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What Drives City Growth in the Developing World?

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Cities are capital-intensive, a stylized fact which has led many pessimists to assert that current rates of city growth in the developing world cannot be sustained. To make matters worse, cities are stocked with public capital at low or zero user charges, and in that sense they are too capital-intensive. Since the social costs of in-migration thus exceed private costs, the number and sizes of cities turn out to be excessive. Furthermore, the increasing scarcity of urban land encourages the substitution of capital for land and increases capital intensity. When the economy can no longer finance such urban costs—when it fails, for instance, to cope with social overhead and housing requirements—the process of urbanization is retarded.

No doubt the qualitative analysis is correct: cities are capital-intensive and have a voracious appetite for savings and accumulation. But is the quantitative emphasis—the idea that cities are "too big"—warranted?

It is also often alleged that rapid city growth in the developing countries represents a disequilibrium, that these countries have "overurbanized," and that a painful structural adjustment will eventually be required. Analysts of urban problems in the developing world point out that migrants are attracted to the cities in the hope that they (or their children) will be selected for training and employment in protected, high-wage sectors. Apparently, new in-migrants are willing to accept underemployment in low-wage traditional service sectors while waiting. Eventually, however, social discontent is likely to erupt. Are labor markets in these cities really in serious disequilibrium, and is the developing world overurbanized as a consequence?

It is often alleged that the unusually high rates of developing-country urbanization in the recent past can be traced to the availability of cheap energy, technological diffusion that favors modern urban sectors, heavy capital inflows, world trade liberalization, a drift toward domestic price distortions that favor city output, and unusually rapid population growth. That these conditions have begun to show signs of changing suggests that the developing world may have overurbanized in the recent past. Urban growth may be expected to decelerate over the next two decades under certain conditions: a recurrence of fuel scarcity, technological regression in modern sectors in the face of a productivity slowdown in industrial countries, diminished capital transfers because of economic austerity in industrial countries, a retreat toward protectionism in industrial countries, and a decrease in population growth.

In short, the pessimists offer three sources for an incipient urban crisis in the developing world: a savings constraint which will bridle the growth of capital-intensive cities; a labor market disequilibrium which has made overurbanization a temporary but serious problem of overshoot; and the disappearance of unusual external conditions which were favorable to urban growth in the past. Although the pessimists have established a plausible case, no one to our knowledge has offered a quantitative assessment of the importance of these forces over the past two decades. Without such an assessment, debate over future trends in developing countries will be dominated by allegation and anecdotal evidence. It is our view that the debate can be better informed by the application of a general equilibrium model of development that includes some of the costs of urbanization, so that "natural limits" to urban growth can be evalu-

ated and the impact of changing economic and demographic conditions assessed (see Kelley and Williamson 1984a, b).

The Limits on City Growth

The limits on urban growth are set, on the one hand, by urban costs that affect migration decisions and, on the other, by rising urban investment requirements that compete with productive capital accumulation. Urban land constraints raise rents, increase living costs in urban areas relative to rural areas, and thus inhibit migration into cities. To the extent that rising rents and urban disamenities are caused by high densities, crowding, and other manifestations of inelastic urban land supply, city rents reflect the quality of urban life as well as living costs. To evaluate the impact of urban land constraints on city rents, a general equilibrium model is needed which, at the minimum, admits housing service activities and confronts equilibrium land use issues. Furthermore, a variety of urban land requirements must be included—residential squatter settlements, factory sites, land use for public social overhead, and luxury housing sites.

The housing and social overhead investment requirements of city growth must also be analyzed. Such "unproductive" urban investment requirements (first analyzed by Coale and Hoover 1958) compete directly with "productive" capital accumulation and may check urban growth. If such overhead investment is forgone, housing costs rise, the quality of urban services falls, and migration to cities is discouraged. Thus, in addition to the effect of the rise in the relative cost of living in the city, the rise in unproductive investment requirements in cities may lower the rate of productive capital accumulation and job creation and set a limit to urban growth.

Modern urban sectors also tend to be relatively intensive in skills, in intermediate inputs, and in such imported inputs as energy. To the extent that cities are energy-intensive, fuel scarcity can limit urban growth. If capital and skills are complements and different labor skills are poor substitutes for each other, rapid rates of urban capital accumulation imply increasing demands for skilled labor, which can constrain capacity expansion, retard growth of employment, and limit urban growth. An effort to relax the labor constraint through skill accumulation is likely to compete with productive urban capital accumulation and itself constitute a limit on urban growth.

This chapter uses a computable general equilibrium model to analyze past, present, and future growth of cities in the developing world. Since the model has appeared elsewhere (Kelley and Williamson 1980, 1982, 1984b), only a suggestive outline is presented here. The model is in the neoclassical general equilibrium tradition. Prices of outputs and inputs are completely flexible, and most are endogenously determined; firms are driven by profit maximization; households are driven by utility maximization; and even government demand decisions obey well-defined rules from consumer demand theory. Mobility of capital and labor is constrained to reflect the institutional realities of factor markets in developing countries, but economic agents are motivated to search for the optimal sectoral and spatial use of resources.

The model has eight sectors (table 3-1). Tradables and nontradables—the latter include various location-specific services—are distinguished. This is not the first multisectoral model to recognize nontradables, but it is the first spatial development model to stress the importance of nontradables as an influence on spatial cost-of-living differentials, on migration behavior, and thus on the rate of urban growth.

The model is savings-driven, and the aggregate savings pool is generated endogenously from three sources: retained after-tax corporate and enterprise profits, government savings, and household savings. This savings pool is allocated competitively and endogenously to three uses: investment in physical capital (productive investment), investment in human capital (training), and investment in housing (unproductive investment). It should be emphasized that these three modes of accumulation are competitive and are determined endogenously; that is, investment in skills (training) takes place up to the point at which rates of return are equated to the economywide rate on physical capital accumulation. Physical capital goods are allocated across the three capital-using sectors so as to minimize differentials in after-tax rates of return. Dwelling investment utilizes household savings only up to the point at which rates of return equal the economywide rate on physical capital accumulation. Of course, there are institutional and technological features which seriously restrict the ability of the economy to equate rates of return at the margin. Any of the three dwelling markets (rural, urban squatter settlements, and formal urban housing) may be starved for funds, since the absence of an intersectoral mortgage market may leave housing investment requirements in excess demand. The immobility of sector-specific capital stocks makes it likely that current investment allocations are insufficient to equalize sectoral rates of return. Indeed, the larger are housing requirements, the smaller is the residual pool available for physical capital accumulation and the more likely it is that current investment allocations are insufficient to equalize sectoral rates of return. Furthermore, firms' demands for skills may remain unsatisfied if the stock of

Table 3-1. ***Sector Characteristics of the Kelley-Williamson Model***

Sector	*Location*	*U.N. ISIC counterpart*	*Determination of market price*	*Tradability characteristics*	*Production inputs*		*Production function form*
					Primary	*Intermediate*	
Manufacturing and mining (M)	Urban	Manufacturing, mining	Exogenous	Traded internationally and interregionally	Capital, skills, labor	Imported raw materials and fuels, A,KS	Nested CES, constant returns
Modern capital-intensive services (KS)	Urban	Electricity, water, and gas, banking, public administration, trade, commerce, construction	Endogenous	Traded interregionally	Capital, skills, labor	Imported raw materials and fuels, A,M	Nested CES, constant returns
Informal urban services (US)	Urban	Personal services, some trade and commerce	Endogenous	Not traded	Labor	None	Cobb-Douglas diminishing returns
Low-quality (squatter) urban housing services (H, US)	Urban	Dwellings (rent and imputed ownership)	Endogenous, owner-occupier shadow price	Not traded	Dwellings, land	None	Cobb-Douglas constant returns
High-quality urban housing services (H, KS)	Urban	Dwellings (rent and imputed ownership)	Endogenous, owner-occupier shadow price	Not traded	Dwellings, land	None	Cobb-Douglas constant returns
Agriculture (A)	Rural	Agriculture, livestock, forestry, fishing, hunting	Exogenous	Traded internationally and interregionally	Capital, land, labor	Imported raw materials and fuels, M, KS	Cobb-Douglas constant returns
Informal rural services (RS)	Rural	Personal services, some trade and commerce	Endogenous	Not traded	Labor	None	Cobb-Douglas diminishing returns
Rural housing services (H, RS)	Rural	Dwellings (rent and imputed ownership)	Endogenous, owner-occupier shadow price	Not traded	Dwellings	None	Leontieff

Sources: Kelley and Williamson (1980, 1982, 1984b).

potential trainables is insufficient to meet desired levels of investment in training. In short, capital market disequilibrium may well be a chronic attribute of the economy.

Finally, some exogenous variables that help drive the economy over time are alleged to have influenced city growth. These variables are the nominal value of foreign capital and aid (F) available each year to help finance the development effort and forestall balance of payments problems; the total unskilled labor force (L), which is determined by earlier demographic events; the sectoral rates of change in total factor productivity, which favor modern sectors and are labor saving; prices of imported raw materials and fuels (P_Z), which are influenced by actions of OPEC and by other world market conditions; and the terms of trade between primary exportables (P_A) and manufactured importables (P_M), which are twisted by domestic price policy and the political economy of protectionist or liberalization winds in the industrial nations.

To permit generalization about urbanization in the developing world, the representative developing economy (RDE) has been employed as the data base on which the model is estimated and validated. The RDE is a fictional economy that embodies the experience of developing economies on three continents since 1960. Three criteria were used to select the RDE group: availability of data beginning in the early 1960s, low per capita income but some successful growth, and close conformity to the model's most important assumptions. (The last-named criterion implied the rejection of economies which have been heavily dependent on foreign capital and on mineral exports such as fuel.) The forty economies which met the criteria[1] seem to exhibit the same average attributes as the far larger group analyzed by Chenery and Syrquin (1975). The RDE group contains eleven of the world's twelve largest developing economies and covers more than 80 percent of the population of the developing world excluding China.

Predicting the Past

Of the about one hundred endogenous variables generated by the model, three—urbanization, city growth, and rural-urban migration—form the core of this chapter. The illustrations below show how the model replicates past trends for these and other selected variables, both to throw light on past trends and to validate the use of the model for making predictions. Much of the initial discussion focuses on 1960–73, but the late 1970s are also discussed.

Macroeconomic Indicators

Aggregate Growth. As set out in table 3-2, the model generates an annual average growth rate of gross domestic product (GDP) in constant prices of 6.26 percent for 1960–73, and the growth rate of GDP per worker averages 3.58 percent. A significant trend acceleration is indicated; GDP growth rises from an annual rate of 5.92 percent in 1960–65 to 6.60 percent in 1968–73. That these predictions conform fairly closely to the actual pre-OPEC history of the RDE group helps to establish the model's plausibility at the most aggregate level.

Unbalanced Growth and Industrialization. The model also replicates the RDE history of industrialization quite closely, as can be seen in table 3-3. The M-goods sector underwent relatively rapid growth, from 15.9 percent of GDP at factor cost (current prices) in 1960 to 20.8 in 1973; the model generates almost identical trends. The service sector underwent a more modest rise, from 47.5 to 50.6 percent of GDP at factor cost, and the model captures these trends too. The rapid decline in the relative importance of agriculture—from 36.6 to 28.6 percent—is also faithfully replicated in the simulation. It is satisfying that the model so closely replicates the quantitative record of the unbalanced growth of sectoral output.

Investment Allocation and Sources of Finance. Gross domestic investment as a share in GDP increased markedly between 1960 and 1973, from 15.59 to 19.46 percent (Kelley and Williamson 1984b, table 3.10, p. 89). Total investment shares, including investment in training, also drift upward in the model, a prediction which conventional national accounts cannot document. Although the aggregate investment share increased over the period, the model suggests that the distribution of investment was remarkably stable. Investment allocation by sector and type is poorly documented for the pre-OPEC period, but the model predicts that the distribution of investment by sector and type must have been quite stable over the thirteen years. The sources of

Table 3-2. *Annual Average Growth Rate, 1960–73*
(percent)

	GDP (constant prices)		*GDP per worker (constant prices)*	
Period	*Model*	*Actual*	*Model*	*Actual*
1960–65	5.92	5.78	3.19	3.24
1968–73	6.60	6.12	3.98	3.58
1960–73	6.26	5.80	3.58	3.26

Source: Kelley and Williamson (1984b), table 3.5, p. 84.

Table 3-3. *Output Mix, 1960–73*
(percent of GDP)

Sector	1960		1970		1973	
	Model	*Actual*	*Model*	*Actual*	*Model*	*Actual*
Agriculture (A)	36.6	36.6	30.4	30.9	28.2	28.6
Manufacturing and mining (M)	15.9	15.9	19.3	19.2	20.9	20.8
Modern capital-intensive services (KS)	29.6	29.6	30.4	n.a.	30.8	n.a.
Informal urban services (US)	6.2	6.2	6.9	n.a.	7.2	n.a.
Informal rural services (RS)	3.2	3.2	3.1	n.a.	2.8	n.a.
Housing, all sectors (H)	8.5	8.5	9.9	n.a.	10.1	n.a.
All services combined (KS + US + RS + H)	47.5	47.5	50.3	49.9	50.9	50.6

n.a. Not available.
Source: Kelley and Williamson (1984b), table 3.7, p. 86.

saving, however, did not show the same stability (Kelley and Williamson 1984b, table 3.10, p. 89).[2] The share of gross domestic investment financed by public saving rose to 34 percent. The model predicts a comparable rise to 33.7 percent, with both shares rising by about 5 percentage points. The fall in the private share of finance was attributable not so much to lagging household saving as to a decline in the share of gross corporate saving in gross domestic investment, from 31.7 to 26.6 percent.

Income Inequality and Wage Patterns. Size distributions for the model and for an average of eighteen of the RDE for which data exist are given in Kelley and Williamson (1984b, table 3.12, p. 91). In spite of well-known limitations, the top 5 percent and the bottom 20 percent shares of national income exhibit some striking trends. Contrary to conventional wisdom, an unambiguous rise in inequality is not confirmed. The bottom 20 percent suffered an erosion in income shares during the period, but the top 5 percent underwent an even more dramatic erosion. Clearly, the middle classes flourished at the expense of both the very rich and the very poor. Those are exactly the conditions under which Lorenz curves intersect. Inequality inferences are then impossible unless value weights are imposed on social classes. The model exhibits the same behavior: a 3.1 percent fall in the share in national income of the top 5 percent is predicted, compared with the RDE history of a fall of 2.6 percent. Similarly, while the bottom 20 percent found its share declining by 0.3 percent, the model predicts a fall of 0.2 percent. The group in the 60–90 percent range increased its share by 3.7 percent, which implies that the source of the inequality lies with increased inequality of earnings. Those in the 60–90 percent range in the model are urban skilled and unskilled in the formal sectors. In short, the model generates wage inequality and skill scarcity.

Urban Indicators

Migration, Urbanization, and City Growth. Table 3-4 documents four key aspects of urban development: the share of the population that is urban, city growth rates, net rural out-migration rates, and net urban in-migration rates. The rise in urban shares provides some evidence of accelerating rates of urbanization and conforms to the pre-inflection-point phase along logistic urbanization curves that is commonly found in developing-country time series (Preston 1979; Ledent 1980). In the first five years of the simulation (1960–65) urbanization levels rise by 3.18 percentage points, while in the last five years (1968–73) they rise by 5.38 percentage points. Similarly, city growth rates rise over time, con-

Table 3-4. *Migration, Urbanization, and City Growth, 1960–73, Model Predictions*

Year	*Percent urban*	*City growth rate*	*Net rural out-migration rate*	*Net urban in-migration rate*
1960	32.60	—	—	—
1961	33.55	5.56	1.41	2.91
1962	34.30	4.87	1.13	2.24
1963	34.73	3.85	0.65	1.25
1964	35.25	4.13	0.81	1.51
1965	35.78	4.11	0.82	1.50
1966	36.49	4.60	1.10	1.98
1967	37.23	4.61	1.16	2.01
1968	38.07	4.90	1.35	2.27
1969	38.95	4.91	1.42	2.31
1970	39.93	5.15	1.60	2.51
1971	40.96	5.22	1.71	2.58
1972	42.15	5.56	2.02	2.91
1973	43.45	5.72	2.21	3.07

—Not applicable.
Source: Kelley and Williamson (1984b), table 3.13, p. 93.

forming to the trends reported in the *World Tables 1976* (World Bank 1976, table 2, "Social Indicators") between 1960 and 1970. Rural-urban migration rates also rise.

Table 3-5 presents model predictions and actual experience. City growth rates in the RDE group were 4.60 percent a year during the 1960s; the model predicts a rate of 4.67 percent. The model predicts a rural out-migration rate of about 1.1 percent a year, and the historical rate ranged between 1 and 1.2 percent; the predicted urban in-migration rate is 2.1 percent a year, and the historical rate ranged between 1.8 and 2.3 percent. Finally, 45 percent of the increase in city population is accounted for by in-migration in the model; this figure falls between Preston's (1979) estimate of 39 percent (based on twenty-nine developing countries) and Keyfitz's regional estimate of 49 percent (1980, p. 151). It is also close to the 42 percent figure for developing countries reported by Linn for 1970–75 (1979, p. 73).

Urban Land Use, Density, and Land Scarcity. Table 3-6 reports indicators of urban land use and scarcity. The share of urban land devoted to squatter settlements rises sharply (Mohan 1979; Beier and others 1975). Competition for land use generates sharply rising land scarcity; the shadow site rent on urban land almost doubles between 1960 and 1970 and in 1973 reaches a level about 2.3 times that of 1960. Urban land values (deflated by the general price level) surge; the index rises from a base of 100 in 1960 to 195.2 in 1970 and 239.7 in 1973. These trends in urban land values imply a rapid annual growth of 7 percent—exactly the sharp rises which were singled out at the U.N. Habitat Conference in 1976 (United Nations 1976). Urban densities rise everywhere in the model, but they rise most dramatically in "luxury" housing, where the relative scarcity of land compared with structures rises most sharply, encouraging land saving and greater density.

Table 3-5. ***Predicted and Actual Migration, Urbanization, and City Growth, Averages, 1960–70***
(percent)

Variable	*Predicted*	*Actual*
Annual city growth (compounded)	4.67	4.60
Total increase in urban share of population	7.33	5.30
Annual increase in urban share of population	0.73	0.53
Net in-migrant share of increase in urban population	45.0	39.3–49.0
Net in-migration rate	2.09	1.81–2.26
Net out-migration rate	1.10	0.97–1.21

Source: Kelley and Williamson (1984b), table 3.13, p. 93.

Table 3-6. ***Urban Land Use, Density, and Land Scarcity, Model Predictions, 1960, 1970, and 1973***

Variable	*1960*	*1970*	*1973*
Share of urban land in squatter settlements (percent)	43.0	52.2	53.9
Urban land density (persons ÷ area) (1960 = 100)			
High-quality housing areas	100.0	152.0	172.7
Squatter settlements	100.0	121.4	141.7
Shadow site rent on urban land (1960 = 100)	100.0	183.3	233.3
Shadow price on urban land (1960 = 100)	100.0	195.2	239.7

Source: Kelley and Williamson (1984b), table 3.14, p. 95.

Housing Scarcity and Cost-of-Living Differentials. In addition to land scarcity, excess demand for housing units in the short run and rising costs of housing construction in the long run can inflate the cost of city life, as summarized in table 3-7. Excess housing demand arises because capital market segmentation excludes intersectoral (mortgage) loans for housing investment, and each socioeconomic class must rely on its own internally generated saving to meet housing investment. Table 3-7 reports that the saving constraint is never binding for rural households or for skilled workers and higher-income households, but for squatter settlements—the faster growing sector—the saving constraint is binding very early in the period and thus excess short-run demand for new low-quality dwelling units is generated. Excess demand and increasing urban land scarcity ensure a rapid upward drift in (shadow) rents in

Table 3-7. ***Housing Scarcity and Cost-of-Living Differentials, Model Predictions, 1960, 1970, and 1973***

Variable	*1960*	*1970*	*1973*
Excess housing investment demand[a]			
Urban high-quality housing	−3.77	−2.55	−2.67
Urban squatter settlements	−0.02	0.37	0.28
Rural housing	−0.29	−0.58	−0.88
Housing rent index			
Urban high-quality housing	1.00	1.35	1.46
Urban squatter settlements	1.00	1.72	1.90
Rural housing	1.00	1.38	1.45
Urban squatter ÷ rural	1.00	1.25	1.31
Cost-of-living index			
Urban ÷ rural	1.00	1.09	1.12

a. [Desired housing investment demand − household saving] ÷ desired housing investment demand.
Source: Kelley and Williamson (1984b), table 3.15, p. 96.

urban squatter settlements, and the cost-of-living differential rises as a result.

Understanding City Growth: Some Major Influences

Which exogenous variables have had the greatest impact on city growth in developing countries? Which are least likely to account for future growth? Answers to these questions can be divided into three parts: the size of the past and future changes in the exogenous variable thought to influence endogenous rates of city growth; the short-run comparative static impact of that exogenous variable; and the long-run forces set in motion by the short-run comparative static impact. This section focuses on short-run comparative static elasticities and explores the impact of some key macroeconomic events on urban growth: unbalanced productivity advance, world market conditions and price policy, accumulation, demographic change, and land scarcity.

Each of these short-run elasticities reflects the full general equilibrium impact of the exogenous variable in question, based on the initial conditions in 1970. Labor markets adjust through migration, and urban land markets seek an optimal land use solution, but capital markets are severely constrained in the short-run analysis: old capital cannot migrate, and new capital goods and newly trained skilled workers are not added to capacity. Investment responses are also ignored in the short-run analysis: recent historical experience with sectoral investment allocation is assumed to guide entrepreneurs who are slow to adjust to the new, unexpected, and shock-distorted rates of return.

Unbalanced Productivity Advance

If output demand is relatively price inelastic, sectoral total factor productivity growth (TFPG) for a sector tends to generate a relative price decline rather than an elastic supply response. Thus, the rise in the marginal physical productivity of factors used in a technologically dynamic sector will be partially offset by the decline in price, so that marginal value products rise by less, and shifts of resources, including labor, to the technologically dynamic sector are minimized. If, on average, urban sectors tend to have relatively high rates of TFPG, and if the demand for urban output is price elastic, final demand shifts toward the dynamic urban sectors, the derived demand for urban employment is augmented, and the city grows. The higher are price elasticities of demand for urban output, the greater is the city growth attributable to unbalanced productivity advance that favors the modern sectors.

In table 3-8 disembodied TFPG (the A_js, in rates of change) in agriculture and manufacturing exert a much greater impact on urbanization than do productivity improvements in the service sectors. The price variables P_A and P_M are exogenously determined and are fixed by invoking the small-country case of infinite price elasticity. Services are nontradables with price elasticities of demand sufficiently low that the productivity-induced declines in service sector prices (P_{KS}, P_{US}, and P_{RS}, in response to A_{KS}, A_{US}, and A_{RS}, respectively) imply stable marginal value products and trivial employment and city growth effects. Although productivity advance in manufacturing is an important potential determinant of urbanization, rapid productivity advance in agriculture tends to forestall out-migration to the city. This result is in contrast to the closed dual economy model in which productivity advance in agriculture meets with demand absorption problems, declining farm terms of trade, and thus a labor surplus which out-migrates to glut urban labor markets.

Unbalanced rates of TFPG that favor manufacturing are likely to have been a key determinant of rapid in-migration and city growth since the late 1950s. Not only are the comparative static elasticities in table 3-8 consistent with that position, but limited evidence suggests that annual rates of TFPG in manufacturing have been relatively high in most successful developing economies.

Although technological advance tends to be lower in the service sectors, especially in the informal service sectors, table 3-8 suggests that rapid TFPG in those sectors has had little impact on urbanization experience for the demand elasticity reasons already offered. If rapid TFPG matters little to urbanization even in the modern capital-intensive and skill-intensive KS sector, lagging productivity advance in the service sectors would also matter little. It is believed that urban social overhead is crucial to the profitability and viability of urban firms. In our model, KS activities such as transport, communications, and electricity have that role. Table 3-8 confirms that productivity advance augments KS services supplied in short-run equilibrium (Q_{KS}), but because almost all of these productivity gains are passed on to users elsewhere in the economy (P_{KS} declines), employment in KS itself changes little. Final-demand customers of KS services, who tend to be the urban rich, gain. A major user of KS services as intermediate inputs is manufacturing, and employment rises there. The net effect on urbanization is, however, indirect and small.

Short-Run Constraints on City Growth

Productivity advances that favor modern sectors foster urbanization, but in the short run the city growth

Table 3-8. *Comparative Static Impacts of Unbalanced Productivity Advance on City Growth in Developing Countries (1970 Elasticities)*

	Tradable commodities		*Nontradable services*		
Endogenous variable	A_M	A_A	A_{KS}	A_{US}	A_{RS}
City growth attributes					
Percent urban	0.50	−0.26	0.03	−0.01	−0.03
City growth rate	10.29	−5.33	0.68	−0.26	−0.67
In-migration rate	20.57	−10.65	1.36	−0.52	−1.33
Squatter house rents	3.57	−0.73	0.40	0	−0.14
Cost-of-living differential (urban ÷ rural)	1.49	−0.80	0.12	−0.11	0.01
Selected economywide attributes					
P_{KS}	0.82	0.22	−0.91	0.03	0
P_{US}	1.03	0.24	0.15	−1.09	0
P_{RS}	0.02	1.17	0.09	−0.01	−1.03
Q_M	2.34	−0.57	0.24	0.08	−0.09
Q_{KS}	0.02	0.17	0.99	0.01	0
Q_{US}	0.23	0	0.02	0.75	−0.01
Q_A	−0.34	1.31	0.07	0	0.07
Q_{RS}	−0.11	0.32	−0.01	0	0.60
L_M	1.36	−0.84	0.10	0.18	−0.09
L_{KS}	−0.18	0.15	−0.07	0.11	0
L_{US}	0.24	0	0.02	−0.26	−0.01
L_A	−0.37	0.15	−0.02	0.01	0.08
L_{RS}	−0.11	0.34	−0.01	0	−0.41

Source: Kelley and Williamson (1984b), table 4.1, p. 103.

Note: Variables are defined as follows: A_M, total factor productivity growth in the manufacturing sector; A_A, total factor productivity growth in the agricultural sector; A_{KS}, total factor productivity growth in the modern services sector; A_{US}, total factor productivity growth in the informal urban services sector; A_{RS}, total factor productivity growth in the informal rural services sector; P_{KS}, price per unit of modern services; P_{US}, price per unit of informal urban services; P_{RS}, price per unit of informal rural services; Q_M, output in the manufacturing sector; Q_{KS}, output in the modern services sector; Q_{US}, output in the informal urban services sector; Q_A, output in the agricultural sector; Q_{RS}, output in the informal rural services sector; L_M, unskilled labor in the manufacturing sector; L_{KS}, unskilled labor in the modern services sector; L_{US}, unskilled labor in the informal urban services sector; L_A, unskilled labor in the agricultural sector; L_{RS}, unskilled labor in the informal rural services sector.

response is constrained, partly by problems with absorption of output, partly by short-run capacity constraints and skill bottlenecks, and partly by a rising supply price of unskilled labor in the cities. Table 3-9 focuses on the rising supply price of urban labor. Urban job creation fosters in-migration, but with some limitation. Although land use shifts to squatter settlements to accommodate rising density, urban rents nevertheless rise steeply in the face of the migrant influx. Since most new in-migrants are unskilled and poor, rents in squatter settlements rise more sharply than do rents for high-quality housing. Squatter-settlement rents reflect excess demand for housing and sites; the rents for high-quality housing mostly reflect increased land scarcity as the needs of the poor are partially accommodated by shifting land use. The cost-of-living advantage of the rural area rises sharply as a result of increased urban rents. All these factors raise the average unskilled wage in the cities and tend to restrict city growth in the short run. Furthermore, job creation is constrained by skill bottlenecks (the skilled wage rises) and capital scarcity (the return to capital in manufacturing rises far above its return in other uses), which suggests that the long-run impact of unbalanced productivity advance on city growth is far greater than these short-run elasticities imply.

Scarcities of Fuel and Imported Raw Materials

Since urban-based manufacturing uses intensively fuels and raw materials (importables which we call Z-goods), any increase in the price of imported Z-goods penalizes manufacturing directly and other urban activities indirectly and thus inhibits urban job creation and city growth. Even though the model admits the possibility of direct and indirect substitution away from the more expensive imported fuels and raw materials, table 3-10 reports that in-migration and city growth are still constrained because urban activities tend to be Z-intensive. The elasticity of P_Z, however, is low compared

Table 3-9. *Short-Run Constraints on the City Growth Response to Unbalanced Productivity Advance (1970 Elasticities)*

Endogenous variable	A_M	A_{KS}
City growth attributes		
City growth rate	10.29	0.68
In-migration rate	20.57	1.36
Congestion indicators		
Percent urban land in squatter settlements	1.25	0.13
Squatter house rents	3.57	0.40
High-quality house rents	1.16	0.15
Cost-of-living differential (rural ÷ urban)	1.49	0.12
Factor market disequilibrium indicators		
Average urban unskilled wage	1.03	0.15
Rural unskilled wage	0.02	0.09
Urban skilled wage	1.28	0.13
Return to capital in M	2.34	0.27
Return to capital in KS	0.80	0.07
Return to capital in A	−0.30	0.06

Source: Kelley and Williamson (1984b), table 4.2, p. 105.

with the unbalanced productivity advance indicators (the A_js) or with the other two exogenous prices reported in table 3-10. At first glance this may suggest that the sensitivity of urbanization to scarcity of fuels and raw materials has been overstated in the literature. In view of the historical record since 1960, however, one must be cautious. After all, P_Z soared in the 1970s after its recorded stability during the 1960s. Thus, P_Z may have been a dominant source of developing-country urbanization over the past two decades in spite of the modest elasticities reported in table 3-10. (The issue is discussed again below.)

Price Policy and World Market Conditions

Table 3-10 presents the short-run impact multipliers for prices of agricultural and manufactured goods, both of which compete in world markets. These prices are usually heavily distorted by external and internal price policy. The table shows that city growth was far more sensitive to P_A and P_M than to P_Z. Any effort to understand the sources of past and future city growth must therefore carefully sort out these relative price conditions, including the impact of past liberalization and future protectionist trends in the industrial countries and the influence of price-distorting policy regimes in developing countries.

Accumulation, Capacity, and Job Creation

Table 3-10 also summarizes the impacts of "productive" capital accumulation and population-sensitive "unproductive" capital accumulation on employment demand, urban job creation, and city growth. Accumulation in the urban modern sectors fosters job creation, and an investment policy which favors manufacturing at the expense of agriculture fosters urbanization. It is surprising, however, that accumulation of urban squatter housing (H_{US}) has the most potent short-run impact on urban job creation and city growth. This result occurs even though the impact multipliers exclude the employment effects of the formation of the housing stocks through investment (and investment activities in squatter dwelling construction are highly labor-intensive). The relatively large urban employment effects associated with the accumulation of squatter housing are therefore all indirect: housing rents de-

Table 3-10. *Factors That Influence City Growth in Developing Countries (1970 Elasticities)*

	Endogenous urbanization variable		
Exogenous variable	*Percent urban*	*City growth rate*	*In-migration rate*
Land and labor			
R_A	−0.03	−0.69	−1.38
R_U	0.04	0.88	1.77
L	−0.57	6.38	12.75
Accumulation			
K_M	0.09	1.82	3.63
K_{KS}	0.02	0.40	0.81
K_A	−0.03	−0.68	−1.35
H_{KS}	0	0.07	0.15
H_{US}	0.39	7.92	15.83
H_{RS}	−0.13	−2.75	−5.50
Prices			
P_Z	−0.04	−0.89	−1.77
P_M	0.54	11.13	22.23
P_A	−0.32	−6.51	−13.01
Productivity advance			
A_M	0.50	10.29	20.57
A_A	−0.26	−5.33	−10.65
A_{KS}	0.03	0.68	1.36
A_{US}	−0.01	−0.26	−0.52
A_{RS}	−0.03	−0.67	−1.33
Other			
Skilled labor force (S)	0.23	6.96	13.90
Foreign capital (F)	0	−0.03	−0.06

Note: Variables, in addition to those defined in table 3-8, are as follows: R_A, agricultural land stock; R_U, urban land stock; L, total unskilled labor force; K_M, physical (productive) capital in the manufacturing sector; K_{KS}, physical capital in the modern services sector; K_A, physical capital in the agricultural sector; H_{KS}, high-quality urban housing; H_{US}, low-quality (squatter) urban housing; H_{RS}, rural housing; P_Z, price per unit of imported raw materials; P_M, price per unit of manufactured goods; P_A, price per unit of agricultural goods.
Source: Kelley and Williamson (1984b), table 4.6, p. 111.

crease with the augmented supply of dwelling space, the relative cost of living in the cities declines, in-migration is fostered, nominal wages of the unskilled are lowered by the temporary labor glut, and employment expands everywhere in the city as a result, especially in manufacturing. In contrast to Coale and Hoover's (1958) emphasis on the tension between unproductive and productive capital accumulation in city growth, table 3-10 suggests no conflict: of the six alternative modes of accumulation listed, accumulation in H_{US} has the highest urban job creation and city growth effects. An issue for future work is to assess whether this conclusion holds for the longer run.

Land and Labor

Popular accounts of rapid urbanization in developing countries emphasize the role of high population growth. Table 3-10 contradicts this view, although how wrong the population account is depends on which aspect of urbanization and city growth is of interest.

Lewis (1977) has stressed the capital intensity of cities, and the present model conforms with that reality, since urban activities are, on average, far less labor-intensive than are rural activities. The Rybczynski theorem in trade theory holds that an increased endowment of any given factor of production should favor the expansion of those sectors which use that factor most intensively. Thus, whatever its source, population-induced labor force growth should foster the expansion of rural activities and suppress urbanization. According to this analysis, population growth does not offer an explanation for urbanization, and the negative impact multiplier in table 3-10 (percent urban, −0.57) proves the point. For in-imigration and city growth, however, table 3-10 reports a more conventional result, since the impact multipliers are positive and quite large. (The next section elaborates on this issue.)

What about land endowments? Conventional wisdom has argued that scarcity of agricultural land has tended to push labor into the cities. Although an extension of the arable land stock would certainly increase the retention of labor in rural areas and thus retard urbanization, the size of the impact reported in table 3-10 is small. Changes in agricultural land endowment are simply not an important part of the city growth tale.

The OPEC Watershed and Recent Growth Trends

The changing growth environment in the aftermath of the OPEC price shock has been significant. It has been manifested mainly in relative prices, which are captured in the model by exogenous trends in P_A, P_M, and P_Z (table 3-11). In relation to prices of primary exports from developing countries, the quality-adjusted price of manufactured goods declined at an annual rate of 0.7 percent up to 1973. The rate of decline accelerated after 1973 and averaged 1.6 percent a year to 1979. In contrast, the price of imported raw materials (including fuels) rose by 5.2 percent a year after 1973 compared with P_A; the same relative price exhibited long-run stability before 1973. Although these price trends are affected by the base periods selected, the averaging devices applied, and the underlying price series, there can be no doubt about the epochal character of the post-OPEC price trends which developing countries faced in the 1970s.

Table 3-11. *The Growth Environment, Pre-OPEC and Post-OPEC: Dynamic Parameters Assumed in the Simulations*
(percent)

Exogenous variable (dynamic parameter)	*Average annual growth*	
	Pre-OPEC (1960–73)	*Post-OPEC (1973–79)*
Price of imported raw materials ($\overset{*}{P}_Z$)	0	5.2
Price of M-goods ($\overset{*}{P}_M$)	−0.7	−1.6
Agricultural land stock ($\overset{*}{R}_A$)	1.0	0.5
Urban land stock ($\overset{*}{R}_U$)	1.0	1.0
Total labor force $\left(\frac{*}{L+S}\right)$	2.54	2.68

Source: Kelley and Williamson (1984b), table 5.1, p. 126.

As table 3-11 shows, the growth rate of the labor force was higher after 1973, although the acceleration was quite modest. Table 3-11 also documents the assumed rates of farmland growth, showing a decline which captures the apparent rapid exhaustion of possibilities for augmenting extramarginal land. Clearly, there were other (perhaps less important) nonprice changes in the economic and demographic environment that surrounded the RDE group after 1973. For that matter, not all of the epochal price trends were related to OPEC. Nonetheless, we have labeled these two epochs pre-OPEC and post-OPEC.

Evaluating the OPEC Watershed

The world economy has been undergoing painful adjustments to the price shocks associated with short-run OPEC policy and long-run scarcities of raw materials and fuels. Since as late as 1979 the world economy was still digesting the impact of these disequilibrating shocks, it seems clear that a long-run general equilibrium model such as ours cannot be expected to account

adequately for the short-run trends that developing countries have undergone since 1979. Nonetheless we can use the post-OPEC conditions to illustrate the model's sensitivity to such epochal shocks.

Tables 3-12 and 3-13 summarize the city growth predictions. Table 3-13 offers a 1960–73 prediction, using the actual pre-OPEC economic and demographic environment, that has already been compared with actual experience in previous sections; a 1973–79 prediction using the actual post-OPEC economic and demographic environment documented in table 3-11; and a counterfactual post-OPEC prediction, which simply allows the pre-OPEC environmental conditions to continue beyond 1973. The counterfactual experiment makes it possible to assess what urbanization would have been like without the post-OPEC epochal shocks.

Comparison of the pre-1973 and post-1973 predictions by the model in table 3-13 might suggest that the OPEC price shocks mattered little to subsequent urban performance in the late 1970s. The annual rate of city growth declines only modestly over the period as a whole (from 4.86 to 4.65 percent); the percent urban continues its rapid climb; and in-migration rates, although somewhat lower, remain high. Note, however, the unambiguous evidence of retardation in the Actual columns of table 3-12, in which the rates of in-migration and city growth lose their steam quite dramatically. More important, in table 3-13 compare the predicted actual post-OPEC experience with the counterfactual 1973–79 experience that assumes pre-OPEC environmental conditions: while the actual city growth rate for 1973–79 is 4.65 percent a year, the counterfactual rate would have been 6.04 percent. Furthermore, without the shocks of the late 1970s, the counterfactual rate of in-migration

Table 3-12. *Post-OPEC Urban Adjustments, Model Predictions, 1973–79*

	Actual post-OPEC environment			*Counterfactual environment*		
Year	*Percent urban*	*City growth*	*Net urban in-migration rate*	*Percent urban*	*City growth*	*Net urban in-migration rate*
1973	43.45	5.72	3.07	43.45	5.72	3.07
1974	44.45	5.10	2.32	44.78	5.75	3.10
1975	45.22	4.48	1.72	46.25	5.92	3.27
1976	46.26	5.03	2.26	47.80	6.03	3.38
1977	47.05	4.52	1.76	49.46	6.14	3.47
1978	47.85	4.47	1.71	51.22	6.23	3.56
1979	48.58	4.29	1.53	53.03	6.16	3.49

Note: The counterfactual results assume that the 1960–73 dynamic parameters persist after 1973. The net urban in-migration rate is the ratio of annual in-migration to the average urban population in all previous years.
Source: Kelley and Williamson (1984b), table 5.3, pp. 130–31.

Table 3-13. *Pre-OPEC and Post-OPEC Urban Adjustments, Model Predictions, Period Averages*
(percent)

	Basis for prediction		
Variable	*Actual pre-OPEC environment, 1960–73*	*Actual post-OPEC environment, 1973–79*	*Counterfactual environment, 1973–79*
Annual city growth	4.86	4.65	6.04
Total increase in share urban for period	10.85	5.13	9.58
Annual increase in share urban	0.83	0.86	1.60
Net in-migration share of urban population increase	47.72	41.34	57.50
Net in-migration rate	2.35	1.83	3.30
Net out-migration rate	1.37	1.60	3.13

Note: The 1973–79 counterfactual results assume that the 1960–73 dynamic parameters persist after 1973. The net in-migration rate is the ratio of annual in-migration to the average urban population in all previous years. The net out-migration rate is the ratio of annual rural out-migration to the average rural population in all previous years.
Source: Kelley and Williamson (1984b), table 5.3, pp. 130–31.

would have risen to 3.30 percent rather than fall to 1.83 percent, as in fact happened.

Isolating the Sources of Slowdown in City Growth

It seems clear that exogenous economic and demographic conditions had a powerful impact on developing-country urbanization during the 1970s. Table 3-14 reports an effort to isolate the most important factors. Nine counterfactual stimulations are used. Each generates a history in the 1970s (1973–79), but the table presents only one of the model's predictions—the annual rate of city growth. Each counterfactual case should be compared with the actual 1973–79 performance reproduced in column 1 (which repeats table 3-12). The fuel abundance counterfactual in column 3 maintains all of the exogenous conditions that underlie the actual performance in column 1 except fuel price behavior: while the OPEC-augmented actual $\dot{P}_Z^*$ was 5.2 percent a year between 1973 and 1979, the counterfactual assumes that $\dot{P}_Z^* = 0$, as was indeed the case up to 1973.

The urban slowdown had little to do with agricultural land expansion or labor force growth. Rather, it appears that prices were doing most of the work. Furthermore, fuel scarcity, in spite of the attention it has received, was not nearly as important a source of slowdown in city growth as was the accelerated decline in the relative price of manufactures (lower $\dot{P}_M^*$) This finding obviously supports the view that any future trend toward protectionism in industrial countries will play an important role in shaping city growth in developing countries in the next two decades. The same might be said, of course, of the mix of internal policies which may twist the relative price of manufactures in the future. This position is reinforced by the counterfactual experiment under "stable world markets," in which the relative price of manufactures is held fixed during the 1970s. Under these more favorable price conditions for manufacturing the model predicts annual city growth rates of 6.49 percent, in contrast to the actual rate of only 4.65 percent.

Although a sharp decline in the rate of population growth would certainly have diminished the rate of city growth, column 8 in table 3-14 suggests that this influence has been grossly overdrawn in the popular literature. The counterfactual explores the impact of a spectacular reduction in population pressure from the actual RDE rate of 2.68 percent a year to the 0.9 percent which prevailed among industrial countries. Even under this enormous diminution in population growth, the rate of city growth would still have reached almost 4 percent a year for the period 1973–79. Rapid population growth certainly has contributed to spectacular city growth rates, but the experiments suggest that it is not the central force that drives urbanization. Table 3-14 also suggests that a shift to foreign capital austerity would not matter much to urbanization.

Urbanization in developing countries is, however, sensitive to a productivity slowdown. Given a plausible retardation in the economywide rate of TFPG from 1.8 to 1 percent a year, city growth rates decline significantly, and the impact seems to show signs of cumulating over time.

Conclusion

This chapter has shown the ability of the Kelley-Williamson model to adequately replicate growth, accumulation, distribution, and city growth in developing countries up to the 1973 watershed. On that basis it is concluded that the model can be used to analyze the sources of urban growth during the 1960s, the early 1970s, and the difficult period of structural adjustment since then and to analyze future trends in urban experience under varying world market conditions and domestic policy regimes.

To summarize, rapid rates of population growth are not—as a reading of the popular literature would suggest—the central influence that drives rapid urban growth in developing countries. Capital transfers to developing countries have not played a significant part, and rural land scarcity has had only a modest role. The most potent influences on city growth appear to have been the rate and imbalance of sectoral productivity advances—technological events which have favored the urban modern sectors—and prices (although OPEC-induced fuel scarcity has been less important than the relative price of manufactures). Thus, trade policy in the industrial countries and price policy in developing countries are likely to have the most important impacts on city growth in the next two decades.

Notes

1. Algeria, Bangladesh, Brazil, Cameroon, Chile, Colombia, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Arab Republic of Egypt, El Salvador, Ethiopia, The Gambia, Guatemala, Honduras, India, Indonesia, Kenya, Korea, Malaysia, Mexico, Morocco, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Portugal, Sri Lanka, Swaziland, Syria, Taiwan, Thailand, Togo, Turkey, Uganda, and Yugoslavia.

2. The World Bank's *World Tables* normally report only total private savings and do not separate household savings from firm (corporate) reinvestment. Although the distinction

Table 3-14. ***Sources of a Slowdown in City Growth, 1973–79***
(percent)

Item	Actual 1973–79 (1)	OPEC watershed counterfactuals, 1973–79: Total pre-OPEC environment (2)	OPEC watershed counterfactuals, 1973–79: Fuel abundance, pre-OPEC, $\overset{*}{P}_Z = 0$ only (3)	OPEC watershed counterfactuals, 1973–79: World markets, pre-OPEC, $\overset{*}{P}_M$ only (4)	OPEC watershed counterfactuals, 1973–79: Land expansion, pre-OPEC, $\overset{*}{R}_A$ only (5)	OPEC watershed counterfactuals, 1973–79: Population pressure, pre-OPEC, $\overline{\overset{*}{L+S}}$ only (6)	Other counterfactuals, 1973–79: Stable world markets, $\overset{*}{P}_M = 0$ (7)	Other counterfactuals, 1973–79: No population pressure (developed country rate) (8)	Other counterfactuals, 1973–79: Technological slowdown (decrease in TFPG from 1.8 to 1 percent) (9)	Other counterfactuals, 1973–79: Foreign capital austerity, $F = 0$ (10)
Year										
1973	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72
1974	5.10	5.75	5.35	5.59	5.09	5.06	5.95	4.46	5.10	5.21
1975	4.48	5.92	4.91	5.67	4.51	4.50	6.46	4.03	4.27	5.66
1976	5.03	6.03	5.28	5.90	4.95	4.96	6.51	4.37	4.60	4.37
1977	4.52	6.14	5.13	5.91	4.47	4.48	6.64	3.72	4.22	4.33
1978	4.47	6.23	5.05	5.96	4.36	4.36	6.63	3.68	3.93	4.21
1979	4.29	6.16	4.83	5.79	4.27	4.28	5.76	3.57	3.82	4.24
Average	4.65	6.04	5.09	5.80	4.61	4.60	6.49	3.97	4.32	4.67
Exogenous variables taken to be:										
$\overset{*}{P}_Z$	5.2	0	0	5.2	5.2	5.2	5.2	5.2	5.2	5.2
$\overset{*}{P}_M$	−1.6	−0.7	−1.6	−0.7	−1.6	−1.6	0	−1.6	−1.6	−1.6
$\overset{*}{R}_A$	0.5	1.0	0.5	0.5	1.0	0.5	0.5	0.5	0.5	0.5
$\overline{\overset{*}{L+S}}$	2.48	2.54	2.68	2.68	2.68	2.54	2.68	0.9	2.68	2.68
$\overset{*}{F}$	← $\overset{*}{F}$ such that $F/\text{GDP} = 3$ percent →									
TFPG	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.0	1.8

Note: Variables are defined as follows: $\overset{*}{P}_Z$, fuel and raw materials prices; $\overset{*}{P}_M$, domestic price of manufactures; $\overset{*}{R}_A$, agricultural land stock; $\overline{\overset{*}{L+S}}$, population (or labor force); $\overset{*}{F}$, foreign capital inflow; TFPG, economywide productivity growth.

Sources: Kelley and Williamson (1984a), table 5, p. 435; (1984b), table 5.4, p. 133.

may be fuzzy in the economies being analyzed, the two sources of savings are quite distinct in the model and are thus reported separately. Furthermore, what the model identifies as training investment is embedded in private and government consumption in the RDE national accounts.

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