

NATIONAL SAVINGS IN PAKISTAN: CAUSAL LINKAGES WITH THE MACROECONOMY

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1. Introduction

Modern saving theories indicate that the rate of growth in aggregate real income is a key determinant of the national saving rate. Rapid growth raises the saving rate. Higher national saving then releases resources for the investment needed to sustain high growth. If investment is discouraged the growth rate falls, as does the saving rate. Hence, one link between saving and investment is the growth rate, which determines saving and is partly determined by investment. For the Asian countries Fry found that a one percentage point increase in the growth rate raises the national saving rate in the 14 sample countries by, on, average just over 1 percentage point.¹

These patterns have been well documented for a number of developing countries. It is clear however that patterns of financial savings may not always mirror those of physical savings. For one thing aggregate savings may not be as sensitive to changes in the real interest rate as compared with financial savings because of the possibility of substitution between financial savings and physical assets.² Also, the literature suggests that increases in financial savings may be more important for capital formation than simply increases in physical savings.³ Pakistan's savings patterns differ⁴ from those of other Asian countries in that worker remittance have significantly affected their pattern of growth since the late 1970s. In particular these remittances have resulted in gross national savings increasing much more rapidly than gross domestic savings.

The purpose of the analysis below is to examine the causal links between savings and other important macroeconomic aggregates in Pakistan. In particular: despite the increase in worker remittances, have savings generally followed the expansion in GDP? What is the link between savings and private investment? Have increased savings been invested across a wide spectrum of activities or have the been focused areas such as manufacturing? What are the implications for the future?

2. Patterns of Savings

Historically Pakistan has had one of the lower rate of savings in Asia. While many East

1. Maxwell J. Fry, "Saving, Financial Intermediation and Economic Growth in Asia" *Asian Development Review*, vol. 2, no. 1 (1984), p. 85.

2. K.L. Gupta *Finance and Economic Growth in Developing Countries* (London: Croom Helm, 1984).

3. K.L. Gupta *Finance and Economic Growth in Developing Countries* (London: Croom Helm, 1984).

4. For a detailed comparative study see Graham J. Abbott, "National Saving and Financial Department in Asian Countries", *Asian Development Review*, vol. 2, no. 2 (1984), pp. 1-22.

Asian countries save 25 to 30 percent of their GDP, saving rates in Pakistan have rarely been over 15 percent (Tables 1 and 2). Public saving has been particularly low, averaging 2-3 percent of GDP. Worker remittances aside, several studies have attempted to identify the underlying causes of the country's poor savings performance. Of these Khan's⁵ is the most comprehensive. Khan found that:⁶

- i) A significant positive association exists in Pakistan between the real rate of return on deposits and aggregate savings. In particular the interest elasticity of national savings ranges from 0.01 to 0.03, suggesting that given the existing real return on deposits (3.78) if increased by one percentage point then the increase in aggregate (on national) savings will range from 0.3 to 0.8.
- ii) Aggregate real income (measured or permanent) was also found to be a key determinant of national, financial and physical savings. The marginal propensity to save (MPS) out of real income under various assumptions concerning expectations for three types of saving functions range from 0.06 to 0.21.
- iii) Financial development, measured by the financial intermediation ratio is also found to have a significant and positive influence on national and financial savings while negative influence on physical savings.
- iv) Besides real income (measured or permanent) and real return on deposits there are other factors such as unanticipated inflation and variability of inflation which are found to have a significant impact on these savings functions.

Khan feels these findings clearly point out the existence of financial repression on the one hand and lack of financial development on the other in Pakistan. If this is the case the solution would lie in freeing the return on deposits, thus allowing them to find their equilibrium in a free market environment.

In particular the authorities should strive to make the real return on deposits positive either by increasing the nominal return or by reducing inflation. Furthermore, a widespread network of financial institutions and a diversified array of financial instruments will increase savings in Pakistan⁷.

While not questioning the wisdom of these findings, it is apparent that Khan has made several strong assumptions concerning causality. In particular he follows the classical

5. Ashfaq H. Khan, "Financial Repression, Financial Development and Structure of Savings in Pakistan" *The Pakistan Development Review*, vol. XXVII, Part II, no. 4 (Winter 1988), pp. 701-711.

6. Khan, *op. cit.*, p. 709.

7. Khan, *op. cit.*, p. 709.

assumption that causation runs from increased incomes to increased savings. As noted however, starting in 1976 worker remittances as net factor incomes caused a dramatic shift in the pattern of gross domestic and gross national savings. In other words national savings in Pakistan have increased at rates not necessarily associated with an overall expansion in domestic income or Gross Domestic Product.

Table 1: Pakistan: Gross Domestic and National Savings, 1973-1982

(billion rupees)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Gross Domestic Savings	6.7	5.6	5.5	10.4	11.5	15.2	11.3	16.1	17.6	18.8
Net Factor Income From Abroad	0.5	0.6	1.2	3.0	5.5	10.3	12.5	16.0	19.6	22.1
Gross National Savings	7.2	6.2	6.7	13.4	17.0	25.5	23.8	32.1	42.1	46.3
Public Sav	-0.3	-0.1	-0.6	1.1	3.7	3.2	2.1	5.1	11.6	10.8
Private Sav	7.5	6.3	7.3	12.3	22.3	21.8	26.9	30.5	35.5	57.3

(percent of Gross Domestic Product)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Gross Domestic Savings	10.1	6.4	5.0	8.0	7.7	8.6	5.8	6.9	6.3	5.8
Gross National Savings	10.8	7.1	6.0	10.3	11.4	14.5	12.2	13.7	15.1	14.3
Public Sav	-0.5	-0.2	-0.6	0.8	2.5	1.8	1.1	2.2	4.2	3.3
Private Sav	11.3	7.3	6.6	9.5	8.9	12.7	11.2	11.5	11.0	10.9

Sources: Compiled from: World Bank, Pakistan: Review of the Sixth Five Year Plan (Washington: IBRD, 1984), p. 141 and World Bank, Pakistan: Growth Through Adjustment, Report No. 7118-PAK (Washington: IBRD, March 21, 1988), p. 144.

Table 2: Pakistan: Gross Domestic and National Savings, 1963-1991*(billion rupees)*

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Gross Domestic Savings	30.5	32.1	31.6	45.2	70.3	71.3	89.1	99.5	128.0
Net Factor Income From Abroad	31.4	31.1	29.4	31.4	26.9	20.7	19.3	20.7	16.2
Gross National Savings	61.9	63.2	61.1	76.6	97.2	92.1	108.4	120.2	144.2
Public Savings	4.6	8.5	1.8	8.8	2.8	9.0	1.5	10.8	24.1
Private Savings	57.3	54.7	59.2	67.8	94.4	83.1	106.9	109.4	120.1

(percent of Gross Domestic Product)

	1983	1984	1985	1986	1987	1988	1989	1990	1991
Gross Domestic Savings	8.4	7.7	6.7	8.8	12.3	10.6	11.6	11.5	12.6
Gross National Savings	15.6	14.0	12.2	14.0	16.2	13.2	13.7	13.6	14.0
Public Savings	1.2	1.9	0.4	1.6	0.5	1.3	0.2	1.2	2.3
Private Savings	14.5	12.1	11.8	12.4	15.7	11.9	13.5	12.4	11.6

Source: World Bank Pakistan: Current Economic Situation and Prospects, Report No. 10223-PAK (Washington: IBRD, March 16, 1992), p. 79.

In brief, just as logical argument could be made that in Pakistan's case increases in national savings have led to the overall expansion in the economy and not vice versa. If this is true, the factors patterns of savings and investment are also likely to vary from those usually found in developing countries. These causation patterns are examined in detail in the following section.

3. The Issue of Causation

Ultimately any statistical test for causation will be based on a number of arbitrary assumptions. Still, using a number of alternative specifications for the key variables it is possible to make some credible inferences concerning the timing of savings and GDP or

of savings and private investment.

The original and most widely used causality test was developed by Granger⁸. According to this test (again using the example of savings and economic activity), savings (SAV) affect growth of economic activity (EA) if this series can be predicted more accurately by past values of deficits than by past (expenditure) growth patterns. To be certain that causality runs from loanable funds to EA, past values of loanable funds must also be more accurate than past values of economic activity at predicting increases in savings.

4. Granger Test

More formally, Granger⁹ defines causality such that X Granger causes (G-C) Y if Y can be predicted more accurately in the sense of mean square error, with the use of past values of X than without using past X. Based upon the definition of Granger causality, a simple bivariate autoregressive (AR) model for savings (SAV) and EA can be specified as follows:

$$EA_{(t)} = C + \sum_{i=1}^p a_{(i)} SAV_{(t-i)} + \sum_{j=1}^q b_{(j)} SAV_{(t-j)} + u_{(t)} \quad (1)$$

$$SAV_{(t)} = C + \sum_{i=1}^r d_{(i)} SAV_{(t-i)} + \sum_{j=1}^s e_{(j)} EA_{(t-j)} + v_{(t)} \quad (2)$$

where EA is the growth in economic activity and SAV = the growth in savings; p, q, r and s are lag lengths for each variable in the equation; and u and v are serially uncorrelated white noise residuals. By assuming that error terms (u,v) are "nice" ordinary least squares (OLS) becomes the appropriate estimation method¹⁰.

8. ... C.W.J. Granger, "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," *Econometrica* (1969), pp. 424-438.

9. ... C.W.J. Granger, "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods," *Econometrica* (1969), pp. 424-438.

10. If the disturbances of the model were serially correlated, the OLS estimates would be inefficient, although still unbiased, and would distort the causal relations. The existence of serial correlation was checked by using a maximum likelihood correlation for the first-order autocorrelation of the residuals [AR(1)]. The comparison of both OLS and AR(1) results indicated that no significant changes appeared in causal directions. Therefore, we can conclude "roughly" that serial correlation was not serious in this model.

Within the framework of unrestricted and restricted models, a joint F-test is appropriate for causal detection. Where:

$$F = \frac{RSS_{(x)} - RSS_{(u)} / df_{(x)} - df_{(u)}}{RSS_{(u)} / df_{(u)}} \quad (3)$$

$RSS(r)$ and $RSS(u)$ are the residual sum of squares of restricted and unrestricted models, respectively, and $df(r)$ and $df(u)$ are, respectively, the degrees of freedom in restricted and unrestricted models.

The Granger test detects causal directions in the following manner: first, unidirectional causality from SAV to EA if the F-test rejects the null hypothesis that past values of SAV in equation (1) are insignificantly different from zero and if the F-test cannot reject the null hypothesis that past values of EA in equation (2) are insignificantly different from zero. That is, EA causes SAV but EA does not cause SAV. Unidirectional causality runs from EA to SAV if the reverse is true. Second, bidirectional causality runs between SAV and EA if both F-test statistics reject the null hypotheses in equations (1) and (2). Finally, no causality exists between SAV and EA if we can not reject both null hypotheses at the conventional significance level.

The results of Granger causality tests depend critically on the choice of lag length. If the chosen lag length is less than the true lag length, the omission of relevant lags can cause bias. If the chosen lag is greater than the true lag length, the inclusion of irrelevant lags causes estimates to be inefficient. While it is possible to choose lag lengths based on preliminary partial autocorrelation methods, there is no *a priori* reason to assume lag lengths equal for all types of deficits.

5. The Hsiao Procedure

To overcome the difficulties noted above, Hsiao¹¹ developed a systematic method for assigning lags. This method combines Granger Causality and Akaike's final prediction error (FPE), the (asymptotic) mean square prediction error, to determine the optimum lag for each variable. In a paper examining the problems encountered in choosing lag lengths,

11. C. Hsiao, "Autoregressive Modeling and Money-Income Causality Detection," *Journal of Monetary Economics* (1981), pp. 85-106.

12. D.L. Thornton and D.S. Batten, "Lag-length Selection and Tests of Granger Causality Between Money and Income," *Journal of Money, Credit and Banking* (1985), pp. 164-78.

Thornton and Batten¹² found Hsiao's method to be superior to both arbitrary lag length selection and several other systematic procedures for determining lag length.

The first step in Hsiao's procedure is to perform a series of autoregressive regressions on the dependent variable. In the first regression, the dependent variable has a lag of one. This increases by one in each succeeding regression. Here, we estimate M regressions of the form:

$$G_{(t)} = a + \sum_{i=1}^m b_{(t-i)} G_{(t-i)} + e_{(i)} \quad (4)$$

where the values of m range from 1 to M . For each regression, we compute the FPE in the following manner

$$FPE_{(m)} = \frac{T+m+1}{T-m-1} ESS_{(m)} / T \quad (5)$$

Where: T is the sample size, and $FPE(m)$ and $ESS(m)$ are the final prediction error and the sum of squared errors, respectively. The optimal lag length, m^* , is the lag length which produces the lowest FPE. Having determined m^* additional regressions expand the equation with the lags on the other variable added sequentially in the same manner used to determine m^* . Thus we estimate four regressions of the form:

$$G_{(t)} = a + \sum_{i=1}^{m^*} b_{(t-i)} G_{(t-i)} + \sum_{i=1}^n c_{(t-i)} D_{(t-i)} + e_{(i)} \quad (6)$$

with n ranging from one to four. Computing the final prediction error for each regression as:

$$FPE_{(m^*, n)} = \frac{T+m^*+n+1}{T-m^*-n-1} ESS_{(m^*, n)} / T$$

we choose the optimal lag length for D , n^* as the lag length which produces the lowest FPE. Using the final prediction error to determine lag length is equivalent to using a series of F tests with variable levels of significance¹³.

13. Since the F statistic is redundant in this instance they are not reported here. They are, however, available from the authors upon request.

The first term measures the estimation error and the second term measures the modelling error. The FPE criterion has a certain optimality property that "balances the risk due to bias when a lower order is selected and the risk due to increases in the variance when a higher order is selected"¹⁴. As noted by Judge¹⁵ et. al., an intuitive reason for using the FPE criterion is that longer lags increase the first term but decrease the RSS of the second term, and thus the two opposing forces are optimally balanced when their product reaches its minimum.

Depending on the value of the final prediction errors, four cases are possible: (a) Savings cause Economic Activity when the prediction error for economic activity decreases when the savings are included in the activity equation. In addition, when economic activity is added to the savings equation, the final prediction error should increase; (b) Economic Activity causes Savings when the prediction error for savings increases when savings are added to the regression equation for economic activity, and is reduced when economic activity is added to the regression equation for savings; (c) Feedback occurs when the final prediction error decreases when savings are added to the economic activity equation, and the final prediction error decreases when economic activity is added to the savings equation; and (d) No Relationship exists when the final prediction error increases both when savings are added to the economic activity equation and when economic activity is added to the savings equation.

6. Operational Procedures

The data used to carry out the causation tests¹⁶ was derived from World Bank and IMF data¹⁷. All variables were deflated by the GDP deflator and are in constant 1985 prices. For

14. C. Hsiao, "Causality Tests in Econometrics," *Journal of Economic Dynamics and Control* (1979), p. 325.

15. G.G. Judge, W. Hill, H. Griffiths, H. Lutkepohl, and T.C. Lee, "Introduction to the Theory and Practice of Econometrics (New York: John Wiley and Sons, 1982).

16. Causation tests were performed using a program written in RATS386 Version 4.0. Cf. Thomas A. Doan, *RATS User's Manual Version 4* (Evanston, Illinois: Estima, 1992).

17. World Bank Pakistan: *Current Economic Situation and Prospects—Report No.10223-PAK* (March 16, 1992). Pakistan: *Current Economic Situation and Prospects—Report No. 10223-Pak* (Washington: The World Bank, 1982). World Bank Pakistan: *Current Economic Situation and Prospects—Report No. 9283-PAK* (March 22, 1991). Pakistan: *Current Economic Situation and Prospects—Report No. 9283—PAK* (March 22, 1991); World Bank Pakistan: *Progress Under the Sixth Plan* (1984). Pakistan: *Progress Under the Sixth Plan* (1984). Gross Domestic Product, the GDP price deflator, the various monetary aggregates, and private consumption are from various issues of the International Monetary Fund: *International Financial Statistics Yearbook*.

best statistical results¹⁸, the variables were transformed into their logarithmic values.

Relationships were considered valid if they were statistically significant at the ninety-five percent level of confidence. That is, if ninety-five percent of the time we could conclude that they had not occurred by pure chance, we considered them statistically significant.

As noted above, there is no theoretical reason to believe that financial aggregates and economic activity have a set lag relationship—that is they impact on one another over a fixed time period. To find the optimal adjustment period of impact, lag structures of up to six years were estimated. The lag structure with the highest level of statistical significance was the one chosen best depict the relationship under consideration (the optimal lag reported in Tables 3-6). To assess the robustness of our findings definitions of savings were used—the actual increase in savings and that anticipated¹⁹.

7. Results

The causation analysis produced a number of interesting findings:

1. In the case of Gross Domestic Product, (Table 3) two patterns clearly stand out. Contrary to the general case described by Fry, Gross National Saving tends to affect GDP but not versa. That is there is no tendency for increases in the growth of real Gross Domestic Product to subsequently expand the overall rate of Gross National Savings.
2. The lag of increased savings to GDP is relatively long, averaging 3 or 4 years. This suggests a mechanism whereby increased savings flows into tangible capital formation, subsequently expanding the economy.
3. In contrast increased rates of growth of actual Gross Domestic Savings tend to occur after periods of expanded GDP.

To see if these patterns of savings and economic activity carried over to private investment, a similar analysis was undertaken for private investment in large scale (Table 4) and small scale manufacturing (Table 5), and finally non-manufacturing activities (Table 6). Again several striking patterns are apparent:

1. The patterns characterizing savings and GDP are closely replicated for savings and private investment in large scale manufacturing (Table 4). Causation is largely from increases Gross National Savings to expanded private investment.

18. The reasons underlying involve the assumption of stationary conditions. See: C. Hsiao, "Autoregressive Modeling and Money-Income Causality Detection" *Journal of Monetary Economics* (1981), pp. 85-106 and W. Joerding, "Economic Growth and Defense Spending: Granger Causality" *Journal of Development Economics* (1986), pp. 35-40.

19. See the note to table 3 for an explanation as to how anticipated values were derived.

2. On the other hand expanded private investment in large scale manufacturing tends to precede a corresponding expansion in Gross Domestic Savings. It should be noted that the links between Gross National Savings and investment are considerably stronger than those between Gross Domestic Savings and investment.

Table 3: Pakistan: Interaction of Gross National/Domestic Savings and Gross Domestic Product, 1973-1991

	Causation Patterns				Dominant Pattern
	A	B	C	D	
Gross National Savings (actual)					
Optimal Lag (years)	1	3	3	1	Savings → GDP (+m)
Final Prediction Error	(0.20E-3)	(0.14E-2)	(0.17E-1)	(0.17E-1)	
Durbin-Watson Statistic	2.43	2.46	2.39	2.45	
Ling-Box Q Statistic	8.72	9.37	9.45	11.11	
Gross National Savings (anticipated)					
Optimal Lag (years)	1	4	3	1	Savings → GDP (+m)
Final Prediction Error	(0.20E-3)	(0.12E-3)	(0.15E-1)	(15E-1)	
Durbin-Watson Statistic	2.43	2.87	2.49	2.42	
Ling-Box Q Statistic	8.72	13.99	9.67	10.17	
Gross Domestic Savings (actual)					
Optimal Lag (years)	1	3	3	2	GDP → Savings (+w)
Final Prediction Error	(0.20E-3)	(0.21E-3)	(0.52E-1)	(0.37E-1)	
Durbin-Watson Statistic	1.72	2.31	2.02	2.18	
Ling-Box Q Statistic	8.45	8.25	4.11	9.70	
Gross Domestic Savings (anticipated)					
Optimal Lag (years)	1	4	3	3	Feedback (+w,+w)
Final Prediction Error	(0.20E-3)	(0.16E-3)	(0.56E-1)	(0.48E-1)	
Durbin-Watson Statistic	1.72	2.96	1.99	2.13	
Ling-Box Q Statistic	8.45	15.65	1.66	9.63	

Notes:

Summary of results obtained from Granger Causality Tests. A Hsiao Procedure was incorporated to determine the optimal lag. All variables estimated in logarithmic form. Regression Patterns: A = GDP on GDP; B = savings on GDP; C = savings on savings; and D = GDP on savings. The dominant pattern is that with the lowest final prediction error. The signs (+/-) represent the direction of impact. In the case of feedback the two signs represent the lowest final prediction error of relationships B and D. Each of the variables was regressed with 1, 2, 3, and 4 year lags. Strength assessment (s = strong, m = moderate, w = weak) based on the size of the standardized regression coefficient and t test of statistical significance. Anticipated values were computed by regressing savings on its value for the previous year. The predicted (anticipated) value for each year was then estimated from the regression equation.

Table 4: Pakistan: Interaction of Gross National/Domestic Savings and Private Investment in Large Scale Manufacturing, 1973-1991

	Causation Patterns				Dominant Pattern
	A	B	C	D	
Gross National Savings (actual)					
Optimal Lag (years)	3	2	3	1	Sav → INVEST
Final Prediction Error	(0.11E-1)	(0.82E-2)	(0.17E-1)	(0.17E-1)	(+m)
Durbin-Watson Statistic	1.72	2.77	2.39	2.46	
Ling-Box Q Statistic	8.45	10.38	9.45	11.54	
Gross National Savings (anticipated)					
Optimal Lag (years)	3	4	3	1	Sav → INVEST
Final Prediction Error	(0.11E-1)	(0.55E-2)	(0.14E-1)	(15E-1)	(+m)
Durbin-Watson Statistic	1.72	1.84	2.52	2.43	
Ling-Box Q Statistic	8.45	10.30	9.17	9.15	
Gross Domestic Savings (actual)					
Optimal Lag (years)	3	1	3	3	Invest → Sav
Final Prediction Error	(0.11E-1)	(0.12E-1)	(0.52E-1)	(0.38E-1)	(+w)
Durbin-Watson Statistic	1.72	1.69	2.02	2.12	
Ling-Box Q Statistic	8.45	6.05	4.11	6.03	
Gross Domestic Savings (anticipated)					
Optimal Lag (years)	3	1	3	1	Invest → Sav
Final Prediction Error	(0.11E-1)	(0.12E-1)	(0.56E-1)	(0.47E-1)	(+w)
Durbin-Watson Statistic	1.72	1.79	1.99	1.89	
Ling-Box Q Statistic	8.45	7.84	1.661	2.53	

Notes:

Summary of results obtained from Granger Causality Tests. A Hsiao Procedure was incorporated to determine the optimal lag. All variables estimated in logarithmic form. Regression Patterns: A = investment on investment; B = savings on investment; C = savings on savings; and D = investment on savings. The dominant pattern is that with the lowest final prediction error. The signs (+, -) represent the direction of impact. In the case of feedback the two signs represent the lowest final prediction error of relationships B and D. Each of the variables was regressed with 1, 2, 3, and 4 year lags. Strength assessment (s = strong; m = moderate; w = weak) based on the size of the standardized regression coefficient and t test of statistical significance. Anticipated values were computed by regressing savings on its value for the previous year. The predicted (anticipated) value for each year was then estimated from the regression equation.

Table 5: Pakistan: Interaction of National/Domestic Savings and Private Investment in Small Scale Manufacturing, 1973-1991

	Causation Patterns				Dominant Pattern
	A	B	C	D	
Gross National Savings (actual)					
Optimal Lag (years)	2	3	3	1	No Relationship
Final Prediction Error	(0.22E-2)	(0.22E-2)	(0.17E-1)	(0.17E-1)	
Durbin-Watson Statistic	2.10	1.65	2.39	2.46	
Ling-Box Q Statistic	7.27	11.28	9.45	11.54	
Gross National Savings (anticipated)					
Optimal Lag (years)	2	2	3	1	Sav ↔ Invest (+w)
Final Prediction Error	(0.22E-2)	(0.20E-2)	(0.15E-1)	(0.16E-1)	
Durbin-Watson Statistic	2.10	1.84	2.52	2.43	
Ling-Box Q Statistic	7.27	10.30	9.17	9.15	
Gross Domestic Savings (actual)					
Optimal Lag (years)	2	3	3	1	Invest → Sav (+w)
Final Prediction Error	(0.22E-2)	(0.22E-2)	(0.52E-1)	(0.39E-1)	
Durbin-Watson Statistic	2.10	1.71	2.02	1.87	
Ling-Box Q Statistic	7.27	5.05	4.11	6.46	
Gross Domestic Savings (anticipated)					
Optimal Lag (years)	3	2	3	2	Invest → Sav (+w)
Final Prediction Error	(0.22E-2)	(0.25E-2)	(0.56E-1)	(0.49E-1)	
Durbin-Watson Statistic	2.10	1.89	1.99	1.93	
Ling-Box Q Statistic	7.27	8.09	1.66	5.85	

Notes:

Summary of results obtained from Granger Causality Tests. A Hsiao Procedure was incorporated to determine the optimal lag. All variables estimated in logarithmic form. Regression Patterns: A = investment on investment; B = savings on investment; C = savings on savings; and D = investment on savings. The dominant pattern is that with the lowest final prediction error. The signs (+, -) represent the direction of impact. In the case of feedback the two signs represent the lowest final prediction error of relationships B and D. Each of the variables was regressed with 1, 2, 3, and 4 year lags. Strength assessment (s = strong; m = moderate; w = weak) based on the size of the standardized regression coefficient and t test of statistical significance. Anticipated values were computed by regressing savings on its value for the previous year. The predicted (anticipated) value for each year was then estimated from the regression equation.

Table 6: Pakistan: Interaction of National/Domestic Savings and Private Investment in Non-Manufacturing, Activities, 1973-1991

	Causation Patterns				Dominant Pattern
	A	B	C	D	
Gross National Savings (actual)					
Optimal Lag (years)	3	1	3	1	Invest ↔ Sav (+w)
Final Prediction Error	(0.21E-2)	(0.23E-2)	(0.17E-1)	(0.15E-1)	
Durbin-Watson Statistic	2.18	2.21	2.39	2.46	
Ling-Box Q Statistic	2.75	3.02	9.45	10.19	
Gross National Savings (anticipated)					
Optimal Lag (years)	3	1	3	1	No Relationship
Final Prediction Error	(0.21E-2)	(0.22E-2)	(0.14E-1)	(0.15E-1)	
Durbin-Watson Statistic	2.18	2.11	2.49	2.31	
Ling-Box Q Statistic	2.75	3.84	9.67	10.24	
Gross Domestic Savings (actual)					
Optimal Lag (years)	3	4	3	1	Sav ↔ Invest (+m)
Final Prediction Error	(0.21E-2)	(0.12E-2)	(0.52E-1)	(0.59E-1)	
Durbin-Watson Statistic	2.18	1.94	2.02	1.98	
Ling-Box Q Statistic	2.75	7.51	4.11	3.89	
Gross Domestic Savings (anticipated)					
Optimal Lag (years)	3	3	3	1	Sav ↔ Invest (+s)
Final Prediction Error	(0.22E-2)	(0.12E-2)	(0.56E-1)	(0.61E-1)	
Durbin-Watson Statistic	2.18	2.08	1.99	1.77	
Ling-Box Q Statistic	2.75	7.81	1.66	2.48	

Notes:

Summary of results obtained from Granger Causality Tests. A Hsiao Procedure was incorporated to determine the optimal lag. All variables estimated in logarithmic form. Regression Patterns: A = investment on investment; B = savings on investment; C = savings on savings; and D = investment on savings. The dominant pattern is that with the lowest final prediction error. The signs (+, -) represent the direction of impact. In the case of feedback the two signs represent the lowest final prediction error of relationships B and D. Each of the variables was regressed with 1, 2, 3, and 4 year lags. Strength assessment (s = strong; m = moderate; w = weak) based on the size of the standardized regression coefficient and t test of statistical significance. Anticipated values were computed by regressing savings on its value for the previous year. The predicted (anticipated) value for each year was then estimated from the regression equation.

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3. As one might imagine the links between savings and investment in small scale manufacturing (Table 5) were a bit weaker than those associated with larger scale manufacturing. Still anticipated increases in Gross National Savings apparently induced some investment in this area. Also as with large scale manufacturing, private investment tended to precede Gross Domestic Savings.
 4. In contrast to manufacturing, private investment in non-manufacturing tends to increase savings (with a one year lag). Also the patterns between Gross Domestic Savings investment vary considerably from those found in manufacturing with private investment in non-manufacturing activities tending to precede the expansion in Gross Domestic Savings.

8. Conclusions

The patterns found in between savings and economic activity appear to deviate considerably with those usually assumed to exist in developing countries. In particular Gross National Savings appears to be largely determined by exogenous factors-it expands prior to the overall increase in GDP. Since a large component of Gross National Savings consists of worker remittances one can assume that many of the Pakistani expatriates accept foreign employment for the purpose of eventually investing. Interestingly, this investment appears to be largely concentrated in manufacturing (as opposed to non-manufacturing activities).

The main implication of these results is that the country's recent boom in manufacturing investment may terminate. With the likely decline in worker remittances, Gross National Savings rates will gradually come into line with Gross Domestic Savings. At that time the overall pattern of saving and economic activity will revert to the more normal one of Gross Domestic product leading the expansion in savings. If past patterns hold, and unless the government finds ways of increasing savings, much of this growth lead savings may be more inclined to flow into non-manufacturing as opposed to manufacturing activities.

One implication of these findings is that the thrust of government policy should to focus on programs in the area of eliminating financial repression. While the growth in financial assets appears to simply adjust to the demands generated by a growing economy, their importance lies in the fact that their growth appears to be one of the most effective ways of stimulating private sector investment in manufacturing.

Abstract

The purpose of the analysis is to examine the causal links between savings and other important macroeconomic aggregates in Pakistan. The patterns found appear to deviate considerably with those usually assumed to exist in developing countries. In particular Gross National Savings appears to be largely determined by exogenous factors—it expands prior to the overall increase in GDP. Since a large component of Gross National Savings consists of worker remittances one can assume that many of the Pakistani expatriates accept foreign employment for the purpose of eventually investing. Interestingly, this investment appears to be largely concentrated in manufacturing (as opposed to non-manufacturing activities).

ÉPARGNE NATIONALE AU PAKISTAN: LIENS CAUSAUX AVEC LA MACROÉCONOMIE**Résumé**

Cette analyse se propose d'examiner les liens causaux entre l'épargne et d'autres agrégats macroéconomiques importants au Pakistan. Les tendances qu'on a observées s'écartent considérablement de celles qu'on s'attend normalement des pays en développement. En particulier, l'Épargne Nationale Brute semble être déterminée surtout de facteurs exogènes - elle augmente avant l'augmentation globale du PIB. Puisque une composante importante de l'Épargne Nationale Brute est représentée des remises des travailleurs, on peut supposer que les émigrés pakistanais acceptent de travailler à l'étranger dans le but éventuel de faire des investissements. Il est intéressant d'observer que ces investissements se concentrent dans le secteur industriel (en tant qu'opposé aux activités non-industrielles).

