Determinants of Private Savings:
The Case of Jordan (1976-2000)

Said Hallaq

Associate Professor, Department of Economics, Yarmouk University
Irbid, Jordan

Abstract. This study aims at analyzing and examining the determinants of private savings in Jordan during 1976-2000; the main results are as follows: The size of effect of the dependency ratio on private savings is found out negative and significant, government savings depress private savings in less than one-to-one fashion, though, growth influences private savings throughout two channels the direct positive association between GDP growth rate and private savings, and the significant positive effect of the level of GDP per capita income. The development of Jordan consumer's credit market has a positive effect on private savings, wehere as, the ratio of social security and welfare public expenditures to total public expenditures has a positive and significant impact on the level of private savings, and finally, the real interest rate, inflation rate, and terms of trade have insignificant impact on the level of private saving in Jordan.

1. Introduction

Traditional analysis of savings and growth have concentrated on two important issues as Edwards [1] points out: (a) the effect of higher savings on long-run growth; (b) the impact of an increase in domestic savings on investment. Neoclassical models suggest that an increase in saving ratios generates higher growth in the short-run, while the long-run equilibrium rate of growth will depend mainly on structural demographic variables [5]. However, Romer [7] and Lucas [6] predict that higher savings and related increase in capital accumulation can result in a permanent increase in growth rates.

The empirical work of Barro [8], De Long and Summers [9], and with Edwards [1] provided additional support to the notion that capital accumulation, and thus savings, are central for understanding growth differentials across countries. Masson [4] points out that capital accumulation, not technological progress, explains the growth rates of the East Asian " tigers" along with Korea and Hong Kong. On the other hand, empirical analyse are less relevent in explaining savings behavior across countries. For example, Modigliani [12] argues that a higher growth whether it resulted from population or

productivity growth would, with unchanged saving rates by age group, raise aggregate saving because it would increase the aggregate income of people   not earning labor income (i.e, retired persons living off their accumulated assets). Tobin [10] points out that if workers correctly expect that their income will grow in the future according to the life-cycle model, they should want to consume more today. Thus, saving rates of working individuals could fall by a sufficient amount to offset the aggregate effect of higher growth. Carroll and weil [1, 7] confirm that lagged values of increase in income growth seem to explain higher saving rates.

Masson, Byoumi and Samiei [4] examine the determinants of private savings for a large sample of industrial and developing countries. Both time series and cross-sectional estimates have obtained results suggesting that there is a partial offset on private savings of changes in public saving for industrial countries, whereas in developing countries demographics and GDP growth are the most important determinants of private saving rates.

Cardenas and Escobar [2] analyze the determinants of saving in Colombia using a framework of intertemporal model and concluded that national saving partially responds to temporary changes in output, higher government expenditures are associated with lower national saving; The results indicate that increase in age dependency has had a significantly negative effect on private saving rates, with special emphasis on Latin American saving. The study based on international comparison, using data from 36 countries for 1970-1992. The results also indicate that per capita income growth is the most important determinant of private and public savings; public savings crowd out private saving. Murphy and Navnjas [3] point out that public saving and investment are responsible for sharp changes in domestic savings throughout decades in Argentina.

Thus we can conclude that despite extensive studies on private saving behavior, several issues have not been resolved conclusively, including the effects of real interest rates, demographic factors, and per capita income GDP on their savings.

The purpose of this study is to examine the set of possible determinants of private saving in Jordan during the period 1976-2000. A time-series estimation will be used to analyze the following variables (a) persistent or long-term country variables, such as dependency ratio per capita GDP, (b) annual fluctuations or short-term variables, such as terms of trade, growth in gross domestic product GDP, and (c) fiscal variables which explain both some long-term variables and short-term fluctuation. Data and information will be collected from the Central Bank of Jordan monthly bulletins and Department of Statistics yearly bulletins.

In addition to its intoduction, this study comprises four sections. section 2 analyzes the possible determinants of private savings in Jordan; section 3 explains the private saving behavior in Jordan; section 4 describes the empirical results; and section 5 introduces some concluding remarks.

2. The Possible Determinants of Private savings in Jordan.

The dependent variable is the ratio of private saving to GDP for period 1976-2000. The independent variables falls in three different categories (namely Long-term, short-term and fiscal variables) and can be defined in the following way [1, pp: 10-12]:

1) Dependency rate (Dr_t): is defined as population younger than 20 year old plus population over 65 years old. This variable was taken from Jordan's department of statistics data set. The life-cycle hypothesis highlights the importance of the population is of working age, then the economy should have a high rate of private savings, as workers provide for their retirement . According to the life-cycle hypothesis its coefficient should be negative [4, pp: 21]

2) Government saving (S^g_t): is defined as net taxes (T_t) minus government final consumption expenditures (C_t) . Its coefficient is expected to be negative, capturing the fact that government savings tend to crowd out private savings.

3) GDP growth rate (GDP $^{gr}_t$) :Carroll and Weil [1, 7, pp: 43]confirm that lagged values of increase in income growth seem to explain higher saving rates. This variable was defined as 3- years moving average of the rate of growth per capita GDP. The life-cycle model suggests that its coefficient should be positive.

4) GDP per capita (GDP_t ^{pc}) Ogaki [1, 4, pp: 33] point out that a rise in per capita income may lead to higher saving rate. However, in the case of LDC's like Jordan the process of development involves initially a low saving rates, its coefficient will be negative.

5) Money/GDP (M^1 + M^2/GDPt): this variable has been used as a proxy for the depth and sophistication of the financial system in Jordan, its coefficient should be positive. The extent to which individuals can actrually dissave when young, will depend on their ability to borrow. If the borrowing constraint is made less stringent, present consumption will increase and, thus, national savings will tend to decline. In this regard, McKinnon [13, pp: 123] points out that this variable can be taken as a measure of the borrowing constrains and , its coefficient should be negative.

6) Social security (SSt): is defined as the ratio of social security and welfare of public expenditure to total public expenditures. It is a proxy for expected social benefits and its coefficient is expected to be negative.

7) Real interest rate (RRt): is defined as nominal interest rate values minus the inflation rate. The effect of interest rate on consumptiuon (e.g.,see Masson , et al is ambigious theoritically, being subject to potentially offsetting negative substitution and positive income effect. Giovannini [14, pp: 212] concluds that in most cases the real intent elasticity is zero for developing countries, and other studies also find no clear effect of real intent rate on private saving.
But in the case of Jordan private investment is expected to be insensitive to interest rates.

8) Inflation rate (INt): is defined as the rate of change of the consumer price index (CPI). This variable captures the degrees of macro economic stability, and its

coefficient is expected to be negative.

9)   Term of Trade (ToTt): is defined as the ratio of Jordan's expert prices (Px) to its import prices (Pm). According to the Harberger-Laursen-Metzler effect, the improvement in terms of trade leads to an increase in saving and an improvement in the trade balance, its coefficient is expected to be positive. Edwards [1, pp:41]

Having listed the possible determinants of private savings in Jordan, a careful analysis of private savings behavior in Jordan during the period 1976-2000 will be attempted.

3. The Private Savings Behavior in Jordan

Edwards [1, pp:15-16] points out that most of the empirical studies have associated private savings to private savings. However, this is not absolutely correct, since in a number of countries corporate savings constitue an important component of the aggregate. In this study, only household private savings behavior will be included, simply because most of the related studies have concentrated on aggregate savings behaviour, which, of course, includes both government and business savings. Such a distinction would enable policy makers of having a better insightful picture about the behaviour of private savings only, which would, in turn, inform us exactly how individuals will react to the suggested possible determinants of savings in Jordan Household have to decide how much of their current income to consume in the present and how much to put a side for future consumption. This fundamental insight has been captured by a number of models that have focused on optimization including life-cycle theories originaay developed by Modigliani. The model will be used for the purpose of this study has been used by Edwards, and can be presented as follows:

$$\text{Max} \int_0^\infty E \{U (C_t \ g_t) e^{-pt} \ dt \}$$

Subject to

$$\int_0^\infty C_t e^{-rt} \ dt \ \leq \ w$$

$$W = \int_0^\infty Y_t (1-\tau_t) \ e^{-rt} dt$$

$$S_t = [Y_t (1-\tau_t) - P_t \ C_t]$$

$$-K \leq S_t \leq Y_t (1-\tau_t)$$

Where:

E: is the expectation error;

U ( ): is the instantaneous utility function, which is assumed to be strictly concave;

r : is the interest rate;

C_t: is the private consumption in period t, and

G_t: is consumption of public goods during that period;
W: is the total wealth   ;
$Y_t (1-\tau_t)$: is the net income;
τ_t : is the tax rate in period t; and
S_t: is savings.

If $S_t < 0$, then the individual in question is borrowing from the financial system to maintain his level of current consumption.

Table 1 shows that the behavior of private savings (Spt) is defined as GDP (Yt) minus net taxes of transfers and subsidies from the government to the private sector (Tx) minus final consumption expenditures (Ct); government savings (Sgt) are defined as net taxes (Tx) minus government final consumption expenditures (Gt); and foreign savings (St) are defined as the net exports of goods and non-factor services (Xt –Mt). Masson, *et al* [2, pp;489] .

Table 1. Private savings, government savings and foreign savings (1976-2000) (in J.D millions)

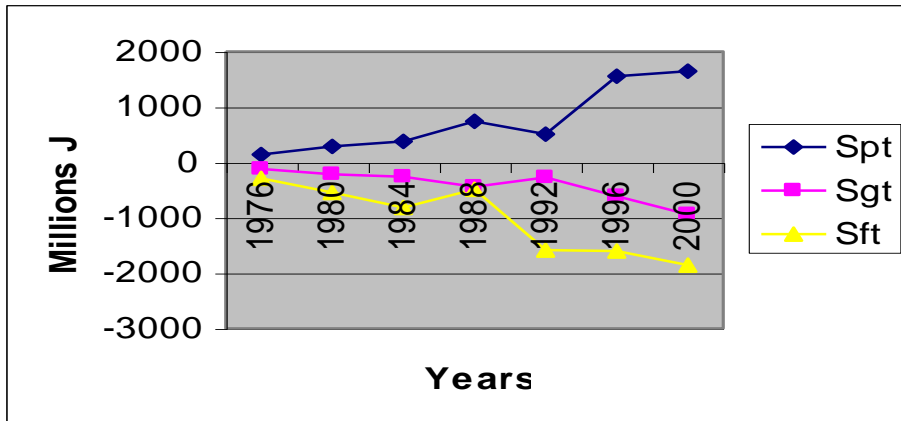| Year	GDP(Y_t) current price	T_t Net taxes	C_t Final private consumption expenditures	Spt Private savings	T_t Net taxes	Gt Final government consumption expenditures	Sg$_t$ Government saving
1976	547.4	63.3	432.7	140.5	63.3	185.9	-122.6
1977	676.4	87.4	555.0	151.5	87.4	195.6	-108.2
1978	779.3	87.9	650.6	164.1	87.9	212.9	-125.0
1979	981.0	103.8	854.0	174.3	103.8	321.9	-218.1
1980	1180.3	121.1	950.3	283.5	121.1	336.1	-215.0
1981	1469.3	165.9	114.4	357.9	165.9	391.5	-225.6
1982	1701.1	186.8	1457.6	281.9	186.8	443.0	-256.2
1983	1828.7	213.6	1579.1	249.4	213.6	453.7	-240.1
1984	1981.4	223.5	1648.2	375.6	223.5	488.1	-264.6
1985	2220.2	227.6	1794.8	186.3	227.6	542.1	-314.5
1986	2163.6	210.6	1718.2	521.3	210.6	570.2	-359.6
1987	2208.6	219.1	1669.2	635.3	219.1	602.7	-383.6
1988	2264.4	224.7	1626.5	738.1	224.7	669.6	-444.9
1989	2372.1	252.2	1655.1	755.8	252.2	749.7	-497.5
1990	2668.1	367.4	1976.5	642.2	367.4	841.4	-474.0
1991	2855.1	379.3	2039.1	599.3	379.3	904.0	-524.7
1992	3493.0	655	2648.4	506.2	655	929.5	-274.5
1993	3801.7	631.2	2720.4	1192.5	631.2	1182.3	-551.1
1994	4218.0	662.9	2795.6	1257.4	662.9	1251.5	-588.6
1995	4656.8	522.6	3104.7	1751.3	522.6	1111.3	-588.7
1996	4870.1	592	3523.6	1554.4	592	1204.1	-612.1
1997	5145.0	584.4	3702.0	1672.2	584.4	1312.5	-728.1
1998	5637.1	487.2	4143.5	1865.0	487.2	1367.0	-879.8
1999	5715.2	507.5	4256.3	1835.6	507.5	1412.3	-904.8
2000	6008.4	553.7	4770.2	1646.4	553.7	1493.3	-939.6

Note: 1) Net taxes = total tax revenue – subsidies.
2) Private savings = private disposable income – final private consumption expenditures.
3) Government savings = net taxes – final government consumption expenditures.

Table 1 (continued).

Xt Exports	Mt Import	Sft foreign saving	Private savings GDP %	Government savings GDP %	Foreign savings GDP %
49.552	339 .539	- 290.0	.31	- .224	-.53
60.253	454.417	-394.1	.81	- .160	-.58
82.556	458.826	-376.3	.18	-.16	-.48
120.107	589.523	-469.4	.19	- .22	-.47
169.026	715. 977	-546.8	.24	-.18	-.46
185.581	1,047,504	-861.9	.25	-.15	-.58
160.085	1,42,493	-982.4	.16	-.15	-.57
260.055	1,103,310	-842.2	.14	-.13	-.46
255.346	1,071,340	-816.0	.19	-.13	-.41
225.615	1,074,448	-848.9	.10	-.14	-.42
248.773	850,199	-601.3	.24	-.16	-.28
324.788	915,545	-590.8	.29	-.17	-.26
534.106	1,022,469	-488.4	.30	-.19	-.21
612.252	1,230,000	-617.7	.32	-.21	-.26
598.627	1,725,828	-1127.2	.24	-.178	-.42
633.755	2,214,000	-1580.2	.21	-.183	-.55
864.7	4,449,9	-1585.2	.15	.-78	-.45
995.2	2357,6	-1362.4	.13	-.145	-.36
1241.1	2588,2	-1347.1	.30	-.140	-.32
1288.6	3041,6	-1753.0	.38	-.126	-.38
1301.4	2906,5	-1605.1	.32	-.126	-.33
1420.0	2518,0	-1099.0	.33	-.141	-.22
1277.9	2712.4	-1434.5	.33	-.156	-.25
1298.8	2622.5	-1323.7	.32	-.158	-.23
1345.3	3203.9	-1858.6	.27	-.156	-.31

Source: (a) Central Bank of Jordan, yearly statistical series (1964-1995), May 1996, special issue.
           (b) Central Bank of Jordan. Monthly Statistical Bulletin, different issues.

The behavior of private savings presented in Fig. 1 shows fluctuations in its value during the period 1976-2000, for example, it was 170.5 million in 1976 (i.e. 31% of GDP) reduced to 143.3 million in 1978 (i.e., 18% of GDP), then reached 375.6 million in 1984 (i.e. 19% of GDP reduced to 186.3 million in 1985 (i.e. 10% of GDP); private saving reached its maximum in 1985 and amounted to 1751.3 million (i.e., 38% of GDP). Thus, the importance of this study stems from the fact that it is very important to determine the main variables behind this cyclical behavior of private savings in Jordan.

Note: Spt = private savings, Sgt = government savings, and Sft = foreign savings.

Fig. 1. Absolute values of public, private and foreign savings in Jordan; in current prices for the period (1976-2000).
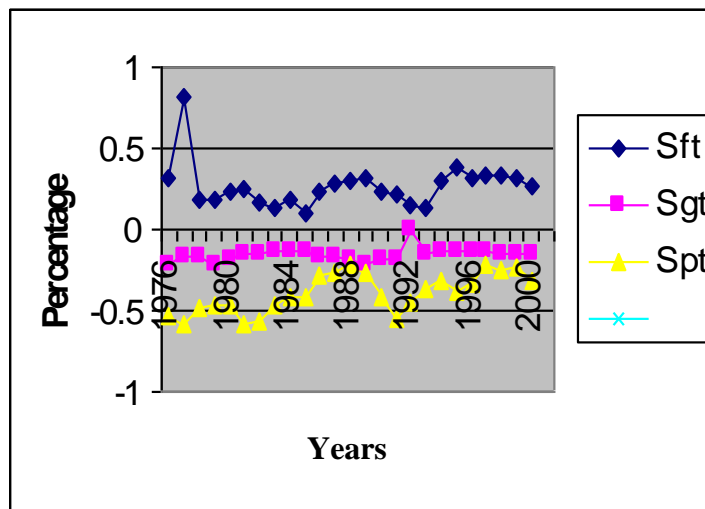

Fig. 2. Public, private, and foreign savings in Jordan as a percentage of GDP.

4. The Empirical Results

Based on the discussion in section (1), the following equation was estimated for private saving rates via ordinary least square method (OLS).

$S_t^p = a_0 + a_1 D_t^r + a_2 S_t^g + a_3 GDP_t^{gr} + a_4 GDP_t^{pc} + a_5 M^1 + M^2/GDP_t + a_6 SS_t + a_7 RR_t + a_8 In_t + a_9 ToT_t + U_t$

Where:

S_t^p: is the private savings rate,

D_t^r: is the age dependency ratio,

S_t^g: is the government saving rate,

GDP_t^{gr} : is the GDP growth rate,

GDP_t^{pc} : is GDP Per Capita,

$M^1 + M^2/GDP_t$: is the ratio of Money supply (1) and (2) to GDP,

S_t^s : is the social security,

R_t^R: is the real interest rate,

In_t: is the inflation rate,

To_t^T: is the term of trade, and

U_t: is the error term.

Table 2 shows the results obtained from the estimation of the above equation.

Table 2. Private saving determinants
Dependent variable: private savings rate (SPt)

Independent variables	Estimated coefficients using ordinary least squares	Corrected for serial correlation	First-difference, instrumental variables
Age dependency (Dt)	-0.15	-0.14	-0.15
	(-4.36)*	(2.84)**	(2.95)**
Government savings (St)	-0.31	-0.28	-0.36
	(-1.12)***	(-2.25)**	(-3.25)**
GDP growth rate (GDPt)	0.70	0.64	0.95
	(2.75)**	(3.01)**	(1.65)***
GDP per capita (GDt)	0.65	0.68	0.45
	(3.01)**	(3.64)**	(1.25)***
M1 + M2 /GDPt	0.32	0.27	0.024
	(4.20)*	(2.23)**	(1.043)***
Social security (SSt)	-0.30	-0.28	-0.21
	(3.20)*	(4.12)*	(3.12)*
Real interest rate (RRt)	0.04	0.01	0.012
	(1.10)***	(1.23)***	(0.79)***
Inflation rate (INt)	-0.045	-0.14	-0.012
	(1.04)***	(1.67)***	(0.86)***
Terms if Trade (ToTt)	0.06	0.07	0.034
	(0.85)***	(1.01)***	(0.756)***

R^2 = 0.90, DW. Test=0.95, number of observations = 25

Note: The dependent variable is the private savings rate. Regressions are estimated using 1976-2000 data. Absolute t-ratios are in parentheses.

    a)   *   Significant at 1%
             **   Significant at 5%
             ***   Significant at 10%
    b)   The results were obtained after correcting for auto correlation.
        c)   The auto correlation coefficient is (0.65) with a standard error of (0.228).

The preliminary results presented in Table 2 indicate that 90% of total variation in private savings can be attributed to the explanatory variables: Age dependency, government savings, GDP growth rate, GDP per capita, M1 + M2/GDP and social security, real interest rate, inflation rate and terms of trade. The coefficients of M 1 + M2 /GDP, social security, and age dependency were significant at 1% level, while the GDP growth rate and GDP per capita were significant only at 10% level. The low Durban-Watson statistic value indicates the presence of serial correlation problem [11]. However, a problem with the OLS results is the presence of serial correlation of the residuals, as evidenced by the low Durbin-Watson statistics calculation [4]. A further potential problem with the results is that saving may be determined simultaneously with some other variables, in particular GDP growth rate, the real interest rate, money supply, and per capita income are correlated, causing the estimated coefficients to be biased. Accordingly, we reestimated the suggested model using instrumental variable [11]. Column three in Table 2 shows the results of the instrumental variables method. The results indicate that there are more insignificant variables. The coefficient of the social security, government savings and age dependency remains significant. M1+M2/GDP is now only significant at 10%, GDP per capita now has no explanatory power, and this could be justified by the fact that changes in this variable occur only slowly. Real interest rate, inflation rate and terms of trade still insignificant.

One can justify why the results turned out to be like this for a small country like Jordan as follows:

- The estimated per capita income for Jordan is about 1650 $, which indicates that the portion of that income will be saved (if any) tends to be relatively low, which will tend to put extra pressure on government savings.
- Age structure in Jordan has improved. As women have fewer children, the proportion of children under 15 has declined from 52% in 1976, to 44% in 1990 and to 41% in 1997. The smaller proportion of young persons helps lessen the economic burden on persons in the productive age group. This will most likely tend to increase private savings.
- Government savings, for a country like Jordan is expected to positively affect the creation of social and political institutions, which will reduce the degree of political instability. This will have a fairly direct, positive effect over growth and economic progress.
- Social security programs will effect the pattern of spending and savings for individuals. When people feel that they do not have to worry much about their post- retirement plans, they will feel more secure and tend to increase their current level of spending at the expense of saving rates.

The results presented in Table 2 indicate the following:

1) The coefficient of the age dependency ratio is significantly negative, implying that demographic factors play an important role in determining the value of

private savings in Jordan. The increase in the ratio of age dependency will have a negative impact on private savings.

2)   The coefficient of government savings was negative but significant, which implies that although higher government savings crowd out private savings, they will not do it one-to-one, and that Ricardian equivalence does not hold strictly.

3)   The coefficient of GDP growth rate is positive and significant, indicating that private saving will associate positively with GDP growth rate.

4)   The coefficient of GDP per capita is positive and significant, indicating that if the growth rate in GDP were higher than the growth rate in population, this would increase the level of per capita GDP, which- in turn - would increase the level of private savings. Edwards [1] has referred to this situation as a virtuous circle that goes from faster growth to increase savings to even higher growth.

5)   M1 + M2/GDP coefficient is positive and insignificant. This explanatory variable as mentioned elsewhere has been used as a proxy to capture the extent of development of the consumer's credit market in Jordan including the sensitivity of borrowing-constrains. This implies that individuals will face these borrowing constraints by increasing their private savings.

6)   The coefficient of social security is negative and significant, indicating that when government expenditures on social security and welfare rise as a percentage of total public expenditures; individuals will feel more secure and relaxed, and then they might not worry greatly about their living standards after retirement.

7)   The coefficient of real interest rate was positive and insignificant. This result has come as no surprise, since the interest rate behavior in Jordan is very stable.

8)   The coefficient of inflation rate was negative but insignificant, due to the fact that inflation distorts pricing, planning and investment decisions in Jordan. The economy produces less output and suffers a diminished standard of living.

9)   The coefficient of terms of trade was positive but insignificant due to the fact that Jordan exports mainly primary products; thus a change in terms of trade may not have a very strong impact on the level of private savings.

5. Findings

This paper has analyzed the determinants of private savings in Jordan during the period 1976-2000. The study used the OLS method first, then used the instrumental variable method to avoid the multicollinearity problem. It provides evidence that private savings in Jordan respond to the following: First, the size of the effect of the dependency

ratio on private savings is found out to be negative and significant. Second, Government savings depress private's savings, in less than one-to-one fashion. The statistical results suggest that a 1% increase in government savings will generate a 0.36% decline in private savings. Third, growth influences private savings throughout two channels: a direct positive association between GDP growth rate and private savings, and a significant positive effect of the level of GDP per capita.

Fourth, the development of the consumer's credit market will have a positive and significant effect on private savings, such that the increase in restrictions on consumer credit will associate positively with the level of private savings in Jordan. Fifth, the ratio of public expenditures on social security and welfare to total public expenditures has a negative and significant impact on the level of private savings. Sixth, the real interest rate, inflation rate and terms of trade prove to have insignificant impact on the level of private savings in Jordan.

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محددات الادخار الخاص: حالة الأردن
(١٩٧٦–٢٠٠٠م)

سعيد الحلاق

أستاذ، قسم الاقتصاد، جامعة اليرموك، اربد، الأردن

ملخص البحث. هدفت الدراسة الحالية إلى مناقشة وتحليل أهم محددات الادخار الخاص في الأردن خلال الفترة من ١٩٧٦م إلى ٢٠٠٠م. أما أهم نتائج الدراسة فكانت على النحو التالي: كان لدرجة الإعالة تأثير سلبي وذو دلالة إحصائية على الادخار الخاص في الأردن بينما أدت المدخرات الحكومية إلى انخفاض المدخرات الخاصة رغم أن نسبة الانخفاض لم تتجاوز مستوى١:١ . أما بالنسبة لأثر النمو الاقتصادي على حجم المدخرات الخاصة فقد تمت مناقشته من خلال تأثيره على كل من العلاقة الطردية لحجم النمو في الناتج المحلي الإجمالي والمدخرات والعلاقة ما بين متوسط نصيب الفرد من الناتج المحلي الإجمالي والمدخرات الخاصة. كذلك كان لتطوير الجهاز المصرفي أثرا إيجابيا على حجم المدخرات الخاصة وكان للإنفاق الحكومي على الضمان الاجتماعي تأثيرا موجبا وذو دلالة إحصائية على حجم المدخرات الخاصة. أما سعر الفائدة الحقيقي، التضخم، ومعدل التبادل التجاري فقد كانت لها تأثيرات ضعيفة على حجم المدخرات الخاصة.