137		17,108		15,311		22,281
R ²		0.33		0.41		0.40		0.38

Notes: Results corrected for heteroskedasticity, all coefficients are significant at the 1 per cent level

TABLE II
RETURNS TO EDUCATION (LABOUR INCOME)

	(1)		(2) 84,89		(3) 84,94		(4) 84,98		(5) 84,02	
	Pre-lib	Post-lib	Pre-lib	Post-lib	Pre-lib	Post-lib	Pre-lib	Post-lib	Pre-lib	Post-lib
Age	0.079		0.083		0.083		0.084		0.080	
Age ²	-0.001		-0.001		-0.001		-0.001		-0.001	
Female	-0.345		-0.325		-0.348		-0.344		-0.330	
Union	0.283		0.184		0.261		0.348		0.321	
Primary education		-0.246		-0.098		-0.160		-0.407		-0.308
Secondary education	0.486	0.184	0.508	0.295	0.494	0.347	0.483	0.066	0.455	0.077
Tertiary education	0.784	0.695	0.800	0.663	0.786	0.928	0.782	0.643	0.760	0.580
Agriculture		-0.580		-0.576		-0.585		-0.509		-0.655
Manufacture		0.053		0.068		0.038		0.081		0.064
Constant		6.592		6.526		6.523		6.486		6.590
Observations		57,832		16,137		17,108		15,311		22,281
R ²		0.37		0.33		0.41		0.40		0.38

Notes: Results corrected for heteroskedasticity, all coefficients are significant at the 1 per cent level

TABLE III
UNIONISATION AND WAGES (LABOUR INCOME)

Table 3A	(1)		(2)	
	Pre-lib	Post-lib	Pre-lib	Post-lib
Non-Union		-0.174		-0.226
Union	0.602	0.477	0.331	0.053 *
Age				0.079
Age ²				-0.001
Female				-0.345
Agriculture				-0.579
Manufacture				0.052
Secondary education				0.432
Tertiary education				0.932
Constant		7.965		6.573
Observations		57,832		57,832
R ²		0.08		0.37

Table 3B	(3) 84,89		(4) 84,94		(5) 84,98		(6) 84,02	
	Pre-lib	Post-lib	Pre-lib	Post-lib	Pre-lib	Post-lib	Pre-lib	Post-lib
Non-Union		-0.068		-0.110		-0.387		-0.304
Union	0.340	0.062	0.309	0.134	0.331	-0.026	0.326	0.020 *
Age		0.084		0.083		0.084		0.080
Age ²		-0.001		-0.001		-0.001		-0.001
Female		-0.325		-0.345		-0.340		-0.328
Agriculture		-0.575		-0.587		-0.509		-0.654
Manufacture		0.066		0.036 ^		0.079		0.062
Secondary education		0.417		0.502		0.472		0.395
Tertiary education		0.772		1.048		0.987		0.871
Constant		6.501		6.478		6.470		6.589
Observations		16,137		17,108		15,311		22,281
R ²		0.33		0.41		0.40		0.38

Notes: Results corrected for heteroskedasticity, all coefficients are significant at the 1 per cent level unless otherwise indicated, * significant at 5 per cent, ^ insignificantly different from zero at conventional levels

APPENDIX

Changes in share of educational levels in terms of supply of hours and income bill and changes in average hourly income
(annualised log change x 100)

	1984-1998	1998-2002
Primary		
Average income	-2.26	-0.09
Hours	-0.86	-1.39
Income bill	-2.25	-1.32
Tertiary		
Average income	0.43	-3.11
Hours	2.57	6.09
Income bill	4.38	1.20

The table above makes comparisons between the rising inequality period and the latter period of decreasing inequality, by exploring annualised changes in shares and average hourly income for both primary and tertiary educational categories. Relative supply shifts can be represented by changes in share of hours of work. Under the assumption that the elasticity of substitution between skilled and unskilled workers equals one and the production function is Cobb-Douglas, relative demand shifts can be represented by changes in income bill share (Airola and Juhn, 2005). Shifts in average income tend to be positive when demand grows faster than supply.