# IMPACTS OF INFLATION, EXCHANGE RATE, INTEREST RATE, GOVERNMENT INVESTMENT, GNP and CR/P ON PRIVATE INVESTMENT (1964-1997)

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**Özet**

Çalışmanın amacı, faiz oranları, enflasyon, hükümet yatırımları, döviz kurları ve özel sektör yatırımları arasındaki ilişkileri muhakemeye çalışmaktır. Bunlar arasında sıkı bir ilişki sözkonusudur. Özel sektör yatırımları, faiz oranları, enflasyon, döviz kurları, hükümet yatırımları tarafından etkilenmektedir. Bu çalışmada öncelikle 1964'ten 1997'ye kadar olan 33 yıllık dönem ele alınıp incelenmiştir. Daha sonra 33 yıllık dönem 1964'ten 1980'e ve 1980'den 1997'ye olmak üzere iki ayrı alt dönem halinde incelenmiştir. Bu dönemler içinde özel sektör yatırımları bağımlı değişken, diğerleri bağımsız değişken olarak ele alınmış ve aralarındaki ilişki ortaya konmaya çalışılmıştır.

**Anahtar Kelimeler:** Özel yatırımlar, döviz kurları

**Abstract**

The aim of this study try to explain relationship between interest rate, inflation, government investment, exchange rate and private investment. There is a strong relationship between them. Private investment can effected by exchange rate, government investment, inflation. In this study, private investment is a dependent variable, the others are independent variables. We analyzed 33 years from 1964 to 1997, than the full period separete two sub period. The first period is from 1964 to 1980 the second period is from 1980 to 1997. So it try to explain the effect of independents variables on private investment.

**Key Words:** Private investment, exchange rate

## I. Introduction

The role of interest rate, inflation, government investment, and exchange rate on the private investment has received much attention in the world. Until the early 1970s, the main line of argument was that low interest rate would promote investment spending, Policy maker in many

developing countries generally adopted low interest rate policies, whether for doctrinal or other reasons. Also inflation, government investment, and exchange rate policy have some important effect on private investment.

The aim of this study is to analyze the impact of interest rate, inflation, growth, and government investment, GNP and CR/P on the private investment. Before analyzing empirical relationship among them, We study the literature survey about this subjecet. Second, ve briefly summarize the economic background of Turkey. Because in 1980, Turkish government implemented structural adjustment program. Finally, we examine the effect of interest rate, inflation, growth and government investment on private investment by using resression analyses. In our regression, private investment is considered as a dependent variable, other; inflation, growth, exchange rate, and goverment expenditure are explanatory variables. Our data resources are from International Financial Statistic and State Institute of Statistic in Turkey.

## II. Literature Survey

Saving and investment are one of the serious problem of developing countries. Economic studies show that there is a link between saving, investment and economic growth. In the litarture, most of the studies examine saving, investment, interes rate and economic growth.

Understanding the link between saving and investment is important for at least two reasons. It may hold the key to positive correlation between saving and growth. Capital accumulation is indeed the engine of growth, understanding the interaction between saving and investment is crucial to assesing the validity of the traditional reciepe that raising saving is surest way to increase growth. The determinant of saving are different from those of investment, that saving depends mainly on income ande wealth, and that investment depends on profitability and risk. Because saving and investment result from two independent decisions, they clearly can differ ex ante. Nevertheless in a closed economy, national saving and domestic investment must be equal ex-post; if saving rises, investment must also rise.

Hebel, Serven, and Solimano(1996) examined saving and investment. According to their studies, there is a very complex relationship betwen them, Feldstein and Horioka(1980) estimated that saving and investment

were highly correlated. Furthermore, no decline in such  a relationship was observed.

They have also examined the possibility that the link between domestic investment and domestic saving varies with the degree of openness of  economy. According to them, it seems  plausible that small economies that engage in substantial international trade will have much a weaker link between domestic saving and domestic investment than large and nearly autarchic economies.. They examined 15 countries and they found a link between domestic saving and investment for 15 years period (Feldstein and Herioka, 1994: 316).

Argimon and Rolden examined saving and investment in 1994. They started to analayses the basic national accounting identity of an open economy. Since in a closed economy saving must equal investment, a high saving investment correlation can be viewed as a result a low degree of capital mobility. In this context, the rate of the real interest rate   is crucial. If a private investment is a decreasing function of a real interest rate and private saving is an increasing function of the same variable, than bi-directional causality between saving and investment. On the other hand, if saving does not respond to interes rates, than causality would run from saving to investment, that is saving would act as a restriction for investment(Argiman and Roldan, 1984: 62).

Fry (1980) who investigesated saving, investment, growth in developing countries, Concluded that  saving and investmend are both determinated by the rate of growth. Fry examined seven Asian Countries (Burma, India, Korea, Malaysia, Philippines, Singapure and Taiwan). He used Alman's polynominal lag techique. He showed that higher real deposit rates of interest could reduce the level of investment, by raising costs of institutonal credit. In this case the growth rate would have to fall to equlibrate saving and investment(Fry, 1981:  317).

The relationship between investment and the nominal interest rate in an economy where the cash balances of households and firms are rigidity linked to their respective expenditures has been examined by Koening(1989). In such an economy the nominal interest rate acts like a tax on agents' purchases. As a result, housholds are inclined to save, rather than spend, when the nominal interest rate is relatively high. Provided that at the margin, firms are able to finance at least some of their capital spending  out of contemporaneous earning, this increase in

desired saving is only particularly offsett by a decrease in desired investment. His paper extends Koenig's analaysis to case in which houshold and firms, at a cost in terms real resources, are able to increse the velocity of money. Intutitively, when the nominal interes rate is high, consumption of financial services by households and firm may rise to such and extend that any decline in the consumption of nonfinancial goods and services is overvalued, reducing the resources available for investment (Koenig, 1982: 325).

In the paper "Determinants of Private Saving" by Masson, Bayoumi, and Samiei (IMF Staff Paper, 1995) the estimated coefficient for real rate of interest, as determinant of private saving was not significant. Therefore, they omitte this variable from their regression.

According to the Mc-Kinnon(1973) and Shaw(1973), allowing real interest rates to rise to market levels alteref the intertemporal rate of substitution, encouraging aggregate saving, as measuredr in GNP accounts, does not respond strongly to highen real interes rate. Empirically a number of studies for the case of developing countries have failed to find any effect of interest rate on private saving.

Moreover, most of the studies showed that real interest do not have much influence on saving. For instance, Giovannini analyzed saving and investmend rate in Less Developped Countries (LDC). He used cross sectional data. He provided emprical evidence on the questions of whether saving respond positively to changes in the real rate of interest. He argued two points. First, emprical estimates of the response of aggreate saving to the real interest rate, based on modifications of Keynesian consumption function of the seventies. Second, estimates of the response of the expected rate of growth of aggregate consumption to the expected real interest indicate that intertemporal subsititutability in consumption is likely to be very small in the majority of countries studies. (Giovannini, 1985: 235).

Long and Summer investigated equipment invesment and economic growth. They found that machinery and equipment investment has a strong association with growth. They analayzed 25 period from 1960 to 1985. During the twenty five years period each extra percent of GDP invested in equipment is associated with an increase in GDP growth of on third of a percentage point per year. This is a much stronger association

than found between growth and any of other components investment(De Bradford and Summer, 1991: 445).

In 1993, Morriset studied relationship between financial liberalization and improve of private investment in developing countries. According to him the most favored justification for high interest rate policy in LDCs is derived from the persence of liquidity constraint on private capital and lead to an excess demanad for capital relative to what would happen if the deposit interest rate were allowed to find its maket-clearing level. Because the principal consraint on investment is quantity rather than cost of financial resources, a rise in interest rates will incsrease the supply of credit to finance private investment.

He used McKinnon-Shaw hypothesis with a simple model of investment to show investment behavior. He demonstrated with a simple structural model that a number of factor can influence the relationship between real interest rate and private investemnt in LDCs.

This model estimated for Argentina, is that the effect of interest rate policies on the demand for capital goods is weak, althoguh the total impact might be stronger on the quality of investment does not result from exceedingly small direct interest elasiticity's of private investment. Instead, it is due to interactions of a number of mechanism allowed for in the model which tend to neutralize the impact of such policies. In Argentina, the public investment has a positive effect on private investment(Morisset, 1993: 133).

Carbo and Hebbel analayzed the effectiveness of public policies in raising saving in    developing countries drawing from estimations of consumption functions for 13 developing countries. While indirecet effect of public policies via changes in domestic inflation an real interest rates on private saving are shown to be public current expenditure cuts or tax hikes on private saving. However, higher public saving is offset only in part by a private saving decline the exact offset coefficien depending on which fiscal variable is affected ond on the private sector's perceptions of how permanent the fiscal policies play an effective role in raising national saving level in developing countries.

From their empirical estimation, they showed that $1 transitory increase in public saving achieved by cutting current-period public expenditures reduces private saving by 16 to 50 cents. However, if the same increase in public saving is achieved by raising current period taxes

private saving declines on average between 48 to 65 cent. The main source of the different effect of reducing government expenditure vis a vis inceasing taxes arises from the effect of tax increases on both current and permanent income levels(Carbo, 1996: 89).

### III. A Brief Economic Background

Right after the establisment of the Republic in 1923, Turkey has had strict nationalism in its political life and state regulations, specifically state enterprises in econonmic life. Beginning in the 1960s with the establishment of the State Planning Organization, the basic strategy for the decedes oof the 1960s and 1970s was one of active government of the country with a programmed based on import-subtituting industrialization. In many ways, the programmed was a continuation of Turkey's pre-war development strategy, though it represented a departure from more liberal economic policies of 1950s.

The causes of the 1977 debt crises were both internal and external. External pressures setmmed from the first oil price shock of 1973, world-wide recession in 1974 and 1975, and deteriorating term of trade. Given external conditions, internal policy adjustment were slow in coming. The government continueted to amass large public sector deficits.  In turn, its expansionary increased the demand for imports.

The programmed inaugurated on 24 January 1980, was aimed not onli redressing the current situation, but also changing the entire orientation of Turkey's development strategy from its position of an inward-oriented, government controlled economy to that of more open, market-type system. Elements of the prgram included an adjustable exchange rate regime, the elimination of many price controls, a more flexible interest rate policy, encouragement oof foreign investment, and trade liberalization

### IV. Gross National Product And Private Investment

We try to show the behavior of real GNP growth and private invstment for the entire 1964-1997 period. The periods were chosen to represent the 1964-1997, 1964-1980 and liberalization period (1980-1997). Real GNP growth has avaraged over  5% for the entire 33 year period. However, growth was one-and-a-half points higher than that on avarage in early period. Almost zero  during the crises years, and quite respectable for the times during the liberalization period.

It is interesting to note that the level of investment in the post reform period has not returned to level of the crisis years. The share of investment in GNP is more than two percentage points lower than during the liberalization period and private investment is growing at about half the rate of growth in the before 1980 period.

### V. Methodology

In this part of this study we tried to examine what is the effect of inflation, exchange rate, interest rate, GNP, Government expenditure, and CR/P on the private investment. We fallowed Ziya Oniş and James Reidel's regression model(Onis and Riedel, 1993; 87). According to their model explained variable is log of real private investment, explanatory variables are rate of change of real GNP lagged one year, real interest rate and CR/P is the banking system's claims on the private sector(CR), deflated by implicit GNP deflator. In our model we accepted same variable and also we adjusted inflation rate, government investment, and exchange rate. We run three regression. First regression coverst whole perod from 1964 to 1997. Secondly we split the period two subperiods from 1964 to 1980 and from 1980 to 1997. Because Turkish government announced a major economic program on January 24 1980. So we want to see what is the effet of Turkish financial liberalization policy on the private investment before and after 1980. For this reason we have used the model to run regression for three periods.

This model:

$$PIN = \alpha_o + \beta_1(INR) + \beta_2(EXC) + \beta_3(INFR) + \beta_4(GNP)_{-1} + \beta_5(GOV) + \beta_6(CR/P) \quad (1)$$

Where

PIN = Reel Private Investment

INR = Reel Interest Rate

EXR = Reel Exchange Rate

INFR = Inflation Rate

$GNP_{-1}$ = The Rate of Change of Real GNP lagged one year

GOV = Reel Government Investment

CR/P = It is the Banking system's claims on private sector(CR), deflated by the implicit GNP deflator.

Than we took log some of these variable of this equation. Than (1)rewritten as fallow

$$\log(PIN) = \log\alpha_o + \beta_1(INR) + \beta_2(EXC) + \beta_3(INFR) + \beta_4\log(GNP)_{-1} + \beta_5\log(GOV) + \beta_6\log(CR/P)$$

## VI. Hypothesis

a. The key financial variable influencing investment in a liberal financial regime is the

b. real interest rate. According to known theory, increasing real interest rate will result a decreasing investment. Expectation is negative on this relationship. But this relationship between them works well in liberal market. However, Turkish Financial market is still heavily controled by Turkish government. Than we may not see expected way of relationship clearly.

c. Because of high inflation rate, the credibility of methods to predict medium and long term decreases this distorted situation of economy cannot let enterpreneurs make good decisinons about their investment. So most of them will stay indecisively. For this reason, we expected negative relationship between them.

d. Devaluation makes export easy. This can not create opportunities to increases export volume and to expend export sector of Turkey. We were expected that devaluations create more investment for exporting sector. It means, there is a positive relationship between devaluation and private investment.

e. There is a two way causation between growth and private investment. We looked at just from growth to investment side of this relation. We expected positive sign.

f. I used CR/P to see volume of loans from bank to private sector. We expected that an increase in loanable funds will create more investment for private sector.

g. The effect of change of government investment on private investment can be positive and negative. As long as government spending (current and capital) is a complement for private sector like infrastructure investment, pirvate investment can increase. On the other side, more government spending means less loanable funds more and more to make more spending, and this can give

rise less investment to private sector. If this negative affect of government spending increas offsets the positive effect, then we can say that crowding out dominates this relationship, and unexpectedly there exists a negative relation between government investment and private investment.

## VII. Regression Result

When we look at the t values of all coefficients in three perods, we see that, the coefficient of interes rate is insignificant an all periods. Even though exchange rate and inflation rate are not significant in the first and third period, they are significant in the second period. The coefficient of log $(GNP)_{-1}$ and log CR/P coefficient are significant both first and second period. But there are insignificant in the last period.

When we analyze our regression result, we see that coefficients of exchange rate, log of government investment, log of $GNP_{-1}$ are positive. Log of $GNP_{-1}$ and log of CR/P are more significant than the others. When exchange rate increases by 1 % private investment increases by 1.92 %, for the first period. However, the effects of $GNP_{-1}$ and CR/P on the private investment increased by 1% are 1.33% and 1.16% respectively. $R^2$ is 0.99 for this period.

In the second period GNP became more effective than the others. Also CR/R is more effective on the private investment relative to the previous period. The effect of exchange rate on the private investment feel sharply from the first to the second period.

In the last period, exchange rate became more effective than in the first two periods. Because real exchange rate was negative in that time. In this period, reel exchange rate decreased by 1% and in response to tiis private investment which increeased by 5%. CR/P is also second in the last period and the coefficient of log $(GNP)_{-1}$ increased from 1.65% in the second period to 2.5% in the last. In this period when log of CR/P increased by 1%, private investment increases by 3.2%

## VIII. Conclusion And Comparison Of Our Result With Similar Studies

Ziya Onis, James Riedel(1993) and Libby Ritenberg (1991) have studied similar regression analayses about Turkey. Onis and Riedel used both log of $GNP_{-1}$ and CR/P as explanatory variables and real private investment as dependent variable for period 1965-1985. According to

their result, private investment in Turkey was determined overwhelmingly by conditions in the financial markets. Although the coefficient of log $GNP_{-1}$ variable carried the expected sign, was not very significant statistically in their study. But CR/P were estimated to be the principal determinants of private investment. Also several other variables which might have been expected to influence private investment, including real exchange rate, the rate of inflation, and variability of inflation were experimented with in the investment function, but none proved statistically significant. Their $R^2$ was 0.93, Durbin Watson was 1.53 and F statistic was 94.76(Onis and Riedel, 1993: 87).

Rittenberg (1991) examined interest rates, inflation, growth, and private investment for Turkey from 1964-1986. According to his study's result real interest rate had negative effect on the private investment in Turkey. When interest rate increases by %1, private investment decrease by 3.4%. But log of $GNP_{-1}$ had a positive effect on the privte investment. When log of $GNP_{-1}$ increases by 1% private investment increases by 1.36%. He found that $R^2$ was 0.98, Durbin Watson was 2.26(Rittenberg, 1991: 151).

When we compare our regression results with Onis, Riedel and Rittenberg, we can see some similarities among them. We showed that log of $GNP_{-1}$ had positiv effect on the private investment. Onis, Riedel, and Rittenberg found same result. This variable has positive effecet on the private investment. Even though our coefficient of CR/P is different from Onis and Riedel. It has positive effect on the private investment. Also, when we compare $R^2$, all of the stidies found very high $R^2$.

To sum up we concluded that our econometric study supported the theory. Log of CR/P, log of $GNP_{-1}$ and log of GOV have positive effecet on the private investment.

### Impact of Public Investment on Private Investment (log GOV):

Theoretically, the effect of public sector investment is ambiguous. There are two views regarding to the effect of public sector investment on private investment.

1. On the one hand, public sector investment is said to be complimantary to private investment because it is assumed that it genarates useful infrastructure which enhances private investment.

2. On the other hand, second view is that public investment can crowd out private investment, especially when public enterprises produce goods that compete with private sector production or when an increase in the private portfolio in favor of public sector projects. Therefore, less funds will be available to the private sector.

Although this debatable issue, our study shawed that public sector investment was complementary to private sector investmnt between 1964-1997 perod in Turkish economy. Estimated coefficient of lof of GOV was positive and significant. Coefficient of 0.59 with a highly significant t-test (t= 3.20 5% significant level).

**Impact of Domestic Credit to the Private Sector Investment (Log CR/P):**

Estimated coeefficient of log of CR/P on private investment positive and significant. Coefficient of 1.16 with a highly significant t-test(2.39 at 5% significant level) implies that expansion to the private sector is one of the important determinats of private investment.

In order to increase the private sector invest requirement, as it is mentioned by Morriset, the flow of domestic credit to the private sector should not be absorbed for the public sector need.

Therefore, we recommend that Turkish government should manage prudent monetary and fiscal policies to increase the flow of credit expansion. We feel fallowing are the major policies to focus on:

1. Privatization of State Economic Enterprises to reduce the deficit, therefore more funds will be available to the private sector.

2. Increase foreign saving. Fallowing steps needs to be taken:

   a. There is a need to further liberalize the finacial sector so that the real interest deposit rate can be made competitive in relation to the rest of the world. This involves gradual move towards market oriented financing and restructuring of credit controls.

   b. With regards to maintaining the competitiveness of domestic economy with respect to industrial countries the nominal exchange rate should be adjusted in such a way that real exchange rate remain stable.

**Impact of GNP on Private Investment (log of GNP$_{-1}$)**

Similarly, the estimated log of GNP$_{-1}$ has positive effect on the private investment. Coefficient of 1.33 with a highly significant  t-test(t=2.63) implies that there is strong and positive relation between each other during period of 1964-1997. Furthermore, higher growth will accumulate higher capital and stimulate higher level of investment for the country.

Therefore, the main objective of Turkey should be to maintain a sustainable growth. Clearly, the growth depends upon the increase in investment. On the other hand, achieving the desired level of investment can be considered as a positive factor in realizing the desired level of growth.

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