WEALTH AND CONSUMER HORIZON:
EVIDENCE FROM A DEVELOPING ECONOMY

BY PREM S. LAUMAS

Northern Illinois University

This paper presents new evidence on the length of consumer horizon, which represents an important aspect of the Permanent Income Hypothesis. It uses data on private wealth of India for 1949–50 to 1974–75. Time varying parameter estimation is used to derive annual values of consumer discount rate and horizon. The findings support Friedman's view that horizon is approximately three years long. The author discusses the plausibility of his findings.

I. INTRODUCTION

Two types of tests have appeared in the literature to examine the validity of the Permanent Income Hypothesis (PIH). The first type of tests has addressed the relevance of the strict version of the PIH, *viz.*, that the permanent consumption is proportional to permanent income and that the marginal propensity to consume out of transitory income is close to zero. The second type of tests has examined the length of the consumer horizon to see if it was longer than one year and thus the policy implications of the PIH were indeed different from the ones derived from the Keynesion type Absolute Income Hypothesis.

Since the PIH has exciting policy implications for the savings efforts in underdeveloped countries several attempts have been made to understand the relevance of this theory in the context of underdeveloped countries. However, most of the studies thus far have been confined to the first type of tests. As yet no suitable attempt appears to have been made to calculate the length of the consumer horizon to see if it is equal to or longer than one year.

At the very outset it may be noted that the term "horizon" in the PIH has a quite different meaning from what it usually does. As it has generally been used "horizon" implies a cutting off point—that a consumer does not look beyond, say, three years if that is the length of his horizon. In other words, in the usual parlance horizon implies a planning period. However, in relation to the PIH (Friedman, 1958, 1963) it means that it is the dividing line between effects he (consumer) considers transitory and those he considers permanent; that he will not adjust his consumption pattern to actual or possible changes in circumstances except as these can be expected to affect his consumption possibilities for a period longer than three years; and hence he definitely does look beyond three

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years. His permanent income for a three year period may differ from his average measured income for those three years, just as the expected value of the mean of a sample of three observations may differ from the observed mean of a specific sample. In other words horizon is a period of time used to dichotomize factors affecting income into transitory factors, all of whose effect on income are over within the time period, and permanent factors whose effects last beyond the time period. Therefore, the length of consumer horizon represents the length of time a factor must affect income before it is regarded as permanent. Given this, it can be argued that the shorter the horizon, the less significant is the distinction between the PIH and the Keynesion AIH. When the length of horizon is one year, the policy conclusions following from the PIH and the AIH will be similar.

The length of consumer horizon is of particular interest to planners in less developed countries. Should the length of consumer horizon be equal to one year, then, given the low levels of per capita income in less developed countries, the savings rates may be insufficient to launch the development effort required to escape the low level equilibrium trap into which many such countries find themselves. Furthermore, since fiscal policy is widely used to stimulate capital formation, the length of horizon becomes important. With shorter horizon the effect of changes in income on consumption is much more quickly reflected and the effectiveness of fiscal policy greatly increased. Thus, for example, the expected effect on consumption of a tax increase that is to last for only a year or two will be based on the presumed length of the horizon. The shorter the length, the stronger the expected effect (Landsberger, 1971). The main purpose of this paper is to examine the length of consumer horizon with reference to India with a new data set.

Friedman in his calculations of the consumption function for the United States estimated the consumer units horizon as approximately three years. Since this was an important finding several studies have appeared to further examine this aspect of the PIH. Several writers (for example, Laumas, 1969, Landsberger, 1971, Laumas and Mohabbat, 1972, Darby, 1974, Mohabbat and Simos, 1977) using quite different data sources and different techniques of analysis provided support for Friedman's calculation of a three-year horizon. However, some others (such as Griliches *et al.*, 1962, Holbrook, 1967 and Wright, 1969) provide evidence for a much shorter horizon.

It may be noted that except for the study by Mohabbat and Simos, all the previous studies suffer from one major weakness. Due to the lack of data on wealth, all previous writers were forced to calculate permanent income as some sort of a smoothed function of measured income, rather than inferring values of permanent income from the stock of wealth. The values of consumer horizon were arrived in the process of calculating permanent income. However, all such approaches associate fluctuations in permanent income with the pattern of change in measured income instead of relying upon fluctuations in the measured stock of wealth to indicate fluctuations in permanent income and the length of the horizon (Elliot, 1980). Fortunately, in the last few years several pieces of data relating to non-human wealth for India have become available. From the available data, it is possible to construct a time-series estimate of non-human wealth for 26 years (1949–50 to 1974–75). In this paper, we propose a direct estimate of

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consumer horizon from wealth data and thus test the relevance of PIH in the context of underdevelopment.

II. Data, Methodology and Empirical Results

Friedman's theoretical construct of the PIH calculates the value of horizon from the value of interest rate used to convert wealth to permanent income in equation (1) below,

$$(1) \qquad\qquad Yp = r \cdot W.$$

Where Yp is permanent income, W is total wealth (human and non-human), r is an undefined term having the dimensions of an interest rate (Friedman, 1963). r is also referred to by Friedman as the subjective discount rate, which includes both pecuniary and non-pecuniary returns. The discount rate (Friedman, 1963) is a subjective rate that need bear little or no relation to any market rate of interest since human capacities cannot be bought or sold, though they can, of course, be improved with training. The length of the horizon is equal to $1/r$, "the number of years purchase" implied by the discount rate. Higher subjective discount rate implies shorter horizon and vice versa. With shorter horizons consumers will weigh receipts in the near future more heavily compared to distant receipts than when they have longer horizons. It may be noted that the relevant magnitudes are expected "real" receipts, not nominal money receipts and hence r is to be interpreted and calculated as real discount rate.

In equation (1) W is observable but r and Yp are not. However, following Friedman we can assume that the average value of transitory income is zero.[1] Using this assumption equation (1) can be written for estimation purposes as follows:

$$Ym - Yt = rW,$$

$$(2) \qquad\qquad \text{or } Ym = rW + Yt.$$

Ym is measured private income and Yt is transitory income.[2]

In equation (2), r is the weighted average of a vast variety of observable and non-observable interest rates on all assets in the economy. The precise level of r is determined by the rate used for each type of asset and the relative importance of different assets. The horizon $1/r$ is likewise weighted horizon.

The existence of several different rates explain why the value of r should vary over time. Even though each rate remains the same, the weights may change. In an underdeveloped economy that is undergoing structural change, all this points to the need for using varying parameter regression technique to calculate the value of consumer horizon. Following Mohabbat and Simos (1977), we use

[1] In the empirical verification of the PIH several other writers have also made the same assumption. See, for example, (Walters, 1970); (Johnston, 1972); (Darby, 1974) and (Mohabbat and Simos, 1977).

[2] Data on private income is taken from the following publications of the Central Statistical organization, (Government of India). *Estimates of National Income* (1948–49 to 1962–63) 1964, pp. 8–9; *Estimates of National Product* (1960–61 to 1968–69), August 1970, p. 2; *National Accounts Statistics* (1960–61 to 1973–74), February 1976, p. 6, and, *National Accounts Statistics* (1970–71 to 1975–76), February 1978, pp. 4–5.

the method developed by Cooley and Prescott (1976) to obtain annual estimates of r. The Cooley-Prescott method is particularly useful in correcting for autocorrelation. The varying parameter regression procedure is particularly appropriate because it reflects sequential variations in r due to sequential variations in the measured stock of wealth. The underpinnings of this approach are rooted in the notion that the regression parameters in the econometric model may be subject to sequential variations over time. This may be due to a host of reasons such as misspecification of the model, structural changes and problems of aggregation. This approach has the advantage of making it possible to separate parametric variations that are transitory from those that are permanent. In calculating the consumer discount rate for India, time-varying parameter regression is of special relevance since the Indian economy underwent several structural changes during the period under review. In particular there was a relative decline in the share of the agricultural sector in the Gross National Product. There was also a relative increase in the share of the Government sector and Government investment became more capital intensive relative to the private investment. All this happened in an era of increased financial liberalization, further monetization of the Indian economy and some shifts in the distribution of income. All these changes, undoubtedly had effect on both the observable and the non-observable interest rates that determine the average value of r and thus the length of consumer horizon.

To simplify the exposition of the Cooley-Prescott method, we may restate equation (2) as follows:

$$(3) \qquad Y_t^* = X_t' \beta_t$$

where Y_t^* represents the values of measured private income for the t-th observation, and X_t is a vector of non-human private wealth, and β_t is a vector of unknown parameters subject to sequential variation. The parameters β ($t = 1, \ldots, T$) are assumed to be subject to both permanent and transitory changes. More specifically, the pattern of variation is confined by the following specification,

$$(4) \qquad \begin{aligned} \beta_t &= \beta_t^p + u_t, \\ \beta_t^p &= \beta_{t-1} + v_t, \qquad t = 1, \ldots, T \end{aligned}$$

where p denotes the permanent component of the parameters.

The stochastic variate u_t and v_t are assumed to be normal, identically and independently distributed with mean vectors o and covariance structures known up to scale factors which may differ. After imposing the normalization $\sigma_1^u = \sigma_1^v = 1$, the convenient parametrization may be employed. If there is

$$(5) \qquad \begin{aligned} \mathrm{Cov}\,(u_t) &= (1 - \delta)\sigma^2 \Sigma_u, \\ \mathrm{Cov}\,(v_t) &= \delta^2 \Sigma_v \end{aligned}$$

no reason to suspect that the permanent changes are more or less important than transitory changes, the assumption of identical covariance structures up to scale factors may be utilized, i.e. $\Sigma u = \Sigma v$.

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To apply the varying parameter framework for estimating the values of β_t, the matrices Σu and Σv may be specified *a priori*. For the empirical results reported here, these two matrices were specified as equal (i.e. $\Sigma u = \Sigma v = \Sigma$) diagonal matrices. The equality of these matrices implies that the relative import-ance of permanent and transitory changes is the same for all parameters while the diagonal property implies that the random changes in the parameters are non-correlated. Following the Mohabbat–Simos (1977) study only one specification of Σ was used, *viz.* $\Sigma = \text{diag}(1)$ to estimate the value of r, the consumer subjective discount rate.[3]

Data on human wealth is not available for India. Following other writers (for example, Meltzer, 1963) I assume that the ratio of human to non-human wealth is constant throughout the period under study.[4] Two concepts of wealth are used—the first (W_1) excludes the stock of money and the second (W_2) includes it. The arguments for including money as part of wealth are well known and need not be repeated here (see, for example Johnson, 1969). In the context of an economy undergoing monetization (such as India) the case for including money as part of private wealth is even stronger. It is by now common knowledge among economists that monetization results in considerable shifts from sub-sistence to commercial production with resultant increases in output due to specialization, increased work effort, emphasis on high income crops and enhanced responsiveness to changes in the relative prices of different corps (Patrick, 1966). Within this context, in another paper I have shown the salutary effects of financial liberalization on the growth of the Indian economy (Laumas, 1990). In particular, for the corporate sector I have found reasons to believe that money is a productive asset held by India's manufacturing firms since it enters as an input into their delivered production function (Laumas and Williams, 1983). While all this may not be an impeccable evidence for including money as part of wealth, it is highly suggestive for using the W_2 concept of wealth as well in examining the length of consumer horizon in India.

The data on private sector wealth is computed as follows. I have used the study by Roy Choudhry (1977) as a benchmark in estimating a series of tangible reproducible wealth of India. Roy Choudhry's study provides data on non-human wealth for the Indian economy for 1949–50. In order to derive the value of private wealth we deducted the share that was specifically marked for the government sector. The total tangible reproducible wealth of India for 1949–50 amounted to Rupees 17,086 crores (one crore is equal to ten million rupees). After the obvious

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[3]For additional ramifications of the Cooley-Prescott method see (Rausser and Laumas, 1976).

[4]We justify making this assumption for India on the ground that the ratio of labor income to property income was more or less constant during the period under study. Since labor income is a return on human wealth and property income a return on non-human wealth and the return on non-human wealth has been fairly constant (around six percent), it follows that the ratio of human to non-human wealth is fairly constant. All this is based on the premise that we can calculate the share of factor income with great accuracy. However, even in a modern developed economy, for well-known theoretical and empirical reasons such exact calculations may be very difficult. For an underdeveloped economy due to the existence of a large unincorporated sector (contributing as much as 40 to 50 percent to the GNP) the problem is even more formidable. Notwithstanding these difficulties, in making the assumption of constancy of the ratio of human to non-human wealth we have taken into account the income shares of labor and capital in the organized as well as the unorganized sectors of the Indian economy.

deductions attributed to the public sector the tangible reproducible wealth for the private sector amounted to Rupees 16,545 crores for 1949-50. Besides this, the stock of reproducible wealth in railways, airways, other transport and roads and bridges were also deducted, for these activities are known to be a central part of the government program to build infrastructure in India. After these deductions, I arrived at the total reproducible tangible wealth of India equal to Rupees 14,339 crores for 1949-50. Annual figures for net capital formation in the private sector were added to this to derive a time series for private reproducible wealth for India. To secure the data on net capital formation in the private sector we used various issues of the *Journal of Income and Wealth* and Central Statistical Organization, *National Accounts Statistics*, New Delhi.[5] To the annual estimates of the private reproducible wealth were added annual estimates of the value of land, in order to derive a series for the non-human wealth of India. Data on land is available for 1949-50, 1960-61, and 1965-66 in (Roy Choudhry, 1977) and for 1972-73, and 1975-76 in (Bannerjee, 1981). Data for the intervening years was found by using linear cubic spline interpolation.[6] The W_1 concept of wealth used here, therefore, consists of the value of land plus the value of reproducible tangible assets.

My earlier research (Laumas and Williams, 1983) has indicated that M_2 is the proper stock of money for defining economic policy in India. The data on the stock of M_2 is taken from Gupta (1979) and various issues of the *Reserve Bank of India Bulletin.*

All data was deflated by consumer price index and by population.[7] Equation (2) was used to estimate the values of r. In Table 1 we present the annual estimates of consumer discount rate r, and the values of horizon with the W_1 and W_2 concepts of wealth. The estimates were arrived at by using the time varying parameter regressions for equation (2). The study could not be extended beyond 1974-75 due to the lack of reliable estimates on the value of net private investment after 1974-75.

The following facts with respect to the average values of r (1949-50 to 1974-75 period) and the corresponding values of the horizon (defined as $1/r$) may be noted. *First,* the average value of r with the W_1 concept of wealth is 0.34 and the average value of r with W_2 concept of wealth is 0.32. The corresponding values of the horizons, therefore, are 2.9 years and 3.2 years respectively. On the

[5]Data on Net Private Capital formation is not available. However, it was calculated as follows. From the data on Gross Capital formation in the Public Sector (*Journal of Income and Wealth,* October 1978, pp. 48-49) depreciation on public sector savings (in the absence of information on the depreciation on public sector investment) was deducted to arrive at net capital formation in the public sector for 1950-51 to 1974-75. This figures for net capital formation in the public sector were then deducted from net domestic capital formation data (p. 153 of *National Accounts Statistics,* 1985) to arrive at net private capital formation. Data on depreciation on public sector savings is not available beyond 1974-75.

[6]The cubic spline interpolation is a smoother approximation to curves than linear interpolation and obviates the problem of aliasing. The algorithm used here can be found in (Sard and Weintraub, 1971). I am thankful to my colleague Professor Susan Porter-Hudak for interpolating the values of land used in this paper.

[7]Data on Consumer Price Index is taken from the following sources: (a) Kulkarni (1968) p. 131, (b) Reserve Bank of India Bulletin, July 1968, p. 971 and (c) Reserve Bank of India Bulletin, March 1977, p. 234. Data on population is taken from *National Accounts Statistics* (1985) p. 153.

TABLE 1

Time-Series Estimates of the Discount Rate and
Consumer Horizon on W_1 and W_2 Concepts of
Wealth for India, 1949–50 to 1974–75

Year	r_1	H_1	r_2	H_2
1949–50	30	3.3	26	3.8
1950–51	30	3.3	28	3.6
1951–52	30	3.3	29	3.6
1952–53	30	3.2	28	3.6
1953–54	31	3.1	30	3.3
1954–55	31	3.1	27	3.7
1955–56	31	3.1	27	3.7
1956–57	32	3.1	30	3.3
1957–58	32	3.1	29	3.4
1958–59	33	3.0	31	3.2
1959–60	33	3.0	31	3.2
1960–61	34	3.0	30	3.3
1961–62	34	3.0	30	3.3
1962–63	35	2.9	31	3.2
1963–64	36	2.8	33	3.0
1964–65	37	2.7	36	2.8
1965–66	38	2.6	34	2.9
1966–67	38	2.6	36	2.8
1967–68	38	2.6	38	2.6
1968–69	38	2.6	36	2.8
1969–70	36	2.8	35	2.9
1970–71	35	2.9	34	2.9
1971–72	33	3.0	32	3.1
1972–73	34	3.0	32	3.1
1973–74	35	2.9	34	2.9
1974–75	35	2.9	34	2.9

whole, this supports Friedman's view that the length of the horizon is approximately 3 years.[8] *Second,* given that the market rate of interest in the organized money market in India is between 6 to 10 percent, the discount rate of the order of 34 percent may appear too high at first. However, in the predominantly unorganized money market, interest rates are notoriously high, often ranging from 24 to 36 percent (Bottomley, 1963). Since most loans in underdeveloped countries involve small and risky investments with very little collateral, the result is very high interest rates, particularly in the unorganized sector of the Indian economy. In addition, Friedman (1963) points out, "if it [the subjective rate of discount] seems drastically out of line with the widely quoted market rate of interest, it should be kept in mind that these rates apply only to a very limited range of assets; that most of the future receipts whose discounted value constitutes wealth comes from assets that cannot be readily bought or sold or for which buying and selling prices differ widely. It should be kept in mind also that the

[8]This provides additional support on the universality of the PIH. Landsberger's (1971) empirical findings on the value of horizon were very close to three years for Israel. Mohabbat and Simos (1977) supported Landsberger's results, using U.S. annual data on non-human wealth. Laumas' results (1969) for Canada and Laumas and Mohabbat (1972) calculations for the U.S. provide some additional supporting evidence along the same lines.

value of r required by the theory includes not only pecuniary but also non-pecuniary returns from the assets. These non-pecuniary returns rationalize the simultaneous ownership by consumer units of assets that have widely varying rates of pecuniary yield." *Third,* the average value of r_2 is generally lower than the average value of r_1. This is consistent with our expectations. Underdeveloped economies are usually characterized by fragmented capital markets. During the period under study, in India, as a result of a policy of financial liberalization there was a reduction in the size of the barter sector and a move toward an integration of the capital market. All this helped to reduce the levels of uncertainty which typically plague the entrepreneur's decision making in less developed countries. Thus, a slight reduction in the subjective discount rate with the W_2 concept of wealth was obtained. *Fourth,* over the years the average length of the horizon has tended to decline somewhat. This may reflect a decline in the level of overall uncertainty as a result of the restructuring of the Indian economy—away from a predominantly agriculture-based economy towards a more manufacturing-based diversified economy. Within the agriculture sector itself, there has been a decline in dependance on rainfall and the prescientific means of increasing productivity. With the advent of irrigation, better quality seeds and the availability of chemical fertilizers, there has been a marked increase in productivity in the farm sector. All this has reduced the levels of uncertainty facing the farmers and, therefore, their subjective discount rate. *Finally,* we may note that after the late 1960s the length of the horizon rose somewhat. The increase in the length of the horizon resulted from the consumers becoming very cautious due to the drought years of 1965-67. The recession that followed in its wake dealt a body blow to industrialization in India (Chaudhuri, 1979). The net effect of all this was that per capita real NNP grew only at the average rate of 0.54 percent per annum during 1968-69 to 1972-73 after experiencing an average rate of growth of 1.34 percent per annum from 1950-51 to 1967-68. As the economy began to experience somewhat higher growth in 1973-74 and 1974-75, the consumers seem to have regained their confidence resulting in a slight decline in the length of the horizon.

III. CONCLUDING REMARKS

As yet there is no study dealing with the values of consumer horizon, based on wealth data, for less developed countries. Therefore, it is not possible to compare our results with others. However, our study is in line with the Mohabbat-Simos study for the U.S. Both studies have, (a) in the absence of a comprehensive stock of wealth used non-human stock of wealth, and, (b) viewed r as a function of time rather than a constant. The latter is more in spirit with Friedman's construct of PIH. All other studies have implicitly viewed r as a constant, thereby implicitly assuming perfect loan and capital markets, perfect liquidity and perfect certainty regarding the future (Landsberger, 1971, p. 1348). It is obvious that such conditions do not exist in less developed countries like India. (c) Both studies substantiate Friedman's results of three-year horizon.

In closing, we may note that economic theory does not dictate what the length of consumer horizon should be. All that is implied in the PIH is that the horizon should be considerably longer than one year. Given this, our results

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indicate that formulation of economic policy in India should not be based entirely on the Keynesion type Absolute Income Hypothesis as has been the common practice, but should also take into account important policy implications of the Permanent Income Hypothesis.

REFERENCES

Bannerjee, N., Estimating Urban Land Values, *The Journal of Income and Wealth*, 167–174, July, 1981.
Bottomley, A., The Premium for Risk as a Determinant of Interest Rates in Underdeveloped Rural Areas, *The Quarterly Journal of Economics*, 637–647, November, 1963.
Central Statistical Organization, Government of India, *National Accounts Statistics*, New Delhi.
Chaudhuri, P., *The Indian Economy: Poverty and Development*, St. Martin's Press, New York, 1979.
Cooley, T. F. and Prescott, E. C., Estimation in the Presence of Stochastic Variation, *Econometrica*, 167–184, January, 1976.
Darby, M., The Permanent Income Theory of Consumption—A Re-statement, *Quarterly Journal of Economics*, 228–250, May, 1974.
Elliot, J., Wealth and Wealth, Proxies in a Permanent Income Model, *The Quarterly Journal of Economics*, 509–536, November 1980.
Friedman, M., Reply to Comments on, "A Theory of the Consumption Function" in Lincoln H. Clark ed. *Consumer Behavior*, 463–469, Harper and Bros., New York, 1958.
———, Windfalls, the 'Horizon,' and Related Concepts in the Permanent Income Hypothesis, in Christ, C. F. (ed.), *Measurement in Economics*, Stanford University Press, Stanford, California, 1963.
Griliches, Z., Maddala, G. S., Lucas, R., and Wallace, N., Notes on Estimated Aggregate Quarterly Consumption Function, *Econometrica*, 491–500, July, 1962.
Gupta, S. B., *Monetary Planning for India*, Oxford University Press, Delhi, 1979.
Holbrook, R. S., The Three Year Horizon: An Analysis of the Evidence, *Journal of Political Economy*, 750–754, October, 1967.
Johnson, H. G., Inside Money, Outside Money, Income, Wealth and Welfare in Monetary Theory, *Journal of Money, Credit and Banking*, 30–45, February, 1969.
Johnston, J., *Econometric Methods*, McGraw-Hill, New York, 1972.
Kulkarni, V. G., *Statistical Outline of Indian Economy*, Vora and Co., Publishers Private Limited, Bombay, 1968.
Landsberger, M., Consumer Discount Rate and Horizon: New Evidence, *Journal of Political Economy*, 1346–1359, November/December, 1971.
Laumas, P. S., A Test of the Permanent Income Hypothesis, *Journal of Political Economy*, 857–861, Septeber/October, 1969.
———, Monetization, Financial Liberalization and Economic Development, *Economic Development and Cultural Change*, 377–390, January, 1990.
Laumas, P. S. and Mohabbat, K., The Permanent Income Hypothesis: Evidence from Time-Series Data, *American Economic Review*, 730–734, September, 1972.
Laumas, P. S. and Williams, M., An Analysis of the Demand for Cash Balances by the Manufacturing Firms in a Developing Economy, *Journal of Development Economics*, 169–182, March, 1983.
Laumas, P. S. and Williams, M., The Household Demand for Money in an Underdeveloped Economy: A Case Study of India, *The Pakistan Development Review*, 37–46, Spring, 1983.
Meltzer, A. M., The Demand for Money: The Evidence from Time Series, *Journal of Political Economy*, 219–246, June, 1963.
Mohabbat, K. A. and Simos, E. O., Consumer Horizon: Further Evidence, *Journal of Political Economy*, 851–858, August, 1977.
Patrick, H. T., Financial Development and Economic Growth in Underdeveloped Countries, *Economic Development and Cultural Change*, 174–189, 1966.
Rausser, G. C. and Laumas, P. S., The Stability of the Demand for Money in Canada, *Journal of Monetary Economics*, 367–380, Number 2, 1976.
Roy Choudhry, U. D., Industrial Breakdown of Capital Stock in India, *Journal of Income and Wealth*, 144–63, April, 1977.
Sard, A. and Weintraub, W., *A Book of Splines*, John Wiley and Sons, New York, 1971.
Walters, A. A., *An Introduction to Econometrics*, W. W. Norton, New York, 1970.
Wright, C., Estimating Permanent Income: A Note, *Journal of Political Economy*, 845–850, September/October, 1969.