AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

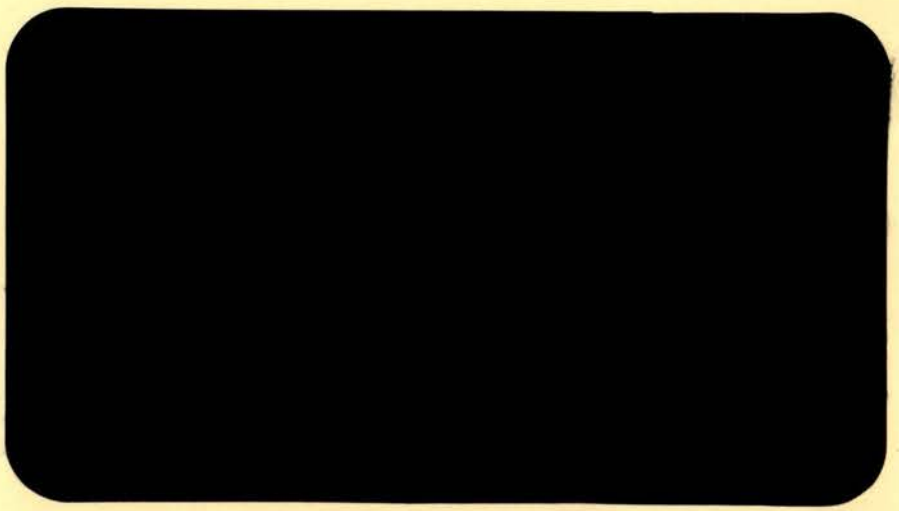
*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

EGYPT-
AGRICULTURE
C

1981

UNIVERSITY OF CALIFORNIA
DAVIS
AUG 2 6 1981
Agricultural Economics Library

UCD Department of Agricultural Economics



WORKING PAPER SERIES

University of California, Davis
Department of Agricultural Economics

Working papers are circulated by the authors without formal review. They should not be quoted without their permission. All inquiries should be addressed to the authors, Department of Agricultural Economics, University of California, Davis, California 95616.

Rural Wages and Agricultural Planning: The Case of Egypt

by

Alan Richards and Philip Martin

Working Paper No. 81-4

Rural Wages and Agricultural Planning: The Case of Egypt

Introduction

Do sharp increases in real wages for farm workers reflect increased demands for farm labor, decreased worker availability, or both? How long will such increases persist? The answers have important implications for agricultural planning in developing countries (e.g., how much scarce foreign exchange should be used to purchase labor-saving machines), especially in countries experiencing substantial migration of labor from agriculture.

One of the most striking examples of rising rural wages occurred in Egypt since 1973/74. Although real wages have increased slowly since 1938, the post-1973/74 rise is unprecedented (Figure 1). Such a rise is especially striking for a country with less than 0.08 ha. of cultivated land per capita. Egypt's agricultural authorities argue that increased labor demands and reduced labor supplies justify heavily subsidized mechanization efforts. The U.S. contributed $5.3 billion to Egypt since 1975 in "the largest, most ambitious [aid] program undertaken by the U.S. since the Marshall Plan that helped Western Europe recover from World War II," (New York Times, 1981), making the proper subsidy policy of considerable interest to U.S. and Egyptian policymakers. Lessons from Egypt may influence other donor-recipient arrangements as well.

Egyptian planners argue with increasing vigor that a severe "labor shortage" is impeding plans to diversify crop production and increase agricultural efficiency. However, there is little data and less consensus on the structure and functioning of rural labor markets because few labor surveys have been conducted since the mid-1960's (Nasrat and Goueli, 1977).

This paper reviews the labor shortage debate and its implications for Egyptian agricultural policy. We review labor demand changes that can be expected to result from shifts in the crop mix and technological changes in production. Data from a 1978/79 survey in Sharqiyya Governorate reinforce the hypothesis that rising real wages are the result of migration-induced supply changes. Since these supply changes reflect internal and external emigration of workers who may return, planners must be careful not to subsize "too many" irreversible changes that could aggrevate un- and underemployment if migration patterns were reversed.

Rising Real Wages

Important changes have occured in Egypt's rural labor markets. Debates over the importance of "surplus labor" dominated discussions in the 1960s. Today both farmers and local agricultural administrators complain of a "labor shortage." There is, indeed, evidence of tighter labor markets. We shall review the quantitative evidence, examine the qualitative evidence, and then turn to a discussion of changes in the demand for labor in agriculture.

Several real wage indices are available. The best and most comprehensive is that of Samir Radwan (1977), which stops in 1974. For more recent years we have used the series of Koval and Bahgat (1980), data that is virtually identical to the Ministry of Agriculture series. For the 1950s and 1960s a variety of other sources are also available [e.g., Hansen (1966); Abdel Fadil (1975)]. Although there are some minor differences, all of these indices show the same trend: an increase in real wages in the early 1950s, sharp fall in the mid-1950s, recovery to the mid-1960s, a second decline from roughly 1966 to 1973, and (most germane here) a dramatic upsurge after 1974. (See Tables 1 and 2 and Figure 1).

TABLE 1

MOVEMENT IN REAL WAGES IN RURAL EGYPT, 1938-74

(1938 = 100)

Average Daily

Year	Money wage		Cost-of-living index	Real wage index
	PT	Index		
1938	3.0	100	100	100
1939	3.5	117	101	116
1941	3.6	120	132	90
1942	5.0	167	198	83
1943	6.3	210	238	87
1944	9.3	310	262	117
1945	9.3	310	262	117
1946	9.5	317	297	107
1948	10.0	333	271	123
1949	10.0	333	259	130
1950	11.6	387	264	147
1951	12.6	420	263	160
1952	12.0	400	265	151
1953	12.0	400	269	150
1955	7.6	253	294	87
1956	10.0	333	342	97
1959	12.5	417	334	124
1960	12.5	417	337	123
1961	12.3	410	358	113
1962	14.0	450	367	122
1963	15.0	480	377	127
1964	19.0	609	438	138
1965	22.0	704	519	135
1966	25.0	801	468	170
1967	24.5	784	479	162
1968	24.5	784	499	156
1969	25.5	817	536	151
1970	25.0	801	576	138
1971	25.5	817	580	140
1972	27.5	880	613	143
1973	29.2	930	661	140
1974	32.2	1,001	792	125

Source: Samir Radwan (1977), 31.

TABLE 2

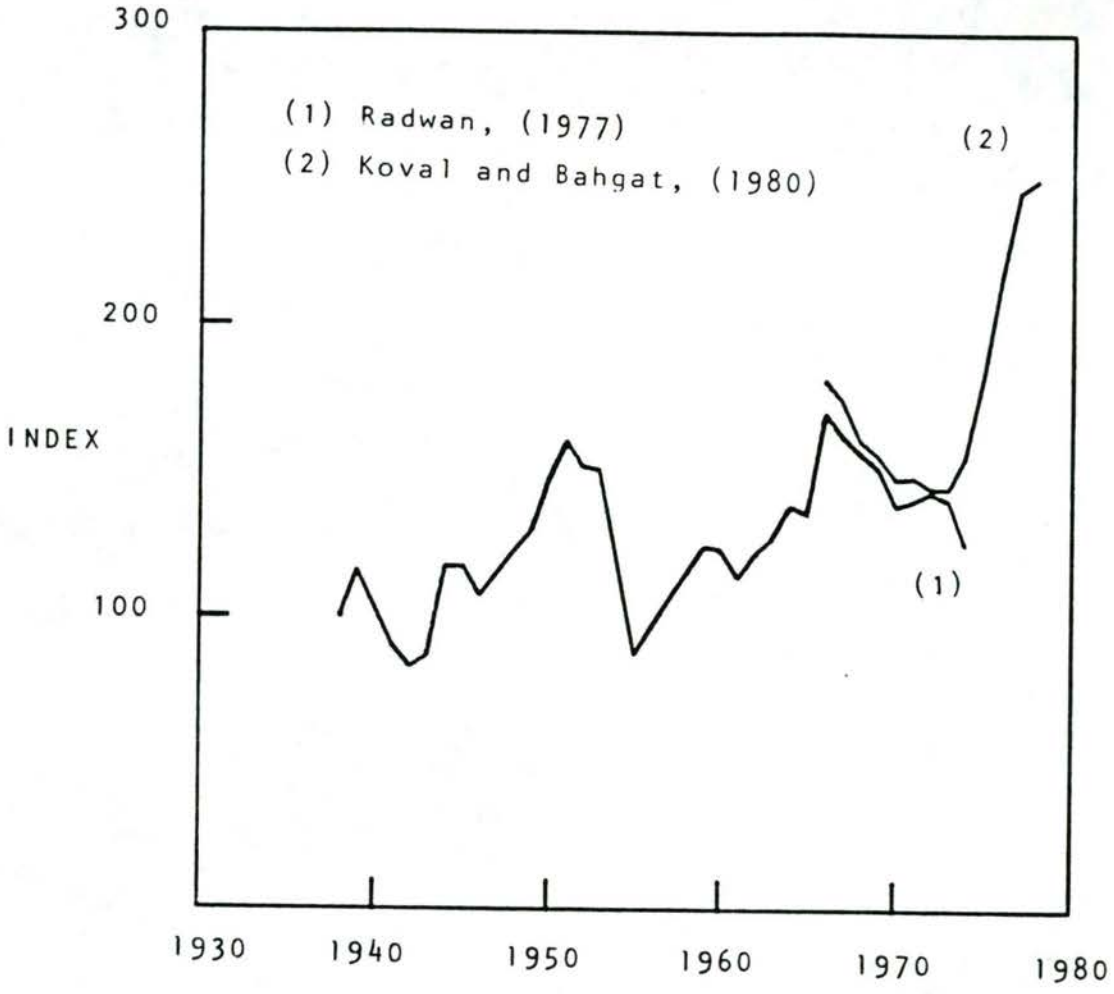
DAILY WAGE RATE IN RURAL EGYPT, 1966-1978

Year	AVERAGE DAILY Money Wage P.T.	Wage Index	Cost of Living/Rural Consumer Index	Real Wage Index
1966	25.5	850	468	181
1967	25.0	833	479	174
1968	24.0	800	499	160
1969	25.0	833	536	155
1970	25.5	850	576	147
1971	25.8	860	580	148
1972	26.5	883	613	144
1973	28.5	950	661	144
1974	35.1	1170	753	155
1975	46.5	1550	845	183
1976	61.6	2053	947	217
1977	76.0	2533	1039	246
1978	90.0	3000	1199	250

Source: Koval and Bahgat (1980), 7

FIGURE 1

INDICES OF RURAL REAL WAGES,
1938-1978



Both Radwan and Koval and Bahgat use Zaghloul's (1965) rural cost of living deflator, in which maize receives a weight of 45 percent of total consumption. A glance at Tables 1 and 2 will show that the two indices are identical until 1966: thereafter they diverge, for reasons still obscure. However, we are inclined to believe that the latter data set for 1974 are more accurate than Radwan's, primarily because 1974 was a watershed year for rural wages. The government offered public sector jobs to all veterans of the October War, and the migration of Egyptian workers abroad accelerated as oil revenues and development spending in the OPEC states increased the demand for Egyptian labor.

It should be noted that the overall trend in rural real wages from 1938 to 1974 is positive. Radwan's conclusion that "with the exception of a brief period in the late 1960's, the standard of living of agricultural laborers has more or less remained unchanged over the last 25 years" (Radwan, 1977, 31) must be rejected even if one accepts his calculation for the real wage in 1974 rather than the higher estimate of Koval and Bahgat. A simple regression of the real wage index on time for the 1938 to 1974 period yields the following:

INDEX = 102.92 + 1.468 YEAR (All coefficients significant at the 5 percent level): The real wage index increased by at least 1 percent, on average, every year. Radwan goes on to state that "the real wage index in 1974 decline(d) to the 1948 level" (Radwan, 1977, 31). Again, even accepting his rather low figure for 1974, and repeating the above procedure for the period 1948-1974, we obtain:

INDEX = 127.54 + .63652 YEAR, again significant at the 5 percent level. We may reject the hypothesis of no upward trend in rural real wages from 1948 to 1974.

Nevertheless, Radwan is correct to stress the slow growth of rural real wages before 1973/4. However, since 1973/4 rural real wages have increased at an annual rate of 11 percent, a sharp upward trend without historical precedent. Indeed the Ministry's estimates of money wages for adult males may be too low. For Sharqiyya Governorate, our sample survey reported a wage rate of LE 1.5 per day, compared to the official 0.9 L. E. (Richards and Martin, 1981) Zaghloul's deflator also seems quite reasonable--unless one believes that landless laborers' incomes (derived primarily from agricultural labor) have risen sufficiently to permit them to shift into more preferred food stuffs. Of course, such a shift is itself prime facie evidence of rising real wages and incomes. If one elects to use the rural consumer food price index, instead of Zaghloul's deflator, a similar result is obtained. From 1970/71 to 1978 the index increased at a compound annual rate of 11 percent. Money wages rose by 17 percent during that period.

There is no reason to suspect that the above figures overstate the growth of real wages. Indeed, such estimates may be considered lower-bounds because they are given as "L.E. per day." Agricultural workers now work from 8:00 A.M. to 2:00 P.M. instead of the "sunrise to sunset" pattern of earlier years. Such a short working day was first noted by Hanni Fakhouri in his anthropological study of Kafr Elow, a village within 5 km. of the industrial center of Helwan (Fakhouri, 1971). This short working day has spread throughout the country.

The available evidence suggests that rural real wages have grown very rapidly and are now at historically unprecedented levels. Despite the fact that the "labor shortage" complaint is too vague to be of any policy

relevance, it is clear that important changes in rural labor markets have occured.

Demand Changes

The explosion of real wage rates could be explained, grosso modo, by a change in the demand for labor or by changes in the conditions of labor supply. It is often suggested that increased cropping intensities and the shift of farmers into more labor intensive crops such as fruit and vegetables are the demand changes that increase rural wage rates.

To test this hypothesis, we constructed estimates for the total labor required to produce field crops from 1950 to 1978. We first assume unchanging labor input coefficients and then test different labor coefficients. We consider 1) whether the kind of technical change which has occurred is likely to have raised significantly the labor input required per feddan for the principal crops, and 2) whether the estimate overstates changes in the demand for hired labor.

These field crop estimates represent upper-bounds of any increase in the demand for labor, especially for hired labor. Since even this estimate of the extent of growth of the demand for labor does not seem large enough to account for observed increases in rural real wages, we conclude that the principal explanation for such wage rate changes lies on the labor-supply side.

The labor demand estimate is constructed as follows:

$$\text{Define} \quad L^K = \sum_{j=1}^{13} a_{oj} \, T_j^K$$

Where L^K = total quantity of (principal) field crop labor in year K,

a_{oj} = labor input per feddan for crop j,

T_j^K = total area planted in crop j in year K.

The labor input coefficients are shown in Table 3. The "original set" of coefficients, from the Ministry of Agriculture, were used by Amr Mohie El-Din, (Mohie El-Din, 1975). Since such aggregate coefficients may well contain serious errors and potential biases, two other sets are also presented. The resulting pattern of change L^K is shown in Figure 2.

Figures 1 and 2 will show that there is very little relationship between changes in labor demand and changes in real wages. This is true for all the labor input coefficients. Changes in cropping patterns have raised labor utilization 28 percent from 1952 to 1978, but 78 percent of this total change occurred by 1969. The increase in labor demand has been a gradual, fairly steady long-term trend, unlike the discontinuous trend of wages.

Increased seasonal bottlenecks, resulting from the need to transplant rice, plant maize, and harvest wheat in May, began in the mid-1960s after increased water supplies from the Aswan High Dam permitted the spread of rice cultivation and the shift in the planting date of the maize crop [El Tobgy (1976)]. While such a change may have contributed to the increase in real wages in the mid-1960s, there is no evidence that such "bottlenecks" vanished in the early 1970s, when real wages declined. There is little reason to suppose that either the aggregate or the seasonal demand for labor has shifted dramatically in the last decade. Demand-side forces do not appear to explain the post-1973 rise in rural wage rates.

Some Further Considerations

Our demand estimate may be biased because we assume that the labor input coefficients (a_{oj}'s) are stable over time. Input coefficient changes depend on the nature of technical change, although labor inputs do vary between regions and among different sized farms. We believe that there is no evidence

TABLE # 3

COMPARATIVE SETS OF LABOR COEFFICIENTS
(days per feddan)

CROP	ORIGINAL SET		LOW SET		HIGH SET	
	Men	Women, Children	Men	Women, Children	Men	Women, Children
COTTON	42	87	26.33 (c)	87	48.5 (d)	102 (d)
MAIZE	25	10	17.5 (e)	10	39.5 (b)	43.7 (b)
WHEAT	27	4	11.17 (c)	4	27	7.5 (d)
RICE	35	40	30 (d)	37.5 (e)	45 (e)	51.55 (b)
BIRSIM	15.625*	.5*	15.625*	.5*	44.33 (e)	26.8 (b)
MILLET	42	9	23 (e)	9	42	16 (e)
BEANS	19	5	17 (e)	1 (e)	19	5
BARLEY	18.25	3	10.75 (e)	1 (e)	18.25	3
SUGAR	98	31	55 (e)	31	98	59 (e)
LENTILS	21	2	12 (e)	1 (e)	21	2
ONIONS	33.5	70	33 (a)	70	36 (e)	80 (e)
VEGETABLES	60	-	60	-	66+ (d)	-
FRUIT	68	-	68	-	127++ (d)	-

* average; + tomatoes only; ++ oranges only.

Unless footnoted, figures are from Ministry of Agriculture, Department of Economics, Agricultural Economy, Vol. 15, No. 2, Cairo, February, 1964.

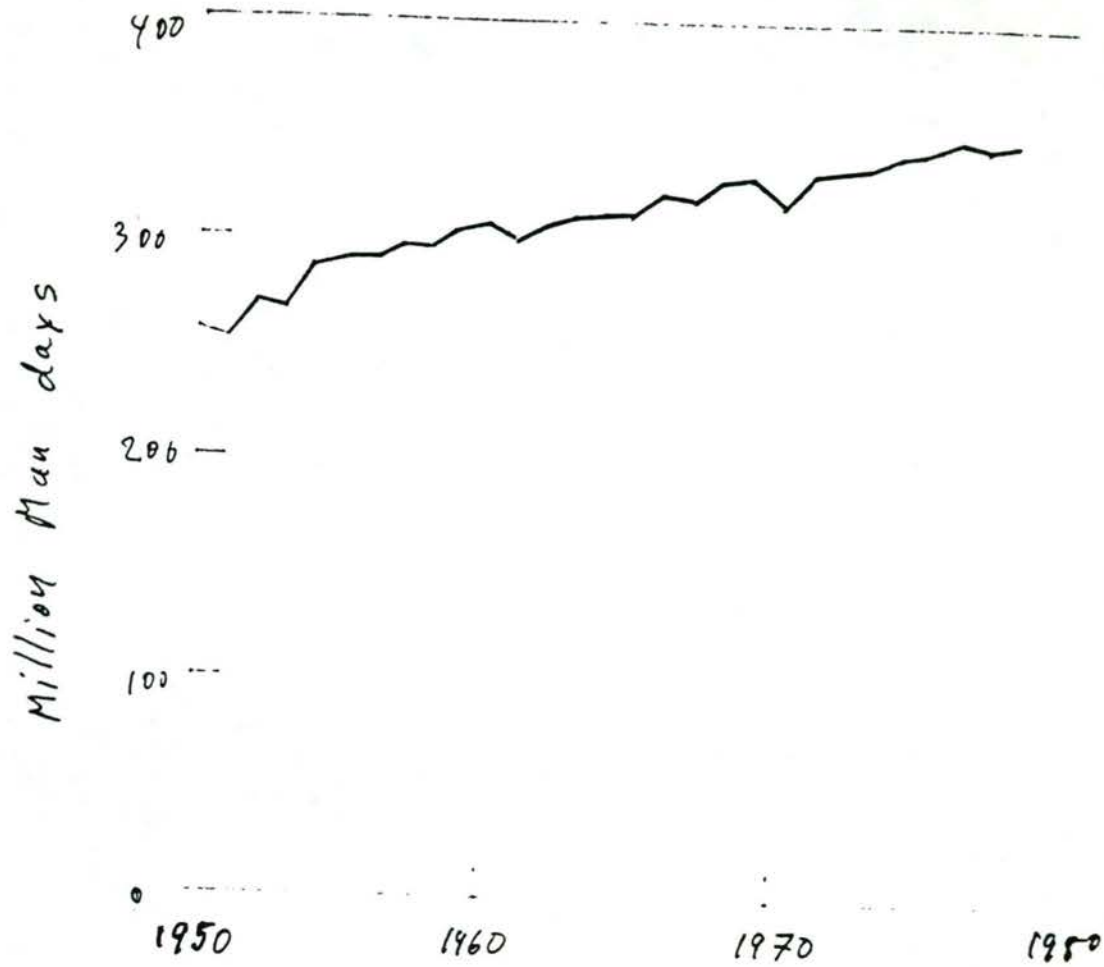
Other Sources:

a) L'Egypte Contemporaine, "Debate on Agricultural Mechanization," 331, Jan., 1968.
b) ERA 2000, Inc., Further Mechanization of Egyptian Agriculture, 1979.
c) Calculated from EWVMP, Quenemeon data.
d) IBRD, 1975. IBRD uses Ministry of Agriculture Data.
e) M.R. Ghonemy, Resource Utilization in Egyptian Agriculture, Ph.D. North Carolina State University, 1954.

FIGURE 2

ESTIMATED TOTAL CROP LABOR USE,

1950-1978



to show that more hired labor per feddan is required now than at the beginning of the 1970s.

Labor-using technical changes include increased fertilizer and water use and higher yields. Again, such changes were more important in the 1950s and especially in the 1960s than in the last decade. Crop yields have shown little increase from 1970 to 1980 despite the increased use of fertilizer. There has been little change in water supply, and the areas planted to high yield varieties (usually considered labor-using) remain low. On the other hand, it is widely agreed that farm mechanization proceeded fairly rapidly in the last decade: the number of tractors in Egypt rose from about 17,000 in 1970 to at least 26,000 in 1980. Land preparation is almost entirely mechanized in some Delta governorates, and small-grain threshers are spreading rapidly. Such changes clearly reduce the labor input per feddan per crop, unless there are large yield gains. There is little evidence that this has been the case in Egypt (Richards, 1981).

On balance, the assumption of relative stability in the labor input coefficients does not appear unreasonable. In particular, there is little reason to suppose that hired labor input per feddan per crop has increased sufficiently to drive rural wages upward.

Furthermore, our demand estimates are for all farm labor, both family and hired. As is well known (ILO, 1969), small farms rely on family members to do most of the work, although some hired labor is used even on the smallest farms. As Gabriel Saab (1961) notes with respect to the original land reforms of the 1950s, as more land is farmed by small farmers, ceteris paribus, the demand for hired labor declines, because family labor is substituted for hired

labor. Table 4 shows that a larger proportion of land is farmed in small units now than twenty years ago. It follows that the increase in the demand for hired labor has probably been even slower than the increase in the demand for total labor.

Mechanization, Migration, and Government Policy

If changes in the demand for labor cannot explain the rise of rural real wages, the explanation must lie on the supply side. Little research on changes in the conditions of rural labor supply has been completed, but the broad outlines of change are discernible. Migration, both internal and international, appears to be the fundamental force behind rising wages. Estimates of the number of Egyptians abroad range from 400,000 (Birks and Sinclair, 1980) to 1.5 million (Egyptian government estimate). Some 40 percent of the urban construction work force departed for the Gulf after 1974 (Choukri, Ecklaus, and Mohie El-Din, 1978). Since Egyptian construction accelerted at the same time, rural Egyptians have been "filling in" for experienced construction workers. The number of men in the armed forces has risen from 298,000 in 1973 to 395,000 in 1978 (Institute of Strategic Studies, 1979) and all veterans of the October War were given government jobs. Our own sample survey shows a markedly lower percentage of landless workers than did surveys conducted in the 1960s; it also contains other indirect indicators of out-migration (Richards and Martin, 1981). Migration appears to be the "exogenous shock" generating the sudden acceleration of rural wages.

The Egyptian government has responded to the changes in rural labor markets by promoting the diffusion of labor-saving tractors, threshers, and irrigation pumps. Two policies stand out. First, the government directly subsidizes mechanization: subsidies reduce the price of diesel fuel 19

TABLE 4

Size Distribution of Area Farmed, 1940, 1961, and 1975

SIZE	% AREA FARMED		
	1950	1961	1975
0-5 Feddans	23.2	37.8	65.9
5-50	37.7	40.7	33.3
50^{+} Feddans	39.1	21.5	1.8

Source: 1950, 1961: Abdel-Fadil (1975)
1975: Ministry of Agriculture

percent (Cuddihy 1980); the rate of interest on tractor loans has been reduced from 12 to 5 percent (in an economy with an inflation rate of at least 30 percent); most tractors were imported under the old, over-valued exchange rate; and agricultural machinery is exempted from import duties. Second, the government's price policies, which hold down farm prices, creates a "profit squeeze" for farmers as wages rise. The labor share of per acre variable costs has risen significantly for all of the major field crops since 1972. (Richards, 1981).

These policies may create serious long-run problems for the Egyptian economy, in addition to the usual efficiency distortions (Cuddihy, 1980). Most of Egypt's manual workers in the Oil States are construction laborers building infrastructure. Once such construction is completed, they will be sent home. Those that remain face increasingly sharp competition from South Asian and, especially, East Asian labor. (Birks and Sinclair, 1980; Richards and Martin, forthcoming). But returning Egyptians may find few farm jobs left. Experience suggests that mechanization is an irreversible phenomenon: once a farmer owns a tractor, the marginal costs of acquiring additional attachments is very low (Schultz, Cochrane).

Egyptian farmers use their tractors on average for ten years; they typically pay for them within one to three years after purchase (ERA 2000, 1978). For the remaining seven years, the cost of using tractors is the (subsidized) cost of fuel and amortization. Binswanger (1978) found that South Asian farmers considered tractors a consumer durable. Tractors provide transportation, status, and greatly improved working conditions for family members. Once Egyptian farmers have tractors, they are unlikely to hire more labor even if the return of migrants decreased wages.

Farm mechanization appears irreversible. Irreversibility is reinforced by learning effects, especially those that are "technique-specific" (David, 1975). In Figure 3, technique A is traditional technology, chosen at relative factor price level PP. If factor prices change to $P'P'$, farmers shift to technique B, e.g., to tractors. Suppose that the search for further improvements in the locality of a technique is random, i.e., any cost-saving innovation will be adopted, regardless of factor-bias (Salter, 1966). Then the cone around the process ray β is the zone of technological change. But once improvements have been pushed beyond C (after farmers learn how best to use their tractors, after they adopt additional implements), then a reversal of relative prices, a shift back to PP, will not induce a return to the old technique A.

Rising agricultural wages in Egypt have induced changes in agricultural technology, changes encouraged by government and international aid donors' plans. The subsidies encouraging labor-saving agricultural technology cannot be justified because of increased labor demands, since demand changes are not responsible for the principal indicator of a "labor shortage", rising real wages.

Labor supply conditions also fail to support these subsidy policies. Some 300,000 new jobs must be created every year just to provide jobs for normal additions to the labor force. Should large numbers of Egyptians return from abroad, the unemployment problem could become very serious. This is especially worrisome if, the returnees must be accommodated in the cities because irreversibile farm mechanization eliminated rural jobs. The strain on Egypt's already overburdened urban infrastructure would be severe (Waterbury, 1978). Egypt needs a flexible agricultural policy that can accomodate a

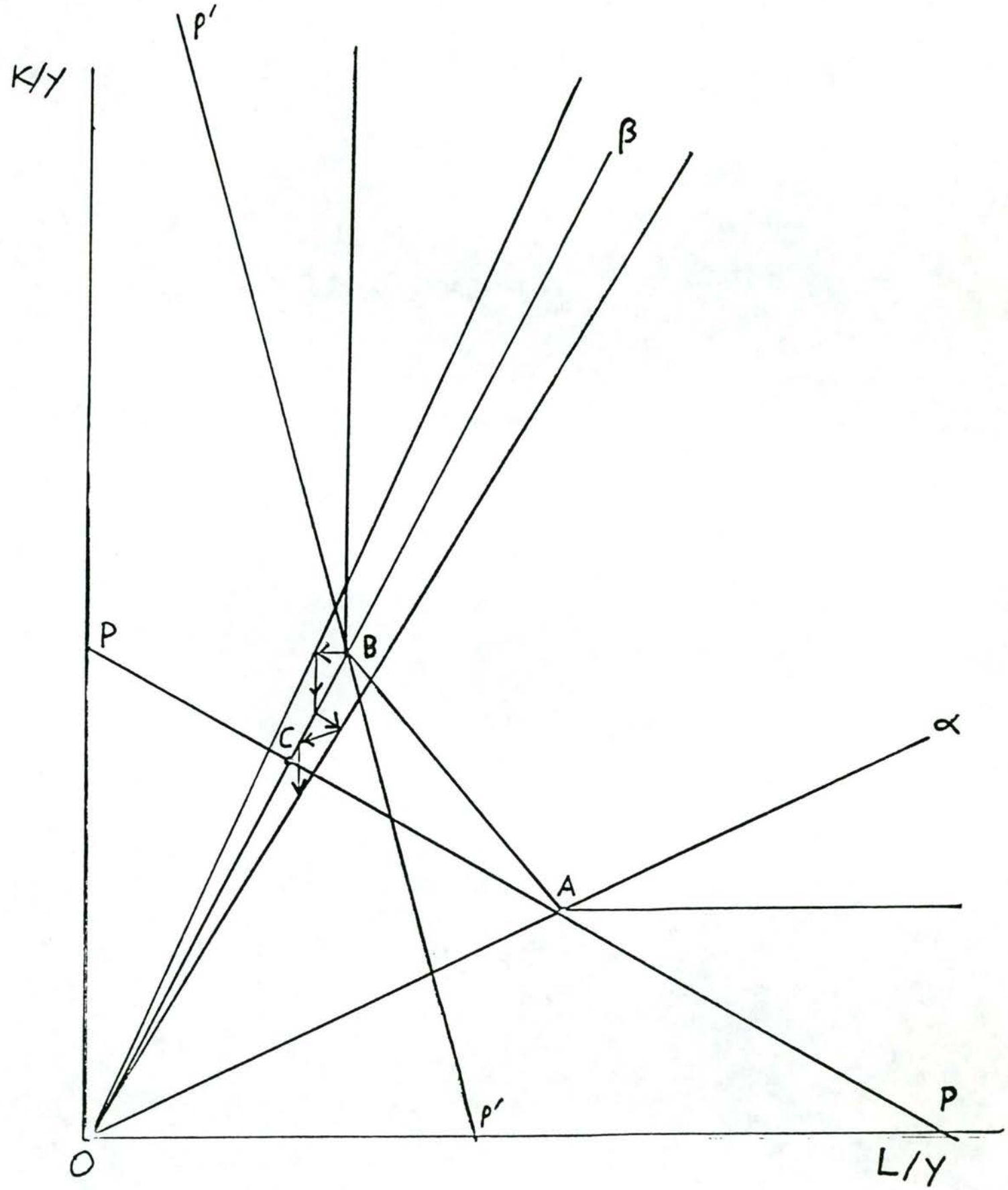


Figure 3: Localized Learning and Technical Irreversibility

return flow of migrants. It cannot assume that the current situation is permanent. Instead, government policy should be focused on the long-run shadow-prices of inputs.

REFERENCES

Abdel-Fadil, Mahmoud. Development, Income Distribution and Social Change in Rural Egypt, 1952-1970. Cambridge: Cambridge University Press, 1975.

Binswanger, Hans P. The Economics of Tractors in the Indian Subcontinent: An Analytical Review. Hyderabad: International Crops Research Institute for the Semi-Arid Tropics, 1977.

Birks, J.S. and C.A. Sinclair. International Migration and Development in the Arab Region. Geneva: International Labour Organization, 1980.

Choukri, N., R. Eckaus, A. Mohie El-Din. "Migration and Employment in the Construction Sector: Critical Factors in Egyptian Development." Cairo University-Massachusetts Institute of Technology, Technology Adaption Program, Cairo, 1978.

Cochrane, William. Farm Prices--Myth and Reality. Minneapolis: University of Minnesota Press, 1958.

Cuddihy, William. "Agricultural Price Management in Egypt." World Bank Staff Working Paper, No. 388. Washington, D.C.: 1980.

David, Paul. Technical Choice Innovation and Economic Growth. Cambridge: Cambridge University Press, 1975.

ERA 2000, Inc. Further Mechanization of Egyptian Agriculture. Gaithersburg, MD, U.S.A.I.D. Contract No. AID/NE-C-1513, 1978.

Fakhouri, Hana. Kafr Elow: An Egyptian Village in Transition. New York: Holt, Rinehart and Winston, 1972.

Hansen, Bent. "Marginal Productivity Wage Theory and Subsitence Wage Theory in Egyptian Agriculture", Journal of Development Studies, 4, (1966).

International Labor Organization. Rural Employment Problems in the U.A.R. (Egypt). Geneva: I.L.O., 1969.

Koval, Andrew J. and Ahmed Bahgat. "Ten Horsepower Agriculture." Paper presented to Symposium on "Appropriate Mechanization of Small Farms in Africa," Nairobi, Kenya, 1980.

Mohie El-Din, Amr. "Underemployment in Egyptian Agriculture," in Manpower and Employment in Arab Countries: Some Critical Issues. Geneva: I.L.O., 1975.

Nasrat, Mohiey Nasrat and Ahmad Goueli. "The Productivity of the Human Work Force in Traditional Agriculture with Special Reference to Egypt." Proceedings of the World Food Conference of 1976. Ames: Iowa State University Press, 1977.

Radwan, Samir. Agrarian Reform and Rural Poverty: Egypt, 1952-1975, Geneva: International Labor Organization, 1977.

Richards, Alan. "Agricultural Mechanization in Egypt: Hope and Fears." Forthcoming, International Journal of Middle Eastern Studies, 13, 4 (Nov, 1981).

Richards, Alan and Philip L. Martin. "The Laissez-faire Approach to International Labor Migration: The Case of the Arab Middle East." Economic Development and Cultural Change, Forthcoming.

Richards, Alan and Philip L. Martin. "Rural Social Structure and the Agricultural Labor Market: Sharqiyya Evidence and Policy Implications." University of California-Egyptian Ministry of Agriculture-U.S.A.I.D. Agricultural Development Systems Project Working Paper, May, 1981.

Saab, Gabriel. The Egyptian Agrarian Reform, 1952-1962. London: Oxford University Press, 1967.

Salter, W.E.G. Productivity and Technical Change. Second Edn. Cambridge: Cambridge University Press, 1966

Schultz, T. Paul. Agriculture in an Unstable Economy. (N.Y.: McGraw Hill, 1945).

Waterbury, John. Egypt: Burdens of the Past, Options for the Future. Bloomington and London: Indiana University Press, 1978.

Zaghloul, F. "A Cost-of-Living Index for Rural Laboxurers, 1913-1961." Egyptian Ministry of Planning, Institute of National Planning, Memo #557. Cairo, 1965.