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A Shift-Share Analysis of Regional and Sectoral Productivity Growth in Contemporary Mexico

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A SHIFT-SHARE ANALYSIS OF REGIONAL
AND SECTORAL PRODUCTIVITY GROWTH
IN CONTEMPORARY MEXICO

Clark W. Reynolds

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FOREWORD

Roughly 1.6 billion people, 40 percent of the world's
population, live in urban areas today. At the beginning
of the last century, the urban population of the world to-
taled only 25 million. According to recent United Nations
estimates, about 3.1 billion people, twice today's urban
population, will be living in urban areas by the year 2000.

Scholars and policy makers often disagree when it comes
to evaluating the desirability of current rapid rates of ur-
ban growth in many parts of the globe. Some see this trend
as fostering national processes of socioeconomic development,
particularly in the poorer and rapidly urbanizing countries
of the Third World; whereas others believe the consequences
to be largely undesirable and argue that such urban growth
should be slowed down.

As part of a search for convincing evidence for or against
rapid rates of urban growth and urbanization, a Human Settle-
ments and Services research team, working with the Food and Ag-
ricultural Program, is analyzing the transition of a national
economy from a primarily rural agrarian to an urban industrial-
service society. Data from several countries selected as case
studies are being collected, and the research is focusing on
two themes: spatial population growth and economic (agricul-
tural) development, and resource/service demands of population
growth and economic development.

This paper focuses on one of several case studies: Mexico. In it, Dr. Reynolds investigates the effects of labor force shifts on sectoral as well as regional total factor productivity growth. He shows that at the beginning of the 1940-1970 period substantial increases in productivity were achieved by movements of population between sectors and between regions. However, towards the end of the period, increases in productivity attributable to labor mobility declined.

A list of papers in the Population, Resources, and Growth Series appears at the end of this publication.

Andrei Rogers
Chairman
Human Settlements
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ABSTRACT

        This paper presents a shift-share analysis of labor produc-
tivity in Mexico. Following a brief review of the role of rising
labor productivity in recent economic growth, the analysis focus-
es on 1) the possible contribution to increases in labor produc-
tivity of interregional labor force migration, and 2) the impact
of intersectoral labor force shifts within the Mexican economy.
The paper concludes that the shift factor is declining as a con-
tributor to productivity growth, both regionally and sectorally,
at the same time that migration's contribution to growth in the
labor force is on the increase.

CONTENTS

A SHIFT-SHARE ANALYSIS OF REGIONAL
AND SECTORAL PRODUCTIVITY GROWTH IN
CONTEMPORARY MEXICO

C.W. Reynolds

BACKGROUND

A decade ago Mexico's rapid growth performance was widely
acclaimed as a "miracle". Questions of income distribution and
social equity tended to take second place to those of productiv-
ity growth among policy makers. Rapid increases in output, in a
dynamic system such as Mexico's, were to provide a bounty that
government and private sector leaders believed would assuage so-
cial pressures. Income would shift from high productivity sec-
tors toward the poor through changes in the regional and sectoral
pattern of employment. The neglected majority of workers in rain-
fed agriculture would benefit from a concentration of investment
in irrigated farming in newly opened regions, and urban migration
would absorb the rest. (Little was said about emigration abroad.)
Where this natural adjustment process might fail, through inade-
quate market forces, the government could, within reason, inter-
vene. But the very surplus needed to pay for such intervention
depended, it was felt, upon the underlying growth process led by
private investment response to underlying market forces in close
cooperation with government. In describing the development pro-
cess at the end of the 1960s, I wrote:

> Hence, although no major economic obstacles stand in
> the way of sustained growth, political pitfalls abound.
> It may become necessary for the government to turn from

growth promoting to political and economic redistribu-
tion programs in the near future in order to avoid a
repetition of history. Just as social revolution once
brought about changes in the structure of the economy
that permitted increased social participation in the
production process, so economic revolution in recent
years has set the stage for broader social participa-
tion in the political process.
(C. Reynolds, 1970, p. 310.)

It is now evident that the political pitfalls mentioned
above could not be separated from economic policies of the post-
war period. The "stabilizing development" strategy of the 1960s
involved conscious government decisions to postpone fiscal reform,
limit development expenditures, neglect traditional agriculture,
delay land redistribution that had been promised for decades, and
defer exchange rate adjustment despite evidence that the peso,
pegged since 1954, was becoming progressively overvalued. All of
these policies had an adverse impact on the long run stability of
the economy and society, although they served to buy time. One
consequence was that a growing share of productive assets in Mex-
ico was moving under the control of decision makers abroad, as for-
eign direct investment gradually overtook that of the local elite
in leading sectors and as foreign borrowing became increasingly nec-
essary to fill the gap between investment and domestic savings.

Buying time then might have made sense if the resulting pat-
tern of development had led to productivity growth which could
eventually diffuse itself through the work force, thus raising liv-
ing standards of all Mexicans including the millions who remain in
poverty. In earlier decades there was evidence that such diffus-
ion was gradually taking place, thanks to the responsiveness of the
work force to opportunities elsewhere and the migration in the hun-
dreds-of-thousands of those in search of better jobs. This, coupled
with strong demand growth, had caused an impressive shift in the re-
gional and sectoral structure of employment. In this paper the so-
called "shift factor" is measured from 1940 to 1970. The findings
are analyzed in terms of their consequences for productivity growth,
real wages, and social welfare. Placed in the context of accelera-
ting demographic growth, and subsequent growth in the number of job
seekers, this paper asks the question whether or not the shift fac-
tor was sufficient for Mexico's sectorally and regionally unbalanced

productivity growth to lead to a more balanced social participa-
tion in the economic product. There is strong evidence that the
domestic shift factor, while significant in the immediate post-
war years, had become sharply diminishing by the 1960s. Mean-
while the external shift factor (as workers pursued employment
opportunities in the U.S.) was becoming increasingly important
to sustain domestic wage and productivity levels.

By the 1970s the Mexican model of growth was showing signs
of internal instability and external dependence that were incon-
sistent not only with national political goals but also with ris-
ing rates of domestic savings and investment on which further
growth would depend. Sensing a need for change, the Echeverría
administration (1970-1976) attempted to implement a number of
long overdue reforms with varying degrees of success. The tax
share of gross domestic product increased, though truly progres-
sive tax reform was avoided. Federal expenditures on infrastruc-
ture and social welfare accelerated, outstripping revenues and
resulting in soaring fiscal deficits. Increased foreign borrow-
ing and expansionary monetary policy to finance these deficits
added fuel to the inflationary fire. Meanwhile private invest-
ment was deterred by the threat (if not action) of further fiscal
reform, by government supported wage increases, by the prospect
of land reform, and by accelerating inflation. The policy space
open to decision makers was shrinking at the very time that so-
cial pressures for action were growing. Caught in this bind,
Echeverría's program of "shared development" suffered a credibil-
ity gap. The rhetoric of reform outstripped accomplishments, and
opposition groups inside and outside of government fought to pre-
serve long-standing interests. A final long-overdue measure, the
peso devaluation of 1976, led to a massive flight of capital,
amid rumors of coups and counter-coups.

In 1976 the incoming administration of Lopez Portillo in-
herited both the problems and promises of its predecessors, in-
cluding the misgivings of both business and labor. Since then the
new President has shown strong and balanced leadership doing much
to allay the worst fears of both groups. Still a struggle for
shares of decelerating GDP characterized the first years of his

government as well. However, recent prospects of a petroleum ex-
port bonanza have forestalled, if not eliminated, the consequences
of many of these problems. Because of the importance of general
economic performance to reform-mongerizing, the success with which
goals of growth and equity may be reconciled in coming years will
depend on the level and composition of future productivty growth
of the economy, as much as on the political skill with which that
surplus is apportioned among competing interest groups. In deal-
ing with recent regional and sectoral trends in productivity, it
is hoped that this study will contribute to the achievement of
Mexico's future goals of employment, growth and social welfare.
It is also hoped to shed light on the importance to Mexico's in-
ternal stability and growth of links with the United States.

The following sections deal respectively with (I) proximate
sources of productivity growth in Mexico from 1940 to 1975; (II)
a shift-share analysis of total factor productivity growth in the
primary, secondary, and tertiary sectors from 1940 to 1970; (III)
a shift-share analysis of total factor productivity growth in the
six main regions of Mexico from 1940 to 1970; (IV) a shift-share
analysis of productivity growth in the three main regions: Bor-
der, Metropolitan Mexico City, and Rest of Mexico, 1940 to 1970;
and (V) a shift-share analysis of the primary, secondary, and ter-
tiary sectors of the three main regions of Mexico, 1940 to 1970.

I. PROXIMATE SOURCES OF PRODUCTIVITY GROWTH IN MEXICO: 1940 TO 1970

In a recent paper Professor Ansley Coale of Princeton commented that Mexico had astonished the world with its sustained rapid productivity growth since 1955, despite increased fertility rates and accelerating population growth. But he suggested that its recent economic performance might have been even better had demographic pressures been alleviated beginning in the mid-1950s rather than two decades later. He also predicted that the wave of job seekers generated by past population growth will flow forward into the labor force for at least another generation (Coale, 1978). In order to assess the impact of increased labor supply on the level and diffusion of productivity gains, an analysis will ⊃e made first of net productivity growth at the national level (Section I) and then of sectoral and regional productivity growth (Section II-V). The findings offer striking support for Professor Coale's hypothesis and have sober implications for government policies as well as the level and pattern of private expenditures, if goals of growth and income distribution are to be made consistent with accelerated expansion of the work force. The following analysis was made possible as part of the program of the Mexico Task Force of the IIASA Human Settlements and Services Area and is believed to have relevance well beyond the Mexican case.[1]

Measuring Net Factor Productivity Growth

In this first section we present new calculations of net productivity growth in Mexico from 1940 to 1975 based on the most recent available information on output and input of labor, capital, and land. The objective is to determine how total factor productivity has grown during periods of quite different underlying patterns of employment and investment, government policy, and land use. The stress is on productivity growth as an essential element in the improvements of living levels. The relationship between net factor productivity, labor productivity, and employment is crucial to the distribution of gains throughout the workforce. But the first step is to determine whether output has continued to rise relative to *all* factor inputs including capital

and land. The basis of the calculations is a simplified "Denison production function" (Denison, 1962) in which output is expressed as a function of labor (L), capital (K), land (R), and a productivity factor (e^T). $Y = e^T L^a K^b R^c$ such that the logarithmic relationship $\hat{Y} = T + a\hat{L} + b\hat{K} + c\hat{R}$ permits one to use information on observed growth of the respective inputs of labor, capital, and land, and on observed growth of output to derive the "unexplained residual" (T), such that

$$\hat{Y} - a\hat{L} + b\hat{K} + c\hat{R} = T$$

Inputs L, K, and R are weighted according to the assumptions of a Cobb-Douglas production function, in which case the constant returns to scale property ensures that the output elasticity coefficients with respect to each input (a, b, and c, respectively), sum to unit. Each coefficient represents the respective share of that factor in value added. Hence we can use observed shares of value added in gross domestic product (GDP) accruing to each factor to represent that factor's elasticity of output a, b, or c. For example, if the share of labor income represents 60 percent of GDP, then the coefficient is assumed to be .6. For purposes of the following calculations, the following factor shares are applied to the Mexican case:

    a = labor share   = .60
    b = capital share   = .35
    c = land rent share = .05

Growth of output is taken from the Banco de Mexico gross domestic product estimates expressed in constant prices as provided by the bank staff and published in its *Anuario*. It should be noted that the post-1960 GDP series was somewhat revised since the Reynolds (1970) volume was published and the present study incorporates these changes causing the results for earlier years to be slightly different from earlier estimates.

Growth of the labor force is based on man years of labor un-corrected for age, sex, skill or degree of unemployment or under-employment, drawing upon census figures for the economically active population (PEA) over 12 years of age for the years 1940, 1950 and 1970. For 1960 major adjustments to the census were made by Oscar Altimir (1974), reducing the PEA by slightly over one million work-ers. The 1960 census PEA (economically active population over 12 years of age) was reported to be 11,235 thousand, a figure which Altimir adjusted to 10,213 thousand. The agricultural population was most affected by this downward adjustment: the census PEA in agriculture for 1960 of 6,086 thousand being reduced by Altimir to 5,048 thousand. If the census figures for 1960 (6,086 thousand) and 1970 (5,329 thousand) are compared, it appears that the rural PEA declined sharply in absolute terms. Yet as Altimir shows, this is not consistent with sample surveys taken in 1963, 1964 and 1965 which showed rural labor participation rates to be close to the 1970 levels and much below those of 1960. Clearly, Altimir's ad-justments for 1960 when disaggregated are crucial, regionally, to the analysis of migration and sectoral and regional labor absorp-tion in Mexico between 1950 and 1970.[2] On the basis of the uncor-rected 1960 census data, the degree of labor flow from rural to urban areas is seriously understated for the 1950s and overstated for the 1960s.

The capital stock indexes for 1960 onward are calculated on a survival basis, by which an initial capital stock is assumed, a hypothetical rate of depreciation applied, and current gross in-vestment (in constant) prices added so as to derive the capital stock (K) at the end of the year (Table 1). The capital stock in 1959 was assumed to be 331,124 million pesos (at constant 1960 val-ues) to which an assumed 5 percent depreciation rate was applied. To this figure were added gross investment flows in 1960 of 33,132 million pesos producing an estimated capital stock at the end of 1960 of 355,978 million pesos (this would have meant a capital/out-put ration (K_{t-1}/Y_t) for 1960 of 2.2.[3]

Land inputs in Table 2 are derived from figures in Cynthia Hewitt de Alcantara, *Modernizing Mexican Agriculture*, UNRISD, 1976 for total cropland of Mexico for the years 1960 and 1970. Earlier

Table 1. Capital stock estimates for the relevant years
used in the productivity calculations.

	(Million current pesos)*	(Million 1960 pesos)			
	Gross investment	Gross investment[b] I	Capital stock K	Gross domestic product Y	Capital/ output (K_{t-1}/Y_t)
1959			331,124		
1960	33,123	33,132	355,978[c]	150,511	2.2
1961	32,829	31,750		157,931	
1962	32,344	30,370		165,310	
1963	(34,426)[a]	31,353[a]		178,516	
1964	(36,642)[a]	31,588[a]	422,148	199,390	
1965	39,000	32,856	463,951	212,320	2.1
1966	50,400	40,843		227,037	
1967	59,600	46,929		241,272	
1968	65,700	50,538		260,901	
1969	72,500	53,664	604,673	277,400	
1970	81,100	57,436	646,992	296,600	2.0
1971	75,500	51,254		306,800	
1972	98,874	63,503		329,100	
1973	123,300	70,456		354,100	
1974	175,759	80,995	842,242	375,000	
1975	210,189	81,977	903,163	309,300	2.2
1976:	(0)				

*At the official exchange rate a current peso in 1978 was worth about 4.5
cents U.S. On a purchasing power parity basis a 1960 peso would be worth
about 25 cents U.S. (1978) value and a 1950 peso would be worth about 50
cents U.S. today.

[a]Interpolated for 1963, 1964.

[b]Converted from current values using implicit GDP inflator. Figures for
1972 to 1975 are from E.V.K. Fitzgerald, "The State and Capital Accumu-
lation in Mexico" mimeographed, 1977 expressed as percentages of GDP,
applied to 1960 value GDP estimates of the Banco de Mexico for the same
years.

[c]Raymond Goldsmith (1966) estimated the physical capital stock ("structures
and equipment") for 1960 to be 250,000 current pesos (cited in Reynolds,
1970, appendix Table D.8, 0.383.)

Source: The initial capital stock figure as well as the current value fig-
ures for gross investment 1960-62 were taken from Reynolds (1970),
p. 7.9. Gross investment figures for 1965-71 in current values
are from E.V.K. Fitzgerald (1977) Table II. For 1972-75 (Ibid.)
investment percentages of GDP are applied to GDP figures from Banco
de Mexico official estimates to derive gross investment estimates.
The method of calculation of K is described in the text.

Table 2. Proximate sources of productivity growth
in the Mexican economy 1940-1970.

(compound annual rates of growth)

	1940-50	1950-60	1960-70	1960-65	1965-70	1970-75
OUTPUT						
1. Gross Domestic Product[a]	5.8	5.9	6.8 (7.2)[b]	6.9	6.7	5.5
INPUTS						
2. Man years of labor[c]	3.5	2.0	2.4	(2.4)*	(2.4)*	(2.5)*
3. Stock of fixed reproducible Assets	2.8	5.5	6.0	5.3	6.7	6.7
4. Hectares of Land in Cultivation	3.6	1.0	2.1	3.2	-0.5	(2.0)*
5. Rate of growth attibutable to inputs 2,3,and 4 above[d]	3.3	3.2	3.6	3.5	3.8	(3.9)*
6. Rate of growth unexplained by above inputs ("Unexplained residual")	2.5	2.7	3.2	3.4	2.9	(1.6)*

*Estimate based on extrapolation of trends (land and labor, 1975) or
interpolation (labor, 1965).

Source:

[a]The compound rates of growth of Gross Domestic Product for the per-
iods 1940-50 and 1950-60 are based on GDP estimates used by Unikel
(1976) and Appendini (no date) in million 1950 pesos (1940: 22,889;
1950: 41,060; 1960: 74,215). These are taken from Solis (1969) and
may be compared with other Bank of Mexico estimates used in Reynolds
(1970) for 1940 in 1950 pesos: 21, 658; 1950: 41,060 (same); 1960:
74,317.

[b]Unikel's figure for 1970 is 152,341 which implies a rate of growth
for 1960-70 of 7.2 percent p.a. However, the latest Bank of Mexico
data (in million 1960 pesos) as cited in Table 1, imply a lower
growth rate for the 1960s of 6.8 percent p.a. Note that regional
and national shift-share estimates of subsequent sections employ
the Unikel-Appendini GDP estimates (in 1950 pesos), so that they
almost certainly bias upward productivity growth during that decade.

[c]Based on economically active population (PEA) reported in the census
for those 12 years of age and over for 1940 (000's): 5,858; 1950:
8,345; 1970: 12,955. The 1960 census figure for PEA (11,253) was
rejected in favor of the downward adjustment by Altimir: 10, 213.
The growth of PEA from 1950-60 based on Altimir's adjustment is 2.0
percent p.a. and that of 1960-70 2.4 percent. On the basis of the

official 1960 census figures for PEA the growth for the 1950s rises
to 3.1 percent p.a. and that of the 1960s falls to 1.4 percent p.a.
(too low and too high respectively, see text).

[d]The weights used were labor (.60), capital (.35), and land (.05),
compared to Reynolds's (1970) weights .66, .29, and .05 respectively
which would give residuals of 1940-50: 2.5 percent p.a.; 1950-60:2.9
percent; and 1960-70: 3.4 percent. For the form of production func-
tion used see p. 7. The factor shares applied in Table 2 reflect
subjective considerations of underlying factor productivities in the
absence of distortions in relative prices, subsidies, and other pol-
icies which bias upward the share of profits, interest, and quasi-
rent. The actual labor share of GDP during the period was probably
closer to 30 percent, while the capital share, including mixed income
of owner-operated farm and non-farm enterprises and depreciation al-
lowances, was about 65 percent of GDP. The land rent share was about
5 percent of GDP. If these observed shares were used to weight in-
puts, productivity residuals would be 2.8 percent p.a. for the 1940s,
1.7 for the 1950s, and 2.1 for the 1960s. For the period 1960-65
productivity growth would be 2.6 percent p.a., 1965-70 would be 1.7,
and 1970-75 would be o.3, sharpening the downtrend in productivity
growth observed in recent years.

years are from Reynolds (1970). The figures for total hectares
cultivated are:

	(000 hectares)
1940	7,934
1950	10,753
1960	12,239
1970	15,128

Source: Hewitt de Alcantara (1976).[4]

In Table 2, proximate sources of productivity growth in the
national economy are estimated so as to determine the largest
reasonable residual attributable to increased net factor produc-
tivity. Unfortunately, continual revisions of the Mexican na-
tional accounts make it difficult to get a secure fix on the lev-
el of income and product much less on the secular trends in GDP.
For example, earlier data implied trends in GDP for the 1940s of
6.4 percent to 6.7 percent p.a. (Reynolds, 1970) compared to 5.8
percent in Table 2, (Solis, 1970; Unikel, 1976). Data which have
appeared since the Unikel study lower the growth rate for the 1960s

from 7.2 percent to 6.8 percent p.a.   In order to keep estimates
in this section as close as possible to those in the following
sections (which rely on Appendini/Unikel regional gross product
estimates which are linked to the Solis (1970) GDP data at the
national level), I have retained the Solis figures for GDP growth
in the 1940s and 1950s.   However, the estimates for 1960-76 pro-
vided by the Bank of Mexico in 1977 correspondence with the author
are so different from those of Solis's earlier figures that it
was necessary to use the more recent data for the 1960s, despite
the fact that they lower the growth rate (and residual) during
that decade by 0.4 percent p.a.   Note that the apparent turn-
around in productivity growth since the mid-1960s is independent
of the choice of GDP estimates for the 1960s.

Results

Net productivity gains at the national level, after rising
steadily from the 1940s through the mid-1960s, have since sharply
reversed their trend.   As Table 2 shows, the unexplained residual
which is a surrogate for net productivity growth in the economy,
fell from a high of 3.4 percent p.a. in the period 1960-65 to 2.9
percent in the second half of the decade and further declined to
1.6 percent from 1970-75.   This trend primarily reflects higher
rates of growth of labor and capital inputs in contrast to slower
rates of output growth in recent years.   Since both the economic
constraints on the ability of government to respond to social
pressures, and the capacity of the market to transmit productivity
gains from leading to lagging sectors depend on net productivity
growth, this is an alarming trend.   It suggests that the Mexican
economy may have reached a watershed in the mid-1960s, such that
the previous pattern of development described in my earlier work
(Reynolds, 1970) is now giving way to a new set of structural
forces that imply slower output growth per unit of input.[5]   Since
this process of deceleration is occurring precisely at the time
when pressures are mounting for wage increases, greater social
outlays, more equitable agrarian policies, and other reform mea-
sures, an analysis of the factors underlying productivity growth
is especially timely.   Also the acceleration in demographic growth

and urbanization in recent decades places a growing demand on
the economy to absorb new entrants into the work force, exacer-
bating the problems caused by declining rates of output growth.

The preceding examination of productivity trends suggests
that rapid expansion of the work force may have begun to place
a significant drag on productivity growth as early as the mid-
1960s. The turnaround in the "residual" reflecting net factor
productivity growth may be due to the onset of diminishing mar-
ginal productivity of labor as growth in the supply of available
workers began to outstrip demand growth. This is supportive of
the suggestions by Professor Coale (1978) that acceleration in
population growth since 1940 would, with a lag, lead to a lower
rate of productivity growth and social progress than would have
been obtained under more moderate demographic conditions. The
more detailed shift-share analysis of the following sections pro-
vides additional evidence to support this conclusion.

Although both output and productivity growth have deceler-
ated in the past decade, Mexico's rate of investment has contin-
ued to expand as shown in Table 3.

Table 3. Rates of investment and saving in Mexico
          (as a percentage of GDP)

Average	Gross fixed capital formation			Gross saving		
	Public	Private	Total	Internal	External	Total
1940-49	4.4	4.8	9.2	9.0	0.2	9.2
1950-59	5.4	10.8	16.2	15.0	1.2	16.2
1960-69	7.0	10.6	17.6	15.8	1.8	17.6
1970-76	8.4	12.0	20.4	17.3	3.1	20.4

Source: Fitzgerald (1977) p. 50.

The investment share of GDP has risen progressively since
1940 as has the internal rate of savings, which in the 1970s was
almost double that of the 1940s. Investment opportunities appear

to have increasingly outstripped domestic savings capacity lead-
ing to a growth of foreign borrowing. External savings (imports
minus exports) have risen sharply as a share of GDP, from 0.2 per-
cent in the 1940s to 1.8 percent and 3.1 percent in the 1960s and
1970s. As a share of total investment, external savings rose
from under 2 percent in the 1950s to 10 percent in the 1960s and
15 percent in the 1970s. This is consistent with evidence that
net productivity growth is decelerating, implying that the domes-
tic surplus available for saving and investment is expanding at a
lower rate, forcing increased dependence on foreign borrowing and
foreign direct investment.

Total government expenditure has risen as a share of GDP in
recent years, though Mexico remains below the average in Latin
American as shown in Table 4 below.

Table 4. Public sector expenditure in Latin America, 1960-70
(as percentage of GDP).

Country	1960-61	1969-70
Mexico	16.7	21.9
Argentina	21.4	25.2
Brazil	25.3	33.3
Chile	29.3	34.6
Colombia	11.2	17.3
Peru	15.9	18.9
All Latin America[a]	20.7	25.7

[a]Average weighted by GDP in 1960.

Source: ECLA; cited in Fitzgerald (March, 1978) p.9.

The Federal Government, by far the dominant fiscal entity,
has progressively increased both its current and capital expendi-
ture shares, while the current account surplus is declining (Table
5). Although tax shares of GDP have risen, they have not grown as
fast as current expenditures.

Thus burgeoning capital formation of the public sector has
increasingly been financed out of government borrowing from the
financial sector, foreign borrowing and an "inflation tax" on the

private sector relecting Central Bank discounting of otherwise
unfunded fiscal deficits.

Table 5. Consolidated Federal Government account, 1940-76
(as percent of GDP).

	1940-49	1950-59	1960-68	1969-72	1973-76
Current income	6.5	7.7	7.5	8.2	9.8
Current expenditure	4.6	5.4	6.1	6.5	8.9
Current account surplus	1.9	3.2	1.3	1.6	0.9
Capital expenditure: GDCF	1.7	2.0	2.0	2.2	3.2
Other	0.5	1.3	.1.2	0.6	0.7
	2.2	3.3	3.2	2.8	3.9
Total expenditure	6.8	7.8	9.3	9.0	12.8
Total deficit	0.3	0.1	1.8	1.2	3.0

Source: Fitzgerald (March, 1978) p. 14.

By revealing recent declines in productivity growth, the
analysis of this section provides some support for a possible
constraint on capacity to tax by the government (at least from
non-mineral production sectors). V.K. Fitzgerald recently examined
the broad contours of resource flows between the private, public,
and foreign sectors for Mexico. He found that while the government
has increased both growth and social-equity oriented expenditures
in recent years, its capacity to extract additional tax revenues
and voluntary financial savings from the private sector has
been progressively limited. As we have mentioned, the result is
increased inflation and foreign indebtedness. Evidence from the
following sections indicates that the "shift" factor is declining
as a component of overall productivity growth having a retarding
effect on increases in output per unit of input. This places
limitations not only on the direct sharing of labor in the benefits
of growth, but also on the governments's ability to mobilize a
decelerating surplus. If this bonus from the shift factor is
declining, it is evident that future growth in public and private
savings will be more costly in the future.

What about oil and natural gas? There is the possibility
that future resource "rents" will provide a new windfall surplus
permitting Mexico's productivity residual to again recover in
the final decades of this century. Such projects are limited
by trends in the terms of trade for petroleum production, Mex-
ico's role as a world supplier, its rate of output growth, and
trends in input costs in the petroleum and natural gas sectors.
Productivity growth and the government's ability to capture this
surplus through fiscal measures, are quite different phenomena.
Mexico with its nationalized oil industry is equipped institu-
tionally to mobilize a large share of the petroleum surplus for
the public sector. However, it is not so equipped with respect
to quasi-rents from manufacturing, agriculture, and commerce.
Gas and oil windfalls notwithstanding, the aggregate figures
suggest that Mexico reached a "turning-point" in the mid-1960s,
after which it would have to pursue new (and less productive)
growth paths. Future rents from wasting resources such as oil
and gas do not alter the need to find new long-term bases for
growth, though they may provide a breathing space for the trans-
ition period by generating a surplus to finance structural
change. Alternatively, they may be a pitfall allowing crucial
policy decisions to be postponed until it is too late (Fagen and
Nau, 1977). Also, these windfalls may permit overvaluation of
the peso, reducing the international competitiveness of produc-
tion in the non-mineral sectors. This could seriously delay
market-induced evolution of the economy, which might otherwise
have been expected to occur if the peso remains valued at its
long-term social opportunity cost and the revenues from petrol-
eum are adequately stabilized in the form of reduction in for-
eign debt and, increased international reserves.

II. A SHIFT-SHARE ANALYSIS OF TOTAL FACTOR PRODUCTIVITY GROWTH
IN THE PRIMARY, SECONDARY, AND TERTIARY SECTORS: 1940 TO 1970.

An important share of overall productivity growth in Mexico
has been associated with a continuing shift of the labor force
from lower to higher productivity occupations. This shift has
occurred within production sectors, among sectors, and between
regions of the economy, as well as from rural to urban areas. In
an earlier work (Reynolds, 1970) a measurement was made of the
relative contribution of shifts of labor among the three main
sectors of the economy; primary, secondary, and tertiary, for the
two decades since 1940. Subsequently these calculations at the
national level were updated to include the 1960s (Reynolds, 1977).
It is now possible to extend this analysis to the regional level
permitting productivity growth to be linked to internal migration.
To do this, shift-share analysis is applied to the main regions of
the economy as well as to intra-regional shifts among the three
production sectors for the three decades from 1940 to 1970. This
permits one to determine the secular pattern of output, employment,
and total factor productivity growth (increase in value added per
worker) in response to changing market conditions and government
policy. The extension of shift-share analysis to the regional
level, first to six regions and then to three (the Border States,
Metropolitan Mexico City, and Rest of Mexico), substantially
increases its usefulness by permitting the analysis to be associat-
ed with major migratory trends. Trends in agricultural, and
tertiary sector productivity show sharp regional differentials as
do related patterns of migration and employment.[6]

The method of estimating the shift-share component of total
factor productivity growth is relatively straightforward. It
takes advantage of the fact that growth in value added per worker
in the economy as a whole (or any region of the economy) is the
sum of increases in output per worker times intitial employment
in the subsectors, plus the increase in sectoral employment times
initial output per worker in the subsectors, plus the cross-products.

The model is as follows[7]

$$Y_T = Y_1 + Y_2 + , \ldots, Y_n \tag{1}$$

$$Y_T/N_T = Y_1/N_T + Y_2/N_T + , \ldots, Y_n/N_T \tag{2}$$

$$Y_T/N_T = Y_1/N_1 \cdot N_1/N_T + Y_2/N_2 \cdot N_2/N_T$$

$$+ , \ldots, Y_n/N_n \cdot N_n/N_T \quad , \tag{3}$$

where

$Y_{ij} \equiv$ value added in sector or region i in period j, where
$i = 1, \ldots, n$

$N_{ij} \equiv$ employment in sector i in period j, where $1 = 1, \ldots, n$

$T \equiv$ total economy .

Let

$A \equiv Y_1/N_1 \quad ; \quad a \equiv N_1/N_T$

$B \equiv Y_2/N_2 \quad ; \quad b \equiv N_2/N_T$

$\ldots \ldots$

$Z \equiv Y_n/N_n \quad ; \quad z \equiv N_n/N_T \quad ,$

and let t ≡ period t; and t + j be the period t plus j years; then

$$Y_{Tt} = Aa + Bb + ,..., Zz \tag{4}$$

$$\frac{Y_T(t + j)}{N_T(t + j)} = (A + \Delta A)(a + \Delta a) + (B + \Delta B)(b + \Delta b)$$
$$+ ,..., (Z + \Delta Z)(z + \Delta z) \tag{5}$$

$$\frac{Y_T(t + j)}{N_T(t + j)} = Aa + \Delta Aa + A\Delta a + \Delta A\Delta a +$$
$$Bb + \Delta Bb + B\Delta b + \Delta B\Delta b + ,..., + \tag{6}$$
$$Zz + \Delta Zz + Z\Delta z + \Delta Z\Delta z$$

therefore

$$\frac{Y_T(t + j)}{N_T(t + j)} - \frac{Y_{Tt}}{N_{Tt}} = \Delta(Y_T/N_T)$$
$$= \Delta Aa + A\Delta a + \Delta A\Delta a +$$
$$\Delta Bb + B\Delta b + \Delta B\Delta b + ,..., + \tag{7}$$
$$\Delta Zz + Z\Delta z + \Delta Z\Delta z$$

This change can be divided into the own sectoral (or regional) productivity growth component, the intersectoral (or interregional) shift component, and the combined elements as follows:

$$
\overbrace{}^{\substack{\text{own sectoral (or} \\ \text{regional) factors}}}
$$

$$
A\Delta\,(Y_T/N_T) \;=\; \Delta Aa \;+\; \Delta Bb \;+\; ,\ldots, \;+\; \Delta Zz
$$

$$
\overbrace{}^{\text{shift factors}}
$$

$$
+\; \Delta aA \;+\; \Delta bB \;+\; ,\ldots, \;+\; \Delta zZ \tag{8}
$$

$$
\overbrace{}^{\text{combined factors}}
$$

$$
+\; \Delta A\Delta a \;+\; \Delta B\Delta b \;+\; ,\ldots, \;+\; \Delta Z\Delta z \;.
$$

This model may be used to estimate the effects on productivity on the country as a whole of shifts in labor among sectors with different average productivities (shift factor) as distinct from changes in total output per worker resulting from productivity growth within each sector (own factor). The term "total factor productivity" reflects the fact that the numerator, value added, represents a return to all factors of production, though only labor appears in the denominator, hence the increases in output factors, such as physical capital, average hours worked per man-year, age, sex, and skill composition of the work force, and technological change. Index number problems may also bias output estimates owing to changes in price relatives and product mix. None of these factors is expressly considered here.

A simplifying assumption in the model is that changes in output per worker occur independently from employment changes. Hence a once-and-for-all shift in average productivity of labor from period t to t + j is implied in ΔA, ΔB,...,ΔZ, average productivity assumed to be invariant to subsequent changes in the quantity of employment in the sector (or region). This implicitly supposes that complementary factor inputs adjust in proportion to labor under conditions of constant returns to scale for each sector and region.

One might alternatively assume that labor is subject to diminishing marginal productivity to that ΔA would be a declining function of Δa and similarly for other sectors. There is evidence that investment growth has increased more rapidly than the demand

for labor, since the capital/labor ratio is rising in the economy
as a whole. However, it is likely that capital deepening was
disproportional among sectors and regions in Mexico, and that the
capital-labor ratio grew more slowly in the tertiary sector than
in the secondary or primary sectors. It is also likely that
capital deepening was more pronounced in the Border region and
Metropolitan Mexico City, compared to the Rest of Mexico.
Unfortunately comparable investment figures are unavailable at the
sectoral or regional level making it impossible to estimate the
pure marginal productivity of labor by region and sector for the
three decades studied. Hence, the total factor productivity model
presented above is used for analysis of Sections II to V. For
purposes of counterfactual estimation a Dension-type production
function might be employed which would posit constant elasticity
of output with respect to labor, subject to a variety of assump-
tions about sectoral and regional patterns of investment and
migration.

The pattern of total factor productivity growth among the
three principal sectors of the economy is presented in Table 6 for
four benchmark years 1940, 1950, 1960, and 1970. It is evident
that growth in output per worker was not balanced among the sectors,
nor did the same rank order of growth apply over time. In the
1940s the teritary sector led with absolute productivity growth
of 626 pesos per worker, followed by 550 pesos for the agricultural
sector. The fact that 22 percent of overall growth was attribut-
able to the agricultural sector (see Table 7) and 44 percent to
the tertiary sector was extremely important in permitting the
economy to expand at the rate it did in the 1940s. In contrast,
manufacturing which might have been expected to take the lead
fared least well despite its recovery from several decades of
Revolution and Depression during the boom years of World War II.
Productivity grew by only 148 pesos per worker in the secondary
sector, though it accounted for one-third of total productivity
growth in the economy. This is partially explained by the fact
that capital deepening in manufacturing only began after World
War II when machinery and equipment imports again became available.
The lagged effects of these investments are seen in the data for

Table 6. Output, employment and total factor productivity in Mexico, 1940-70.

		1940	1950	1960	1970
Primary Sector					
Y_A	Output (value added in million 1950 pesos)	5,171	9,242	13,917	17,712
N_A	Labor force (economically active population (000))	3,832	4,867	5,048	5,329
Y_A/N_A	Output per worker (1950 pesos)	1,349	1,899	2,757	3,324
$\Delta(Y_A/N_A)$	Change in output per worker over past decade (1950 pesos)		550	858	567
Secondary sector					
Y_B	Output	6,788	12,466	24,603	52,198
N_B	Labor force	826	1,490	2,175	3,198
Y_B/N_B	Output per worker	8,218	8,366	11,312	16,322
$\Delta(Y_B/N_B)$	Change in output per worker		148	2,946	5,010
Tertiary sector					
Y_C	Output	10,930	19,352	35,695	82,431
N_C	Labor force	1,200	1,988	2,990	4,428
Y_C/N_C	Ouput per worker	9,108	9,734	11,938	18,616
$\Delta(Y_C/N_C)$	Change in output per worker		626	2,204	6,678
Total GDP					
Y_T	Ouput	22,889	41,060	74,215	152,341
N_T	Labor force	5,858	8,345	10,213	12,955
Y_T/N_T	Output per worker	3,907	4,920	7,267	11,759
$\Delta(Y_T/N_T)$	Change in output per worker		1,013	2,347	4,495

Definitions: Primary sector: Agriculture, cattle, forestry, fishing. Secondary sector: Manufacturing, mining, petroleum, construction, electricity. Tertiary sector: Transport, communications, commerce, government, other services. (Banking services are included in the value added of the respective user sectors including services. Hence their inclusion in the tertiary sector is net of an adjustment for banking services in the primary and secondary sectors.)

Table 6 sources and methods:

GDP estimates in million 1950 pesos are taken directly from Unikel (1976) and Appendini (no date) both of which refer to Solis (1969). As discussed in the text there are now more recent estimates of the Bank of Mexico since 1960, reported in 1969 pesos. These later estimates may be compared to those of Solis (1969) by converting the former into 1950 pesos using the implicit GDP deflator between 1950 and 1960 of .477. This deflator is based on earlier official Bank of Mexico GDP series, presented in Reynolds (1970) p. 368-373. In that series GDP for 1960 in current prices was 155,867 and in constant 1950 prices 74,317 giving an implicit deflator of .477.

	Bank of Mexico (1977)				(Unikel)**	
	1960		1970		1960	1970
	(Million pesos)		(Million pesos)		(Million pesos)	
	1960 prices	1950* prices	1960 prices	1950 prices	1950 prices	
Primary	23,970	11,433	34,535	16,473	13,917	17,712
Secondary	43,933	20,956	102,154	48,727	24,603	52,198
Tertiary	82,608	39,404	159,911	76,278	35,695	82,431
Total GDP	150,511	71,793	296,600	141,478	74,215	152,341

*Converted by a factor of $\frac{1950}{1960}$ peso = .477.

**Used in Table 6.

There is probably a wide margin of error in GDP whatever the estimates adopted. For reasons of consistency with the Unikel/Appendini statewide breakdowns of GDP, which we employed in later sections of the paper, the Unikel series was chosen. Hence, growth in output for both the 1950s and 1960s is slightly higher in Table 6 than would have been obtained using the more recent revisions of GDP, see Table 6. The latter gives a compound annual rate of growth for 1960 to 1970 of 6.8% compared to 7.2% in the Unikel data of Table 6.

Labor force estimates are for economically active population (PEA) from the censuses of 1940, 1950, anad 1970, as presented in Unikel (1976). Data on PEA for 1960 are revised downward based on Altimir (1974), as discussed earlier. Reynolds (1978) uses the unrevised 1960 PEA of 6,086 (000) as reported in the census for that year and hence probably understates productivity growth between 1960 and 1970.

Table 7. Sectoral and shift elements underlying growth in output
per worker, 1940-70.

	1940-50	(%)	1950-60	(%)	1960-70	(%)
Primary sector						
ΔAa (Sectoral)	360		500		280	
ΔaA (Shift)	- 95		-169		-229	
ΔaΔA (Combined)	- 39		- 76		- 47	
Total growth of output per worker	226	22	255	11	4	00
Secondary sector						
ΔBb	21		537		1,067	
ΔbB	312		284		385	
ΔbΔB	6		100		170	
Total growth of output per worker	339	33	911	39	1,622	36
Tertiary sector						
ΔCc	128		525		1,957	
ΔcC	300		525		585	
ΔcΔC	21		121		327	
Total growth of output per worker	449	44	1,181	50	2,869	64
Total Mexico						
ΔYn	509		1.552		3.304	
ΔnY	517		650		741	
ΔnΔY	- 12		145		450	
Total Δ(Y/N) growth of output per worker	1,014	100	2,347	100	4,495	100
Shift%	50		34		26	
ΔYn Estimated change in productivity with no shift in labor force	509		1,552		3,304	
Share of productivity attributable to the shift factor	$\frac{1014-509}{1014}$ = .50		$\frac{2347-1552}{2347}$ =.34		$\frac{4495-3304}{4495}$ =.26	

Notes:

ΔA, ΔB, ΔC refer respectively to changes in output per worker in the
primary, secondary, and tertiary sectors based on data in Table 6. a,
b, and c refer to the share of the labor force in the primary, second-
ary, and tertiary sectors in the base year of each period. Δa, Δb, Δc

refer to changes in the sectoral share of the labor force over each
decade based on labor force data in Table 6.

A 1950 peso valued at the exchange rate in that year of 8.64 pesos
to the dollar, was then worth about 11.6 cents U.S. which through
U.S. inflation would be 30 cents U.S. in 1977. Raising the 1950 peso
to its 1960 peso value, based on the Mexican implicit GDP inflator
$\frac{1}{.477}$ and then converting to dollars at the 1960 purchasing power
parity rate of 8 pesos to the dollar would give a 1950 peso value of
26 cents in 1960. At the U.S. GDP deflator betor between 1960 and
1977 of 2,057, this would represent over 50 cents U.S. today (Reynolds,
1970, U.S. Government Council of Economic Advisors, 1978). Hence one
may estimate the value of 100 1980 pesos to be from $30 to $50 U.S. in
1977.

the 1950s (Table 6), as the secondary sector took the lead ac-
counting for almost 40 percent of the nation's productivity
growth (Table 7).

The agricultural sector which had been given substantial in-
jections of public infrastructure investment since the late thir-
ties, also showed increased productivity growth during the fif-
ties, though it lagged behind the rest of the economy. Its share
of total productivity growth declined to one-half of the former
rate or 11 percent in the 1950s. The relatively large and grow-
ing share of the labor force in the tertiary sector caused it to
account for an ever increasing share of national productivity
growth reaching 50 percent in the 1950s and 64 percent in the
1960s.

These data point to the key role of labor migration in Mexico's
total factor productivity growth. They indicate that a "pull"
factor has operated continually from 1940 into the sixties, draw-
ing labor from primary into secondary and tertiary occupations,
sustaining strong absolute and relative productivity gains in both
sectors. A number of scholars have pointed to the potential for
increases in output per worker in certain key tertiary activities
due to capital deepening, technological progress, learning by do-
ing, and the rising skill content of labor. Still the enormous
upward productivity trend for the tertiary sector (Table 7) seems
exaggerated. For this reason some alternative calculations were
made for the present study based on more recent GDP estimates by
the Bank of Mexico. While these updated data are not consistent

with those used for the regional estimates in the following sec-
tions (the Unikel/Appendini breakdown of GDP at the state level
is linked to earlier GDP estimates as shown in Table 6) the later
figures are useful for checking possible biases in aggregate pro-
ductivity growth estimates drawn from previous GDP estimates.

In Table 8, an alternative set of total factor productivity
figures (Estimate B) is presented for the tertiary sector, using
the more recent GDP estimates. These data show somewhat more
productivity growth in the 1950s and much less in the 1960s than
those of Estimate A. The secondary sector, on the other hand,
shows opposite changes, productivity growth being less in the
1950s and greater in the 1960s in Estimate B. Evidence of impres-
sive growth in manufacturing during the 1960s is sustained by the
new data, as is that of acceleration of productivity in the sec-
ondary sector. But what is perhaps most notable is that the ter-
tiary sector, which led the rest in productivity growth in the
1940s and 1950s, now lags behind manufacturing. This provides
important evidence that service employment may be beginning to
place a drag on Mexico's overall productivity growth, helping to
account for the turnaround in the "residual" as reported in Sec-
tion I. This one might expect, given the rush of job seekers to
the urban sector, reflecting earlier demographic trends, recent
lags in agricultural productivity growth, and a steady shift to-
ward more capital intensive cropping since the 1930s. Indeed
the primary sector has made a shockingly small contribution to
national productivity, falling to 11 percent in the 1950s and to
zero in the 1960s (Table 1). Even by more recent GDP estimates
which bias upward agricultural output growth in the 1960s to 3.7
percent per annum (compared to Unikel's figures of 2.4 percent
in Table 8), the primary sector only accounted for 1 percent of
national productivity growth in the 1950s and 3 percent in the
1960s (Table 9).[8]

Based on the data in Table 6, total factor productivity growth
in Mexico increased steadily since 1940, from 2.3 percent per an-
num in the 1940s to 3.9 percent and 4.8 percent respectively in
the 1950s and 1960s. These figures agree with the general trend
of *net* productivity growth through the mid-1960s presented in the

Table 8. Alternative output and total factor productivity Estimate B: 1960 and 1970 (1950 pesos).

	1950	1960				1970			
	Est. A	Est. A	%*	Est. B	%*	Est. A	%*	Est. B	%*
Primary sector									
Y_A	9,242	13,917	4.1	11,433	2.1	17,712	2.4	16,473	3.7
N_A	4,867	5,048		5,408		5,329		5,329	
Y_A/N_A	1,899	2,757		2,265		2,324		3,091	
$\Delta(Y_A/N_A)$**		858		366		567		826	
Secondary sector									
Y_B	12,466	24,603	6.8	20,959	5.2	52,198	7.5	48,727	8.4
N_B	1,490	2,175		2,175		3,198		3,198	
Y_B/N_B	8,366	11,312		9,636		16,322		15,237	
$\Delta(Y_C/N_C)$**		2,946		1,270		5,010		5,601	
Tertiary sector									
Y_C	19,352	35,695	6.1	39,404	7.1	82,431	8.4	76,278	6.6
N_C	1.988	2,990		2,990		4,428		4,428	
Y_C/N_C	9,734	11,938		13,179		18,616		17,226	
$\Delta(Y_C/N_C)$**		2,204		3,445		6,678		4,047	
Total GDP									
Y_T	41,060	74,215	5.9	71,794	5.6	152,341	7.2	141,478	6.8
N_T	8,345	10,213		10,213		12,955		12,955	
Y_T/N_T	4,920	7,267		7,030		11,759		10,921	
$\Delta(Y_T/N_T)$**		2,347		2,110		4,495		3,891	

* Rate of Growth per annum
** Total factoral productivity

Notes:

Estimate A corresponds to Table 6 and 7; the GDP figures for 1960 and 1970 are taken from Unikel (1976) using as sources Appendini (1960) and Banco de Mexico (1970) and the labor force data for 1970 from Unikel (1976). For 1960 the Unikel figures are adjusted based on Altimir (1974). Estimate B use more recent GDP estimates for 1960 and 1970 (Banco de Mexico, 1977) expressed in constant 1960 pesos and converted for this study using the implicit GDP deflator of 0.477 1960 pesos = 1. 1950 pesos as in Reynolds (1978). The Altimir and Unikel labor force figures for 1960 and 1970 are used in both Estimate A and B. See footnote to Table 6 for details, whereas in Reynolds (1978) the adjusted 1960 and 1970 census figures were used.

earlier section (Table 2) which also takes into account capital and land inputs. In absolute terms the increase in output per worker in the 1960s was four times that of the 1940s, or almost 4,500 (1950) pesos in the course of the decade. This is equivalent to between $1,200 and $2,400 current U.S. dollars depending on the conversion factor used. In principal such growth should have greatly enlarged the economic "policy space" permitting higher rates of savings and investment together with improvements in real incomes of the work force. However, more recent GDP estimates show slower growth in the 1960s of about 3,900 (1950) pesos per worker, or between $1,000 and $2,000 (1977 dollars). (See Table 8 for a comparison of the two sets of estimates.) Of course these estimates cannot take into consideration the possible turning point in the mid-1960s indicated by the analysis in Section I.

Especially interesting is the contribution to overall productivity growth made by "shifts" in employment from lower to higher productivity occupations. This must be one important element in the "unexplained residual" presented earlier in Table 2. To the extent that there has been a shift of the work force toward more productive occupations, significant gains in national productivity growth could have been experienced without net gains in any specific sector. In Reynolds (1970) the "shift element" was estimated as a residual after deducting from total productivity growth in each sector that component which could be attributed to pure increases in output per worker ($a\Delta A$, $b\Delta B$,...$z\Delta Z$). The remainder represents the sum of the pure "shift" (ΔaA, ΔbB,...,ΔzZ) and "shift-share" components ($\Delta a\Delta A$, $\Delta b\Delta B$,...,$\Delta z\Delta Z$). It was found that the shift factor accounted for 41 percent of national productivity growth in the 1940s and 24 percent in the 1950s (ibid., pp. 66-68), indicating that although the movement of labor between sectors was extremely important in the first decade of rapid growth, it became less so in the 1950s. It is now possible to carry this analysis forward thanks to more recent estimates of both output and employment through 1970. The shift component, based on Estimate A (Table 7), appears to have been even more important than was earlier believed. It is now seen to have accounted for 50 percent in the 1960s. Alternatively, Estimate B (Table

9) shows the trend also declining to the 1950s when the shift component was 40 percent of productivity growth, after which it fell to 28 percent in the 1960s. However the contribution of the secondary sector to the shift factor increased significantly in the 1960s relative to the tertiary sector, its share of the shift factor being 38 percent in the 1950s and 54 percent in the 1960s (Table 9).

The implications are that half of total factor productivity growth in the 1940s was associated with labor force shifts from lower to higher productivity occupations. However in the next two decades this shift factor fell to one-fourth of total productivity growth. Hence there is strong evidence that the shift contribution to Mexican growth is declining. The relative importance of the tertiary sector for transmission of productivity growth through labor absorbtion is also diminishing, notwithstanding sustained increases in income per worker within that sector. For future productivity growth to continue, greater stress must be placed on investments which are complementary to labor and on labor-absorbing technological progress in the primary and secondary sectors as well as in the tertiary sector, since the shift factor cannot be expected to take up the slack as before. Data at the national level indicate that the gains from labor diffusion and migration are dwindling, and that more attention must be directed to investment and innovations in those localities and occupations where labor is most redundant.

Table 9.   Alternative sectoral and shift elements in productivity
           growth, Estimate B, 1950-70.

	1950-60	(%)	1960-70	(%)
Primary sector				
ΔAa (Sectoral)	213		408	
ΔaA (Shift)	-169		-229	
$\Delta a \Delta A$ (Combined)	- 33		- 69	
Total growth of output per worker	11	1	110	3
Secondary sector				
ΔBb	227		1,193	
ΔbB	284		385	
$\Delta b \Delta B$	43		190	
Total growth of output per worker	554	26	1,768	46
Tertiary sector				
ΔCc	820		1,186	
ΔcC	535		585	
$\Delta c \Delta C$	189		198	
Total growth of output per worker	1,544	73	1,969	51
Total Mexico				
ΔYn	1,260		2,787	
ΔnY	650		741	
$\Delta n \Delta Y$	200		320	
Total $\Delta(Y/N)$ growth of output per worker	2,110	100	3,848	100
Shift component $\dfrac{\Delta(Y/N) - \Delta Yn}{\Delta(Y/N)} \times 100 =$		40		28

III. A SHIFT SHARE ANALYSIS OF TOTAL FACTOR PRODUCTIVITY
GROWTH IN THE SIX MAIN REGIONS OF MEXICO: 1940 TO 1970

In order to determine the impact on productivity of internal
migration of the labor force, shift-share analysis has been applied
to output and employment data for the six major regions of Mexico.[9]
The results are presented in Table 10 and 11. They indicate that
the regional shift factor does not appear to be of major impor-
tance in explaining productivity growth, especially when compared
with sectoral elements as analyzed in Section II. For example,
the regional shift component in the 1940s was only 16 percent,
falling to 11 percent in the 1950s and recovery to 14 percent in
the 1960s in Table 11. This implies that at the most only one-
seventh to one-tenth of the growth in output per worker could have
been explained by movement of the work force from lower to higher
productivity regions, with that share falling over the course of
three decades.

These figures also permit one to examine the effect of re-
gional relocation of the work force on regional inequality in
output per worker. The rank ordering of total factor productivity
for the six regions remains almost unchanged over the four bench-
mark years, with the Metropolitan Mexico City region well ahead
in each year followed by the North Pacific (Table 10). The North
region, also including primarily border states with the U.S., is
third in all years except 1950, when it was temporarily displaced
by the Gulf region (which includes the city of Veracruz and a ma-
jor traditional oil producing region). In all other years the
Gulf ranked fourth. The rest of the Center (exclusive of Mexico
City and the state of Mexico) ranked next to last in all years,
followed finally by the Pacific South.

There is some evidence that the gap between richest and poor-
est regions is gradually narrowing, since output per worker in the
Metropolitan Mexico City area was 6.8 times that of the Pacific
South in 1940. This multiple declined to 4.6 in 1950, rose again
to 5.9 in 1960, and ultimately fell back to 5.0 in 1970. In the
1940s greater Mexico City accounted for only 24 percent of nation-
al productivity growth, but its share doubled to 56 percent in

Table 10.   Output, employment and total factor productivity by
            region, 1940-70.

Region		1940	1950	1960	1970
North					
Y_N	Output (value added in million 1950 pesos)	5,276	9,001	14,978	30,653
N_N	Labor force (economically active population (000))	1,121	1,631	1,854	2,350
$N = Y_N/N_N$	Output per worker (1950 pesos)	4,706	5,519	7,665	13,044
$\Delta(Y_N/N_N)$	Change in output per worker over past decade		813	2,146	5,379
$n = N_N/N_T$	Labor force share	.191	. 95	.191	.181
Gulf					
Y_G	Output	2,556	5,483	8,400	13,477
N_G	Labor force	711	973	1,174	1,496
$G = Y_G/N_G$	Output per worker	3,595	5,635	7,155	9,009
$\Delta(Y_G/N_G)$	Change in output		2,040	1,520	1,854
$g = N_G/N_T$	Labor force share	.121	.117	.115	.115
North Pacific					
Y_P	Output	1,710	3,730	6,774	16,358
N_P	Labor force	362	549	748	1,034
$P = Y_P/N_P$	Output per worker	4,724	6,794	9,056	15,820
$\Delta(Y_P/N_P)$	Change in output		2,070	2,262	6,764
$p = N_P/N_T$	Labor force share	.062	.066	.073	.080
South Pacific					
Y_S	Output	998	2,142	3,164	5,543
N_S	Labor force	769	1,088	1,295	1,375
$S = Y_S/N_S$	Output per worker	1,298	1,969	2,443	1,375
$\Delta(Y_S/N_S)$	Change in output		671	474	1,588
$s = N_S/N_T$	Labor force share	.131	.130	.127	.106

Table 10 continued.

Region		1940	1950	1960	1970
Metropolitan Mexico City					
Y_D	Output	8,329	13,959	30,538	65,491
N_D	Labor force	946	1,545	2,111	3,223
$D = Y_D/N_D$	Output per worker	8,804	9,035	14,466	20,320
$\Delta(Y_D/N_D)$	Change in output		231	5,431	5,854
$d = Y_D/N_T$	Labor force share	.162	.185	.207	.249
Rest of center					
Y_C	Output	4,018	6,746	10,361	20.810
N_C	Labor force	1,948	2,558	2,922	3,478
$C = Y_C/N_C$	Output per worker	2,062	2,637	3,546	5,983
$\Delta(Y_C/N_C)$	Change in output		575	909	2,437
$c = N_C/N_T$	Labor force share	.333	.307	.286	.268
Total Mexico					
Y_T	Output	22,889	41,060	74,215	152,341
N_T	Labor force	5,858	8,345	10,213	12,955
$T = Y_T/N_T$	Output per worker	3,907	4,920	7,267	11,759
$\Delta(Y_T/N_T)$	Change in output		1,013	2,346	4,491
$t = N_T/N_T$	Labor force share	1.00	1.00	1.00	1.00

Sources: GDP and labor force by region are aggregated from state level data estimated by Unikel (1976) and Appendini (1974).

Definitions:
North: Coahuila, Chihuahua, Durango, Nuevo Leon, San Luis Potosí, Tamaulipas, Zacatecas.
Gulf: Campeche, Quintana Roo, Tabasco, Veracruz, Yucatán
North Pacific: Baja California Norte, Baja California Sur, Nayarit, Sinaloa, Sonora.
South Pacific: Colima, Chiapas, Guerrero, Oaxaca
Metropolitan Mexico City: Distrito Federal, State of Mexico
Rest of Center: Aguascalientes, Guanajuato, Hidalgo, Jalisco, Michoacán, Morelos, Puebla, Querétaro, Tlaxcala.

Table 11. Sectoral and shift elements underlying growth in output per worker by region, 1940-70.

Region	1940-50	%	1950-60	%	1960-70	%
North						
Regional	155		418		1,027	
Shift	19		- 22		- 77	
Combined	3		- 9		- 54	
Total	177	18	387		896	20
Gulf						
Regional	247		178		213	
Shift	- 14		- 11		0	
Combined	- 8		- 3		0	
·Total	225	22	164	7	213	5
North Pacific						
Regional	128		149		494	
Shift	19		48		63	
Combined	8		16		47	
Total	155	15	213	9	604	13
South Pacific						
Regional	88		62		202	
Shift	- 1		- 6		- 51	
Combined	- 1		- 1		- 33	
Total	86	9	55	2	118	3
Metropolitan Mexico City						
Regional	37		1,005		1,212	
Shift	202		199		608	
Combined	5		119		246	
Total	244	24	1,323	56	2,066	46
Rest of center						
Regional	191		279		697	
Shift	- 54		- 55		- 64	
Combined	- 15		- 19		- 44	
Total	122	12	205	9	589	13
Total Mexico						
Regional	847		2,091		3,845	
Shift	171		153		479	
Combined	- 8		103		162	
Total	1,010	100	2,347	100	4,486	100
Estimated change in productivity with no shift in labor force	847		2,091		3,845	
Share of productivity attributed to shift factor	$\frac{1010-847}{1010} = .16$		$\frac{2347-2091}{2347} = .11$		$\frac{4486-3845}{4486} = .14$	

Source: Table 10.

the 1950s and remained high at 46 percent in the 1960s (Table 11).
It appears that labor absorption by Mexico City in the 1940s was
accompanied by relatively slow productivity growth. One may pre-
sume that had agricultural policy been delayed during that crucial
decade, causing urbanization to have been even greater than it was,
the resulting drag on productivity growth would have seriously un-
dermined political and economic stability and have increased pres-
sure for migration to the U.S. The timing of public investment
policy, in agriculture first and then in manufacturing was of the
utmost importance in preventing premature urbanization.

Hence in terms of regional income inequality, there was a
narrowing of the gap between 1940 and 1950, a widening during the
1950s, and a narrowing again in the 1960s. Despite the small re-
gional shift factor, some of this reduction in inequality may
well be due to internal migration as suggested by Unikel (1976,
p. 182). He refers to Mexico's possible confirmation of the Wil-
liamson model (1965) in which urbanization, may widen income gaps
in the short run but will eventually narrow them in the long run.
Unikel notes that migration was from lower productivity regions
to those with higher incomes per capita, and still the productiv-
ity growth in the leading areas continued to outstrip the in-
migration of labor. This finding is supported by shif-share an-
alysis for the five regions, since those regions with a negative
shift factor (due to declining labor force shares) tended to be
the poorest, namely the South Pacific and Rest of Center. The
behavior of the North and Gulf regions is ambiguous, since both
had negative shift factors in two of the three periods, the Gulf
in the 1940s and 1950s and the North in the 1950s and 1960s. In
Section V regional shift-share analysis is disaggregated to the
sectoral level, to provide a more detailed picture of the absorb-
tive capacity of the respective sectors. These results tend to
show a net movement of population out of primary into secondary
and tertiary employment. While this holds throughout Mexico, the
regions of lowest overall productivity have not absorbed increases
in the work force in proportion to their initial employment shares.
The only consistently gaining regions have been the Pacific North
and Metropolitan Mexico City, the combined shares of which rose
from 23 percent of the work force in 1940 to 33 percent in 1970.

The following are the means and standard deviations of out-
put per worker in the six regions for the four benchmark years.
The ratio of the mean to the standard deviation indicates the in-
verse of the degree of dispersion of productivity:

		1940	1950	1960	1970
μ	Mean productivity of the six regions (1950 pesos per worker)	4200	5265	7390	11370
σ	Standard deviation of productivity of the six regions	1193	860	1921	2771
$\frac{\mu}{\gamma}$	Ratio of mean to standard deviation; indication of narrowing of productivity differentials among regions	3.5	6.1	3.8	4.1

These ratios show a sharp reduction in inequality between 1940
and 1950, after which the earlier pattern was recovered. Between
1940, 1960, and 1970 there is evidence that regional disparities
gradually narrowed, providing modest support for the Williamson
hypothesis. In order to test the results still further, GDP is
broken into rural and urban income shares in Table 12. The re-
sults are then compared with rural and urban populations shares
to estimate trends in relative income shares associated with ra-
pid urbanization since 1940 in Table 13.

One would expect from the importance of the shift effect in
gradually leveling regional incomes that there might have been
a narrowing of productivity (and income) between the rural and
urban sectors of Mexico over the same period. This would hold
if the pull factor were dominant in urban migration, such that
labor drawn out of the rural sector by higher income possibili-
ties in the cities would cause the rural marginal productivity
of labor to rise together with capital and land labor ratios.
This then would have been reflected in the relative growth of
rural income shares. However there is an additional element,
namely demand for rural output. If rural physical productivity
rose but demand for farm output lagged, then rural terms of trade
(prices of farm products relative to goods and serives) might
decline offsetting this favorable trend. In the estimates in
Table 12 constant value indexes of GDP rural and urban have been
used so as to minimize terms of trade effects.

Table 12. Rural/urban income shares.

	1960	1965	1970	1975
Shares of gross product imputed to rural areas	28	27	22	20
1. Agriculture				
Share of total GDP	15.9	14.2	11.6	9.6
Rural GDP share	14.3	12.8	10.4	8.6
2. Extractive industries				
Share of total GDP	4.9	4.9	5.2	5.5
Rural GDP share	1.7	1.7	1.8	1.9
3. Commerce and Transportation				
Share of total GDP	34.5	34.8	35.0	35.1
Rural GDP share	6.2	5.6	4.7	4.2
4. Manufacturing, construction and electricity				
Share of total GDP	24.3	26.4	29.2	30.3
Rural GDP shares	0	0	0	0
5. Government				
Share of total GDP	4.9	5.6	5.8	7.2
Rural GDP share	0	0	0	0
6. Rent and others				
Share of total GDP	15.5	14.1	13.1	12.2
Rural GDP share	7.6	6.4	5.4	4.9

Sources and methods: Distribution of shares as in Reynolds (1970, Table 2.7, p. 72).

1. Agriculture: 90 percent rural.
2. Extractive Industries: 35 percent rural based on 1950 import output table for Mexico.
3. Commerce and transport $= \dfrac{(3)}{10\% \; GDP \; (3)} \times 1/2$ rural share of GDP in other sectors.
4. Manufacturing, construction, electricity: all urban.
5. Government: all urban.
6. Rent and other: proportional to population share in rural sector 1960: .493, 1965 (est.): .452, 1970: .414, 1975 (est.): .400.

Derived shares from GDP estimates of Bank of Mexico (1977) (1960 pesos) corresponding to those in Estimate B. For this reason the 1960 shares for agriculture (and rural GDP) are well below those in Reynolds (1970, p. 72), which were 18.9 (c.f. 15.9) and 32 (c.f. 28) respectively.

Table 13.   The distribution of GDP and population rural and
            urban 1940-75.

		1940	1950	1960	1965	1970	1975
		%	%	%	%	%	%
1.	Rural share of GDP	40	36	28	27	22	20
2.	Urban share of GDP	60	64	72	73	78	80
3.	Rural share of population	65	57	49	45	41	40
4.	Urban share of population	35	43	51	55	59	60
5.	Rural share of GDP/Rural share of population (Row 1/Row 3 = Row 5)	62	63	57	60	53	50

Source: Table 12 for 1960-75 and Reynolds (1970, p. 74) for 1940-50. Owing
         to the latest GDP estimates used for 1960-75, the 1960 ratio of ru-
         ral GDP to population falls from 65 (Reynolds, 1970) to 57.

With this adjustment the real output of the rural sector per rural dweller fell relative to that of the urban areas in all periods except for the 1940s and the interval from 1960 to 1965 (Table 13). Indeed, the situation as of 1975 indicates that relative rural per capita output was only half that of the urban sector, compared to over 60 percent in 1940.

Clearly the process of migration of the work force has failed to narrow the relative rural-urban income gap. Of course as real income in both rural and urban areas had multiplied several times, the absolute gap is widening even more. To the extent that migration decisions are made on the basis of expected income, the absolute rather than relative gap is more relevant to a study of the relationship between productivity growth and migration. Output per capita in 1960 pesos rose from 3,600 in 1960 to almost 5,000 pesos in 1970, a gain of from between $575 and $800 current U.S. dollars depending on the conversion factor used. However, the gap between Mexico's rural per capita output and real wages in U.S. agriculture paid to temporarily migrating Mexican workers is double or triple that amount.

In order to determine the relative importance of migration to the growth of the regional work forces, a hypothetical pattern of regional labor supply was estimated. It was assumed that in the absence of migration the economically active population in each region would have grown in direct proportion to its initial labor force share at the beginning of each of the three decades from 1940 to 1970. The difference between this hypothetical growth of labor supply and observed increases in active population in each region gives a crude indicator of net regional migration of labor. Naturally this indicator is sensitive to possible errors in the underlying assumptions of proportional changes in demographic factors among regions and proportional shifts in labor participation rates. However it is felt that the results are suggestive of general trends in labor force migration and can be used to estimate the relative importance of such shifts in regional patterns of productivity growth.

It can be seen from Table 14 that total internal migration estimated in these rough terms has amounted to a steadily increasing share of labor force growth. The share was only 11 percent in the 1940s but increased to 16 and 23 percent respectively in the 1950s and 1960s. Without going into the underlying causes of such labor movement, it is evident that regional patterns of productivity growth have been closely associated with increased labor movements. (External migration, while not considered here, is touched upon in Section VI.) The most notable relationship is the strong apparent link between labor force migration and regional productivity growth. Two of the three leading regions in overall productivity growth (Table 11), Metropolitan Mexico City and the North Pacific, also showed net labor in-migration in each of the three decades. However the North, which was second in productivity growth in both the 1950s and 1960s, had a net outflow of labor in both periods. This is almost certainly associated with an impoverished agriculture in much of the North, which led to rural out-migration that outstripped urban growth of Monterrey and the border cities. Earlier, on the other hand, in the 1940s the North was a net attracting region for emigration. Third place shifted to the Gulf, which after losing labor at decreasing rates in the 1940s and 1950s, had become a region of net immigration by the 1960s. With the recent petroleum boom this pattern is certain to continue.

Table 14. Estimates of labor force growth assuming no net migration among the six regions, 1940-1970. Labor force (000).

Region	1940 Observed labor force	1950 Observed labor force	1950 Estimated labor force	Estimated migration	1960 Observed labor force	1960 Estimated labor force	Estimated migration	1970 Observed labor force	1970 Estimated labor force	Estimated migration
1. North	1,121	1,631	1,594	+ 37	1,954	1,990	− 36	2,350	2,477	−127
2. Gulf	711	973	1,010	− 37	1,174	1.194	− 20	1,496	1,491	+ 5
3. North Pacific	362	549	517	+ 32	748	673	+ 75	1,034	947	+ 87
4. South Pacific	769	1,088	1,093	− 5	1,295	1,327	− 32	1,375	1,647	−272
5. Metropolitan Mexico City	946	1,545	1,352	+193	2,111	1,888	+223	3,223	2,685	+538
6. Rest of center	1,948	2,558	2,779	−221	2,922	3,133 ·	−211	3,478	3,709	−231
Total labor force Mexico	5,858	8,344	8,344		10,204	10,204		12,956	12,956	
Net migration				+263			+299			±630
Net migration/growth in labor force (%)				11			16			23

Source: Observed labor force from Table 10. Estimated labor force for region A in year

$$t + j = N_{A_t}/N_{T_t} \cdot N_{t+j}$$

In no case did permanent internal labor migration amount to
a large share of the total work force, the percentage actually
falling between the 1940s and 1950s from 3.2 percent to 2.9 per-
cent. However, the share of migration in labor force growth has
steadily increased to almost one-fourth of growth in the 1960s.
By that decade the absolute share of migration (1960-1970) had
risen to 5 percent of the 1970 labor force. The amount of temp-
orary migration is of course missing from these figures, since
they are based on decennial census data, but there is strong evi-
dence that seasonal migration is especially important in the rural
labor market. Thousands of workers move back and forth hundreds
of miles during harvest periods, and many of them also travel ac-
ross the border. There is some attempt to analyze the relative
importance of seasonal migration to the U.S. in Section V in terms
of its impact on productivity and employment in Mexico.

IV. A SHIFT-SHARE ANALYSIS OF PRODUCTIVITY GROWTH IN THE
THREE MAIN REGIONS: METROPOLITAN MEXICO CITY,
BORDER, AND REST OF MEXICO 1940 TO 1970.

In view of the large and growing importance of migratory
relations between Mexico and the United States, it was determined
to estimate the shift-share effects of regional output and em-
ployment changes for Mexico's two major regions of in-migration,
the border states plus Metropolitan Mexico City, vis a vis the
rest of the country. The breakdown is justified by the findings
in Section III which indicated that the North and Pacific North
had disproportionately large increases in output per worker, and
that the latter together with the Metropolitan Mexico City con-
sistently experiences net in-migration. One may expect that the
greater the inbalance in regional output growth, the more migra-
tion (shift factor) will serve to diffuse productivity gains
through the work force. On the other hand the more proportional
the growth among regions, the more regional productivity factors
will dominate. Where the "pull factor" is relatively strong, in-
itial differentials in regional output growth will be maintained
despite rapid shifts of the labor force from lower to higher growth
regions. Where the "push factor" dominates, labor force migration
could dampen potential regional inequalities in productivity
growth by forcing down the marginal productvity of labor in the
receiving regions while allowing it to rise in the sending regions.

The gravity model of labor force movement suggests that the
shift factor will work to equalize factor incomes, together with
trade in goods and services and capital flows. Given the fact
that the United States enjoys much higher output per worker and
is relatively accessible to Mexican labor, the gravity model would
imply that the Mexican work force should gradually displace itself
northward and shift steadily into the sphere of influence of the
U.S. labor market. Indeed, there is strong evidence from the data
on the border region that labor force growth in areas adjacent to
the border has been much greater than elsewhere. Some of this
movement has been within the border states, from rural to urban
centers located on the frontiers which are connected to the U.S.
service economy through tourism, and which have recently established

a number of border industry assembly plants. These plants are linked with U.S. manufacturers, with duties charged only on the value-added components of re-exports. Since the North also serves as a staging area for migration into the U.S., it (especially the North Pacific) has had a net attraction effect on migration from the center and south of Mexico which is only exceeded by that of Mexico City.

In this section only a cursory view is given of the implications of North/South regionalization in terms of shift-share analysis. Table 15 presents earlier data reorganized so as to permit an examination of the three major regions Border, Metropolitan Mexico City, and Rest of Mexico. One can quickly see the immense and growing gap between output per worker in the Border area and that of the Rest of Mexico. The difference in labor productivity rose from 3,741 (1950) pesos in 1940 to 11,196 pesos in 1970, notwithstanding the fact that the productivity growth rate in the Rest of Mexico was 3.4 percent per annum over the 30 year period, almost equal to that of the Border (3.5). That is due to the simple mathematics of growth whereby values subject to wide absolute differentials may grow at almost the same rates even though the absolute (income) gap widens substantially over time. The gravity process may be working in Mexico, however, despite evidence of widening real productivity levels, since Metropolitan Mexico City has grown at a slower rate than the Rest of Mexico in productivity terms (2.8 percent per annum) between 1940 and 1970. However, here again the disturbing element is that absolute productivity gaps which were wide between the Border and Rest of Mexico are even greater between Metropolitan Mexico City and the Rest of Mexico, but have risen from 6,433 (1950) pesos in 1970. Since the purchasing power parity of a 1950 peso is about 50 cents U.S. today (1978), the comparable value of this differential in productivity between the Border and the Rest of Mexico in 1970 is about $5,600 in today's dollars and between Metropolitan Mexico City and the Rest of Mexico about $7,000 U.S.

Most noteworthy about the evidence from Table 15 is that the gravity process appears to be narrowing the absolute productivity gap between the Border and Metropolitan Mexico City from 2,672

Table 15. Output, employment and total factor productivity
          by region, 1940-1970.

Region		1940	1950	1960	1970
Border					
Y_B	Output (million 1950 pesos)	4,755	9,127	16,838	37,482
N_B	Labor force (economically active population (000))	778	1,225	1,630	2,120
$B = Y_B/N_B$	Output per worker (1950 pesos)	6,112	7,451	10,330	17,680
ΔB	Change in output per worker over past decade		1,339	2,879	7,350
$t = N_B/N_T$	Labor force share	.133	.147	.160	.164
Metropolitan Mexico City					
T_M	Output	8,329	13,959	30,538	65,491
N_M	Labor force	946	1,545	2,111	3,223
$M = Y_M/N_M$	Output per worker	8,804	9,035	14,466	20,320
ΔM	Change in output per worker		231	5,431	5,854
$m = N_M/N_T$	Labor force share	.161	.185	.207	.249
Rest of Mexico					
Y_R	Output	9,803	I7,975	26,839	49,359
N_R	Labor force	4,134	5,575	6,471	7,612
$R = Y_R/N_R$	Output per worker	2,371	3,224	4,148	6,484
ΔR	Change in output per worker		853	924	2,336
$r = N_R/N_T$	Labor force share	.706	.668	.634	.588
Total Mexico					
Y_T	Output	22,887	41,061	74,215	I52,332
N_T	Labor force	5,858	8,345	10,212	12,955
$T = Y_t/N_t$	Output per worker	3,908	4,921	7,267	11,758
ΔT	Change in output per worker		1,013	2,346	4,491
$t = N_T/N_T$	Labor force share	1.00	1.00	1.00	1.00

Border region: Baja California N., Baja California S., Coahuila, Chihuahua,
    Nuevo Leon, Sonora, Tamaulipas.
Metropolitan Mexico City: Federal District (Mexico D.C.) and State of Mexico.
Rest of Mexico: All other states.

Source: See Table 10.

(1950) pesos in 1940 to 2,640 pesos in 1970. This has resulted from a much faster migration of labor over the 30 year period to the Mexico City region (4.1 percent per annum), while output growth was about the same in both regions (6.9 percent per annum). What is not measured is the spillover of labor from the Border Region into the U.S. labor market. There is no place for migrants to Mexico City to go but back home or northward. Hence it is likely that the gravity effect is more successful in leveling income between Mexico City and the Rest of Mexico than between the Border and the rest of the country. This makes sense as long as income differentials between the Border and the U.S. remain so much greater in absolute terms. Since output and productivity in the U.S. economy are growing much more slowly than in Mexico, and especially in Mexico's two major regions of attraction, it would not be surprising that the gravity process would eventually begin to show a leveling effect between the two countries. However, as we have seen, where absolute income differentials remain so large, it will take decades before growth rate differentials will narrow absolute income gaps. Until this happens, absolute gaps will drive the forces of migration. Indeed, the findings of this section indicate that the lure of Mexico City may well begin to give place to that of major Border areas and the U.S., as Mexico City's productivity gap begins to decline vis a vis that of the Border. However, if new centers of growth are fostered within Mexico, this could considerably alter the path of migration and population growth.

How much has migration mattered in terms of overall productivity growth? In Table 16 the regional and shift factors are measured for the three decades. Here again, as in the analysis of the five regions of Mexico in Section III, there is evidence that the shift factor declined as a share of total productivity growth, from 19 percent in the 1940s to 13 percent in the 1950s and remained at 14 percent in the 1960s. In short, the role of regional population movement was important in raising overall productivity growth in the 1940s, but has played a much smaller role since then. In regional terms the contribution of Mexico City to the overall shift factor has risen substantially, from 70 percent of the positive shift component in the 1940s to 93

Table 16. Sectoral and shift elements underlying growth in out-
put per worker by region, 1940-70.

Region	1940-50	%	1950-60	%	1960-70	%
Border						
Regional	178		423		1,176	
Shift	86		97		41	
Combined	18		37		29	
Total	282	28	557	24	1,246	28
Metropolitan Mexico City						
Regional	37		1,005		1,212	
Shift	202		199		608	
Combined	5		119		246	
Total	244	24	1,323	56	2,066	46
Rest of Mexico						
Regional	602		617		1,481	
Shift	- 90		-110		-191	
Combined	- 32		- 31		-107	
Total	480	48	476	20	1,183	26
Total Mexico						
Regional	817		2,045		3,869	
Shift	198		186		458	
Combined	- 9		125		168	
Total	1,006	100	2,356	100	4,495	100
Share of productivity attributed to shift factor	.19		.13		.14	

Source: Table 10.

percent in the 1960s (the remainder being attributed to the Bor-
der). Hence while the Border region continues to exhibit "pull"
tendencies, the Mexico City region may well begin to be dominated
by "push" forces as labor moves there in a desperate search for
release from rural poverty and urban unemployment. In terms of
its contribution to total productivity growth in Mexico, the Met-
ropolitan Center has risen from one-fourth in the 1940s to over
one-half in the 1950s, though this share declined somewhat to 46
percent in the 1960s, while the Border recovered its earlier 28
percent share. Interestingly though,the Rest of Mexico had 70

percent of the work force in 1940 and contributed one-half of
total productivity growth in that decade, its contribution de-
clined to only 20 percent in the 1950s as Mexico City mushroomed
in both population and output. However, by the 1960s the Rest
of Mexico's productivity share had begun to rise again to 26 per-
cent, even as its labor force share continued to fall to 58 per-
cent. This augurs favorably for forces continuing the diffusion
process of Mexican productivity growth from the major centers to
the periphery. The process seems to have been consistent with
the gravity model of migration, as output per worker in the Rest
of Mexico has grown by 3.4 percent per annum since 1940 compared
with 2.8 percent in Metropolitan Mexico City, a figure almost as
high as that of the Border region (3.5 percent per annum). This
is notwithstanding pockets of poverty and stagnation through the
countryside and particularly in the northern desert regions, the
central plateau, and eroded areas of the south. Rural areas sub-
ject to erratic rainfall, and many small and medium sized urban
centers have long since lost their comparative advantage for
growth and will remain so in the absence of major new development
efforts including incentives for investment and technical progress
suited to their special conditions.

While the analysis throughout this monograph has related
migration to output and productivity rather than to income, it
is recognized that among economic incentives labor movement is
primarily responsive to expected wages, and wages are not neces-
sarily related to total factor productivity, especially in a coun-
try in which the supply of labor from impoverished areas is so
abundant. Indeed, it is possible in such cases for output per
worker to rise considerably while real wages remain low or even
decline (especially during periods of inflationary growth). How-
ever, total factor productivity gives some idea of output per em-
ployed worker to support improvements in infrastructure, educa-
tion, and other investments which will permit income to be dif-
fused more broadly. This may occur through private expenditures
of recipients of profits and rental income, as well as through
increased capacity of the government to tax and spend on activi-
ties favoring social development. Moreover, the availability of
urban amenities and other non-wage benefits which attract labor

to new locations tends to be highly correlated with total factor
productivity, even though real wages of unskilled labor may lag.
Furthermore, the ability of workers to organize and bargin col-
lectively is directly related to the surplus (rental income inclu-
ding excess profits) earned per worker which is available to be
bargained away. Hence labor incomes may be increased in those sub-
sectors of the labor market where such "rents" (broadly defined)
are generated, and this tends also to be directly related to sec-
toral productivity growth (though more appropriately to "net" pro-
ductivity growth, after subtracting a normal return to capital).

Finally in Table 17 the net labor force migration among the
three regions is shown for over three decades. Here again, as in
Section III, migration has steadily increased as a share of labor
force growth even when the net flows are restricted to the three
regions. Indeed, the shares remain about the same as those among
the five regions (Table 14) since most of the net regional migra-
tion has been toward the Border and Metropolitan Mexico City. (The
Gulf is the only other main region of net in-migration and then
only since the 1960s.) Most of net labor migration in the 1960s
was to Mexico City (92 percent), though in earlier decades the Bor-
der had accounted for about 36 percent. Again this may be due to
the increasing evidence of underemployment in the border towns,
notwithstanding their rapid growth in output, to the desperate pov-
erty of agriculture in most border regions owing to extreme aridity
of the climate, and finally to the "passing on" of regional migra-
tion to the U.S.

The rank correlation is weak between growth in productivity
and growth in migration among the three regions, since the Border
and Rest of Mexico show much faster productivity growth than Mexico
City over the three decades, though the latter experienced the ma-
jor share of in-migration. However, when one looks at absolute pro-
ductivity differentials the correlation becomes more perfect, since
Mexico City has led throughout the period in both absolute income
per capita and in-migration, followed by the Border which is catch-
ing up in income per capita and is the other region of net in-migra-
tion. The Rest of Mexico, which still lags behind the first two
by over 10,000 (1950) pesos per worker continues to register an im-
portant rate of outmigration which amounted to almost 6000,000 work-
ers between 1960 and 1970, or one-third of the increase in its labor
force.

Table 17. Estimates of labor force migration 1940-1970. Labor force (000).

Region	1940 Observed labor force	1950 Observed labor force	1950 Estimated labor force	1950 Estimated migration	1960 Observed labor force	1960 Estimated labor force	1960 Estimated migration	1970 Observed labor force	1970 Estimated labor force	1970 Estimated migration
Border	778	1,225	1,110	+115	1,630	1,501	+129	2,120	2,070	+ 50
Metropolitan Mexico City	946	1,545	1,344	+201	2,111	1,889	+222	3,223	2,680	+543
Rest of Mexico	4,124	5,575	5,891	-316	6,471	6,822	-351	7,612	8,205	-593
Total Mexico	5,858	8,345			10,212			12,955		
Net migration growth in labor force (%)		13			19			22		

Sources and Methods: Observed labor force from Table 15; Estimated labor force--see text and c.f. Table 14

V. A SHIFT-SHARE ANALYSIS OF THE PRIMARY, SECONDARY, AND
TERTIARY SECTORS OF THE THREE MAIN REGIONS OF MEXICO,
1940 TO 1970

In this section the same regionalization is used (Border,
Metropolitan Mexico City, and Rest of Mexico) to determine what
intraregional shifts were involved in the respective growth pat-
terns of the main sending and receiving regions. For this purpose
each region is analyzed as to the change in output and employment
of its main production sectors primary, secondary, and tertiary.
Tables 18 to 20 present the underlying data on output, employment,
and total factor productivity, and Tables 21 to 23 provide esti-
mates of the sectoral and shift component of productivity growth
for each of the three regions. The results are as follows.

In the Border Region there is important evidence that the
internal shift factor as a share of the region's productivity
growth fell from almost one-half (48 percent) in the 1940s to one-
third (33 percent) in the 1950s and to less than one-tenth (9 per-
cent) in the 1960s (Table 21). Hence the Border area has been in-
creasingly unable to generate overall productivity growth simply
by moving its work force from an impoverished agriculture to more
productivity employment in manufacturing and services. Migration
among sectors has continued (Table 18) but the sectoral productiv-
ity component has grown from one-half to 90 percent of growth in
output per worker. In the 1960s the Border states' manufacturing
sector (secondary) accounted for most of the relative increase, its
share rising from 28 to 37 percent of productivity growth, which
is a very healthy sign (Table 21). This contrasts sharply with the
Metropolitan Mexico City Region where the share of productivity
from the secondary sector fell from 37 percent in the 1950s to 27
percent in the 1960s (Table 22). The establishment of border in-
dustries linked to the U.S. economy plus growth of industry in Mon-
terrey almost certainly had much to do with this impressive perfor-
mance of the Border region. Industry in Mexico City, on the other
hand, grew on the basis of protection through tariffs and quotas.
Oriented toward import substitution, it showed much less productiv-
ity growth in the 1960s than did industries of the border region
(Tables 18 and 19). Earlier, in the 1950s, Mexico City's import

Table 18. Output, employment and total factor productivity in the Border Region 1940-1970.

		1940	1950	1960	1970
Primary sector					
Y_A	Output (value added in million 1950 pesos)	1,052	2,102	3,437	5,916
N_A	Labor force (economically active population (000))	448	614	629	642
$Y_A/N_A = A$	Output per worker (1950 pesos)	2,348	3,423	5,464	9,215
$\Delta(T_A/N_A)$	Change in output per worker over past decade (1950 pesos)		1,075	2,041	3,751
$N_A/N_T = a$	Labor share in sector	.574	.501	.386	.303
Secondary sector					
Y_B	Output	1,501	2,935	5,208	12,521
N_B	Labor force	143	265	409	594
$Y_B/N_B = B$	Output per worker	10,497	11,075	12,733	21,079
$\Delta(Y_B/N_B)$	Change in ouput per worker		578	1,658	8,346
$N_B/N_T = b$	Labor share	.183	.216	.251	.280
Tertiary sector					
Y_C	Output	2,204	4,089	8,195	19,045
N_C	Labor force	189	346	592	884
$Y_C/N_C = C$	Ouput per worker	11,661	11,818	13,843	21,544
$\Delta(Y_C/N_C)$	Change in output per worker		157	2,025	7,701
$N_C/N_T = c$	Labor share	.242	.282	.363	.417
Total region					
Y_T	Output	4,757	9,126	16,840	37,482
N_T	Labor force	780	1,225	1,630	2,119
Y_T/N_T	Output per worker	6,098	7,450	10,331	17,689
$\Delta(Y_T/N_T)$	Change in output per worker		1,352	2,881	7,358

For definitions of sectors see Table 6. For definition of Border Region see Table 15 (all states bordering U.S. plus Baja, California, Sur.)

Table 19.   Output, employment and total productivity in the metropolitan Mexico City Region 1940-1970.

		1940	1950	1960	1970
Primary sector					
Y_A	Output (value added in million 1950 pesos)	385	486	590	673
N_A	Labor force (economically active population (000))	302	372	331	369
$Y_A/N_A = A$	Output per worker (1950 pesos)	1,275	1,306	1,782	1,824
$\Delta(T_A/N_A)$	Change in output per worker over past decade (1950 pesos)		31	476	42
$N_A/N_T = a$	Labor share in sector	.319	.241	.157	.115
Secondary sector					
Y_B	Output	2,680	4,005	11,952	23,298
N_B	Labor force	226	470	810	1,206
$Y_B/N_B = B$	Output per worker	10,858	8,521	14,756	19,318
$\Delta(Y_B/N_B)$	Change in output per worker		-3,337	6,235	4,562
$N_B/N_T = b$	Labor share	.239	.304	.384	.374
Tertiary sector					
Y_C	Output	5,204	9,468	17,996	41,520
N_C	Labor force	418	703	970	1,647
$Y_C/N_C = C$	Output per worker	12,593	13,468	18,553	25,209
$\Delta(Y_C/n_C)$	Change in output per worker		875	5,085	6,656
$N_C/N_T = c$	Labor share	.442	,455	.459	.511
Total Region					
Y_T	Output	8,329	13,959	30,538	65,491
N_T	Labor force	946	1,545	2,111	3,222
Y_T/N_T	Output per worker	8,804	9,035	14,466	20,326
$\Delta(Y_T/N_T)$	Change in output per worker		231	5,431	5,860

For definitions of sectors see Table 6.   For definition of Metropolitan Mexico City see Table 15 (State of Mexico plus Federal District).

Table 20. Output, employment and total factor productivity in the Rest of Mexico 1940-1970.

		1940	1950	1960	1970
Primary sector					
Y_A	Output (value added in million 1950 pesos)	3,734	6,654	4,890	11,123
N_A	Labor force (economically active population (000))	3,082	3,881	4,089	4,318
$Y_A/N_A = A$	Output per worker (1950 pesos)	1,212	1,715	2,419	2,576
$\Delta(T_A/N_A)$	Change in output per worker over past decade (1950 pesos)		503	704	157
$N_A/N_T = a$	Labor share in sector	.746	.696	.632	.567
Secondary sector					
Y_B	Output	2,608	5,526	7,443	16,379
N_B	Labor force	457	755	956	1,398
$Y_B/N_B = B$	Output per worker	5,706	7,319	7,786	11,716
$\Delta(Y_B/N_B)$	Change in output per worker		1,613	467	3,930
$N_B/N_T = b$	Labor share	.111	.135	.148	.184
Tertiary sector					
Y_C	Output	3,462	5,795	9,505	21,866
N_C	Labor force	593	939	1,428	1,897
$Y_C/N_C = C$	Output per worker	5,838	6,171	6,656	11,527
$\Delta(Y_C/N_C)$	Change in output per worker		333	485	4,871
$N_C/N_T = c$	Labor share	.144	.168	.221	.249
Total region					
Y_T	Output	9,804	17,975	26,838	49,368
N_T	Labor force	4,132	5,575	6,473	7,613
Y_T/N_T	Output per worker	2,373	3,224	4,146	6,485
$\Delta(Y_T/N_T)$	Change in output per worker		851	922	2,339

For definitions of sectors see Table 6. For definitions of Rest of Mexico Region see Table 15 (all states except those in Border Region, Mexico, and the Federal District). For Total Mexico see Table 6 which is the sum of Tables 18, 19, and 20.

Table 21. Sectoral and shift elements underlying growth in output per worker in the border region, 1940-70.

	1940-50 (%)		1950-60 (%)		1960-70 (%)	
Primary sector						
ΔAa (Sectoral)	617		1,023		1,448	
ΔaA (Shift)	-171		-394		-454	
$\Delta a \Delta A$ (Combined)	- 78		-235		-311	
Total growth of output per worker (1950 pesos)	368	(27)	394	(14)	683	(9)
Secondary Sector						
ΔBb	106		358		2,095	
ΔbB	346		388		369	
$\Delta b \Delta B$	19		58		242	
Total growth of output per worker (1950 pesos)	471	(35)	804	(28)	2,706	(37)
Tertiary sector						
ΔCc	38		571		2,795	
ΔcC	466		957		748	
$\Delta c \Delta C$	6		104		416	
Total growth of output per worker (1950 pesos)	510	(38)	1,632	(59)	3,959	(54)
Total Region						
$\Sigma \Delta Yn$	761		1,952		6,338	
$\Sigma \Delta nY$	641		951		663	
$\Sigma \Delta n \Delta Y$	- 53		- 13		347	
Total regional growth of output per worker (1950 pesos)	1,349	(100)	2,890	(100)	7,348	(100)
Share of regional productivity growth attributable to shift factor	.48		.33		.09	

For data source see Table 18.; methods are discussed in text Section II and in Table 7.

Table 22. Sectoral and shift elements underlying growth in output per worker in the Metropolitan Mexico City region, 1940-70.

	1940-50	(%)	1950-60	(%)	1960-70	(%)
Primary sector						
ΔAa (Sectoral)	10		115		7	
Δ (Shift)	- 39		-110		- 75	
ΔaΔA (Combined)	- 2		- 40		- 2	
Total growth of output per worker (1950)	- 91	(-40)	- 35	(-1)	- 70	(-1)
Secondary sector						
ΔBb	-798		1,895		1,752	
ΔbB	771		682		-148	
ΔbΔB	-217		499		- 46	
Total growth of output per worker (1950)	-244	(-107)	3,076	(57)	1,558	(27)
Tertiary sector						
ΔCc	387		2,314		3,055	
ΔcC	164		54		965	
ΔcΔC	11		20		346	
Total growth of output per worker (1950 pesos)	562	(247)	2,388	(44)	4,366	(75)
Total region						
$\Sigma\Delta$Yn	-401		4,324		4,814	
$\Sigma\Delta$nY	836		626		742	
$\Sigma\Delta$nΔY	-208		479		298	
Total regional growth of output per worker	227	(100)	5,429	(100)	5,854	(100)
Share of regional productivity growth attributable to shift factor	2.77		.12		.13	

For data source see Table 19; methods are described in text Section II and in Table 7.

Table 23. Sectoral and shift elements underlying growth in output per worker in Rest of Mexico, 1940-70.

	1940-50	(%)	1950-60	(%)	1960-70	(%)
Primary sector						
ΔAa (Sectoral)	375		490		99	
ΔaA (Shift)	- 60		-110		-156	
$\Delta a\Delta A$ (Combined)	- 25		- 45		- 10	
Total growth of output per worker (1950 pesos)	290	(34)	335	(36)	- 67	(-3)
Secondary sector						
ΔBb	179		63		580	
ΔbB	139		90		280	
$\Delta b\Delta B$	39		6		141	
Total growth of output per worker (1950 pesos)	357	(42)	159	(18)	1,001	(43)
Tertiary sector						
ΔCc	48		82		1,075	
ΔcC	142		322		190	
$\Delta c\Delta C$	8		25		139	
Total growth of output per worker (1950 pesos)	198	(23)	429	(47)	1,404	(60)
Total region						
$\Sigma\Delta Yn$	602		635		1,754	
$\Sigma\Delta nY$	221		305		314	
$\Sigma\Delta n\Delta Y$	22		- 14		270	
Total regional growth of output per worker	845	(100)	926	(100)	2,338	(100)
Share of regional productivity growth attributable to shift labor	.26		.33		.13	

For data sources see Table 20; methods are described in text Section II and in Table 7.

substituting manufacturing had taken a temporary lead in productivity growth after having shown a net *decline* in the 1940s (Tables 19 and 18).[10]

Continuing with the Border Region profile, the primary sector steadily lost labor shares, most importantly in the 1950s, so that its rural employment share in 1970 was only 30 percent compared to 57 percent for the Rest of Mexico (Table 20). Hence it is not surprising that the primary sector contribution to productivity growth in the Border fell from 27 percent in the 1940s to 9 percent in the 1960s. However, output per worker in the Border grew by twice that of the Rest of Mexico in the 1970s, three times more in the 1950s and 20 times as much in the 1960s (Tables 18 and 20). Clearly the Northern states have retained the lead in rural output per worker by pursuing capital and land-intensive techniques of irrigated farming. As such they could be regarded as southerly extensions of "Sunbelt" agriculture in the U.S. using much the same technology and cropping patterns and exporting a considerable share of their output to the U.S. Hence, this pattern of Border productivity growth in the primary sector, as in the secondary sector, is closely linked to the U.S. economy.

In the tertiary sector the Border Region has also shown major productivity growth rising from 38 to 59 and 54 percent of the region's growth in output per worker over the three decades (Table 21). Its employment share has risen as well from 24 percent between 1940 and 1970. This is strong evidence that the sector has exerted a demand pull on employment sufficient to prevent steady increases in employment from swamping productivity growth. The most interesting contrast is with tertiary sector productivity in the other receiving region (Metropolitan Mexico City) which had grown more rapidly than that of the Border in the 1940s and 1950s but which lagged behind the Border region in the 1950s (Tables 18 and 19). Here again the Border Region, which is heavily engaged in service related trade with the U.S. (tourism), now leads the whole nation in its growth of output per worker. And over half of that leadership stems from productivity growth in the tertiary sector. (See Table 18 and text of Section IV).

The second region in productivity growth and the leader in
labor absorption is Metropolitan Mexico City (Tables 19 and 22).
This region is by definition almost 90 percent urban, and its ser-
vice sector has accounted for most of its productivity growth in
the 1940s (over 100 percent) and 1960s (75 percent). In the 1950s
the growth of import-substituting industries led the way with 57
percent as mentioned above. The pattern of growth in this region
provides support for the hypothesis that "push" factors are begin-
ning to have a retarding effect on Mexico's productivity growth,
as labor is forced into the tertiary sector which, after remaining
at a fairly constant 45 percent of employment in the first two
decades, rose to 51 percent in the 1960s. Still output per worker
in the tertiary sector continued to grow in the 1960s, though evi-
dence from Section I would suggest that if the decade could have
been divided into five year intervals, that trend might well have
been declining. The probable slowdown is likely to have continu-
ed into the 1970s as the flood of immigrants failed to find ade-
quate employment opportunities in the overcrowded valley of Mexico.
The drastic deceleration in productivity growth in manufacturing
and agriculture almost certainly will have repercussions on in-
come and job multipliers in the service sector of this region, ex-
acerbating relative pressures for migration to the border and
other growth centers. Hence if policies were adjusted to favor
decentralized growth, they might well find a response, though as
shown in Section IV absolute gaps in output per worker still favor
Mexico City.

Finally, the Rest of Mexico (Tables 20 and 23) deserves at-
tention as these 23 states account for almost two-thirds of the
Mexican labor force (1970). Here too the pattern is disturbing,
since although 57 percent of the labor force remained in the prim-
ary sector in 1970, that sector's share of regional productivity
growth which had been one-third in the 1940s and 1950s became neg-
ative in the 1960s (Table 23). Manufacturing on the other hand
showed signs of regional dispersion, as its share of employment
rose from 8 percent in the 1950s to 43 percent in the 1960s (it
had been 42 percent in the 1940s). Here again, however, the ter-
tiary sector took the lead with a 60 percent contribution to over-
all productivity growth. It is likely that without significant

labor emigration from the Rest of Mexico to Mexico City and the Border Region, the productivity growth in the Rest of Mexico would have lagged still more. The output per worker in agriculture in that region was only about one-fourth that of the Border Region though its service sector productivity was one-half the Border level. Clearly it is the tertiary sector in which productivity "levelling" is occurring and it is this sector which deserves much more research than it has received given the general ignorance of its patterns of employment, distribution of output and income trends.

In conclusion the shift factor is declining as a contributor to productivity growth, both regionally and sectorally. Meanwhile the share of migration among regions, as a proportion of growth in the labor force, is on the increase (Table 24). This indicates that while workers are increasingly moving to higher productivity regions in search of employment, those regions are less capable of sustaining their role as transmitters of growth through shifts in the labor force. A squeeze is coming between migratory pressures for higher income and the potential of leading regions to provide jobs. Indeed it is likely that rather than passing on productivity gains, migration is now dampening such growth in the leading sectors and regions. Mexico is in danger of becoming a low income and low productivity "service economy" in contrast to the U.S. which is attempting to maintain its position as a high income "service economy". The consequences are a sharpening of the disparities in levels of living and quality of life between the two countries, disparities that exacerbate pressures for migration northward to bridge the gap that has not yet been narrowed through trade and investment flows or technology transfers. The emerging pattern is different from the 1940s when, according to our data, there was more hope. Then the internal shift factor accounted for one-half of productivity growth. Migration within Mexico offered promise of a better life, and the regional shift accounted for up to one-fifth of national productivity growth (Table 24). But by the 1960s sectoral shifts were at most responsible for only one-sixth and regional shifts for one-tenth of national productivity growth. The new petroleum windfall may provide an economic surplus that could be allocated

Table 24. Regional and sectoral shifts as a share of Mexican
           productivity growth.

	1940s (%)	1950s (%)	1960s (%)
1. Regional shift as a share of productivity growth in Mexico (3 regions)	20	8	10
2. Sectoral shift as a share of productivity growth (3 regions)	51	28	16
3. Net migration as a share of growth in the economically active population (3 regions)	13	19	22

Source: Preceding tables and Sections IV and V.

to favor basic regional and sectoral productivity growth. This
might reverse historical trends. But to do so every effort must
be made to assure that the new oil rents are not simply redis-
tributed as consumption subsidies artificially causing service
sector employment to rise still further, non-petroleum exports
to decline, and imports of consumer goods to expand dispropor-
tionately. What are needed are fundamental changes in the in-
centive structure of the economy favoring true productivity
growth in the non—petroleum primary sector, in manufacturing,
and in agriculture, together with expansion of wage good produc-
tion to serve the mass of the Mexican population.

NOTES

1. The Human Settlements and Services Area's research in urban-
    ization and development is concerned with simulation modeling
    and counterfactual analysis of alternative patterns of demo-
    graphic and economic growth, urbanization, and regional mi-
    gration under conditions of alternative rural technologies,
    income distribution and demand patterns, and implications of
    the foregoing for the provision of social services (Rogers,
    1978). This research is inspired by the importance of issues
    underlying current debates between those criticizing alleged
    "over-urbanization" of developing countries and those support-
    ing present patterns of urbanization and migration as means
    of improving social welfare. Demographic influences on mi-
    gration are of course of considerable importance to economic
    growth, and the outcome will, in an iterative fashion, feed
    back on future growth of population, welfare, and migration.
    By breaking into this sequence of behavior to look at the
    structure of output and employment and its changes over time,
    at the national level and by sector and region, for a single
    important case, the Mexican Case Study seeks to provide em-
    pirical evidence on both costs and benefits of rapid demoec-
    onomic changes during the process of which resettlement of
    important segments of the work force has been an essential
    element.

2. The Altimir adjustments result from a thoroughgoing examina-
    tion of coverage, definition, measurement, and other problems
    of the population censuses of 1950, 1960 and 1970. His re-
    search was done under the auspices of UN-ECLA and the Region-
    al and Urban Development Project at El Colegio de Mexico.
    Altimir argues convincingly that the economically active pop-
    ulation reported in the 1960 census (PEA) was seriously over-
    estimated, the upward bias being concentrated in the rural
    labor force, through overcounting of unrenumerated family

workers and agricultural wage labor in 1960 relative to that
of the 1950 and 1970 censuses. His conclusions are support-
ed by a comparison of the respective population censuses of
1950 and 1960 (which also report rural employment), and a
Colegio de Mexico reestimate of the 1960 PEA based on a 1.5
percent sample of 1960 census cards. As mentioned above,
his major adjustment was to reduce the PEA in the "agricul-
tural sector" (which includes cattle, forestry, and fishing)
in 1960 from 6,089 (000) to 5,048. Altimir does not give
statewide breakdowns for these adjustments by sector, but he
does report that adjusted PEA by state for 1960. Since the
overall total downward adjustment was concentrated in the
agricultural sector, I applied the difference in state PEA
from the census and Altimir's estimates entirely to the prim-
ary sector of the respective state. Only in the case of the
state of Mexico and the D.F. did this method lead to spurious
results (negative employment in the rural sector). In those
two cases instead of using the above method, I reduced prim-
ary sector employment by the same proportion as that of the
rest of Mexico allocating the remainder as a proportioned
reduction to the rest of the states.

3. This compares to average capital output ratios cited in Fitz-
gerald (1977, p. 15) of 2.83 for 1960; 2.66 for 1967; and
2.59 for 1976. Fitzgerald used Solis (1975) and Bank of Mex-
ico sources for his estimates.

4. Hewitt's 1960 figure is derived from CIDA, Vol. 1, and the
source of the 1970 figure is not clearly cited. Her figures
for growth of cultivated land between 1940 and 1960 are com-
parable to those presented in Reynolds (1970), justifying a
linking of her 1960 to 1970 figures to the earlier index.

	1940/50	1950/60	1960/70
Hewitt (1976)	3.0	1.3	2.1
Reynolds (1970)	3.6	1.0	N.A.

5. In my 1970 volume, estimates of the unexplained productivity
residual showed a decline between the 1940s and 1950s, from
3.3 percent per annum to 2.5 percent, respectively, as com-
pared with the reverse trend in Table 2 (from 2.5 percent to
2.7 percent). The later results are due primarily to a
downward revision of output growth in the 1940s (GDP in con-
stant 1950 pesos) based on the GDP estimates (Solis, 1970)
presented in Unikel/Appendini [op. cit.]). Labor force
growth in the 1950s has also been sharply reduced in the pre-
sent study drawing on the more recent downward revision of
the 1960 census figures by Altimar (op. cit.). The growth
in PEA based on official census data between 1950 and 1960
was 3.1 percent per annum (Reynolds, 1970, Table 1.7, p. 50).

6. The agricultural sector (primary sector) receives emphasis
as a source of outmigration. Regional differences in agri-
cultural productivity, which in Mexico reflect severe dualism
between irrigated capital-intensive cultivation (principally
in the North and Pacific North or "Border" States) and rain-
fed agriculture (principally in the Center, Gulf and South,

i.e., "Rest of Mexico" States) have led to different paths
of employment and income among the regions of Mexico. The
"service sector" (tertiary sector in this paper) is focused
on as a buffer which absorbs labor displaced from the rural
sector. In Mexico the tertiary sector also evidences wide
differences in employment and productivity growth by region.
The tertiary sectors of the Border and Mexico City areas ab-
sorbs labor displaced from the rural sector. In Mexico the
tertiary sector also evidences wide differences in employ-
ment and productivity growth by region. The tertiary sec-
tors of the Border and Mexico City areas absorb much labor
displaced from the primary sector both in those regions and
the Rest of Mexico.

7. This is a generalized version of the shift-share model for
three sectors as presented in Reynolds (1970), pp. 64ff, de-
signed to accommodate any number of sectors and regions. Its
characteristics are discussed in detail in that study.

8. In subsequent sections regional patterns of productivity
growth in the service sector will be examined. It will be
shown that the regional performance of this sector is quite
diverse, and that the shift element is an important contri-
bution *within* the tertiary sector as well as between it and
the primary sector. These initial findings support the need
for far more detailed research on the service sector, with
special attention to its role in labor absorption in Mexico
(Souza and Tokman, 1976; Reynolds and Leiva, 1978). It is
quite likely that the pattern of productivity growth within
the tertiary sector is even more unbalanced than between
services and other activities. Growth in output per worker
in services tends to occur in the more capital and skill in-
tensive subsectors which are least likely to absorb job seek-
ers displaced in increasing numbers from the rural areas.
Unfortunately, the data used in this paper do not easily ac-
commodate disaggregation of the tertiary sector. A more de-
tailed study of the output and population censuses might
permit such an analysis to be made at both the national and
regional levels for at least some of the subsectors. This
research could then be combined with a sectoral analysis of
budget study data plus interviews of small businesses and
other activities in the informal sector. The rarely charac-
terized "urban informal sector" is on a consistent basis and
may be said to include self-employed, workers and owners of
small businesses, workers receiving relatively low incomes
and those outside of the social security system, or other
categories depending upon the choice of criteria of the ob-
server. There seems to be a strong overlap between conven-
tionally defined informal sector employment and that of sub-
sectors of the tertiary sector, but all sectors of produc-
tion have been found to have important elements of informal
sector employment (Souza and Tokman, op.cit.).

9. This study draws on the statewide breakdown of GDP data in
Unikel (1976) based on work by Appendini for the years 1940,
1950, and 1960 and estimates by the Secretaria de Hacienda

y Crédito Público, Dirección de Programación y Descentraliz-
ación Administrativa, Subdirrecion de Programación Fiscal
for 1970 (Unikel, op. cit., Cuadro VI-A8). Labor force data
for 1940, 1950, and 1970 are estimated on the basis of the
respective population censuses as described in Unikel and
Torres (1970). The data for 1960 have been further adjusted
by Altimir's agricultural labor force estimates for 1960
(Altimir, 1974).

10. The figures in Table 19 which show a significant decline in
output per worker in the Mexico City region during the 1940s
are suspect. If correct, they suggest that labor absorption
dominated the growth of secondary production in that period
while capital intensive growth characterized the 1950s and
1960s.

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