TRANSFERENCE COSTS AND INTERSECTORAL MOBILITY: EXPLAINING INCOME DIFFERENTIALS AFFECTING THE AGRICULTURAL SECTOR

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ABSTRACT

The inhability of the agricultural sector to maintain the relative income level of the population devoted to the sector has been called the "farm problem" in the literature. The analytical work on the farm problem has been concentrated on the U.S. case. However, there is clear evidence that it also affects a broad set of LDC's, in which high income differentials exist between agriculture and non-agricultural sectors. None of the various intented explanations for these factor return differentials has been fully satisfactory. Here, a new explanation is proposed, which emphasizes general equilibrium dynamic forces rather than partial equilibrium, thus giving insights into the short and long-run resource adjustment mechanisms. It is shown that high intersectoral transference costs of agricultural resources, are a key issue in understanding the farm problem. They explain not only the sluggish adjustment of factor return differentials, but also the persistence of factor return disparities across sectors even in the long-run.

SÍNTESIS

La incapacidad del sector agrícola para mantener el nivel de ingreso relativo de la población que participa en este sector ha sido denominado en la literatura *farm problem*. El trabajo analítico sobre este problema se ha concentrado en el caso de los Estados Unidos. Sin embargo, hay evidencia clara de que también afecta a un amplio conjunto de países en desarrollo, en los que existen altas diferencias de ingreso entre los sectores agrícolas y no agrícolas. Ninguna de las diversas explicaciones propuestas para estos diferenciales de retorno a los factores ha sido totalmente satisfactoria. En este trabajo, se propone una nueva explicación que enfatiza las fuerzas dinámicas de equilibrio general en vez de equilibrio parcial, arrojando así luz sobre los mecanismos de ajuste de los recursos de corto y largo plazo. Se muestra que los altos costos de transferencia intersectorial de los recursos agrícolas son un factor fundamental para entender el *farm problem*, pues explican no sólo el muy lento ajuste de los diferenciales de retorno a los factores, sino también la persistencia de las disparidades de retorno a los factores entre sectores, incluso en el largo plazo.

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1. INTRODUCTION[1]

The farm problem may be defined as the inability of the agricultural sector to maintain the relative income level of the population devoted to the sector, as growth in conjunction with a declining share of the sector in the economy takes place.[2] Low incomes of the agricultural population are caused by persistently lower rates of return to production assets in the agricultural sector, compared with the returns to similar factors employed in other sectors of the economy.

Even when there is evidence of differential factor returns between agriculture and non-agriculture since early in this century, the most relevant empirical evidence in the US, and the one that originated the interest on the farm problem, corresponds to the period between the late 1940's and the late 1960's (Table 1). In those years returns to labor in agriculture and to agricultural production assets were substantially below those obtained in alternative uses (Tweeten, 1979; Gardner, 1969; Hottel and Gardner, 1983; Kost, 1968, Melichar, 1979, and Frey and Hexem, 1984).

Each one of the various avenues attempting to explain the farm problem has had some appealing theoretical or empirical elements in it, but none of them has given a wholly satisfactory answer (Cochrane, 1958; Shultz, 1945; Tweeten, 1978; Johnson and Quance, 1972, Marion et al., 1979). The analytical work on the farm problem has been concentrated on the US case. There is clear evidence that the farm problem also affects a broad set of countries in their developing stages, in which high income differentials exist between the agricultural and non-

* *Estudios de Economía*, publicación del Departamento de Economía de la Facultad de Ciencias Económicas y Administrativas de la Universidad de Chile, vol. 21, N°2, diciembre 1994.

[1] The authors would like to thank M. Fulginiti, Mario Nitklischek and two anonymous referees for their useful comments.

[2] See Gardner (1992) for a compherensive and illuminating discussion about the definition, nature and causes of the farm problem.

agricultural sectors (see Mundlak, 1979, for Japan, 70 countries for 1960-1970 and 17 OECD countries for 1950-1970), or where at least there is evidence that labor returns in agriculture are much lower than in non-agriculture sectors (see Cavallo and Mundlak, 1982 for Argentina and Youmans and Schuh, 1968 for Brazil).

TABLE 1

USA: PER CAPITA PERSONAL DISPOSABLE INCOME OF FARM AND NON-FARM POPULATION, SELECTED YEARS

Year	Farm	Non-Farm	Farm as % of Non-Farm
	($)	($)	(%)
1947	726	1268	57.3
1950	802	1462	54.9
1953	868	1682	51.6
1956	830	1855	44.7
1959	930	2003	46.4
1962	1201	2145	56.0
1965	1606	2505	64.1
1968	1978	3010	65.7
1971	2640	3667	72.0
1974	4162	4691	88.7
1977	5199	5989	86.8
1980	6511	8073	80.7

Original data: Indicators of the Farm Sector; USDA, Washington, D.C..
Source: Vasavada (1984), p.132.

A consistent theory concerning the sources of return differentials between agriculture and non-agriculture requires considering the following aspects: First, it is necessary to characterize the intra and intersectoral relations determining mobility and returns to factors. Second, it is necessary to explicitly recognize the relative nature of the phenomenon (the farm problem is not one of low returns to factors in agriculture relative to factors returns in the rest of the economy). Third, the linkages between the returns-to-factors differentials and the dynamic adjustment of a shrinking agricultural sector need to be considered.

Recent evidence shows that the farm problem as it was originally conceived substantially decreased in the USA during the last two decades, and income differentials between the agricultural and the urban population of the 1950's and

1960's have vanished. The evidence of the continuous increase in the ratio of farm to non-farm income after the 1960's leads Gardner (1992) to conclude that it is hard to maintain any longer that a sector-wide farm income problem exists. Johnson (1977) suggests that the relative improvement of farmers' income since the 1960's is mainly due to the increase of non-farm earnings. In 1947 only 25 percent of the agricultural population's total income was non-farm income, in 1980 the proportion rose to about 61 percent. Booth (1969) shows that over a seven-year period (1960-1967) farms with sales of US$2.500-10.000 switched their income dependence from farm to non-farm income. In 1967, noncommercial farms (sales less than US$2.500) made more than twice as much as in 1960 with respect to its non-farm income. He argues that "it is very clear that those two groups, comprising over 2 million farms are no longer primarily engaged in farming...in the whole of farming, non-farm sources of income are just as important as farm sources" (p.428). Tweeten (1979) shows that farmers receive the majority of their net income, 61 percent in 1977, from off-farm sources and that the proportion is growing. Off-farm income accounted for 68 percent of the growth in total net income of farmers between 1970 and 1977. These findings indicate that even if agricultural assets earned low returns, those could be offset by earnings from non-farm sources.

Even when this evidence suggests that the farm problem in the US is not any longer a socially or politically striking problem, it still represents a great challenge as an unexplained phenomenon, as well as a fertile field that could produce interesting theoretical tools and useful policy implications for less developed countries which are now experiencing a similar phenomenon. In this paper, we propose a new explanation, which, in contrast with most previous analyses of the problem, emphasizes general equilibrium dynamic rather than partial equilibrium forces, thus giving certain insights into the short and long run adjustment mechanisms of resources.

It is shown that high intersectoral transference costs of resources from agriculture to other sectors are a key issue in understanding the farm problem. This phenomenon explains not only a sluggish adjustment of factor return differentials, but also the persistence of factor return disparities between sectors even in long run equilibrium (i.e., when the intersectoral flow of resources has stopped). Furthermore, it is also shown that there exists an inverse correlation between the age of an industry and the returns to factors employed in that industry. Since agriculture is one of the oldest sectors and ultimately the originator of most factors, an implication of this is the tendency to exhibit lower factor returns even in the long-run. Finally, the implications of high intra and intersectoral resource transfer costs are consistent with other stylized facts such as inelastic agricultural supply responses and short-run instability of agriculture.

2. THE COSTS OF MOVING RESOURCES: TRANSFERENCE COSTS

Moving resources from their current occupation to a new one implies transference costs, which are made up of transportation costs, transaction costs and transformation costs. Transformation costs are those expenses required to physically transform a resource to make it suitable to its new use. In what follows we discuss the sources of intra and intersectoral transference costs and explore their relevance in explaining the farm problem.

The degree of specificity of a given resource to any particular use, determines its transformation costs of transferring it from one use to another. The required transformation costs to transfer a non-specific durable good such as a desk from the agricultural sector to the manufacturing industry or to the service sector of the economy will be close to zero. But in transferring a refrigeration equipment, the transformation costs will probably be higher. Transformation costs can be even higher for a cotton picker or irrigation facilities. The current use been given to a resource will determine its transference costs, and therefore its ability to be transferred to alternative uses within the sector or to other sectors of the economy. Transference costs may approach infinite for certain assets, in which case they will be unmovable from their current uses. A sector that uses mostly specific resources with high transference costs will in general have less room to adjust to exogenous shocks and the process of adjustment in factors returns will tend to be very sluggish.

Work in information and search theory shows that all resources exhibit transference costs, which can be directly attributed to resource positioning and transaction costs (Stigler, 1961; Akerlof, 1970). It is tempting to assimilate the kind of adjustment costs we are talking about here to the adjustment costs of the modern theory of investment (Eisner and Strotz, 1963; Lucas, 1967; Morterson, 1973). However, a fundamental difference is that transference costs are, in a general sense, external to the firm, while the adjustment costs of the flexible accelerator theory are internal to the firm.

A resource in agriculture can be expanded by only three possible mechanisms: 1) transferring resources being used in other sectors of the economy, 2) acquiring new resources from domestic capital goods producers and, 3) acquiring imported resources from outside the economy. Similarly, the level of a resource available in agriculture can be contracted by only two means: 1) transference to other sectors in the economy or, 2) depreciation. Exporting the resource to an external economy could also be considered, but for labor and land, which are our main concern here, such a mechanism is not relevant, even when it could be of some importance for financial capital.

In a world of certainty, transference of resources are minimal. With a complete knowledge of the future, the investors can always allocate resources in a way that the present value of the future returns of a resource is the same at any of its uses in the economy, and at any moment in time. Since transference of resources is costly, profit maximization implies that any fresh resource coming into the economy will be optimally allocated immediately, minimizing future reallocations, i.e., minimizing the costs of transferring resources later. When an unexpected shock occurs, the producer has to consider a possible expansion or contraction. The relation between the acquisition price of the resource he needs for expanding and the present value of the expected flow of its value marginal product (PVVMP) is the relevant information for his decision.

3. FACTOR RETURNS DIFFERENTIALS AND TRANSFERENCE COSTS

Transference costs explain differentials in the returns to an asset in different sectors of the economy (or within a sector) not only in the short-run, but also in the long-run. Consider an economy with two sectors: the agricultural sector (A) and a non-agricultural sector (N). If transference costs do not exist, whenever an unexpected shock occurs, resources will immediately move to their best alternative use, which will be the ones where their PVVMP are the highest. The present value of the future stream of value marginal product of any factor will always be the same at both sectors. This corresponds to the extreme version of the neoclassical allocation analysis where all resources can be effectively considered as financial assets.

Assume now that transference costs do exist and that the economy is in a long-run equilibrium in the neoclassical sense, i.e., all resources are actually at their desired levels and returns to any given resource are the same in every use in the economy. Also assume that there is no growth, i.e., the stocks of resources are given and constant, and that there is only one asset in the economy. To replicate one aspect of the historical pattern, consider now the effect of a demand shift away from food and towards non-agricultural goods that deteriorates the domestic terms of trade of agriculture. This causes the PVVMP of the assets used in agriculture to become lower than that of non-agricultural assets. Maximization of profits will induce transference of assets from the agricultural sector to sector N. The assets will flow from agricultural to non-agricultural activities until the gap between the PVVMP is equal to the transference costs of the asset. In the case of labor, for example, migration from agriculture will take place if the present value of the wage differentials within the relevant time horizon or average expected remaining working years –say h– is larger than migration and retraining costs (transference costs) to be carried by workers, γ:

$$\int_0^h \left(w_t^N - w_t^A\right) e^{-rt}\, dt > \gamma \qquad (1)$$

where w_t^N is non-agriculture wage, w_t^A is agriculture wage and r is the discount rate. Labor migration will stop when

$$\int_0^h \left(w_t^N - w_t^A\right) e^{-rt}\, dt \equiv \left(PVVMP^N - PVVMP^A\right) = \gamma \qquad (2)$$

which under the assumption of constant wages leads in steady state equilibrium to

$$w^N - w^A = \gamma \left(\frac{r}{1 - e^{-rh}}\right) \qquad (3)$$

The new equilibrium is thus characterized by a wage gap in favor of the sector receiving the additional flow of labor, in this case the non-agricultural sector. We note that this is an equilibrium situation in the sense that the intersectoral flow of resources has been completed. That is, the wage disparities (or, in general, factor returns disparities) associated with the existence of resource transference costs do not only occur during the process of labor reallocation (i.e., the "short-run"), but remain even after this process is completed in a new "steady state" equilibrium. The process of labor reallocation is effective in reducing the wage gap only up to the point where such a gap is equal to the "annualized" transference costs. From (3) it is clear that the size of the wage gap will rise with transference costs, increase as the discount rate increases and fall as the remaining useful life of potential migrants increases.

Thus, intersectoral factor flows will stop when factor returns are still lower in agriculture than in the rest of the economy. One of the mechanisms to contract its level of utilization in agriculture –transference to the other sector– is blocked.

In the case of physical assets, depreciation is the remaining way of adjustment. As time passes the asset wears out, its level contracts and its PVVMP in agriculture rises. If this mechanism is relevant for a particular resource, within a time interval, and if no other shock occurs in the economy, the level of the asset in the agricultural sector will reach its new equilibrium and its return will be the same across the economy. The asset depreciation mechanism (ADM) is likely to be important for physical capital such as machinery and equipment and,

hence it could equalize their rates of return in the long-run despite the existence of transference costs. However, except under rather unrealistic assumptions regarding the relationship between human fertility and income, this mechanism is not available in the case of labor. Neither is this mechanism likely to be important for agricultural land. Thus, the existence of sizable intersectoral costs of transference implies that the rates of return of labor and land in sectors such as agriculture, which diminish their relative size throughout the process of development, is likely to remain below those prevailing in sectors that expand their relative size even in the long-run. An obvious corollary of this analysis is that factor returns, particularly of labor, will tend to be the lowest in sectors were factors where originally concentrated and are higher in industries which have developed later. That is, a testable prediction of the analysis is that there is an inverse correlation between the age of an industry and the returns to factors employed in that industry.

Another corollary of this analysis is that if the specificity of resources used is greater in agriculture than in non-agriculture sectors (i.e., transference costs to and from agriculture are higher than between the non-agricultural sectors), then agriculture will exhibit greater instability in response to shocks than the rest of the sectors in the economy. This is due to the fact that resources will not move as fast out of agriculture as out of other sectors in periods of negative shocks, while resources will not flow as fast into agriculture in periods of boom as they do in other sectors experiencing booms. Thus, resource returns in agriculture will fall more in response to negative shocks and increase more after positive shocks than in the other sectors. Moreover, the length of depressions and booms will be longer in agriculture than in the non-agricultural sectors.

4. ASSET DEPRECIATION MECHANISM (ADM) AND LONG-RUN FACTOR RETURN DIFFERENTIALS: SOME EMPIRICAL EVIDENCE

The particular characteristics of the depreciation and reproduction mechanisms of land and labor, make these two important factors of production in agriculture different from other productive resources. Capital assets in general, machinery, equipments, buildings and constructions, etc., depreciate with time, and it is then always possible to adjust their levels of utilization in agriculture, or in any other sector, by their wearing off processes. But for land the ADM can be considered, for any practical purpose, as non-existent, and for labor it is very slow given the particular characteristics of its reproduction process and its determinants. These distinctive characteristics of land and labor play a central role in explaining their long-run return differentials between sectors as well as the secular lower relative incomes of the agricultural sector.

Transference costs of land are in general very high. Beyond the urban-rural fringe or the recreational zones, moving land from the agricultural sector to other sectors of the economy is very costly. Thus when a negative shock affects agriculture, moving land outside the fringe zone to other sectors of the economy is not in general an available adjustment mechanism. Returns to land will fall in agriculture, and a differential in land returns in the agricultural and non-agricultural sectors will be established. Contrary to what happens with other assets, as physical capital for example, ADM will not allow the adjustment of the agricultural land stock and returns to land differentials will tend to persist even in the long-run. This is a key element explaining the low relative incomes of the agricultural sector during the long time that the farm problem prevailed in the US, and it is also common to the agricultural sectors of middle income developing countries. According to USDA, the average rate of return on investment in farm real estate for 1950-1957 was 8.1 percent and the corresponding rate of return for common stocks was 17.6 percent; for 1958-1967 the figures were 9.1 and 11.8 percent respectively. Kost (1968) estimated that the mean total rate of return for the 1950-1963 period was 17.94 percent on common stocks and 9.26 percent on farm real estates (Table 2).

TABLE 2

USA: RATES OF RETURN FOR FARM REAL ESTATE AND COMMON STOCK, 1950-1963

	Income Rate of Return		Price Rate of Return		Total Rate of Return	
	Farm Real Estate	Common Stock	Farm Real Estate	Common Stock	Farm Real Estate	Common Stock
Mean	4.41	9.31	4.85	8.64	9.26	17.94
S.D.	0.95	3.59	3.96	14.45	4.47	14.31
$\hat{\alpha}$	6.21	15.01	6.20	6.17	12.41	21.09
$\hat{\beta}$	-0.24	-0.76	-0.18	0.33	-0.42	-0.42

Source: Kost (1968), p. 220.

S.D. = Standard Deviation.

$\hat{\alpha}$ and $\hat{\beta}$ are estimates of the parameters for a trend equation, $r = \alpha + \beta t$, where r equals the rate of return and t is a time trend.

If labor migration and retraining costs for farm workers are high, there will be a considerable differential in returns to labor in agriculture and in the rest of the economy even after the labor flows from agriculture to non-agriculture stop. If population growth in agriculture is independently determined from returns to labor in the economy, the new stable equilibrium will be one in which labor returns are lower in agriculture than in the rest of the economy. It can be argued that this new "steady state" with labor return differentials is a consequence of assuming that the rate of population growth is being determined by "non-economic" factors, which is inconsistent with recent work on the economic determinants of human fertility (Becker, 1971; Becker and Gregg, 1974; Shultz, 1974; Andorka, 1978). However, equalization of returns via this mechanism will be reached only after a long period of time, once the economic determinants of the human reproduction have operated. This is sufficient to explain the persistence of return-to-labor differentials for quite long periods of time.

An important question concerns the quantitative importance of long-run forces in explaining factor return differentials between agriculture and non-agriculture. That is, what proportion of the observed factor return gaps can be explained by the hypothesis of transference costs. To provide some insights on this, lets us look at the behavior of relative returns to labor in agriculture and non-agriculture under different scenarios which follow from the hypothesis of transference costs. To construct these scenarios it is assumed that historically labor flows from agriculture to the non-agricultural sector, and that the time horizon for the representative worker is 30 years old. Twenty different scenarios are then constructed varying migration and retraining costs from agriculture to non-agriculture activities from 0.5 to 3 annual agricultural salaries, and the discount rate from 5 to 30 percent. The long-run ratio of returns to labor in the non-agricultural sector to returns to labor in agriculture (w^N/w^A) is calculated for each scenario using equation (3).

Table 3 presents the ratios obtained for the twenty constructed scenarios; long-run equilibrium returns to labor are consistently higher in the non-agricultural sector than in agriculture and the gap is wider as the transference costs (reading across columns) and the rate of discount (reading across rows) rise. It is important to note that except under very low discount rates, the long-run wage differentials (defined as those prevailing when the intersectoral flow of resources have stopped) are substantial, being in some cases similar to observed wage differentials in certain countries. For example, if transference costs account for one year of agricultural wage, the discount rate is 15.2 percent.

TABLE 3

LONG-RUN EQUILIBRIUM RATIO OF RETURNS TO LABOR IN NON-AGRICULTURE TO RETURNS TO LABOR IN AGRICULTURE (w^N/w^A). DIFFERENT CONSTRUCTED SCENARIOS

WORKER'S TIME HORIZON: 30 YEARS

DISCOUNT RATE (%)	TRANSFERENCE COSTS			
	1/2 w^A	w^A	2 w^A	3 w^A
5	1.032	1.064	1.129	1.193
10	1.053	1.105	1.210	1.316
15	1.076	1.152	1.300	1.444
20	1.105	1.200	1.401	1.601
30	1.150	1.300	1.600	1.900

The estimates presented in Table 3 assume that the rate of unemployment in the urban and agricultural sectors are both zero. This is certainly unrealistic. Following the works of Todaro (1969) and Harris and Todaro (1970) on labor migration, we allow for unemployment in the non-agricultural sector. Assuming that labor migrates in response to expected rates of returns, equation (2) becomes

$$\int_0^h \left(\tilde{p}\ w_t^N - w_t^A\right) e^{-rt}\ dt = \gamma \tag{4}$$

where $\tilde{p}$ is the employment rate in the non-agricultural sector, representing the probability of finding a job in the non-agricultural sector at time t (which is assumed to be constant) and thus $\tilde{p}w^N$ is the expected wage rate in non-agricultural activities. In this case the steady state or long-run wage differential is implicitly given by the equation:

$$\tilde{p}w^N - w^A = \left(\frac{r}{1 - e^{-rh}}\right) \tag{5}$$

Table 4 shows the new ratios w^N/w^A calculated according to (5) when a constant urban unemployment rate of 10 percent is assumed for the constructed scenarios. Returns differentials are increased for every interest rate-transference costs scenario. The higher the unemployment rate in the urban sector, the lower

the probability of finding a job is when migrating from agriculture, which implies a lower labor mobility –as the probability of finding a job in the urban sector approaches to zero, migration approaches to zero– and higher return differentials to labor between the agricultural and the urban sector. A plausible scenario is one exhibiting a discount rate of 10 percent and transference costs equivalent to one annual agricultural wage. In this case, as shown in Table 4, a long-run wage differential of about 23 percent in favor of non-agricultural activities would attain. This is quite a significant wage gap which explains a substantial proportion of wage gaps measured in certain Less Developed Countries.

TABLE 4

LONG-RUN EQUILIBRIUM RATIO OF RETURNS TO LABOR IN NON-AGRICULTURE TO RETURNS TO LABOR IN AGRICULTURE (w^N/w^A). DIFFERENT CONSTRUCTED SCENARIOS

WORKER'S TIME HORIZON: 30 YEARS
URBAN UNEMPLOYMENT RATE: 10%

DISCOUNT RATE (%)	TRANSFERENCE COSTS			
	1/2 w^A	w^A	2 w^A	3 w^A
5	1.147	1.183	1.254	1.326
10	1.170	1.228	1.345	1.461
15	1.195	1.280	1.448	1.617
20	1.222	1.333	1.557	1.780
30	1.278	1.444	1.778	2.111

In Colombia, for example, the average labor return differential between the traditional agricultural sector and the informal urban sector (which presumably uses labor of similar skills) was 47 percent for the period 1970-1984 (see Table 5). The average unemployment rate for the period was 10.2 percent for the entire urban sector, but the actual employment rate in the informal urban sector is estimated at about 85 percent. Assuming a working life span of 30 years, migration costs equivalent to one year agricultural wage and a 10 percent discount rate we can explain a 30 percent labor return differential between agriculture and the informal urban sector, i.e., more than two thirds of the actual average differential for the 1970-1984 period. Correcting by the differences in the costs

of living in the rural and urban sectors estimated at about 15 percent,[3] there is only a 2 percent return differential left to be explained, which could be attributed to labor skills differences, age and short-run factors associated with the process of adjustment.

TABLE 5

COLOMBIA: URBAN AND AGRICULTURAL WAGES AND URBAN UNEMPLOYMENT RATES 1970-1984

YEAR	WAGES			URBAN UNEMPLOYMENT RATE
	URBAN INFORMAL SECTOR (w^N)	TRADITIONAL AGRICULTURE SECTOR (w^A)	WAGE DIFFERENTIAL (w^N/w^A)	
	(COLOMBIAN $ OF 1984)		(%)	(%)
1970	122.5	78.2	1.57	9.9
1971	117.1	84.2	1.39	10.2
1972	131.9	89.2	1.48	9.4
1973	118.4	88.3	1.34	11.8
1974	109.8	84.1	1.31	11.6
1975	122.2	81.6	1.50	11.2
1976	120.1	77.6	1.55	10.4
1977	94.7	79.8	1.19	9.6
1978	111.9	87.8	1.27	8.1
1979	132.8	93.6	1.42	9.1
1980	142.8	94.5	1.51	10.0
1981	175.8	101.1	1.74	8.7
1982	173.1	102.8	1.68	9.3
1983	166.6	104.2	1.60	11.0
1984	151.6	109.6	1.38	13.2
AVRG	132.8	90.4	1.47	10.2

Source: World Bank (1987).

In summary, it appears that long-run labor returns differentials associated with the existence of transference costs can explain a large proportion of the observed wage differentials between agriculture and non-agriculture under reasonable assumptions. That is, it appears that a substantial proportion of

[3] Estimates from the World Bank for Colombia are consistent with this assumption. In the US, Hathaway (1963) calculates that the returns of comparable labor would be about equal if the median income of farm families were 86 percent of non-farm families.

observed wage differentials can be attributed to long-run phenomena rather than purely to adjustment short-run mechanisms. If in addition we consider land and other assets subject to large transfer costs, we can explain a significant part of the overall income disadvantage of farmers which tends to persist even in advanced stages of development.

5. EVIDENCE FROM THE HISTORICAL TREND OF FACTOR USE IN U.S. AGRICULTURE

The use of productive resources by the US agricultural sector exhibits an historical pattern consistent with the transference cost theory presented above. The change of consumption patterns resulting from the general increase in wealth and income, and the reorientation of expenditures towards products containing an increasingly lower proportion of agricultural output, confronted agriculture with a demand highly irresponsive to growing incomes as well as to prices.

Probably even more dynamic than the demand conditions were the supply conditions affecting the agricultural sector since early in this century but particularly after the II World War. New and more efficient production practices allowed agriculture to continuously supply larger quantities of agricultural product to a price and income inelastic demand, with the consequence of a secular decline in agricultural prices in absolute and relative terms (Hathaway, 1963). The technological revolution of this century changed the productivity levels of production factors and their relative productivities in agriculture and in the rest of the sectors of the economy. The agricultural sector, which for historical reasons had had the larger pool of productive resources, adjusted through time. However, in spite of this, factor returns in the sector remained significantly below those of the rest of the economy. The relative importance of land within total agricultural inputs decreased steadily and labor migrated from the sector in a continuous flow. Large substitution of capital for land and labor occurred, and land shifted in the fringe urban-rural zones towards non-agricultural uses. The inability of a certain proportion of the stock of land to be transferred to alternative uses due to high transference costs during the adjustment period is reflected, at least in some degree, by the quantities of crop land that are kept idle (Table 6).

Transference costs of labor have decreased in a significant proportion through time, due to better and cheaper transportation means, more massive and broader information systems, and better and more accessible training and educational means, facilitating labor switching from agriculture. This would explain the persistent downward trend of wage differentials between agriculture and non-agriculture activities in the US during the 1970's and 1980's, which is consistent with the theory of transference costs. The key issue is that, as predicted by this theory, this process has taken an extraordinary length of time to occur.

TABLE 6

USA: IDLE CROPLAND AND MAJOR USES OF LAND

LAND USE	1910	1920	1930	1940	1950	1959	1964	1969	1974	1978	1982
	(million acres)										
Cropland	–	–	–	–	409	392	–	389	382	395	407
Idle Cropland					32	33	52	51	21	26	21
Grassland Pasture	–	–	–	–	701	699	–	692	681	663	661
Forest Land	–	–	–	–	721	728	–	723	718	703	654
Other Land	–	–	–	–	442	452	–	465	483	503	543
Total Land Area	–	–	–	–	2,273	2,271	–	2,264	2,264	2,264	2,265

Idle cropland includes land in cover and soil improvement crops and completely idle cropland. Some cropland is idle each year for various physical and economic reasons. Acreage diverted from crops to soil-conserving uses under Federal farm programs are included in this component.
Source: Frey and Hexem (1984).

6. CONCLUSIONS

A model explaining long-run factor returns differentials across sectors with particular emphasis to the agricultural versus non-agricultural gaps has been proposed, in which intersectoral transference costs of resources play a central role.

It has been shown that the existence of transference costs creates a wedge between factor returns which persists even in a steady state situation.

An important objective of the study has been to isolate the key parameters which may determine long-run factor return dispersion. These parameters are the discount rate, the dollar cost of physically moving resources (in the case of labor, migration costs) among sectors (or regions), the expected remaining working life of the representative worker and the retraining costs or, in general, the cost of converting a resource into a different use.

Moreover, the quantitative importance of the above sources in generating factor return disparities appears to be quite significant. Under plausible assumptions regarding the indicated parameters it has been shown that a sizable proportion of observed labor return gaps between agriculture and non-agriculture can be accounted for by long-run differentials associated with transference costs.

From a more general perspective, what the analysis suggests is that the steady state or long-run factor returns in each sector depend on the original allocation of factors of production. In general, sectors that originate factors of production will tend to exhibit lower rates of return than newly developed sectors.

Finally, intersectoral transference costs not only determine the ability of moving resources from and to agriculture, but also the lower relative flexibility of the agricultural sector to mobilize resources when affected by unexpected shocks compared to other sectors of the economy. Less flexibility for adjusting resources results in inelastic short and intermediate-run agricultural supply schedules and greater instability of the sector to positive and negative shocks.

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