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# **Comparison of Macroeconomic Performance of Turkey and East Asian Countries, and an Econometric Analysis of Economic Growth in Turkey**

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## **Abstract**

The primary aim of this paper is two-fold: First, it provides comparative data regarding the growth rate of real GNP, inflation rate, the domestic saving and investment rates, and the ratio of exports to GNP in relation to Turkey and four of the fast growing East Asian countries including Malaysia, Indonesia, Korea and China. Second, the paper tests various hypotheses regarding the impact of saving rate, investment rate, export growth and volatility of export growth, the share of exports in GNP, inflation rate and saving rate on the growth rate of real GNP in Turkey. Historical data show that the East Asian countries selected, have systematically saved and invested much more than Turkey (in proportion to their GNP) and exported much bigger percentage of their output. Application of simple O.L.S. regression analysis to the annual Turkish data spanning the time period of 1980-2001 suggested that each one of the hypothesis tested can not be rejected.

## **1. Introduction**

A World Bank study about the most important factors responsible for the relatively fast growth rate experienced by East Asian economies listed the following six factors (World Bank, 1993):

- a) High Savings Rates
- b) High Investment Rates
- c) High Ratios of Export to GNP and Export oriented Growth Policies
- d) Allocating capital to high-yielding investments and catching-up technology of the industrial economies
- e) Educational Investments
- f) Existence of Competitive Markets

The study in question suggested that these were the basic structural characteristics of high performing East Asian economies such as Singapore, Taiwan, Malaysia, South Korea and others. These factors are complementary for each other and in a sense, they formed a recipe for high growth; high levels of financial savings are necessary for high investment levels. Allocating capital to high-yielding investments and catching-up technology of the industrial economies is the main mechanism through which new technologies are adapted and productivity is increased. The competitive nature of markets puts pressure on particularly manufacturing and service sectors to decrease costs and increase efficiency. Investment in education increases the size of skilled labor force which is essential for the structural transformation of the economy into high-technology oriented production. On the other hand, export-oriented growth strategy is critical for various factors, all of which help to reach a sustainable and relatively high rate of economic growth in the long-run. The first one of these is the ability to sell in global markets which have potentially unlimited capacity of demand to absorb the products coming from particularly small developing countries. Second, the competitive nature of global markets puts pressure on domestic firms to be cost-efficient. In other words, survival of exporting firms in the long-run critically depends on continuous adoption of latest technologies and management practices so as to lower costs and increase productivity. Finally production for global markets not only allows domestic firms to take advantage of economies of scale but also reduce their vulnerability to fluctuations in domestic demand for their products particularly in case of worsened macroeconomic stability. There is a body of both theoretical and empirical literature which argues that there is a positive relationship between the "degree of international openness" of an economy and economic growth (Balassa, 1978; Jung and Marshall, 1985; Chow, 1987; Chang, 2000; Dhananjayan and Devi, 1997). The "degree of international openness" has usually been measured as the relative share of exports in output or the

volume of exports. However, none of the past empirical work has focused on the possible impact of “volatility of exports” or alternatively “volatility of export growth” on long-run growth rate of an economy. One can intuitively argue that higher volatility of export earnings implies higher volatility of profits of sectors producing exportables. And higher volatility of profits naturally entails higher risk for firms operating in sectors producing exportables. Assuming that firms are risk averse, this is expected to lead to lower investment in these sectors which make up an important portion of overall traded goods sectors in the economy. And lower investment in traded goods sectors, over time, is likely to reduce the relative share of these sectors in gross domestic product and employment. And as Gehrels (1991) suggests this can negatively affect the productivity growth of the economy since historically productivity growth has been reported to be higher in traded goods’ sectors. This, in turn, is likely to lower long-run growth rate of the economy. This intuitive relationship between ‘instability in export growth’ and ‘economic growth’ (to our knowledge) has not been tested before specifically for Turkish economy.

The primary aim of our paper is to investigate the various hypotheses regarding the impact of several key macroeconomic variables themselves or the volatility in these variables on economic growth. In particular we test the following hypotheses for Turkish economy using annual data for the period of 1980-2001:

- a) Hypothesis 1: Higher domestic saving rate positively affects growth rate of real GNP.
- b) Hypothesis 2: Higher domestic investment rate positively affects growth rate of real GNP.
- c) Hypothesis 3: Higher growth rate of exports positively affects growth rate of real GNP.
- d) Hypothesis 4: Higher volatility of export growth negatively affects growth rate of real GNP.
- e) Hypothesis 5: Higher volatility of savings negatively affects growth rate of real GNP.
- f) Hypothesis 6: Higher volatility of inflation rate negatively affects growth rate of real GNP.

The rest of the paper is organized as follows: In section two, we present comparative data about growth performance, inflation rate, domestic saving and investment rates, and export to GNP ratios of Turkey and selected East Asian economies for selective years and sub-periods. The section three is devoted to simple O.L.S. (Ordinary Least Squares) regression results regarding the four hypothesis stated earlier and interpretation of results. The last section concludes with a summary of results.

## 2. Comparison of Key Macroeconomic Indicators for Turkey and Selected East Asian Countries

In this section we first compare the growth performance of Turkey and some selected East Asian countries including Malaysia, Indonesia, Korea and China for various sub-periods between 1980 and 2001, and then present data on their respective export to GNP ratios for each year between 1990 and 1997. Finally, we compare the domestic investment and saving rates of these East Asian countries as a group with those of Turkey for four consecutive sub-periods between 1980 and 1999.

Table 1

Growth Performance of Turkey and selected East Asian Countries \*

	1980-85	1986-90	1991-95	1996-2001
Turkey	3.5	5.8	3.3	1.7
Malaysia	5.6	6.8	8.7	4
Indonesia	5.5	6.5	7.1	1.4
Korea	6.5	10.1	7.5	6
China	9.6	8	12	8.1

\* Average annual percentage change in real GNP

Source: The World Bank (1993), S.P.O (2002) and A.D.B. (2003).

As one can see from Table 1, the growth performance of Turkey is much less impressive than of all other countries listed for all sub-periods (except one in comparison to Indonesia). Not surprisingly the average annual growth rate between 1980 and 2001 is almost half of the average of the other four East Asian countries as a group.

Table 2

Average Annual Growth Rate for 1980-2001\*

Turkey	3.6
Malaysia	6.3
Indonesia	5.1
Korea	7.5
China	9.4
Asian countries as a group	7.1

\*Percentage change in real GNP

Source: The World Bank (1993), S.P.O. (2002), A.D.B. (2003).

Table 2 clearly shows that the growth performance of Turkey has been much poorer than the East Asian economies listed above. According to the World Bank study cited earlier in introduction and mainstream growth theory at least one possible reason (for the differentials in growth rates across countries) is the corresponding differentials in respective domestic (national) saving rates of these countries. Even though it is not possible to raise growth rate permanently by increasing the saving rate, growth rate may respond positively to a given increase in saving rate at least for certain periods of time (Blanchard, 1997). Higher saving rate is expected to affect economic growth positively by increasing the available amount of financial capital for investment which may be used for increasing the rate of capital accumulation. However it is worth to note that in open economies investment rate can increase without any corresponding increase in domestic saving rate; international borrowing can allow a country to run trade deficit which may reflect higher investment spending on additional capital stock enabling it to grow faster. In the light of the above discussion, it is intuitive to check out to see whether the differences in growth performance of Turkey and East Asian Countries are reflected in their respective saving and investment rates. Table 3, given below, suggests that this is indeed the case.

Table 3

Domestic Investment and Domestic Saving Rates of Turkey and East Asian Countries \*

	Investment /GNP		Savings/GNP	
	Turkey	East Asian Countries	Turkey	East Asian Countries
1980-84	20	30.6	16.9	30.3
1984-89	23.2	31.7	22.8	35.1
1990-94	24.1	36.1	22.2	34.8
1995-99	24.4	33.7	21.4	31
1980-99	23.9	33	20.8	32.8

\* In percentage terms

Source: S.P.O. (2000), R.B.A. (1999).

The figures in Table 3 show that Turkey has continuously saved and invested much less (in proportion to her GNP) than East Asian countries. This, in turn, sheds some support for the World Bank argument that relatively high growth performance of East Asian countries is at least partly due to higher saving and investment rates (World Bank, 1993). As noted earlier in introduction, The World Bank had argued that export oriented growth strategies adopted by these countries were an-

other important factor responsible for the remarkable growth performance of East Asian countries. To see whether there is any correlation between the differentials in the degree of international openness and those of the respective growth rates of Turkey and East Asian countries, we provide comparative data on the 'share of exports in GNP' for all these countries in Table 4.

Table 4

## The Share of Exports in GNP\*

	1990	1991	1992	1993	1994	1995	1996	1997	A.V.**
Turkey	8.6	9	9.3	8.6	14	12.8	17.6	16.8	12.1
Malaysia	70.4	73.8	72.1	75.8	82.6	86.3	81.4	83.9	78.3
Indonesia	26.6	24.2	25.4	25.8	25	25.8	24	28.7	25.7
Korea	25.1	24.1	24.9	24.8	25.1	27.5	27.1	31.7	32.4
China	13.5	14.7	14.8	12.6	18.8	18	18.1	19.9	16.3

\* In percentage terms

\*\* Annual average of 1990-97 period

Source: S.P.O (2000).

It is obvious from the figures given in Table 4 that between 1990 and 1997 share of exports in GNP (which is an important indicator of the 'degree of international openness') has been much lower than that of the four fast growing East Asian countries listed. When one considers the respective averages of the growth rate for the sub-period of 1991-95 given in Table 1 along with the figures in Table 4, one can see the correlation between relatively poorer growth performance of Turkey (3.3%) and relatively smaller share of its exports in GNP on average (12.1%) for 1990-97 period. On the other hand, the export to GNP ratio for Malaysia which has grown at 8.7% over 1991-95 period, was much higher (78.3%) as shown in Table 4 above.

And finally, we present below the respective annual inflation rate of each of these East Asian countries and Turkey for the years between 1990 and 1998:

Table 5

## Inflation Rate \*

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Turkey	60.3	66	70.1	66.1	106	89.1	80.4	85.7	84.6
Malaysia	2.6	4.4	4.8	3.5	3.7	5.3	3.5	2.7	5.3
Indonesia	7.8	9.4	7.5	12.5	9.6	9.4	8.0	6.7	57.6
Korea	8.6	9.3	6.2	4.8	6.2	4.5	4.9	4.4	7.5
China	3.1	3.5	6.3	14.6	24.2	16.9	8.3	2.8	-0.8

\* Annual percentage change in consumer price index

Source: International Economic Indicators 1999, S.P.O. 1999, Table 14.

It is striking to see in Table 5 that the inflation performance of Turkey for all the years listed has been much worse than the East Asian countries included in our study. Inflation rate itself or the volatility of it is usually taken as a measure of financial instability which can distort the efficiency of resource allocation and therefore lead to lower growth in the long-run.

Naturally, the correlations between relatively superior growth performance of East Asian countries and their respective relatively higher investment and saving rates, and bigger share of exports in GNP do not automatically imply a cause and effect relationship between each of these macroeconomic variables and economic growth. Using Turkish data we test the possible causal effect of higher investment and saving rates and higher growth rate of exports on economic growth. In addition, we also investigate the possible negative effect of increased volatility of infla-

tion rate, export growth and savings on economic growth. The next section is devoted to the presentation and interpretation of the corresponding regression results.

### 3. Regression Results

In this section we present the estimation results of OLS (Ordinary Least Squares) regression analysis of the hypothesized positive relationships between the growth rate of real GNP and domestic saving rate, domestic investment rate and growth rate of exports. We used annual data spanning the time period of 1980-2001 (Source: S.I.S. (2001), S.I.S. (2002) and S.P.O (2002)).

#### 3.1. *The Impact of Domestic Saving Rate on Economic Growth*

The estimated relationship between domestic saving rate (which is obtained by finding the share of the sum of the private and public savings in GNP) and the growth rate of real GNP is given below in the form of equation (1):

$$GR = - 4.28 + 0.38 SGNP \quad (1)$$

$$(0.23)^* (1.40)^* R^2 = 0.044$$

\* *t* statistics

GR = Annual growth rate of real GNP.

SGNP = Annual share of domestic savings in GNP.

Even though the estimated coefficient of SGNP (.38) is statistically insignificant, it is worth to note that its positive sign is exactly what the growth theory would predict; higher saving rate means larger amount of current output is set aside for investment in additional capital stock. And if this actually leads to higher investment, the economy's productive capacity increases at a higher rate than before leading to an increase in growth rate at least for a certain period of time. The numerical estimate of the coefficient of SGNP in equation (1) suggests that 1% increase in domestic saving rate could lead to approximately 0.38% increase in the annual growth rate of real GNP.

#### 3.2. *The Impact of Domestic Investment Rate on Economic Growth*

As noted above, higher investment rate implies higher rate of accumulation of stock of capital for a certain period of time. As long as the present level of capital stock is less than what is known as 'steady-state level' or 'golden rule level' of capital stock, the increase in rate of investment ensures that the capital stock accumulates at a faster rate as well leading to an increase in growth rate temporarily. The 'golden rule level' of capital stock refers to the 'optimal stock of capital' per worker that maximizes consumption per worker (Mankiw, 2003). Our estimation results suggest that the possibility of a positive relationship between higher rate of investment and growth rate can not be ruled out. However, the *t* statistics of the estimated coefficient is highly insignificant as shown in equation (2) below:

$$GR = - 1.66 + 0.25 IGNP \quad (2)$$

$$(-0.15)^* (0.54)^* R^2 = 0.29$$

\* *t* statistics

IGNP = Annual share of domestic investment in GNP.

#### 3.3. *The Impact of Growth Rate of Exports on Economic Growth*

$$GR = 3.07 + 0.029 EXGR \quad (3)$$

$$(1.93)^* (0.37)^* R^2 = 0.007$$

\* *t* statistics

EXGR = Annual growth rate of exports in \$ terms.

Export growth is expected to affect output growth positively particularly due to the fact that it represents an increased demand for domestic output and therefore has expansionary effect for real GNP. Second, producing increasingly larger amount of output for global markets is expected to increase total factor productivity due to several factors including the adoption of more

advanced technologies and better management practices, learning by doing gains and economies of scale (Krugman, 1987). In addition, higher growth rate of exports may loosen a foreign exchange constraint which makes it easier to import inputs used in domestic production and capital goods which can be critical in terms of faster expansion of output.

### 3.4. The Impact of Higher Volatility of Export Growth on Growth Rate

The possible impact of higher volatility of export growth on economic growth (to our knowledge) has not been investigated in the literature, particularly for Turkey. Intuitively, higher variance of export growth is expected to increase the variance of output growth. And higher instability of output growth means higher volatility of growth of sales and therefore growth of profits of firms. This, in turn, means increased degree of uncertainty and risk regarding the capital investment decisions of a typical firm. Assuming that a typical firm is risk averse one would expect to see a decline in the total amount of capital investment (for a given level of the expected rate of return per \$ invested) in response to an increase in the instability of output growth. In particular, the increased uncertainty in terms of probabilistic behavior of profits of exporting firms, can cause capital (and other productive resources) to flow from the sectors producing exportables to sectors producing non-traded goods or import substitutes. If the relative output share of sectors producing non-traded goods increases, output growth can be negatively affected since historically, productivity growth in this sector has been lower than in the sector producing traded goods (Gehrels, 1991). The estimation results presented below in the form of (4) suggest that this possibility can not be ruled out for Turkish economy:

$$\text{AGR} = 4.07 - 0.0005 \text{ VEXGR} \quad (4)$$

$$(3.20)^* (-0.10)^* R^2 = 0.0034$$

\* *t* statistics

AGR = Average growth rate of real GNP for each one of the five sub-periods between 1980 and 1999 where each sub-period corresponds to four consecutive years.

VEXGR = Variance of the export growth rate for each sub-period.

The sign of estimated coefficient of VEXGR in equation (4) is negative. The relatively low value of *t* statistics for the estimated coefficient (-0.0005) can be due to the very small degrees of freedom that our limited data set allowed for, in estimation process. However, the fact that the sign of the estimated coefficient is as theoretically expected suggests that the hypothesis that higher volatility of export growth negatively affects economic growth can not be ruled out. However, we test the same hypothesis using an alternative measure of volatility of exports given below by equation (5):

$$\text{GR} = 7.38 - 1.53 \text{ BEXGNP} \quad (5)$$

$$(5.36)^* (-3.75)^* R^2 = 0.41$$

\* *t* statistics

BEXGR = Absolute deviation of export to GNP ratio around its long-run mean.

An increase in the value of BEXGNP represents an increase in the instability of exports for that year. The estimated relationship between annual growth rate and this measure of export instability is statistically significant as the reported *t* statistics suggests. In other words, an increase in the volatility of the share of export in GNP is likely to affect long-run growth rate of the economy negatively. It is also interesting to note that the reported  $R^2$  is relatively high suggesting that the variations in the share of exports in GNP can be responsible for a significant portion of the fluctuations in annual growth rate of Turkish economy.

### 3.5. The Impact of Volatility of Savings on Economic Growth

Now we test the hypothesis that volatility of savings in GNP (national savings rate) affects the long-run growth rate. We postulate that higher volatility of national savings which can be caused by changing government policies or varying expectations of households about the future state of the economy is likely to lead to increase instability in real and nominal interest rates. And this in turn, would mean increased degree of uncertainty for the future cost of borrowing and credit availability for domestic firms which may respond by cutting their investment spending. We measure the volatil-

ity of national saving rate by its (absolute) annual deviation from its long-run mean. When we regressed the (annual) growth rate at this measure of (annual) instability in national saving rate the resulting estimate of the coefficient of the independent variable is negative as we expected:

$$GR = 5.93 - 0.99VSAV \quad (6)$$

$$(2.76) * (-1.34) * R^2=0.082$$

\* *t* statistics

VSAV= Absolute deviation of annual share of national saving in GNP from its long run mean.

Even though the estimated coefficient of VSAV is statistically insignificant, its negative sign suggests that the possibility of negative impact of volatility of savings on economic growth can be ruled out. And in countries like Turkey where national saving rate can fluctuate due to unpredictable changes in government fiscal or monetary policies (both of which can have erratic shifts in expected real interest rates), our estimation results can be taken as an indication that macroeconomic policies should also aim at generating not only low levels of real interest rates but also stable macroeconomic policy environment which can help to lower instability in real interest rates.

### 3.6. *The Impact of Volatility of Inflation Rate an Economic Growth*

In what follows we test the possible negative effect of increased volatility of inflation rate on growth rate of real GNP. We carried out the test of this hypothesis using two alternative specifications of both the dependent variable (the growth rate) and the independent variable (measure of volatility of inflation rate) given below by the regression equations (7) and (8):

$$AGR = 4.63 - 0.0024VARIR \quad (7)$$

$$(4.67) * (-1.09) * R^2=0.28$$

\* *t* statistics

AGR= Average growth rate of real GNP for each sub period.

VARIR= Variance of inflation rate for each sub period.

In eq. (7), the dependent variable (AGR) is the average annual growth rate for each of the five sub periods between 1980 and 1999. Each sub periods corresponds to four consecutive years and VARIR (independent variable) is the variance of the inflation rate for the corresponding sub period. The estimated coefficient of the VARIR variable is negative as we postulated. The hypothesis that volatility of inflation rate could have growth retarding effects in Turkey is also supported by the estimation results based on the alternative specifications of the relationship between the two variables given below by eq. (8):

$$GR = 5.12 - 0.056 BVARIR \quad (8)$$

$$(2.86) * (-0.71) * R^2=0.026$$

\* *t* statistics

GR= Annual growth rate of real GNP.

BVARIR= Absolute deviation of annual inflation rate from its long-run mean.

## 4. Conclusions

The mainstream theories of growth (such as Solow's model) predict a (temporary) positive effect of higher domestic saving rate on economic growth. In the light of this, the positive correlations between saving and growth rates of different countries documented in various studies as well as in this study are particularly noteworthy (World Bank, 1993). When saving rate is high, a larger percentage of output can be allocated for investment which may lead to faster rate of capital accumulation and output growth. Summers and Heston (1991) have shown that the experience of 84 countries over the time period of 1960-1992 supports this prediction: High investment rate is associated with high income per capita. On the other hand, recent developments in growth theory allow investment to have even more critical effect on output growth particularly through its effect on economy-wide labor-augmenting technological progress (Berg, 2001). On the other hand, there

is a body of both theoretical and empirical literature which suggested that the volume of exports or growth rate of exports is likely to affect economic growth positively.

In this paper, we have compared the growth performance of Turkey with that of the four relatively faster growing East Asian economies and attempted to see whether the differentials in economic growth are correlated with those of the domestic saving and investment rates, and the respective shares of exports in GNP of these countries. The data clearly showed that these four countries, namely Malaysia, Indonesia, Korea and China have systematically saved and invested relatively larger fraction of their national outputs and relatively larger percentage of their outputs was exported. Given these correlations, we carried out simple O.L.S. Regressions using annual Turkish data to see whether domestic saving rate, domestic investment rate and the growth rate of exports have a positive impact (individually) on growth rate of real GNP. The estimated coefficients of these variables have theoretically expected signs. However, the estimates are not statistically significant. The other hypothesis that we tested is the possible negative effect of higher volatilities of export growth rate, the share of exports in GNP, inflation rate, and national saving rate on average annual growth rate of real GNP. Again in all cases tested the estimated coefficients have all theoretically expected (-) signs. And particularly in case of the volatility of the share of exports in GNP the estimated coefficient is also statistically significant suggesting that export volatility in the long-run is negatively affecting growth rate of real GNP. In general, the estimation results pertaining to the impact of volatility suggest that macroeconomic volatility can be an important determinant of the long-run growth performance of Turkish economy and macroeconomic policies should be formulated in a way to lower the overall macroeconomic volatility particularly in relation to inflation rate, national saving rate and the share of exports in GNP.

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