10-1-1999

HAVE PRICE POLICIES DAMAGED LDC AGRICULTURAL PRODUCTIVITY?

Lilyan E. Fulginiti
University of Nebraska-Lincoln, lfulginiti1@unl.edu

Richard K. Perrin
University of Nebraska-Lincoln, rperrin@unl.edu

Fulginiti, Lilyan E. and Perrin, Richard K., "HAVE PRICE POLICIES DAMAGED LDC AGRICULTURAL PRODUCTIVITY?" (1999). *Faculty Publications: Agricultural Economics*. 2.
http://digitalcommons.unl.edu/ageconfacpub/2

HAVE PRICE POLICIES DAMAGED LDC AGRICULTURAL PRODUCTIVITY?

LILYAN E. FULGINITI and RICHARD K. PERRIN*

This paper examines price policies and agricultural productivity in 18 developing countries over the period 1961–1985. We measure productivity with both a nonparametric Malmquist index and a production function, confirming previous findings of declining agricultural productivity, but with sufficient inconsistencies as to raise concern about the adequacy of the methods. We nonetheless find considerable support for the hypothesis that unfavorable price policies have damaged agricultural productivity performance in these countries. (*JEL* O4, Q1)

I. INTRODUCTION

Beginning in the mid 1960s and continuing into the 1980s the "green revolution" swept across the agricultural sectors of many less developed countries (LDCs), a revolution consisting of new varieties of wheat, rice, and maize that could make use of fertilizer and irrigation water without succumbing to diseases and pests. This revolution contributed to dramatic increases in foodgrain production, particularly in southeast Asia. Yet some previous studies have shown agricultural productivity to be declining in these countries during this period. One possible explanation is that the widespread policy of heavy taxation of the agricultural sector may have so discouraged innovation and efficiency gains that the effects of the green revolution were not fully realized. Another possible explanation is that the available methods of measuring productivity in these countries are somehow inappropriate. This study examines some of the evidence with respect to these two hypotheses.

Agricultural productivity in LDCs has been measured as a shift in the aggregate agricultural production function, because the absence of price data has made conventional indexing techniques infeasible. The first such study relevant to the green revolution period was that by Hayami and Ruttan (1970). They estimated intercountry production functions which indicated that agricultural productivity in 22 LDCs declined at an annual rate of 2.1% between 1960 and 1965, on the eve of the green revolution. That study was updated by Kawagoe, Hayami, and Ruttan (1985), who found that productivity continued to decline but at the rate of 1.5–2.0% per year between 1960 and 1970, and by another 1.0–1.5% between 1970 and 1980. Lau and Yotopoulus (1989) used a slightly different intercountry production function approach using much of the same data, and while production elasticity estimates differed, they estimated that productivity rose at the rate of 0.4% during the 1960s and declined at the rate of 0.25% during the 1970s.[1] It is interesting to note in contrast that similar studies of developed country agricultural sectors, by some of the same authors, have without exception shown increases in agricultural productivity. Before turning to our own measurements of agricultural productivity, we consider briefly the possible effects of price policies on productivity.

There is no consensus in the economic literature about what effect, if any, prices should

---

*This is a revised version of a paper presented at the Western Economic Association International Conference, Seattle, July 12, 1997, in a session organized by D. Stiegel, University of Arizona.

Fulginiti: Professor, Department of Agricultural Economics, University of Nebraska-Lincoln
Phone 1-402-472-0651, Fax 1-402-472-3460
E-mail lfulginiti@unl.edu
Perrin: Professor, Department of Agricultural Economics, University of Nebraska-Lincoln
Phone 1-402-472-9818, Fax 1-402-472-3460
E-mail rperrin@unc.edu

[1] Except for Lau and Yotopoulos's (1989) results, most estimates show more decline in the 1960s than later. Our own results, econometric or nonparametric, support this evidence. As pointed out by one of the referees, the green revolution technologies might have been welfare enhancing given that without them the productivity decline might have been worse.

Contemporary Economic Policy
(ISSN 1074-3529)
Vol. 17, No. 4, October 1999, 469–475

have on productivity. Logic suggests that if individuals' collective choices in virtually every other realm of life are affected by prices, then so also should those choices that determine the rate of technical change. But in what direction? Hicks's (1935) quiet life hypothesis would suggest that during time of prosperity (high prices), the desire of managers for a quiet life might lead them to be inefficient and uninterested in innovation, leading to a negative relationship. A study by Schmookler (1966), however, established a positive relationship between innovation as measured by patent activity and increases in demand for an industry's product. Despite these and a few other scattered studies of the effect of prices on productivity, Capalbo and Antle (1988) observed a decade ago in their book on agricultural productivity, "We know of virtually no research that has attempted to account for the effects of government intervention and explanation of agricultural productivity...." This still seems to be the case. Here we report our own research on the possible role of price policies on agricultural productivity.

II. PRODUCTIVITY MEASUREMENT

As we mentioned above, the unavailability of price data (for land and capital primarily) in LDCs makes it impossible to measure productivity using conventional indexing approaches or indirect profit or cost functions. We must rely on quantity-based conceptual approaches that in some way compare observed change in output with the imputed change that would have been caused by the observed input changes. The imputed output change is based on some type of production possibilities set estimated for the time interval, rather than using prices as proxies for marginal product.

In this paper we report the use of two quantity-based methods, a Malmquist index and a meta production function, to examine productivity in the agricultural sectors of 18 LDCs. The nonparametric Malmquist productivity index, following Färe et al. (1994), allows for simultaneous partitioning of productivity changes into two components, change in technology and change in technical efficiency. The parametric production function approach, on the other hand, assumes technical efficiency. Neither approach requires the use of prices of inputs or outputs in its construction. The advantage of the Malmquist index is that it imposes a minimum of assumptions on the nature of the technology, and thus avoids specification bias. The advantage of the production function approach is that it accommodates stochastic relationships that permit testing of hypotheses about the technology and how productivity changes occur.

The Malmquist index is based on the output distance function defined as

$$(1) \qquad D^T(x^t, y^t) \equiv \inf\{\theta: (x^t, \frac{1}{\theta} y^t) \, \varepsilon \, S^T\},$$

where x denotes a vector of inputs, y are outputs, S is the technology set, and superscript T denotes the technology reference period, usually $T = t$ or $T = t + 1$. That is, $1/\theta$ defines the amount by which outputs in year t could have been increased, given the inputs used, if technology for year T had been fully utilized. While Caves et al. (1982) suggested the Malmquist index of change between year t and $t + 1$ as the ratio $D^T(x^{t+1}, y^{t+1})/D^T(x^t, y^t)$, Färe et al. proposed to measure it as the geometric mean of such indexes calculated both for year t and year $t + 1$ reference technologies as

$$(2) \qquad M(x^{t+1}, y^{t+1}, x^t, y^t) = \left[\frac{D^t(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \; \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^{t+1}(x^t, y^t)}\right]^{1/2}.$$

Färe et al. factor this expression into the product of technical change and efficiency change as

$$(3) \qquad M(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \left[\frac{D^t(x^{t+1}, y^{t+1})}{D^{t+1}(x^{t+1}, y^{t+1})} \; \frac{D^t(x^t, y^t)}{D^{t+1}(x^t, y^t)}\right]^{1/2}.$$

The ratio outside the brackets is the index of change in technical efficiency (i.e., the change in the distance of observed production from the current maximum feasible production) between years t and $t+1$, while the bracketed term is the index of change in technology (or technical change) between the two periods, evaluated at x^t and x^{t+1}. A Malmquist productivity index with value greater than unity reveals improved productivity. Efficiency and technical change indexes exceeding unity reflect gains in those components, as well.

As an alternative to the nonparametric frontier Malmquist index, we have estimated an intercountry production function that permits us to measure total factor productivity (Fulginiti and Perrin, 1993). This basic function is of the Cobb-Douglas form

$$y(x; \beta) = A \Pi x_i^{\beta_i}, \tag{4}$$

characterizing the maximum amount of scalar output y that can be produced from any given set of conventionally measured inputs $x = (x_1, \ldots, x_n)$, where A and vector β designate all parameters. To accommodate a flexible description of technological change, let τ_k, $k = 1, 2, \ldots, m$ represent technology-changing variables that determine the production function parameters according to

$$\log A = \alpha_0 + \sum_k \alpha_k \tau_k + \mu_0, \qquad k = 1, \ldots, m, \tag{4a}$$

$$\beta_i = \gamma_{i0} + \sum_k \gamma_{ik} \tau_k + \mu_i, \qquad i = 1, \ldots, n, \tag{4b}$$

where α and γ are fixed coefficients, μ_0 is a random variable distributed independently of x_i and τ_k, and μ_i are random variables independent of the τ_k with mean zero and a finite positive semidefinite covariance matrix. Thus, β_i here represents a variable elasticity of output with respect to each of the input variables x. The technology-changing variables τ determine the production elasticities and are taken by the decision makers as parameters for the current production period. Expressing equation (4) in logs we obtain the convenient econometric model:

$$\log y = \alpha_0 + \sum_k \alpha_k \tau_k + \sum_i \gamma_{io} \log x_i + \sum_i \sum_k \gamma_{ik} \tau_k \log x_i + \sum_i \mu_i \log x_i + \mu_0 \tag{5}$$

It is clear from this expression that the derivative of this expression with respect to τ_k may be referred to as the productivity elasticity of technology-changing variable k if τ is measured in logs. Technology-changing variables of particular interest are those related to the quality of the natural and human resource endowments and those that serve as incentives for innovation and adoption of new technology. Using the production function approach we measure total factor productivity (TFP) as

$$\mathrm{TFP} = \log(y_t / y_{t-1}) - \sum_i \beta_i \cdot \log(x_{it} / x_{it-1}), \tag{6}$$

Where $\beta_i \cdot$ are evaluated at the means of the technology-changing variables by country. We now turn to a description of how these two models were applied to the issue of measuring agricultural productivity.

III. RESULTS

We have used these two approaches to examine productivity changes in the agricultural sectors of 18 LDCs. This set of countries includes a wide range of geographic locations, income levels, and agricultural policies. The data cover the period 1961–1985 (Elisiana et al., 1993) and consist fundamentally of one output ($y = 1$, aggregate agricultural output in millions of 1980 "international" dollars[2]) and

---

[2] "International" dollars are obtained by Food and Agriculture Organization (FAO) using the Geary-Khamis (see Elisiana et al., 1993) price index with the purpose of aggregating agricultural products for international comparison. The international average prices of agricultural commodities are determined simultaneously with the exchange rates of the national currencies in such a manner that the calculated exchange rates equalize the purchasing power of national currencies with respect to the defined groups of commodities.

five inputs ($x = 1, \ldots, 5$: land, labor, fertilizer, machinery, and livestock[3]). These are the same conceptual variables as used in the Hayami and Ruttan (1970) series of studies, though the present data include different estimates of several variables, a different set of countries, a longer time span, and annual observations.

For estimation of the production function in (5), these data are augmented by a vector of technology changing variables.[4] The Peterson index of land quality (a constant for each country) was assumed to change land production elasticity. Average schooling (measured as the primary school enrollment ratio) was assumed to change labor production elasticity. We constructed a measure of agricultural research stock from annual research expenditures, using a 5-year inverted-V lag, which we assumed to change all production elasticities.[5] Finally, to allow for the possibility that price expectations as formed by past prices might have had an impact on technology for a given year, we introduced 5-year moving averages of past output price, past wages, and past fertilizer price. We assumed that output prices could affect all production elasticities, while the past wage could affect labor elasticity and past fertilizer price could affect fertilizer elasticity.

The Malmquist index was estimated using the approach of Färe et al. (1994) by means of solving some 1500 linear programming problems to estimate the necessary distance functions, imposing constant returns to scale. These distances were used to calculate the Malmquist index of productivity change, the efficiency change index, and the technical change index using equation (3), for each successive pair of years for each country.[6]

To estimate the meta production function (Fulginiti and Perrin, 1993), we pooled all countries and years to estimate equation (5). This pool gave a total of 410 observations, estimated using ordinary least squares. The Breusch-Pagan (1979) test for heteroskedastic errors indicated that the null hypothesis of homoskedasticity could not be rejected at the 5% significance level. Table 1 details the estimates of the 22 parameters, 12 of which were significant at the 1% level, 2 at the 5% level, and 2 at the 10% level. R^2 for the equation was 0.94, and the collinearity diagnostics of Belsley et al. (1980) indicate an absence of multicollinearity.

In Table 2 we show for each country the average rate of output change, the average nominal protection rate, and both the Malmquist and the production function productivity measures. The cross-country average rate of productivity change (last row) implies an annual productivity decline of 1.6% using the Malmquist approach, or 1.4% using the production function. These rates of decline are faster than the 0.25% annual decline estimated by Lau and Yotopoulus (1989) for 1970–1980, but very close to the 1.5% per year for 1960–1980 estimated by Kawagoe et al. (1985).[7] Focusing on just these averages, one might conclude that our estimates of productivity change are fairly robust with respect to method of measurement.

However, these consistent average rates mask substantial inconsistencies from country to country. By the Malmquist measure, eight of the countries achieved a net productivity

---

[3] Land: thousands of hectares of arable and permanent cropland and permanent pastures. Livestock: number of cow equivalent livestock units as calculated by Hayami and Ruttan (1970). Machinery: agricultural tractors and garden tractors (FAO) in thousands of horsepower units, aggregated according to Hayami and Ruttan's procedures. Fertilizer: the sum of nitrogen, potash, and phosphate content of various fertilizers consumed, measured in thousands of metric tons in nutrient units. Labor: thousands of participants in the economically active population in agriculture.

[4] These variables are documented in Elisiana et al. (1993).

[5] As is reported in Fulginiti and Perrin (1993), other lags were also used, and further discussion may be found there. The shorter the lag, the more positive the coefficient for this variable, and only for periods of less than 5 years was the coefficient positive. Estimates of other coefficients were robust to these different specifications. Possible reasons for the shorter lags are that the price expectation variables are proxies for innovative activity, thus crowding out the impact of the research stock variable, or that the adaptive nature of agricultural research in developing countries exhibits a shorter gestation and implementation period. An alternative research stock variable considered was scientific man-years of government agricultural research, which yielded positive and significant coefficient estimates, but still smaller than those found for other intercountry studies.

[6] Details on these calculations, Farrell efficiency measures, scale change, and Malmquist indexes by subperiods can be found in Fulginiti and Perrin (1997).

[7] Recently, work by Trueblood (1996) based on the Malmquist index has confirmed the negative productivity growth found for developing countries in this study. However, his study includes a different set of countries and a different dataset. Work by Lusigi and Thirtle (1997) on African agriculture shows positive rates of growth in agriculture. They include most African countries, whereas we include only four whose productivity performances were poor relative to the heterogeneous group of countries in our study.

TABLE 1
Least Squares Estimates of Equation (3), 18 Countries[a]

	Inputs					Intercept
	Land	**Livestock**	**Machinery**	**Fertilizer**	**Labor**	(α_o, α_k)
Linear terms (γ_{io})	0.040	0.146	0.173	0.093	0.838	−1.964
	(0.083)	(0.114)	(0.061)	(0.051)	(0.093)	(0.652)
Past output price (γ_{i1})	0.527	−0.554	0.064	−0.019	0.231	−2.266
	(0.044)	(0.054)	(0.030)	(0.024)	(0.048)	(0.336)
Past wages (γ_{i2})					−0.011	
					(0.003)	
Past fertilizer price (γ_{i3})				0.006		
				(0.006)		
Research (γ_{i4})	0.011	0.041	0.005	0.022	−0.140	0.523
	(0.016)	(0.022)	(0.013)	(0.009)	(0.017)	(0.119)
Land quality (γ_{i5})	0.054					
	(0.007)					
Schooling (γ_{i6})					0.040	
					(0.009)	

Notes: Based on 410 observations during the years 1961–1985. Standard errors are in parentheses.

gain for the period, while by the production function measure only four did, and two of these four had negative Malmquist measures. These discrepancies in sign would not be of concern if productivity measures are near zero, but that is not the case for Portugal and Zambia, which registered declines in excess of 2% using the production function, but increases using the Malmquist index. Exploring the relationship between these measures further, a simple ordinary least squares regression of the Malmquist measure for each country on the corresponding production function measure yielded an intercept of 0.18 (t-ratio = 0.4 against the null of zero intercept) and a slope of 0.81 (t-ratio of 0.4 for the null hypothesis that slope equals unity), with an F value of 3.5 (just significant at the 8% level). These comparisons do not inspire much confidence that the parametric and nonparametric approaches are measuring the same phenomenon, although they offer some support for the hypothesis.

Two types of evidence are available for considering the effects of price policies on productivity. In the production function estimation reported in Table 1, eight price policy coefficients are estimated, of which six are significantly different from zero at the 1% level. The productivity elasticity of past output prices (obtained by evaluating the differential of equation (5) with respect to past output prices at average values of all other variables) is 0.16, indicating that a 1% increase in past output prices shifts the production function up by 0.16%. The productivity elasticity of past wage increases is −0.011, and that of fertilizer prices is positive but small and statistically insignificant. These results are more consistent with the Schmookler-style hypothesis that good times stimulate innovation, than with the Hicksian-style hypothesis that good times stimulate a noninnovating satisficing type of behavior. Thus, the evidence from the production function strongly supports the hypothesis that favorable prices stimulate innovation.[8]

The other evidence pertaining to the effect of policies on productivity is the relationship between productivity and the nominal protection rate (NPR) for agriculture. The NPR is the ratio of domestic price to border price (minus one), and is thus a measure of the level of

---

[8] Details on these and other results can be found in Fulginiti and Perrin (1993). This paper's main contribution is the estimation of productivity elasticities that establish the long-run impact of price policies on productivity.

TABLE 2

Output Growth, Nominal Protection Rate, and Average Annual Productivity Change, 1961–1985

Country	Rate of Output Change	Nominal Protection Rate	Malmquist Index			Production Function Productivity
			Tech Change	Efficiency	Productivity	
Argentina	1.87	–40	0.952	1.000	0.952	0.994
Brazil	3.70	–13	0.984	1.011	0.995	0.973
Chile	1.54	–25	0.997	1.014	1.011	1.008
Colombia	2.74	–33	0.978	1.023	1.000	1.015
Dominican Rep.	2.46	–40	0.973	1.033	1.010	0.989
Egypt	2.55	–53	1.009	1.000	1.009	0.997
Ghana	0.52	–24	0.976	0.974	0.951	0.992
Ivory Coast	4.36	–53	0.943	0.991	0.934	0.986
Korea	3.82	16	0.925	1.000	0.925	0.957
Malaysia	3.13	–18	0.992	1.012	1.004	0.984
Morocco	2.89	–34	0.984	1.016	0.999	1.010
Pakistan	3.68	–47	0.977	0.988	0.965	0.971
Philippines	3.70	–32	0.981	1.016	0.997	1.001
Portugal	–0.73	–18	1.006	1.002	1.007	0.974
Sri Lanka	2.04	–49	1.003	1.000	1.003	0.988
Thailand	4.39	–41	0.964	0.973	0.938	0.963
Turkey	2.84	–36	1.001	1.022	1.023	0.976
Zambia	1.72	–53	0.976	1.024	0.999	0.977
Geometric ave	2.62	–35	0.979	1.005	0.984	0.986

[a] Nominal protection rate = (domestic price/border price) – 1.

protection of domestic agricultural prices. Table 2 shows that these rates were negative for all these countries except Korea, indicating taxation of agriculture, at an average rate of 35%. Table 3 shows that the average measures of productivity are indeed lower for countries with higher taxation levels. The exception is Korea, the only one of these countries to have subsidized its agriculture, yet its productivity rate was –7.5 (Malmquist) or –4.3 (production function). Korea illustrates a problem for productivity measurement, in that the number of tractors there rose from just over a thousand in 1961 to three million by 1985, an annualized rate of increase of 25% per year over the period. Measurement of productivity change requires estimation of marginal productivities, and it is difficult to estimate a production relationship that accurately represents marginal product over such a wide range of input level. It seems likely that our estimated production function overestimates the marginal productivity of tractors in the later years. In any case, the imputed change in output resulting from this increase in tractors, measured by either of our techniques, is sufficiently large that the imputed increases in output exceed the actual output increase of 4%, leaving a residual measure of negative productivity gains.

IV. CONCLUSIONS

This paper explores whether price policies may have affected agricultural productivity in a set of 18 developing countries during 1961–1985. We have used both a parametric method and a nonparametric method of measuring productivity gains, and both methods confirmed previous findings that, on average, agricultural productivity seems to have declined in these

TABLE 3
Average Rate of Productivity Change by Level of Taxation

Level of Taxation	Malmquist Productivity	Production Function Productivity
High: 40–53% (Dominican Rep., Argentina, Thailand, Pakistan, Sri Lanka, Zambia, Ivory Coast, Egypt)	-2.4	-1.7
Low: 13–36% (Brazil, Portugal, Malaysia, Ghana, Chile, Philippines, Colombia, Morocco, Turkey)	-0.1	-0.7
Subsidy (Korea)	-7.5	-4.3

countries. While the two methods yielded similar average rates of productivity losses, the results differed considerably for some countries, depending on the method. The country that recorded the poorest Malmquist productivity performance, -.75% per year (Korea), recorded one of the highest rates of output increase, 3.8% per year.

These somewhat inconsistent results reveal the shortcomings of productivity measurement during periods of rapid technological change, where quantity data, but not price data, are available for analysis. Clearly, there is opportunity for further exploration and development of alternative productivity measurement techniques for these circumstances.

Despite these inconsistencies in productivity measurement, we found two types of evidence that productivity gains were enhanced by higher output prices and/or lower input prices. First, we observed that productivity performance was, in general, better among those countries that taxed agriculture the least (as measured by nominal protection rates), and we found that the estimated productivity of inputs increased following periods of higher output prices. These results suggest that technological innovation is stimulated by relative prosperity in agriculture, consistent with the Schmookler hypothesis and contrary to the implications of Hicks's "quiet life" hypothesis.

REFERENCES

Belsley, D. A., E. Kuh, and R. E. Welsch, *Regression Diagnostics*, John Wiley, New York, 1980.

Breusch, T. S., and A. R. Pagan, "A Simple Test for Heteroscedasticity and Random Coefficient Variation," *Econometrica*, *47*, 1979, 1287–1294.

Capalbo, S. M., and J. M. Antle, "Introduction and Overview," in *Agricultural Productivity: Measurement and Explanation*, S. M. Capalbo and J. M. Antle, eds., Resources for the Future, Washington, D.C., 1988.

Caves, D., L. Christensen, and D. Diewert, "The Economic Theory of Index Numbers and the Measurement of Input, Output, and Productivity," *Econometrica*, *50*, 1982, 1393–1414.

Elisiana, J., L. Fulginiti, and R. Perrin, Aggregate Agricultural Inputs and Outputs in Developing Countries: A Data Set, Technical Report 93-TR 28, Center for Agricultural and Rural Development, Iowa State University, Ames, 1993.

Färe, R., S. Grosskopf, M. Norris, and Z. Zhang, "Productivity Growth, Technical Progress, and Efficiency Change in Industrialized Countries," *American Economic Review*, *84*, 1994, 66–83.

Fulginiti, L., "Price Conditional Technology," *Journal of Agricultural and Resource Economics*, *19*, 1994, 161–172.

Fulginiti, L., and R. Perrin, "Prices and Productivity in Agriculture," *Review of Economics and Statistics*, *75*, 1993, 471–482.

______, "LDC Agriculture: Non-parametric Malmquist Productivity Indexes," *Journal of Development Economics*, *58*, 1997, 373–390.

Hayami, Y., and V. Ruttan, "Agricultural Productivity Differences among Countries," *American Economic Review*, *40*, 1970, 895–911.

Hicks, J., "Annual Survey of Economic Theory: Monopoly," *Econometrica*, *3*, 1935, 1–20.

Kawagoe,T., Y. Hayami, and V. Ruttan, "The Intercountry Agricultural Production Function and Productivity Differences among Countries," *Journal of Development Economics*, *19*, 1985, 113–132.

Lau, L., and P. Yotopoulos, "The Meta-Production Function Approach to Technological Change in World Agriculture," *Journal of Development Economics*, *31*, 1989, 241–269.

Lusigi, A., and C. Thirtle, "Total Factor Productivity and the Effects of R&D in African Agriculture," *Journal of International Development*, *9*, 1997, 529 538.

Schmookler, J., *Invention and Economic Growth*, Harvard University Press, Cambridge, Mass., 1966.

Trueblood, M., "An intercountry Comparison of Agricultural Efficiency and Productivity," Ph.D. dissertation, University of Minnesota, 1996.

World Bank, *World Development Report*, Oxford University Press, Oxford, 1988.