Economic Growth in Iran: 1950-2000

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Introduction

This paper examines the growth performance of the Iranian economy during the 1950-2000 period and compares it with the growth experience of the MENA countries. This paper will organize the discussion and evaluation of the empirics of economic growth in Iran along the issues identified by the current literature as the "stylized facts" of growth. I will refer to two distinct sets of samples. The "stylized facts" obtained from large inter-regional cross-country empirical tests and those based on the stylized facts obtained from the MENA region. In this way, we can compare the Iranian experience with the general features of modern economic growth at the world and at the regional level and discuss common and uncommon features along the same general framework mentioned above.

The first section is a brief historical prelude and reviews the main economic trends leading to the "take off" stage. The second section deals with the empirics of growth in Iran during the 1950-2000 period and examines the issues of growth pattern and growth volatility. In this connection we identify three distinct growth periods and look at some time series properties of the growth process. In the Third section we use the conventional growth accounting methods to identify and measure the sources of economic growth in Iran. In the fourth section the issue of structural transformation of the economy and sectorial growth will be reviewed. In the fifth section we review and contrast the development strategies before and after the revolution and discuss their effect on the growth process. We will also discuss the link between institutions, national policy, and growth and will attempt to identify important growth correlates for the Iranian economy. To this end we examine both the usual policy and state variables in the empirical growth literature and also variables relevant for the Iranian economy. The final section presents a summary and some policy options.

1. Historical Prelude

Modern economic growth is distinguished by its sustainability and involves four fundamental processes. Emergence of market relations of production and institutions and the formation of the home market; greater division of labor and the exploitation of increasing return to specialization, hence growth of the home market. This process is accelerated by reductions in transportation costs. Exploitation of increasing returns, population growth, and urbanization resulting in a bigger domestic market. This story is similar to Adam Smith's reasoning that "As it is the power of exchanging that gives occasion to the division of labor, so the extent of this division must always be limited by the extent of that power, or, in other words, by the extent of the market." It is also somewhat similar to Marx's "primitive capital accumulation" process. However, Goodfriend and McDermott (1994) link the above pre-industrial story, where productivity gains solely issue from more specialization to an industrial growth model with technical progress. In the industrial growth phase increasing specialization gives rise to Knowledge and human capital accumulation, and a learning technology (a la Romer 1986) is activated, leading to growth take-off and a balanced growth path. In much of the technical papers, the role of the institutions is usually submerged in competitive market assumption.

Market production increasingly supplanted "natural economy" during the first half of the 20th century in Iran. Demographic changes, migration, urbanization, oil discovery,

and transportation breakthroughs accelerated this process. Population growth, particularly in the urban areas picked up. The percentage of urban population rose from around 20 percent at the turn of the 20th century to forty percent of the population in 1955, while the size of the population nearly tripled. Trade between rural areas and the towns expanded. Development and expansion of road networks and highways reduced transportation costs quite significantly (Issawi 1971). Safer and more secure roads facilitated for greater local and regional trade. During the early 1920s to mid 1950's a justice system was created and a set of legal codes for trade and commerce was enacted. Moreover, a public administration system, a fiscal system, and a national bank were created. Growing oil revenues stimulated urbanization and monetization of the economy, further stimulating specialization of labor and commodity production. The rural areas supplied a growing quantity of food and agricultural products to the urban areas. Emergence of wage-laborer employment and stratification of the society further extended market production and monetized exchange. The number of small and large manufacturing firms began to increase in number. In 1926 only 30 manufacturing establishments (employing more than 50 workers including the oil industry) were in existence. By 1956, the total number of large manufacturing units had grown to 114. Total employment in this sector had grown to around 520,000 persons by 1956; the great majority of the employees worked in small artisan type workshops (Bharier 1971). It should be added that Iran was less industrialized compared to Turkey and Egypt in the early 1900s and remained so until the mid-1960s (Issawi 1971). The estimated growth rate for GDP during the 1937-1950 period (equivalent to 1316-1329 period in the Persian Calendar) is 4.42 per cent per annum.[1] The above developments constituted the necessary conditions to lead the economy to the take-off stage in the early 1950s.

As indicated by Good Friend and McDermoth (1994), reaching the take-off stage does not automatically lead the economy to the *sustained* growth stage. This according to North (1994) requires creation and development of institutions capable of sustaining the incentive structure for capital accumulation, innovation, and efficient allocation/utilization of resources. Excessive volatility and discontinuation of the growth process in many developing countries reflects an institutional setup (markets, political-administrative structure, and contractual forms) not conducive to sustainable growth.

2. **Growth Patterns and Fluctuations: 1950-2000**

We can distinguish three different growth episodes in Iran during the second half of the twentieth century: 1950-1977 (corresponding to Persian calendar years 1329-1356), 1978-1988, and 1989-2000 (Jalali-Naini 2002). The time trend in GDP, non-oil GDP and per capita GDP are shown in figures 1.1 and 1.2. The average growth rates and growth fluctuations, measured by their standard deviations, are shown in table 1. The average growth rate of non-oil GDP in constant prices during the first period was 8.15 per cent per annum (8.46 per cent per annum during 1959-1976). A clear break

[1] GDP figures prior to 1959 are based on back-cast projections of Iranian GDP, see, A. Khavari Nezhad, "An Estimate of the Gross Domestic Product of Iran: 1936-1958," Collected Monthly Lectures 2001, Monetary and Banking Research Institute, The Central Bank of Iran, Tehran, 2002. The year 2002 in Christian calendar corresponds to the year 1381 in the Persian Calendar.

in growth trend can be observed during the second period. In the third period, there is another break in the trend as economic growth resumes following the end of war with Iraq. The average annual growth rate in the third period is 4.91 per cent per annum. On a per-worker basis, the distinctions between the three different periods are starker. In this case, the average growth rate in the second period (corresponding to the war years) is negative.

The original stylized facts of growth (Kuznets and Kaldor) focused on a number of grand ratios and their evolution through time. The main facts were: potential output and per-capita income grows steadily over the long-run; capital stock growth is about the same as output; capital-labor ratio grows at a fairly steady rate; the share of profit and wages in output are fairly stable in the long-run. Modern stylized facts (Easterly and Levine 2001, Barro 2000, and Klenow 2001, Klenow and Rodriguez-Clare 1997) have been discussed in the context of the debates between the endogenous and the (finite growth) neo-classical models. Therefore, the discussions are more focused on whether growth is driven by factor accumulation or productivity increases over time; the role of human capital, national policies, and institutions on growth. This is the line we follow in our discussion of economic growth in Iran. The stylized facts can be summarized as (Easterly and Levine 2001):

a)-Growth is highly volatile and not persistent but factor accumulation is.
b)-TFP ("residual") rather than factor accumulation accounts for much of the growth differentials amongst countries;
c)-National policies have a significant effect on economic growth performance.
d)-Income diverges over the long run;
e)-Economic activity is highly concentrated.

We focus on the first three facts and briefly attend to (d). Endogenous growth models and multiple equilibrium growth models—drawing on insufficient saving (Jalali-Naini and Ghorashi 1998), endogenous population, financial intermediation, and non-convexities (Azariadis 1996)--are capable of providing theoretical explanations for the systematic persistence or widening of per-capita income differential between countries. Although we have extensive empirical evidence to refute absolute convergence for large country samples, this generalization cannot be extended to conditional convergence. A test of convergence for MENA countries is beyond the scope of this paper. Suffice to say here that for a selected number of MENA countries (Egypt, Iran, Morocco, Saudi Arabia Syria, Tunis, and Turkey that have a longer GDP data) an inverse relationship between an initial income level and subsequent growth can be observed. Figure 2.1 and 2.2 show the scatter of average period growth rates and log of per capita income for 1975. Figure 2.1 is based on GDP per capita series in constant local currency unit and figure 2.2 is based on the estimates of GNP per capita using the Atlas method. Both figures show that those countries with higher per capita incomes in mid 1970s had lower growth rates in the subsequent period. This can be partly due to lower growth rate in the oil sector. Makdisi, Fattah and Limam (2000) indicate that oil-exporting MENA countries had a lower TFP growth rate since the mid-1970s. On a broader level we can make the observation that a big positive wealth and saving shock failed to stimulate higher growth rates.

Table (2) underscores the fact that growth performance in the Iran and MENA has varied significantly during the last four decades. The growth rate of GDP in the

MENA region accelerated during the 1960s and the 1970s, but decelerated during the 1980s and the 1990s, a trend similar to most other developing countries. The rate of increase in per capita income in MENA during the 1965-80 period outpaced those in other regions of the world economy except East Asia by a considerable margin. GDP growth rate for Algeria, Iran, Egypt, Kuwait, Morocco, Saudi Arabia, and Sudan, was significantly higher during the 1960-1980 period than for the 1980-1998 period. Economic growth in Turkey followed the above pattern but the slow-down was quite moderate. While growth rates decelerated throughout the MENA region during the 1980-1998 period, this was most notable for the oil-exporters. In spite of huge terms of trade improvements and large-scale wealth transfers to oil-exporting countries between 1973 and 1983, growth in output and incomes could not be sustained, especially after oil prices collapsed in the mid-1980s. GDP growth rates for the MENA region were 2.0 and 3.0 percent for the 1980-90 and 1990-1998 period, respectively. GDP growth during the 1980s was significantly below the world's rate of 3.2 percent, but slightly above it in the 1990-1998 period. Growth in MENA was significantly below that of Low and Middle-Income countries during the above mentioned period, and much below those registered by East Asia and the Pacific, but higher than Sub-Sahara Africa.

2.2. Growth Volatility and Shock Persistence

We begin with the examination of fact "a". Economic growth in Iran like most MENA countries and other developing countries (Easterly and Levine 2001) is unstable and shows significant periodic fluctuations. Growth fluctuations have been fairly large in Iran and more generally in the MENA region. Unlike South and East Asia, growth in the MENA, like Latin-America, has been volatile. Output series and estimates for total factor productivity (TFP) in the MENA region are twice as volatile as that in developed countries (Senhadji 1999). Generally, economic growth, like output level series, exhibits a good degree of volatility in MENA countries. Table 3 compares the volatility of output growth (which is equal to the volatility of the first difference of the log of output) for Egypt, Iran, Morocco, Tunisia, Turkey, USA, and UK, for the 1960-1996 period. The first difference filter extracts the cyclical component of the time series of output y_t, in the following form: $y_t^c = (1-L)\, y_t$, where L is the lag operator. This filter also removes the unit root component from output series. Growth is most volatile amongst oil exporters. The coefficient of variation of the growth rate in Iran is nearly twice as much as that in USA and UK. Growth instability in Iran exceeds those of other MENA countries and it is similar in the order of magnitude to that in Saudi Arabia. Growth volatility in Turkey, Egypt, Tunisia, and Morocco is significantly less than Iran and Saudi Arabia but still considerably more than USA and UK. The same observations can be made from Hodrick-Prescott filtered logarithm of output series in the above mentioned countries (Jalali-Naini 2000). The above observations are consistent with the findings of Easterly, Islam, and Stiglitz (2000) that the volatility of growth for developing countries is much higher than that in OECD countries. Interestingly, they also found that employment and real wages are also more volatile in the developing countries.

Economic growth in Iran shows a significant degree of persistence. The coefficient of the one-period lag of output growth in the ADF test on non-oil GDP growth rate indicates persistence. We can check the persistence of growth shocks by inspecting the properties of the first difference of the logarithm of non-oil GDP in the time

and/or frequency domains.[2] The value of the standardized spectrum at high frequencies reflect noise, at zero frequency reflect the long-run properties, and at mid-frequencies reflect business cycle properties of the series. The higher is the value of the spectrum at zero frequency the more persistent are the effects of disturbances that cause deviation of a series from its trend. The spectral density for growth rate of GDP in Iran is shown in figure (3). Its value for the first difference log of non-oil GDP in Iran is more than 2. The values of the spectrum at lower frequencies are higher but decline over the whole frequency axis, and could indicate stationary growth processes with positive autocorrelations. The issue of growth persistence can also be approached more rigorously. Suppose we have a time series x_t that contains a unit root so that it can have the following representation.

$$\Delta x_1 = \mu + \psi(L)\varepsilon_t = \mu + \sum_{i=0}^{\infty} \psi \varepsilon_{t-i}$$

The above equation implies that the effect of a shock (ε), at time t, on the *change* in the level of x in period t+k, Δx_{t+k}, is equal to ψ_k. Moreover, the effect of the same shock on the *level* of x in period t+k, x_{t+k}, is equal to $1+\psi_1+ \ldots+\psi_k$. The ultimate effect of the same shock on the level of x is given by (2). This expression is the infinite sum of the moving average coefficients. The value of $\psi(1)$ is considered a measure of how persistent shocks are on the level of x. For a trend-stationary process $\psi(1)=0$, and for a random walk (i.e. a difference-stationary process) the measure of persistence is equal to one. Estimation of $\psi(1)$ has the problem of estimating an infinite number of coefficients. The literature on shock-persistence has found various ways of tackling this problem. One alternative (Campbell and Mankiw 1987) is to use ARMA modeling.[3] An alternative measure of persistence is due to Cochrane (1988),

[2]Note that the definition of the population spectrum assumes a covariance-stationary series, which does not apply to the log of GDP series, since it is not stationary.

[3]The moving average representation in Campbell and Mankiw (1987) offer an impulse response measure of $\psi(1)$ by approximating $\psi(L)$ by a ratio of finite polynomials. This is possible since Δx_t was assumed stationary and can have an ARMA (p, q) representation as in (below).

$$\Delta x_t = \mu + \phi_1 \Delta x_{t-1} + \ldots + .\phi_p \Delta x_{t-p} + \varepsilon_t + \theta_1 \varepsilon_{t-1} + \ldots + \theta_q \varepsilon_{t-q}$$

Or compactly, $\phi(L)\Delta x_t=\mu + \theta(L)\varepsilon_t$. The expression $\Delta x_t=\phi(1)^{-1}\mu + \phi(L)^{-1}\theta(L)\varepsilon_t$ thus is obtained. Since $\psi(L)= \phi(L)^{-1}\theta(L)$, then the measure of persistence (P) proposed by Campbell and Mankiw (1987) is

$P=\psi(1)=\theta(1)/\phi(1)=(1+\theta_1+ \ldots\theta_q /1-\phi_1 -\ldots-\phi_p)$

The spectral density of Δx_t at zero frequency is given below (Pesaran and Pesaran 1997).

$$f_{\Delta x}(0) = \frac{\sigma^2}{\pi}\left(\frac{1+\theta_1+\theta_2+\ldots+\theta_q}{1-\phi_1-\phi_2-\ldots-\phi_p}\right)^2$$

and can be expressed either as a ratio of variances or as a function of autocorrelations. Cochrane's non-parametric measure, labeled as the variance ratio (V_k) is defined as

$$V_k = (1/k+1)\frac{Var(x_{t+k+1} - x_t)}{Var(x_{t+1} - x_t)}$$

Or alternatively, $V_k=(1/k)\sigma^2_k/\sigma^2_1$, with $\sigma^2_k=V(x_t-x_{t-k})$ and $\sigma^2_1 = V(\Delta x_t)$. As k grows large, the variance ratio equals the variance of the permanent component divided by the overall variance of the first difference. In terms of autocorrelations (ρ_j) it is

$$V_k = 1 + 2\sum_{j=1}^{k}\left[1 - \frac{j}{k+1}\right]\rho_j$$

Cochrane's measure of persistence (P_c), the spectral density of Δx_t at zero frequency is scaled by the unconditional variance of Δx_t, and is equal to the following (Pesaran and Pesaran 1997)

$$P_c = \left\{\frac{\pi f_{\Delta x}(0)}{V(\Delta x_t)}\right\}^{\frac{1}{2}} = \left\{\frac{\sigma^2}{V(\Delta x_t)}\right\}^{\frac{1}{2}} P$$

Since $\sigma^2/V(\Delta x_t)=1-R^2$, and R^2 is the estimated multiple correlation coefficient of the ARIMA (p, 1, q), therefore

$$P_c = (1 - R^2)^{\frac{1}{2}} P$$

The estimates of persistence, based on spectral density and ARIMA estimates for our selected MENA countries are given in table (4). Several different ARIMA (P, 1, q) specifications were estimated. The ARIMA specification with the highest value of Akaike Information Criterion and Shwarz Bayesian Criterion was used.[4] The order of ARIMA and the associated measures of persistence for each country are shown in table (4). The non-parametric measure of persistence, given by the value of the scaled spectrum at zero frequency, estimates the long-run variance of the log of the first difference of GDP. It and the ARIMA measure of persistence are both higher than unity for Iran (also Egypt, Saudi Arabia, around unity for Turkey, and significantly less than unity for Morocco and Tunis). The estimates of persistence, based on spectral density and ARIMA estimates are 2.68 and 2.41, respectively for Iran (Jalali-Naini 2000), for the 1959-1997 period and are higher than unity which is the measure of persistence for a random walk process. An updated non-parametric estimate for the Iranian non-oil GDP shows a value of 2.30 for the 1959-2000 period. The evidence indicates the existence of persistence in Iran for the 1960-1997 period. Therefore, a pick up in the growth rate is followed by movements in the same direction, and the effect of shocks to output do not dissipate rather quickly.[5] In the mainstream macro

[4]In most cases, a first-order autoregressive process in the first difference of the log of GDP (ARIMA 1,1,0) gave the best fit. In Morocco and Tunis a moving average process was selected.

[5]Some words of caution is due here. Given that our sample of observations is limited, the statistical problem of determining long-run characteristics (e.g. permanent component to output fluctuations)

models (excluding RBC) nominal shocks are presumed to have a temporary effect on output fluctuations, though nominal or real rigidities can prolong their effects. Easterly, Islam, and Stiglitz (2000) argue that, given the fact that real wages are more flexible in developing countries, the orthodox Keynesian and monetarist nominal shock-interpretation do not apply. In their opinion shallowness of financial institutions rather than incomplete wage flexibility story in the standard macro models is the cause of excess output volatility.[6] Jalali-Naini and Nazifi (2002) show that monetary shocks tend to have an asymmetric effect on output growth. Moreover, the effect of both positive and negative nominal shocks die out quickly and there are no significant dynamic multiplier effects, thus the hypothesis that monetary shocks have a long-lasting effect on output growth is rejected.[7] Persistence of shocks often can be attributed to the effect of real (as in the RBC class of models) as opposed to monetary variables and also inefficiency or incompleteness of economic institution—as the financial market-shallowness argument. Aside from innovation and productivity increases, the terms of trade disturbances and foreign exchange scarcity, large shifts in economic policies and government's share of GDP, wars and revolutions can all generate long-lasting effects on economic growth.[8] The Iranian economy was affected by all the above shocks and an over-bureaucratized financial sector dominated by government owned banks until very recently. Shock persistence also indicates that pro-growth economic reforms and financial market reforms--that can also ease domestic access to international capital, hence ameliorating the effect of terms of trade shocks--can have more than a short-lived effect on economic growth with significant dynamic benefits.

3. Sources of Growth and Human Capital

The original stylized facts of growth (Kuznets and Kaldor) focused on a number of grand ratios and their evolution through time. The main facts were: potential output and per-capita income grow steadily over the long-run; capital stock growth is about the same as output; capital-labor ratio grows at a fairly steady rate; the share of profit and wages in output is fairly stable in the long-run. Modern stylized facts (Easterly and Levine 2001, Barro 2000, and Klenow 2001, Klenow and Rodriguez-Clare 1997) have been discussed in the context of the debates between the endogenous and the (finite growth) neo-classical models. Therefore, the discussions are more focused on whether growth is driven by factor accumulation or productivity increases over time, and the role of human capital, national policies, and institutions on growth via a

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from finite samples exists. The evidence cited here cannot be taken as the evidence of the existence of a permanent component--even though the evidence is consistent with such an interpretation. Given the length of our sample, the evidence of shock-persistence in Iran can also be consistent with a mean reversion story, that is, a slow reversion of output to a deterministic trend. What can be established with the evidence produced here is that, even if trend reversion cannot be rejected due to finite data, trend reversion does not occur quickly.

[6]Countries can smooth shocks with greater capital account openness and this might result in less growth volatility. Greater openness, however, might increase volatility through sudden capital outflows. In any event, a better access to international capital markets can partially be achieved through a more developed domestic financial sector.

[7]The data used in the above study is annual so we are not dealing with very short-run (quarterly) effects.

[8]Makdisi, Fattah and Limam (2000) point to the significance of the terms of trade shocks in the Arab countries.

higher pace of innovation, quicker adaptation, creation of stronger incentives for investment, and improved resource allocation. Empirically, the issue is whether per-capita income differentials amongst countries is due to different saving/investment rates hence (human and physical) capital accumulation rates or differences in productivity growth. Some cross-country studies show that capital formation is the main driver of growth (Mankiw 1995, Young 1995) others (Easterly and Levine 2001, Klenow 2001) argue that it is TFP. In this section, we would like to examine the sources of growth in Iran. We use standard methods to examine the relative importance of capital accumulation in the growth process and measure the contribution of TFP to growth.

In the Solow-Swan, Ramsey-Cass-Koopmans, Samuelson-Diamond, class of models saving rates and population growth determine the steady-state level of per-capita income. Any growth in per-capita income in the long-run equilibrium is due to *exogenous* technical progress. Endogenous growth models (Grossman and Helpman 1991, Lucas 1988, Roemer 1986) rely on knowledge accumulation or on human capital to deliver growth in the steady state. Finite growth is due to diminishing returns to private capital. Endogenous models allow different mechanisms to counteract this, hence the possibility of unbounded growth. In the Arrow (1962) scheme "learning" does this job. In this model learning by doing occurs without R & D expenditure, as a side effect of economic activity. Learning and knowledge accumulation can also occur as a result of R & D expenditure (Romer 1990). Investment in human capital (HC) can also deliver social externalities to offset diminishing returns to private capital. In contrast to "knowledge" which is a public good accessible to other producers, HC is a rival good. Macroeconomic treatment of human capital either focuses on the growth rate of HC (Lucas 1988) or its level (Nelson and Phelps). In Lucas (1988) *accumulation* of HC (education) generates a positive growth rate in the steady state. Thus differences in growth rates across countries are mainly attributable to differences in the rates of capital accumulation. Lucas (1988) further stipulates that physical capital fails to flow to DCs because of their low endowments of HC as a complementary factor. In the Nelson-Phelps approach, the *level* (stock) of human capital generates growth, and differences in growth rates across countries are due to differences in the level HC.[9] Mankiw, Romer and Weil (1992) argue that by adding HC a better explanation for per-capita income differentials between industrial countries and DCs can be obtained from the traditional growth models. Their Solow-augmented model did in fact obtain much better empirical results than the earlier convergence tests. A number of writers using growth accounting approach (Benhabib and Speigel 1994, Nazrul Islam 1995) suggest that, HC as a separate factor of production, has either zero or negative effect on growth and the main channel through which education influences growth is through its effect on TFP.

From a microeconomic perspective we expect individuals with more education to earn more, a proposition well corroborated by many empirical studies in different countries including the case Iran (Saedi 2002). The implication is higher education attainment rates should raise average incomes, particularly if one considers the positive

[9]Aghion and Howitt (1998) draw distinction between knowledge-based endogenous growth models and Schumpeterian interpretations of endogenous growth models. The empirical evidence have not been supportive of the first generation of endogenous growth models

externalities presumed to be associated with it. However, many empirical studies show that human capital does not have a significant impact on economic growth or on the growth rate of output per worker. The case of MENA countries is even more puzzling. Pritchet (1996) raises a challenging question, "where all the education has gone in MENA?" This is an important policy issue since a large fraction of government resources in Iran (and also in MENA) is spent on publicly funded education. In the next section we consider the contribution of human capital to growth. We follow the general practice in the literature by taking education as the proxy for HC. In the growth accounting equations in the following section we included a stock measure of HC, that is, the average educational attainment of the labor force.[10]

3.1. Estimation Method and Empirical Results

Before discussing the result of our growth accounting regression, let us make some preliminary empirical observations regarding economic growth in Iran. Firstly, the period with the highest average growth in Iran (1959-1976) corresponds to the period with the highest ratio of aggregate investment to GDP ratio or the highest growth rate of physical capital (table 5). Since capital-output ratio is a pro-cyclical variable, we expect it to be higher during expansion phases. Secondly, the growth rate of the educational attainment of the work force does not seem to be strongly correlated with output growth. Therefore, based on the above we should expect that capital accumulation and employment to have been the main driver of growth but for its proximate magnitude we need to run some estimates.

The mean investment/GDP ratio in Iran for the 1975-2000 period is around 25 percent. This is about 2.5 percentage above the world average, six percent below that in East Asia and the Pacific, and 3.5 percentages above Latin American countries. The investment/GDP ratio in Iran is slightly higher than that for the MENA region, four percent higher than in Turkey, 3.5 percent less than Tunis, about the same as in Egypt, and a tad higher than in Morocco for the same period. However, the Iranian growth performance does not rank as high as its investment ratio within this group for the 1975-2000 period.[11]

A number of studies estimate the sources of growth using first difference form to account for the existence of a unit root in output, capital stock, and labor force variables. Differencing has the disadvantage of removing long-run information in the data. The issue of unit root can be handled on two different levels. First, if we impose *a theoretical* identification, the aggregate production function must have one cointegrating vector; hence we can confirm the existence of a long-run equilibrium relationship using the Engle-Granger method. Secondly, we can estimate a cointegration regression to deal with the issue of non-stationary variables using Johanson-Juselius (1990) method and to estimate the sources of growth. If there is a single cointegrating vector the two procedures are different in so far as the estimation

[10]Empirical studies have used a variety of proxies for education: enrollment ratios, the ratio of educated adults to the adult population and the average years of schooling, that is, past educational attainment as a measure of current stock of HC. Jalali-Naini, Talebian, and Koohi (2001) estimate the time series for human capital stock in Iran from household budget surveys for the 1972-1998 period.
[11]The MENA figures are based on World Development Index C-D ROM, World Bank, 2001.

methods are different. Moreover, in this case the use of Phillips-Hansen estimation method is appropriate.

Several forms of aggregate production functions (Cobb-Douglass, CES, and translog) with slightly different factor specifications were estimated for Iran (Jalali-Naini 2002). Those specifications that yielded more satisfactory results are reported here.[12] The estimated parameters of regression I in table (6) is a Phillips-Hansen estimate of a Cobb-Douglass production function for non-oil GDP (value-added). The Phillips-Hansen method is appropriate for estimation when a single cointegrating vector exists between a set of I(1) variables. The cointegrating test (table 7) shows the existence of a single vector. ADF tests indicate that non-oil output, the number of workers and the capital stock are all I(1) variables. The inputs in the production function are the physical capital stock and the employed workers weighted by their human capital. The homogeneity condition was not imposed but the estimated elasticities are very close to one. A time dummy variable is included to capture the effects of the revolution, the war, and foreign exchange scarcity on the economy during the 1977-2000 period. Human capital as a separate factor was included in the production function but it was not statistically significant. The elasticity of output with respect to HC weighted labor is around 0.57 and with respect to capital is about 0.41. Estimate of the same production function using OLS yields similar coefficients. The Estimated coefficients from regression III in table (6) reports the result for an OLS estimate of a C-D function that includes the deviation of real imported intermediate goods from trend as a measure reflecting the availability of imports—which works as a capacity adjustment factor or a shift variable. Different specifications and estimations result in different estimates for TFP. Regression IV is an OLS version of I and regression V is a simple production function containing only physical capital and labor. Regression II is similar to III except it is estimated by the Phillips-Hansen method.[13] In the years where severe import restriction is imposed imports are below trend and hence assume a negative value and influences output accordingly as a shift factor. Based on the results reported in table (8) we calculated the share of output explained by factor growth, and the remainder is the proxy for the contribution of TFP. The estimates produced in this study indicate that TFP for the 1959-2000 period has not contributed to economic growth in Iran. Note that, the contribution of factor inputs to growth exceeds 100 percent because TFP contribution is negative when the growth rate of human capital is also taken into calculations. If we disregard the growth of HC and consider only simple labor (estimate II and V), TFP contribution becomes positive significantly higher but still very limited. In this case, the only periods when TFP contributed to growth were 1961-1972 and 1989-2000 periods. The oil-boom of the early to mid-1970s resulted in an investment boom and a short period of capital-intensive growth. TFP growth during the 1973-1977 period was negative. TFP contribution to output growth fell during the 1978-1988 period. This combined with a decline in the rate of capital accumulation resulted in a lower rate of growth in non-oil GDP.

[12]The statistical properties of C-D functions were superior to the translog estimate, so for the calculation of TFP the translog estimate was not used.

[13]The production function specification here is of the following form

$$Y_t = A_t \left[K^{\alpha} (H_t L_t)^{1-\alpha} \right] f(.)$$

where f(.) measures the factors that cause a shift in the production function aside from productivity shocks. It has a general functional form, the specific form is ascertained through empirical estimation.

Table 6. Estimates of Production Function Parameters, Selected Regressions

	I	II	III	IV	V	VI
	Phillips-Hansen	Phillips-Hansen	OLS	OLS	OLS	OLS
K	0.416	0.452	0.519	0.478	0.509	0.42*
L			0.430			0.47
HL	0.577	0.490		0.513	0.420	
RSINTM		0.159	0.0005			

Sample: 1959-2000

* Mean value. The translog fit was statistically inferior to other regressions.

Regression I is a the estimate of a C-D function

$$Y_t = A_t\left[K^{\alpha}(H_tL_t)^{1-\alpha}\right]^{\theta}$$

Regression II is the estimate of

$$Y_t = A_tK_t^{\alpha}(H_tL_t)^{\beta}R_t^{\phi}$$

Regression III is the estimate of

$$Y_t = A_tK_t^{\alpha}L_t^{\beta}$$

Regression IV is an OLS estimate of I, and Regression V is an OLS estimate of II

Regression VI is an OLS estimate of a translog production function

$$Y_t = \beta_0 + \sum_{i=1}^{n}\beta_i Ln(X_i) + 0.5\sum_{i=1}^{n}\sum_{j=1}^{n}\beta_{ij}Ln(X_i)Ln(X_j)$$

The estimates of TFP should be taken with caution. Aside from the usual caveat of low quality data and variation in capacity utilization rates we observe that under imperfect competition the Solow residual cannot be equated with TFP. In such a case, Solow residual growth rate is a weighted average of TFP growth and the output-capital ratio, and the weights are determined by the market power of the firms--as measured by the inverse of price-markup.[14] The degree of monopoly power in the

[14]Assuming a homogeneous of degree one production function as

$$Y_t = A_tF(K_t, L_t) \qquad (1)$$

$$\frac{Y_t}{K_t} = A_tf(\frac{1}{k_t}),\ \ \frac{1}{k_t} = h_t \qquad (2)$$

$$\hat{q} = \hat{A} + \left[\frac{A_t(\partial f/\partial h_t)h_t}{q_t}\right]\hat{}\ h_t \qquad (3)$$

a hat on a variable indicates its proportional growth rate. Under competitive conditions the real wage is equal to

$$\frac{W_t}{P_t} = a_t\frac{\partial f}{\partial h_t} \qquad (4)$$

and the wage share is $\beta_t = \frac{W_t}{P_t}\frac{h_t}{q_t}$, and

$$P_t = \frac{W_t}{B_t}\frac{h_t}{q_t} \qquad (5)$$

financial sector and the industrial sector (Salehi and Jafari 1999) are fairly considerable. This should indicate that a considerable fraction of the Solow residual is due changes in output-capital ratio. However, a large number of national enterprises with considerable market power (particularly the utilities sector) have in many occasions priced their products below cost. This complicates the matters for calculating TFP even more. At any rate, the evidence produced in table (8) indicates that TFP contribution to growth in the Iranian economy during the 1959-2000 has been negative or small depending on whether HC is taken into calculation of input growth or not.

Easterly and Levine (2001) indicate that TFP ("residual") rather than factor accumulation accounts for much of the growth differentials amongst countries. It is interesting to note that, a sharp decline in the rate of growth of total factor productivity and lower rates of physical capital accumulation were the most important factors explaining a marked slow-down of GDP growth rate in the MENA region after mid-1980s (Senhadji 1999). Both capital accumulation and increased employment have contributed significantly to economic growth in MENA. For the 1960-94 period as a whole, capital accumulation was found to be the most significant source of growth, followed by increased employment and human capital formation, respectively. Even though TFP growth rate in MENA declined precipitously after 1974 and its growth rate during 1987-1994 was estimated to be negative, TFP has contributed *comparatively* more to economic growth in MENA than in Africa and Latin America, but less than that in South and East Asia.

In the wider literature on the subject, the effect of education (human capital) on growth has been found not to be strong. However, as suggested by Benhabib and Speigel (1994) HC may not directly contribute to growth but explains TFP growth. Nazrul Islam (1995) makes a similar point. He also contends that differences in institutions and technology account for cross-country growth variation. If countries differed only by capital per capita convergence would have been much faster. Benhabib and Speigel (1994) argue that human capital affects productivity through two channels. HC a la Romer (1990) raises the capacity of countries to innovate new technologies suited to their domestic economy. Human capital *level* a la Nelson and Phelps (1966) influences the ability of nations to adopt and implement imported technologies. The higher is the level of HC the higher is the speed with which DCs can catch-up to technology leaders.

We tested for the impact of HC in our growth accounting exercise. First, HC was included as a separate factor of production, however, we could not obtain a satisfactory result. The coefficient of HC was not statistically significant and was negative. As noted previously, inclusion of HC as a weighting factor for labor yielded

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under imperfect competition price is determined by a mark-up $(1-\theta)^{-1}$

$$P_t = \frac{1}{1-\theta} \quad \frac{W}{A_t(\frac{\partial f}{\partial h_t})} \quad 0 \le \theta \prec 1 \qquad (6)$$

By inserting (6) in (3) and multiplying both sides by the inverse of the mark-up, we get

$$\hat{q}_t - \alpha_t \hat{h} = (1-\theta)\hat{A} + \theta \hat{q}_t \qquad (7)$$

The left-hand-side of (7) represents TFP growth.

good results. The estimate of TFP from regression I in table (6) was regressed on HC but its coefficient was statistically insignificant. However, when we tested for the effect of HC on the estimate of TFP from regression III in table (6), which does not include HC, its effect was found to be positive and statistically significant (table 9). We could not test for the impact of R&D on TFP because we do not have a reliable estimate. It should be mentioned that examination of the three digit and four digit ISIC manufacturing data shows that R&D, including on the job training expenditures, for the year 1996 was on average about 0.2 percent of total revenue, pretty small by any yardstick.

The unfiltered TFP estimates from regressions I and III (table 6) are regressed on a selected list of structural and policy variables presumed to influence TFP and the results are reported in tables (9) and (10). These include measures of macroeconomic instability like the rate of inflation (Fisher 1993), measures of openness (defined as exports plus imports as a ratio of GDP)[15], and the size of the government. Imported intermediate goods were also included in the regressions table (10) to control for the effect of import compression on output fluctuation due to foreign exchange availability. As shown in both tables the rate of inflation, as a measure of instability and unbalanced macroeconomic policies, negatively influences TFP. Since the most important factor that determines the conventional measures of openness in the case of Iran is the relative magnitude of oil revenues, the negative coefficient for openness should not be surprising. As will be discussed later, oil revenue could negatively influence economic growth if due to poor fiscal and monetary management its domestic expenditure can cause a substantial real exchange rate appreciation of the domestic currency and if its bureaucratic allocation is subject to rent seeking activities and influences. Note that in both equations government size has a negative influence on TFP. Finally, output was included as an additional regressor to see if growth, hence learning, influences TFP. However, the estimated coefficient was insignificant indicating no influence.

3.2. Output and TFP Processes

If the economy-wide production function is described by

$$Y_t = \nu_t K_t^{\alpha} (A_t L_t)^{1-\alpha}$$

and assuming that the compound residual shows persistence, as shown by Farrmer (1993) the output process can be represented by the linearized stochastic Solow model as in below

$$Y_t = \beta + \gamma Y_{t-1} + \theta t + \varepsilon_t, \text{ where } \varepsilon_t = \nu_t + \eta \nu_{t-1}$$

Under the maintained assumption of the model, the Solow residuals represent observations on the productivity shocks—that is, residuals from our estimated regressions, such as IV in table 5, represent observations on real (or productivity) disturbances. Assume further that the statistical representation for Solow residuals (productivity disturbances) ν exhibits persistence and its behavior is given by $\nu_t = d\nu_{t-1} + e_t$, where d is the measure of persistence. The last three equations can be combined to generate a first-order vector system

[15]Several other measures, such as the ratio of non-oil exports to GDP, were attempted and none of them produced the expected results.

$$\begin{bmatrix} Y_t \\ \nu_t \end{bmatrix} = \begin{bmatrix} \gamma & \psi \\ 0 & d \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ \nu_{t-1} \end{bmatrix} + \begin{bmatrix} \beta & \theta \\ 0 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ t \end{bmatrix} + \begin{bmatrix} d \\ 1 \end{bmatrix} e_t$$

The first equation in the vector system is equivalent to a regression of output on its lagged value and the lagged value of the Solow residual—obtained from production function regression IV in table 5. The second equation is an autoregression of real disturbance terms (Solow residuals). The above representation entails two interesting observations. Firstly, the residuals from the two equations must be similar if the assumption that a single shock (e_t) is influencing the economy. The residuals from these two equations are shown in figure (4); although they are not identical they are quite similar. Secondly, the above vector representation indicates that Solow residuals Grange Cause output level but not the reverse, indicating that the growth process (increased volume of economic activity) does not affect productivity. This could imply the absence of learning by doing effects in the growth process. Note that the system estimation in this section yields results similar to the two-stage estimation in the previous section—when we included the level of output in the TFP regressions as an additional regressor.

4. Sectorial Growth and Structural Change

In the early and intermediate stages of economic growth countries undergo significant structural transformations. A number of studies (Kuznets 1971, Chenery and Syrquin 1975, Kongsamut 1997) suggest that structural change accompany growth. The pattern of structural change is dependent on the type of resource endowment, the size of the economy and the population, and the type of development strategy. From a theoretical perspective Kongsamut (1997) points that the large transformation in sectorial composition as a challenge for theories concentrating on balanced growth paths. Mekl (1999) shows by disaggregating the final goods sector of a standard research–driven endogenous growth model and generalizing the concept of a balanced growth path, it can be shown that balanced growth behavior of aggregate variables is consistent with structural change.[16]

Empirical works on the morphology of growth (Chenery and Syrquin 1975) focused on structural changes for large samples of countries. These studies suggest and the pattern of change shows a fair degree of similarity and they made attempts to delineate universal patterns of development that could be explained by widely available social and economic indicators (like the level of income, population, the size of the economy, and resource endowments). Some of the prevalent economic changes that occur as a result of sustained increase of income per capita are a decline in the share of agriculture and an increase in the share of output and employment in industry and services. Also a sustained increase of the ratio of saving, investment, and government (tax) revenue to GDP, and a large increase in the share of industrial exports in total exports.

[16]In this view structural change is a byproduct of economic growth with no feedback on the growth process itself (Mekl 1999). This view differs from the Schumpetarian models, like Aghion and Howitt (1998), where permanent changes in the industry leadership through the process of "creative destruction"drives economic growth.

For primary commodity-oriented economies (also oil exporters) changes in the sectorial composition of output, tax revenue/GDP, and the share of industrial exports in total exports deviated from the "normal" path. Kader (1980) showed that for the oil-exporting countries the service sector was larger and the manufacturing sector smaller than the average for non-primary developing countries within the same income class. In Iran agriculture's share in total value-added has shrank since the early 1960s and the share of the manufacturing and services sector has increased. However, the share of the manufacturing sector in GDP relative to that for middle-income countries is lower as has been the case for the share of industrial exports to total exports. The oil sector (as measured by its valued added) outgrew other sectors until 1974; consequently the ratio of non-oil GDP to GDP (both in current prices) rose. The magnitude of rental income from the oil sector rose rapidly relative to non-oil GDP during the 1970s but declined later. During the 1990s the share of non-oil GDP rose and reached the mid-1960 levels. Table (11) shows average annual sectorial growth for selected periods. Table (12) shows sectorial growth contribution to GDP (share-weighted sectorial growth) for four distinct periods. Agriculture has experienced a growth rate of around 4.1 percent and has had the lowest growth volatility throughout the 1959-2000 period. Aside from the oil sector, industry and mines grew faster than other sector both before and after the revolution but has experienced substantial growth volatility. Construction has grown at rates similar to agriculture, however, its growth rate shows a lot of instability. Services sector, with nearly 40 percent share in total value-added in the economy has over the last two decades, contributed more than any other sector to growth in GDP in all periods except 1977-1988 period. After services, the largest contribution to GDP growth has been made by the oil sector. Nearly 45 percentage of total growth in GDP was contributed by the oil sector during the 1959-1977 period. This contribution has declined to about 12.5 percent during the 1989-2000 period. The potential for the growth to GDP by the oil sector in the future is limited; agriculture, industry, and services will have to assume a greater share of GDP growth in Iran.

There was initially a presumption that predicted changes in the sectorial composition of output was indicative of a more balanced growth path or that following the "normal" pattern could generate some growth momentum on its own. However, cross-section growth studies could only support association between growth and saving/investment rates and not between sectorial composition of output and growth. With the growing internationalization of production and spatial specialization on a global scale, both interest and concern over specialization along domestic economic sectors has dwindled considerably. Instead a different view of sectorial composition has become popular: tradable and nontradable sectors. This decomposition in the case of an oil exporting country has the added advantage of allowing to trace the impact of an oil-boom, or an oil-bust, on the real exchange rate and the consequent movement of capital and labor between traded and non-traded goods sectors (Gelb 1988). With clay type capital and occupationally immobile (or imperfectly mobile) labor and an inefficient foreign exchange market, the social cost of sectorial change due to unsustainable positive oil price (foreign exchange) shocks are fairly significant. We will examine the real exchange rate movements in Iran in a later section.

5. Economic Policy and Growth

Do national policies and institutions influence long-run growth? A number of studies indicate that the answer is affirmative (Barro 2000, 1995, Levine and Easterly 2001). In models that policy and institutions can influence the efficiency of labor and capital utilization and allocation and/or increase the rate of endogenous technological progress higher saving and investment rates have a far greater importance on economic welfare than the traditional models. In the former institutional reform and better macroeconomic policies can lift long-run growth. In the latter class of models reforms can only affect the level of per-capita incomes. We will discuss the issue of influence of national economic policy via several different routes. We have already examined the impact of policy variables on TFP in Iran, so we shall proceed by reviewing the development strategy and the macro environment in Iran during the three growth periods mentioned previously (section 5.1). In sections 5.2 and 5.3 we will briefly review the literature on the influence of policy variables on growth and will identify the more important growth correlates for the Iranian economy through estimation of growth regressions.

5.1. Development Strategy and Growth Performance: 1950-2000

The bread and butter issue in the traditional models of economic growth is capital accumulation (Marxian and classical) or factor accumulation (neo-classical models). Economic development as a distinct field of inquiry began in the early 1950's, and like early growth models was pre-occupied with saving, investment, and capital formation. The underlying presumption in the early models was that the primary constraint on growth was capital formation in both developed and developing countries. Thus raising the saving (investment) rate was the key for higher growth rates and the mechanism to narrow the per-capita income gap between DCs and DICs. Early development writers recognized two main differences between the two groups. One was the *pax Britanica* pattern of international division of labor, which limited DC's foreign exchange earnings thereby tightening the resource constraint on growth—as was described by the effect of foreign savings in the dual gap models. The other was incomplete, missing markets, and the weakness of private institutions. Import substitution strategy and "activist state" was thought to be the appropriate policy remedies in this environment. For a relatively short period these policies delivered respectable growth rates in Latin America, Asia, and in MENA, including Iran. Excluding East Asia, developing countries, and MENA countries, had a higher growth rate during the 1960s until the first oil-crisis in 1974, than the later decades. As noted by Easterly (2001) the median per-capita income in DCs was 2.5 percent during 1960-79 but was zero during the 1980-1999 period. As was alluded to earlier, non-oil GDP in Iran also registered a significantly higher per-capita growth during the 1950-1977 period than during the subsequent decades.

Economic growth in Iran during the late 1950s and the early 1960s began in the context of a stylized LDC: a "late comer" exporting raw materials importing industrial goods. Iran also exhibited a stylized feature of an oil-based economy. Low forward and backward linkages between the oil sector and the rest of the economy rendered the fiscal (revenue) impact of the growing oil exports much more influential than its inter-sectorial demand/supply articulation with other parts of the economy. As in nearly all LDCs in their earlier stages of development, missing markets, pervasive market imperfections, and an economically and politically weak private sector gave

way to the "centralized" view that the state should step in directly to replace missing markets and correct market imperfections. The bureaucracies and the policy makers that oversaw distribution of resources (much of it coming from the oil sector) also had an interest to follow this line. During the 1960s there was no official development strategy and the Second Development Plan did not contain any specific model or vision of growth and industrialization. "Big push," state-dominated ISI, as in other LDCs became the policy and planning framework in Iran during the 1960s and the early 1970s. The basic development thinking in Iran since the mid 1950's has been a planning framework in which the oil industry, as the "leading sector" and the engine of growth supplies surpluses (savings) for investment in other sectors. The mapping of such resource flows into sectorial expenditure allocations has traditionally been the cornerstone of development plans in Iran. The five-year plans, by and large, reflected the general policy framework, sectorial investment targets, and the type of development strategy followed by the government. Import substitution became an official policy in the Third Plan (1963-1967). The same general line was followed in the Fourth Plan (1968-1972), although the huge oil windfall during the Fifth Plan (1973-1977) undermined the structure of domestic protection as open-door policies, expansionary aggregate demand measures, and cheaper foreign exchange rates allowed a huge increase in imports.

It should be noted that, allocation of surpluses through the state machinery, as alluded to in the above, can in principal create an incentive structure conducive to rent seeking. This is a general phenomenon widely observed in oil-exporting countries. The more limited is the extent of the distribution of oil rents through market forces, and the more limited is public access to resources, the greater is the incentive for organized groups and individuals to seek and employ resources to extract rent. In periods when state rationing as opposed to market allocation is practiced and access to public resources by the average citizen is more limited rent appropriation constitutes a larger share of national income.

The large magnitude of oil revenue relative to non-oil GDP and its disbursement through the fiscal budget contributed significantly to the growth of real aggregate demand. This process also created a mismatch between the profile of domestic demand and the structure of domestic production. The urban concentration of government expenditures created growing demand for modern non-durable and durable consumer goods for which no significant domestic production capacity existed until the late 1960s. This formed the market demand for the ISI development strategy in the during the 1962-1973 period. The government, through development plans, also channeled resources to the industrial sector. The above backdrop, combined with low inflation, and rapid increase in demand for real domestic money, and stable exchange rates constituted the environment for high rates of growth in the industrial sector and non-oil GDP during the 1959-1973. Moreover, like a number of other LDCs during the 1960s and the early 1970s, the first and second phases of import substitution (Hirschman 1967) moved along at a fair speed. The huge increase in oil revenues in the 1973-77 period had a double effect. The rise in oil revenue was quickly translated into an upward revision of planned government consumption and investment expenditures. The consequent fiscal and monetary expansion further fueled growth of aggregate demand in an already over-heated economy leading to the emergence of severe domestic bottlenecks and a rapid pick up of inflationary pressures and expectations. Although higher oil revenues boosted domestic income

and expenditures but due to the above-mentioned factors it did not improve the macro environment for import-competing industries and exports. Social dislocations and unfulfilled expectations of higher living standards for low income groups during the oil euphoria days, contributed to political discontent, culminating in the 1979 Islamic revolution. The growth process in this period came to an end because of political upheavals.

Even though state-control/activism and ISI were the general characteristics of development policy in this period, economic policies were on the whole market-friendly, property right uncertainties were limited, and the economy had become more open. In spite of large increases in oil revenues, particularly after 1972, a comprehensive redistribution program was not in place. In fact, in reaction to this package, in the early days of the revolution the left and the radical left groups, particularly those active in the universities, demanded nationalization of private companies (banks, insurance companies, and large industrial units) and a much stronger emphasis on income redistribution. Furthermore, they called for a more inward-looking development strategy—along the lines advocated by the left Structuralists (Dos Santo 1970, 1973) and the "dependency" school (Frank 1967, 1981). Note that, in this view obstacles to development are imposed from outside, i.e. are exogenous, and underdevelopment is a consequence of articulation of the domestic economy or the "periphery" with the "center" linked by international trade.

The 1978-1987 period:

The left Structuralists advocated a "non-capitalist" strategy[17] a view embraced by the secular and religious intellectuals with significant influence over the economic policy-making circles in the first decade of the Islamic revolution. Greater state control on prices, extensive nationalization, nationalization of foreign trade, inward-orientation, and expansion of social subsidy programs were the basic features of the new economic policy. The exigencies of the war with Iraq helped to further reinforce these ideas. This broad consensus emerged at a time when ISI and the activist-state model had failed to deliver *sustained* growth and external balance in a number of developing countries. As a consequence, a diametrically opposite view in international development agencies and in some South East Asian and Latin American countries began to spread. This neo-Liberal view called for the creation of economic incentives and more extensive private sector participation in economic activity; thus calling for less government, more reliance on market forces, and open trade policies to deliver export-led-growth--still considered an important ingredient of a successful growth package.

Two main influences combined to produce an unsatisfactory growth record during the 1978-1988 period. The more obvious was the debilitating effect of the war on the domestic economy and destruction of valuable productive assets and a negative terms of trade shock as a result of a very large decline of oil prices during the mid 1980's. Less obvious, but none the less significant, was the effect of the gradual replacement of market mechanism and the private sector by administrative allocation and

[17] A strategy or a system in which the state assumes a dominant and leading role in resource allocation and--through state-owned enterprises--in the production process. However, unlike the Soviet and Eastern European countries system the sate allows a limited role for the local private sector.

inadequately managed public enterprises and government bureaucracies. This environment fostered over bureaucratization of the economy, important instances of which were bureaucratic allocation of credit, foreign exchange, and imports. Heightened uncertainty about property rights and higher risks of business for the private companies resulted in a reduction of private investment and chronic capital flight. The domestic relative price structure did not create incentives for innovation and efficiency. Suppressing the price of goods, credit, and foreign exchange below their market value coupled with government directed allocation encouraged a vast increase in rent seeking opportunities. The above conditions are generally believed to negatively affected economic growth. Brixiova and Bulii (2001) present a planner-manager interaction model which shows bureaucratized economies tend to end up in a low-effort, low-growth equilibrium. Moreover, Easterly (1993) shows in the context of an endogenous growth model that certain exchange rate distortions can negatively affect economic growth. It can be shown that emergence of rent seeking activities can result in an unambiguously lower steady-state capital-intensity and per-capita income in a Ramsey-Cass-Koopmans setting (Najaf Zadeh 2000).

The above mentioned environment created several important imbalances in the Iranian economy. The internal and external real exchange rates signaled resources out of tradables whilst due to the war the quantity of oil exports declined. The Budget deficits grew, in part due to government finance of war-related expenditures, and given the above-mentioned adverse conditions, total private sector investments fell and its composition changed. The share of private sector investment in machinery and equipment fell relative to the share of private investment in construction (figure 5).

Interestingly, a noticeable reduction in growth rates or negative rates of growth in this period was not confined to Iran. During the late 1970s until mid-1980s, the inefficient bureaucratic structure inherited from the previous period and unsustainable fiscal deficits--caused by uncontrolled government expenditures and weak tax systems and administration--had reduced growth and raised inflation rates. During the 1980s, large MENA countries (including large oil-exporters and Iran) had the largest ratio of government revenue/GDP, government expenditures/GDP, and budget-deficit/GDP in the world. Consequently, growth rates in MENA countries collapsed and inflation rates picked up in the 1980s. Implementation of measures to control growth of government expenditures and to stimulate private sector investment and exports had become inevitable. By and large MENA countries (excluding oil rich Persian Gulf states) did not embrace reforms quickly, they were forced to implement it later to deal with huge fiscal and current account imbalances. Oil exporting countries with relatively large populations (e.g. Algeria and Iran) began to think seriously about economic reform after the oil-price collapse of the 1986 and it took them a few years to adopt a reform package.

Post War Economic Growth and Policy Shift: 1988-2000

In the years following the Iran-Iraq war, the social and political exigencies required a more serious approach to economic issues. The public sacrificed during the war but in its aftermath expected better economic conditions. Per-capita income and the investment rate had declined while the rapidly growing young population needed more educational opportunities and jobs, hence reconstruction and economics became a more pressing social and political issue. The existing economic structure was a

heavily state-controlled war-economy and it had to be adjusted to accommodate resumption of economic growth. The two main views on how this to be achieved can be stylized as those who wanted a more gradual, inward-oriented, government-controlled approach to this transition. The "reformers" wanted less government control, more reliance on the market mechanism, a wider private sector participation, and a more open economy. The reformers' policy package contained privatization, price reforms, trade liberalization, and exchange rate adjustment. These policies were similar to the Structural Adjustment Policies, which were in vogue at the time and a large number of developing countries in various regions of the world had implemented it at least partially. The reformers' views got immersed in the First (1989-1993), Second (1995-1999), and the Third Development plan (2000-2004). The issues faced by planners were clear.

1-A rapidly growing population with several years of repressed demand meant the growth potential for consumption was high. However, domestic production capacity to accommodate this demand was very limited.
2-The ratio of non-oil GDP to GDP had increased significantly (figure 6), indicating a decline in oil revenues and foreign exchange availability.
3-The total investment/GDP ratio, particularly that of the private sector, had reached very low levels (figure 7) just before the end of the war.
4-A highly overvalued domestic currency (figure 8) had signaled resources out of tradables, and private domestic production in many sectors was not profitable.
5-Domestic saving was insufficient to finance the necessary investment in infrastructure and equipment. Moreover, a big chunk of financial resources were allocated to poorly performing public enterprises and government development projects through the state-owned banks. Public enterprises did not generate profits and did not contribute to government revenue. Import of world saving (current account deficits) of the mid 1980's were largely used to finance government current-expenditures or the war efforts. Rationing the dwindling oil revenues was not sufficient to significantly increase the domestic investment rate to significantly raise the rate of economic growth and not sufficient to recapitalize enterprises and to finance reconstruction of the economy, including the oil sector, on a large scale.

The realistic option for the economic planners was to mobilize and generate saving in excess of what the existing heavily state-controlled economic structure could deliver. This required creation of incentives through price signals for additional supplies of capital and conservation of valuable resource like energy. Subsidized energy prices induced a high rate of growth of fuel consumption. Foreign exchange was a major constraint in financing domestic capital investments, a significant fraction of which had to be materialized through imports. Figure (9) shows the time trend of capital goods import/GDP ratio. The official rate had remained unchanged for a long time despite a significantly higher domestic inflation rate compared to that for Iranian trade partners—mostly OECD countries. The foreign exchange market imbalance had pushed the black market premium to near 14 times the official rate by 1992. By reducing the degree of real exchange rate misalignment to manageable proportions, its use in domestic production and consumption (of imported goods) could be economized and domestic production of many items could become profitable. Correction of exchange rate misalignment in favor of tradables and lifting of restriction on export could signal the movement of capital and labor to non-oil exports

and domestic production of import competing goods, hence increased supply of much needed foreign exchange by the private sector.

Devaluation thus became an important part of the reform package. Foreign borrowing was another avenue through which additional resources could be mobilized. A partial nominal devaluation was attempted in 1986 to form a multiple exchange rate system, raising the rates for exporters. In 1992 a partial devaluation was implemented to unify various exchange rate around the free-market rate. The fiscal and monetary package, however, was not consistent with the objective of achieving a real depreciation via nominal devaluation as a means to stimulate exports and discourage imports. The traditional view is that expenditure switching policies should be backed with expenditure reducing policies to achieve a real depreciation. Fiscal expansion, foreign exchange scarcity resulting from a reduction in oil prices and foreign debt repayment, and limited access to international financial markets, rendered inflation tax as the balancing variable in the system. The inflation rate picked up significant momentum in 1993 and reached its height in 1995 (figure 10). As a consequence a real depreciation was not achieved by exchange rate unification policy in 1992 and the central bank had to implement several rounds of devaluation. The social and political environment turned against the reform process and it was stalled. With the election of a new president the critics of the reform strategy gradually took charge of the majority of economic policy making organizations. However, the new group has tried to live with the reform strategy with modest modifications, indicating very few viable policy options. The Third plan, currently underway, calls for privatization, exchange rate unification, removal of quantitative trade restrictions, reform of the financial market and privatization of banks. It also tries to have a dual track industrialization strategy, protection for targeted domestic industries and export promotion. Current economic policy framework *in print* is not very different from the reform strategies adopted in other MENA countries during the 1990s and in many ways similar to the Second Plan[18]. However, the classic problem of execution not being in sync with the policies and the time framework of the plans is again present.

5.2. Institutions, the State, and Economic Growth

Pervasive market failures and inadequate social institutions capable of replacing markets and/or ameliorating the adverse effects of market failures have undermined the perception that the industrial countries (ICs) and developing countries (DCs) are alike except for lower endowments of human and physical capital. If the differences were due to factor accumulation then the rates of return on human capital and physical capital would be significantly higher in DCs and that massive foreign capital should have flown to the poor instead of the rich countries. The evidence is clearly contrary to this pattern of factor reward and capital flows based on differential factor endowments (Stiglitz 1989). There is a growing recognition that the productive power of an economy is not independent of its institutional and governance settings. Moreover, a significant proportion of the per-capita income gap between ICs and DCs can, at least partly, be attributed to qualitative differences in organizations, individual behavior, and the institutions through which the individuals interact (Hall and Jones 2000, Stiglitz 1989). Empirical Studies (Pack 1987) show that labor productivity in similar production units with similar technologies are significantly different in

[18]This refers to the Second Plan after the revolution.

countries with different business, legal, and institutional setups. Differences in property rights can explain differences in growth rates. Tornell (1997) develops a model where improvements and erosion of property rights can explain the rise and decline of an economy.

In the standard growth models the issue of institutions and their effects on organizational and individual behavior, economic coordination, and efficiency are elegantly reduced to the first-order (marginal) conditions; made possible by assuming competitive goods, credit, factor markets, and the absence of information cost. Under this setting, factor accumulation and technical progress are pretty much all we need to explain growth. Moreover, provision of public goods by the government (with no self or group interest) may compensate for diminishing marginal product of capital for private firms resulting in unbounded growth in an endogenous growth setting. Once we depart the world of competitive well-functioning markets, a host of institutional/incentive issues like transaction costs, information asymmetry, and credit rationing emerge. A number of other questions, like property rights, incomplete contracts, fiscal policy, and rent seeking arise when both competitive markets and the benevolent dictator or the "command optimum" are absent.

Institutions are social constraints that structure incentives and human interaction. The institutional matrix in an economy can affects the economic incentives, transaction costs and influences the process of resource mobilization, allocation, and economic performance. Institutions develop endogenously through efforts made by private individuals, groups, formal organizations, and the government, to set and adjust "the rules of the game", define and enforce property rights to reduce uncertainty and transaction/enforcement costs. This multilateral process is close to the ideal (not necessarily the concrete) "Western" model of competitive and corporate capitalism. Apart from economic decentralization and the existence of powerful private institutions capable of checking government, this model generates credibility through repetition of the game, thus making it too costly for the principal actors to change the rules. In societies where the state assumes a leading role in the development process--by defining allocation rules, the scope for private sector participation, and strategies--its role in creation and development of institutions becomes more significant. Economic performance in state dominated economies have varied quite significantly ranging from collapse to "miracle". In societies where the state helps to create a social infrastructure, including a strong foundation for the rule of law, conducts non-distortionary economic policies, produces public goods to promote the private sector, and implements measures to improve income distribution, state intervention has contributed to growth and welfare. This is the basic description of an Effective State (or the virtuous version of the "Asian model"[19]).[20] Its distinctions, aside from keeping a proper balance between public consumption and investment, is the state's role in setting a broad institutional framework with credible rules that lowers economic uncertainty and transaction costs. Moreover, by creating correct signals and proper incentives for economic agents, the Effective State creates an environment conducive

[19] If competition for resources is limited through political means—and a socially efficient allocation rule is not substituted for it—rent seeking and big government can convert the virtuous Asian model into "crony capitalism" as was the case in Indonesia.

[20]For more details see The State in a Changing World, World Development 1997, Washington D.C: The World Bank.

to saving and accumulation of physical and human capital.[21] Under the Western and also the Effective model the commitment and reputation of the state to uphold the rules of the game provides private agents with a frame of reference to form "social capital" which is conducive to growth--[22]eventhough the investment level by private agents might be sub-optimal assuming that social capital creates positive externalitires.

The state model for a representative oil exporting DC is somewhat different from the above two cases. It is an activist state like the stylized Effective State (or the Asian) model but with a bigger command over domestic resources. The economic stylized facts of an oil state are, a very low tax-GDP ratio (Jalali-Naini 1999), a significant ratio of government investment to GDP (in many years larger than private investment), substantial control over the allocation of credit, and a dominating position in the currency market. The state sets the formal rules, which together with the informal rules and of the broader society forms the institutions that mediate individual behavior. However, given its economic powers, the oil-state is much more than an enforcer of the rules but also an active and dominant player in the economic game. The state's dominance and the absence of sufficiently strong private institutions to check and control its activity can generate a range of behavioral patterns encompassed by two polar outcomes: the Effective State model and a rent-command regime.

The kind of political organizations, administrative agencies, and economic firms that come into existence reflect the motivations and opportunities provided by the institutional matrix (North 1994). Likewise, in an oil-state the governance structure, economic policies, and economic agents' behavior will reflect the motivations and opportunities provided by the institutional matrix. At one extreme an Effective State model can emerge if the oil-state undertakes the necessary reforms to create private institutions including incomplete and missing markets. Correspondingly, the state reduces its direct intervention in the production and distribution processes, partially replaces administrative allocation with market allocation, and limits the potential scope for rent seeking.[23] An Effective Oil-State invests in social capital to uphold formal rules and creates institutions for private interaction through socially efficient (low cost) signals for resource allocation--price signals are presumed to have this property.[24] Engineering such socio-economic changes to accommodate growth is a challenging task. MENA countries have implemented various economic reform packages but the outcome has been, at best, mixed. To begin with "path dependence" problem exists; there is no historical precedence for a modern private-sector dominated economy and the corresponding civil institutions. Moreover, the

[21]For more details see World Development Report 1997, Partha Dasgupta and Ismail Serageldin (ed.), Social Capital: a Multifaceted Perspective, Washington D.C.: The World Bank, 2000.

[22]For more details see Ismail Serageldin and Christiaan Grootaert, "Defining Social Capital: An Integrating View," Joseph Stiglitz, "Formal and Informal Institutions", Richard Rose, "Getting Things Done in an Antimodern Society: Social Capital Networks in Russia," and Partha Dasgupta, "Economic Progress and the Idea of Social Capital," in Dasgupta and Serageldin (2000).

[23]The state in more successful Asian states maintained a substantial degree of control in the credit market. In the aftermath of the Asian Crisis, institutional reform for economic transparency has also been on the agenda.

[24] In this setting, a bigger government need not necessarily be (proportionately) more inefficient, unless government size is correlated with rent seeking and favoritism.

intellegensia in MENA have historically looked to the state as a medium for bringing about equity and social justice without sufficient scrutiny whether the state can deliver efficiently or if bureaucratic allocations and pervasive rent-seeking associated with an over-extended government contributes to inequality. On this presumption there has been a significant degree of unease or opposition to the growth of private institutions and market-oriented economic policies. Government insiders have incentives to block reforms for a more competitive access to distributive channels and markets. The attempts for reforms of the economy maybe frustrated even if one assumes that economic development is a primary objective of the state. Since the oil-state obtains resources not supplied by private entities through taxation its actions are not strongly constrained by them. With a narrow private social base and insufficient political openness the Oil-State may not have a stable equilibrium. Even though the state might initially encourage growth and proliferation of non-governmental institutions there are incentives and forces to move the system toward a rent-command system; hence government economic policies might vacillate between these two poles.

A rent-command regime can emerge if the oil- state sets the formal rules so as to limit allocation through markets or competitive non-market allocation rules. In this environment resources are not allocated through competition in the economic and political markets, rather the firms and interest groups attempt to obtain resources controlled by the government through administrative channels and the state supplies benefits through bureaucratic channels at a price. The payoffs to rent seeking can be very significant and in many instances greater than what could be obtained through competition and efficiency—thus one expects to see monopolies (including government monopolies) being active in contracting and sub-contracting projects.[25] This environment facilitates the possibility of two economically detrimental phenomenon: incredibility (or instability) of the rules and their harmful application. The former gives rise to contract uncertainty and low credibility. The effectiveness of the enforcement of contracts is one of the most important determinants of economic performance and a crucial difference between developing and developed economies (North 1990). Countries with higher credibility tend to have a higher investment rate (as a percentage of GDP) and a higher growth rate (World Bank 1997). Harmful application of the rules (by bureaucracies and their employees), even if the rules are benign and economic growth is an objective of the state, results in bureaucratic red tape, delays, and bribery, hence higher transaction costs. Low TFP growth rates and unsustainable growth are consistent with the above two phenomena.

Oil-exporting countries in MENA, including Iran, can be located somewhere along the above two poles and accordingly some structural and behavioral patterns can be

[25] The incentives to invest in "social capital" under the above conditions might take a different, opportunistic, form. Misaligned relative prices and bureaucratic allocation of resources at disequilibrium prices induce rent seeking opportunities and behavior, and private networks to extract rent become an attractive economic activity. In this environment, bureaucratic allocation of economic resources dominates the working agenda or the goals of formal organizations. Or even worse "social capital networks" can penetrate formal organizations and further affect allocation of resources through favoritism and rent seeking. Instead of following the laws and responding to price signals, rules are side stepped by personal contacts and politics. This combination tends to be stronger when the state-agencies or their subsidiaries are the recipients of expenditure allocations approved by other state agencies. In this case, the incentives for bureaucratization of the economy and administrative rationing become potentially greater.

inferred. We expect the market structure to be highly concentrated with a heavy state-owned company presence in these countries. Government owned firms account for the entire insurance market and more than 95 per cent of deposits and loans in the banking system. The estimated Herfindahl indices indicate a high concentration ratio in the Iranian manufacturing industry and indicative of a significant degree of market power by government-owned enterprises. Moreover, government-owned companies account for a very large share in sales, value-added, and employment. As the scale of operations becomes larger the number of private firms decline.[26] Due to economic uncertainty and property right concerns we expect little or no growth in the average size of the private firms-- as shown by Tabibian (2002). Uncertainty and low credibility of economic policies result in lower investment rates and adoption of costly strategies by the private sector. We also expect the economic rents made available through the government budget to be significant--as indicated by Salehi-Isfahani and Taheripour (1999). Karimi (2002) calculates the Katz and Rosenberg index of budgetary rent seeking and shows that this index is relatively high in Iran, as is the case for all populated oil-exporting countries. This index increases after the oil boom of the-mid 1970s and is highly correlated with changes in per capita oil revenues and the size of the government. As argued elsewhere a rentier system generates an incentive structure not conducive to growth (Brixiova and Bulii 2001, Easterly 1993, Najaf-Zadeh 2000). In a sense rent seeking becomes a negative sum game. Gylfason (2001) argues that economic performance in oil-exporting countries is not satisfactory due to widespread rent seeking, policy failures, and Dutch disease.

5.2.1. National Economic Policy Variables and Growth

Institutions and policies influence growth in different ways, e.g. via financial intermediation, resource allocation, rent seeking, and innovations. One way to model their effect is to relate policies and institutional factors to growth by linking them to productivity (TFP) performance and explain per-capita income differences along this line (Hall 2000). This is the approach used in the growth accounting section. A more general approach is to model how institutions, markets being an important subset, affect the growth process. However, there is no comprehensive growth model to endogenize even a subset of these variables in a unified framework. There are a host of models that deal with the effect on growth of one or more of the variables that become significant when competitive and benevolent government behavioral restrictions are relaxed. Often, the institutional factors aside from credit-market and financial intermediation effects are either combined as a composite effect that influences the behavior of TFP. Or the relatively large number of institutional and policy factors that influence growth performance are treated as growth correlates--as opposed to variables obtained from a formal growth model-- along with the state variables in cross-country growth regressions. In this section we will make use of the existing theoretical literature to select the relevant institutional, macroeconomic, structural, and demographic variables as the growth correlates in our growth regressions.

There is a voluminous literature on the effect of national policy on economic growth and no consensus on what type of policies influence growth. Some studies emphasize the role of institutions, the credibility of the rule of law, and political uncertainty

[26]For more details see, H. Salehi and A. Jafari Mozhdehi (1999).

(Brunetti, Kisunko, and Weter 1998). Others focus on the effect of openness (Frankel and Romer 1999). There is a huge literature on the effect of fiscal policy on growth (see below).

The theoretical effect of fiscal variables on growth has been analyzed rigorously but there is limited consensus at the empirical level (Tanzi 1998). A number of models consider government expenditures (on physical capital and social infrastructure investment) to be complementary, not a substitute, for private investment and examine the effect of government on growth in this light (Barro 1990, Barro and Salai-Martin 1992). With this backdrop, the effect of government on the private economy can be approached in two ways. The more traditional approach assumes that government expenditure (G)--a proxy for the size and the extent of the government--results in the provision of nonrivalrous and nonexcludable public services to the economy and complementary to private factor inputs--investment in physical and social infrastructure (capital). The effect of G can be modeled within a competitive endogenous growth model.[27] Each firm utilizes services financed by government expenditure (G) in its production function: $Y_i = AL_i^{1-\alpha} K_i^{\alpha} G^{1-\alpha}$, $0 \prec \alpha \prec 1$. Given the restriction on the parameters of the production function, production for each firm exhibits constant returns to scale in private inputs. With a fixed G, the economy experiences diminishing returns with respect to the aggregate capital stock (K). However, when G rises with K, the production function exhibits constant returns in K_i and G for a constant L_i. A balanced budget implies $G=\tau Y$, where τ is a fixed tax rate on output. It can be shown that the effect of government expenditures on the rate of growth is positively related to the ratio G/Y and negatively related to τ.[28] At low values of G/Y the positive effect of a higher G on the marginal product of capital dominates the negative distortionary effect of taxes. As G/Y increases the distortive effect of taxes becomes larger. Thus growth rate reaches a peak and then declines. The maximum growth rate is given by the efficiency condition $G/Y=1-\alpha$. Since public expenditure (in physical and social infrastructure) is assumed to be complementary to private investment, the marginal product of private capital increases and so does the rate of economic growth, up to a maximum. Thus growth is negatively influenced if G is relatively too large and has no effect when G is at the optimal level.

Cashin (1994 and 1995) extends the endogenous growth model of Barro and Salai-Martin 1992 by including the effect of the *stock* of public capital on growth, which is determined endogenously in this model. His set up contains a congestion model of public goods similar to Barro and Salai-Martin (1992). With congested public services, it is assumed that for a given quantity of aggregate public services (G), the quantity accessible to an individual producer declines as other users congest the

[27] Assuming a standard CRRA utility function where c is consumption per capita and ρ a dicount rate

$$U = \int_0^{\infty} \left[\frac{c^{(1-\theta)} - 1}{(1-\theta)} \right] e^{-\rho t} dt,$$

utility maximization yields the usual Euler's condition for household equilibrium consumption choice over time, $dc/c=(1/\theta)(r-\rho)$, Barro(1990).

[28] $dY/Y = (\frac{1}{\theta})\left[\alpha A^{1/\alpha} (L\tau)^{(1-\alpha)/\alpha} (1-\tau) - \delta - \rho\right]$

facilities (e.g. highway and water systems).[29] The growth rate of output in Cashin (1994) model is increasing in public investment and transfer payments per unit of output and decreasing in the ratio of current (non-lump sum taxes) revenue to GDP.

For an oil-exporting country the tax constraint on fiscal expansion is (partially) relaxed. The long-run balanced budget constraint thus can be amended to include oil revenues: $\tau Y=G+OR$, where OR is defined as oil revenues. Extension of the Barro (1990) model with oil revenues yields the growth maximizing level of G as in I (Nili and Amid 1999). Since oil revenues do not have the distortionary effect of taxes but can finance production of public goods, they have a positive effect on growth. Thus, given a constant level of taxes, oil-financed increases in G/Y positively affects growth.

$$\text{Log}(G/Y) \approx \alpha[\text{Log}(1-\tau) + \text{Log}(\tau)] + \gamma \text{Log}(OR) \qquad (I)$$

The above result is obtained under the assumption that government expenditures provide productive inputs that boost economy-wide growth. There are several possible mechanisms that undermine growth inducing oil-financed increases in G/Y. For instance, rent-seeking activities are likely to increase during an oil-boom when the state distributes the windfall gains through bureaucratic channels. The by-products can include higher unproductive expenditures, such as military spending, huge government investment programs with low social rates of return (Gelb 1988). Moreover, expansionary fiscal policy in the natural-resource abundant countries often

[29] Each producer has a per capita output production function specified in the ratio of the stock of public capital to the aggregate private capital stock (G/K) and the ratio of aggregate public transfer payments to the private capital stock (T/K).

$$y(t) = Ak(t)\left[\frac{G(t)}{K(t)}\right]^{\alpha}\left[\frac{T(t)}{K(t)}\right]^{\beta}$$

A is the level of technology, k is per capita private capital stock, and α and β are the elasticities of output with respect to the ratio of public to private capital and transfer payments to private capital ratio, respectively. Private agents' optimization problem is constrained by the private-capital accumulation equation (f.1), which is equal to the private after-tax income minus consumption. The public capital accumulation equation is given by (f.2), and (f.3) is the equation describing the flow of transfer payments. Individuals maximize their CRRA utility subject to (f.1) and take fiscal variables, τ_1, τ_2 (the constant tax rates on output to finance government investment and to finance transfer payments). T(t)/K(t), G(t)/K(t), and dG(t)/dt as given policy variables.

$$dk(t)/dt) = (1-\tau_1-\tau_2)Ak(t)\left\{\left[\frac{G(t)}{K(t)}\right]^{\alpha}\left[\frac{T(t)}{K(t)}\right]^{\beta}\right\} - c(t) \qquad (f.1)$$

$$dG(t)/dt = \tau_1 ANk(t)\left\{\left[\frac{G(t)}{K(t)}\right]^{\alpha}\left[\frac{T(t)}{K(t)}\right]^{\beta}\right\} \qquad (f.2)$$

$$T(t) = \tau_2 ANk(t)\left\{\left[\frac{G(t)}{K(t)}\right]^{\alpha}\left[\frac{T(t)}{K(t)}\right]^{\beta}\right\} \qquad (f.3)$$

results in lower real exchange rates (the Dutch-disease syndrome) undermining non-oil exports and import-competing manufacturing sector.[30] These tend to dampen growth-inducing effects of government spending.[31]

5.3. Empirical Tests of **Policy Variables and Growth**

The empirical framework follows the literature on the determinants of economic growth (Barro 2001, 1997, 1995, Easterly and Levine 2001). The main growth correlates identified in the literature can be classified as, fiscal variables, monetary variables, population variables, structural and institutional variables, legal and country-risk variables. Due to the lack of a sufficiently long time-series data on the quality of institutions that can be used to measure their impact on economic growth, we need to make special allowance for the effect of government policies and behavior (as the dominating social institution) on growth. Fiscal variables are the most reliable set of time series data we have access to proxy for government policies and behavior. This is also warranted by the fact that the government's command over resources, aggregate savings, and foreign exchange revenue in Iran is quite substantial.

Empirical studies of the impact of fiscal policy on growth can be divided into several groups. Those studies that focus on the effect of the size of the government on growth. The studies that examine the effect of the composition of government expenditures (consumption and investment) on growth, and those that consider the effect of the type of expenditures and taxes (infrastructure, education, health, communication, transportation spending, and income, corporate, trade taxes) on growth. Much of the empirical works on economic growth and fiscal policy is of cross-country regression variety. A large number of variables have been used as explanatory variables. A positive relationship between the investment rate and the growth rate is cited quite frequently in the published studies. The composition of government spending has important implications on economic growth (Tanzi and Zee 1997). When expenditures are disaggregated there is a stronger evidence of a negative relationship between public consumption and growth. Fiscal measures to boost public savings are the most effective way to raise national savings (Easterly, Rodriguez, and Schmidt-Hebbel 1994). For instance, reducing government consumption expenditures can leave more resources for capital formation, hence the rationale for a negative relationship between government consumption expenditures and growth rate (Barro 1995), Balassa (1990). Reducing government consumption expenditure, hence a higher domestic saving rate, lifts the transitional growth rate but only a level-effect in the long-run in the Mankiw, Romer, and Weil (1992) version of the Solow (1956) model. In the context of endogenous growth models a reduction in current expenditures and a higher public investment can generate long-run growth effect.

The empirical evidence regarding the effect of taxes on economic growth is mixed (Tanzi and Zee 1997). Martin and Fardmanesh (1990) show that, amongst the least developed countries, there is a negative relationship between the tax level and economic growth. Engen and Skinner (1992) show a negative relationship between

[30] Radelet et al. (1997). Highly volatile the terms of trade shocks originating from oil prices can also dampen growth as a consequence of heightened uncertainty.

[31] Sachs and Warner (1997) have shown that natural resource abundance negatively affects growth.

the rate of change in the tax level and economic growth. Easterly and Rebelo (1993) found that amongst a relatively large number of tax measures, only an estimate of marginal income tax was negatively related to growth.[32] Mendoza, Milesi-Ferreti and Asea (1998) show that based on panel regressions for 18 OECD countries, a lower income tax has a statistically significant and positive impact on investment.[33] However, the positive investment effect was not of the order to have a significant long-run growth effect.

In MENA countries government financed investment constitutes a large proportion of aggregate gross investment. Moreover, in many MENA countries the government, through public enterprises, directly produces goods and services and competes with private producers. In certain industries, government monopolies limit private sector entry and competition. In this case, higher public investment may crowd-out private investment. As shown by Khan and Kumar (1993), private investments are usually more productive than public investment, so a large reallocation away from the private sector might negatively affect growth. [34] Knight, Loayza, and Villanueva (1993) show that the level of investment by the public sector in infrastructure has a significant positive impact on growth. Easterly and Rebelo (1993) also found strong support for a positive correlation between growth and core public investment (communication and transportation). In contrast, Levine and Renelt (1992) found that the growth effects of public investment or public education expenditures are not robust.[35]

Eken, Helbling and Mazarei (1997) show that, for non-oil exporting countries, the share of government revenue in GDP and the share of current expenditures in GDP, had a negative level effect on economic growth in MENA countries. However, there is a positive relationship between growth and overall budget balance. The share of private investment was positively correlated with economic growth. In sharp contrast, for a panel of oil-exporting MENA countries, economic growth was found (surprisingly) to be positively correlated with the ratio of total government revenue (including oil) in non-oil GDP, and the ratio of current expenditures in non-oil GDP. The positive correlation between growth and government revenue can be consistent with equation (I). The general empirical model for identification of growth correlates for the Iranian economy is given below.

$$\log y_t = \alpha \log y_{t-1} + \beta' X_t + \varepsilon_t$$

Where y is GDP per capita and X is a vector of state and policy variables. Deducting the logarithm of y from both sides of the equation we have

$$\Delta \log y_t = (1-\alpha) \log y_{t-1} + \beta' X_t + \varepsilon_t$$

[32] The estimate of the marginal income tax was obtained by regressing income taxes on GDP.
[33] A lower consumption tax had a negative impact on investment.
[34] Balassa (1990) finds a negative correlation between public investment, private investment, and economic growth. Concerning the negative impact of government consumption on growth the weight of evidence is in her favor, however, the same cannot be said about the issue of the relative size of public investment. See Knight, Loayza, and Villanueva (1993).
[35] This is in contrast to the findings of Barro and Salai-Martin (1995) regarding a positive impact of government financed public education on growth.

The log of the lagged value of GDP per worker is included in this equation to capture the tendency for short-run growth rates to converge to the long-run growth rate. The variables representing the growth correlates are selected based on the literature discussed in the previous section. They include the government's size as measured by G/Y, the ratio of government consumption to GDP indicating how the government allocates its resources between investment and consumption. They also include the rate of inflation and the black-market foreign exchange premium reflecting the degree of macro imbalance, measures of openness, the variables reflecting the effect of import compression on growth, financial "depth", and private investment/GDP ratio.

Tables (13) and (14) show the results for two different estimation methods. We used instrumental methods for estimation to deal with the potential problem of the endogenous RHS variables. The ratio of value-added in the oil sector to non-oil GDP was used as an instrument variable to capture its effect on the RHS variables. Both OLS and two stage estimation methods produced similar results. The sign of the convergence (or the catch up) term, as expected, is negative and statistically significant. The sign of the ratio of total government expenditures to GDP, measuring the effect of the size of the government, is negative indicating the expected negative effect of over-sized government. Note, however, that the coefficient for this variable is not highly significant in the two-stage estimation. To capture non-linearity of the effect of government size on growth the square of this variable was also used as a regressor but it was insignificant.

A number of studies (Aschauer 1989, Knight et al 1993, and Skinner 1987) show that public investment positively affects growth. Empirical evidence cited in Barro (1991) points to a weak correlation between public investment and growth. He interprets this as either government investment are not a significant determinant of growth or that governments are optimizing and invest up to the point where the marginal effect of such investments on growth is close to zero. There is another interpretation that, due to informational, incentive, and management factors, the average productivity of government investments is low. To test for the effect of public investment, aggregate investment is broken into private and public investments. The ratio of public investment to GDP was positive coefficient but highly insignificant and hence was dropped. Easterly and Rebelo (1993) argue that government expenditures do not affect growth in the same way and certain categories of government expenditures may have stronger effect on growth. They found that government investment, especially that in transportation and communication was positively correlated with growth. To capture the effect of different types of public investment on growth, government investment were divided into strategic and non-strategic sectors. The former consists of government investments in transportation, communications, water, and electricity, and the latter as non-strategic investments. Public spending on education was used as a proxy for government investment in human capital. The estimated coefficient for this variable had the expected sign but was not statistically significant and therefore not reported here.

More developed financial institutions and financial deepening are generally regarded as conducive to growth. We tested for the impact of financial depth, measured by M2/GDP, but this variable was not statistically significant. High rates of inflation reflect macroeconomic instability hence economic uncertainty. A number of large sample studies show that instability and uncertainty negatively influence growth. The

level of threshold effect above which inflation significantly influences economic growth for industrial countries is estimated to be between 1-3 per cent and that for developing countries 7-11 per cent (Khan and Senhadji 2000). The average annual inflation rate (measured by CPI) in Iran during the 1974-2000 period was near 20 percent per annum. In fact the coefficient of the inflation rate is negative and significant in both estimations. The black-market exchange rate premium reflects disequilibrium exchange rates and price distortions so it presumably negatively influences growth. The coefficient of the black market premium was positive but was highly insignificant. To capture the effect of foreign exchange shortages on growth we calculated the ratio of imported intermediate to GDP. Imports were converted to domestic currency by the weighted (official and market rates) exchange rate. As indicated by both regressions the coefficient of this variable is positive indicating that unavailability of foreign exchange and import compression negatively influences economic growth in Iran.

6. Summary and Conclusion

Three distinct growth periods can be distinguished in Iran: 1950-1977, 1978-1988, and 1989 till the present. The better growth performance during the first period reflected more favorable external and internal environments. During the 1950s until the early 1970s the share of the oil sector in GDP was not high but oil revenues were growing. While fueling aggregate demand and financing imports of intermediate and capital goods (hence capacity output), growth in oil revenues were at a scale that inflation remained at low rates. Growth in domestic output was mainly due to growth in domestic demand and non-oil exports grew at a moderate to low rates. In spite of an extensive state presence in the economy, stable property rights and limited economic policy uncertainties allowed for the growth of the private sector. The sharp rise of the price of crude oil in 1974 fueled economic growth and inflation; it also induced rent-seeking activities and behavior. At the end of this period growth came to an abrupt end due to the political crisis of the state, in part caused by inadequate social representation and participation in that system. The poor growth record in the second period is mainly due to the debilitating effects of the war with Iraq and bureaucratization of the economy. A higher level of uncertainty both at the macro and on the micro level (contract uncertainty) and adverse incentive/price signals were the main reason for low rates of the private sector participation in the economy. Due to low investment rates and low productivity, growth rate of per capita GDP was negative in this period. During the 1989-2000 period economic growth resumed and TFP rose. Improved economic growth record during the third period partly reflects the unwinding of some of the government controls and a partial correction of the price system imposed in the second period. However, the weight of a large and inefficient bureaucracy, an institutional set up that limits internal competition and openness of the economy has limited the growth potential of the economy.

Like other populated oil-exporting countries, the positive wealth and saving effects of the mid 1970s did not have a long-lasting effect on economic growth--as predicted by endogenous growth models. Economic growth in Iran, and also a number of MENA countries, has been relatively volatile and factor-intensive (resource using) during the 1959-2000 period. Moreover, TFP did not contribute to economic growth in this

period. TFP contribution to growth was small but positive during the 1961-1973 and 1989-2000 but it was negative during the oil-boom of years (1974-77) and during the 1979-1988 period. Human capital accumulation, like other MENA countries was not a significant contributing factor to economic growth. Solow residuals from the growth accounting equations indicates that the residuals Grange Cause output level but not the reverse, indicating that the growth process (increased volume of economic activity) does not affect productivity. This could imply the absence of learning by the economic units in the growth process. We used a number of policy and structural variables to explain movements of TFP. Unfiltered estimate of TFP was regressed on human capital, the measure of macroeconomic instability (the rate of inflation), the conventional measure of openness, the size of the government, and private investment. As expected, human capital has a positive and the rate of inflation has a negative influence on TFP. Government size negatively affected and private investment positively influenced TFP. The results from growth regressions reported in this paper support our findings from the growth accounting exercise. Economic growth is responsive to the ratio of private investment to (non-oil) GDP, is negatively associated with economic instability and the size of the government. Coordination problems have contributed to a significant increase of the average gestation period of government investments, which constitutes more than 40 per cent of gross domestic fixed capital formation in Iran.[36]

The international experience suggests that: an economy characterized by the combination of a big government (with extensive control of the economy), bureaucratic allocation of credit, limited domestic competition, and *highly* protected from external competition, has a high probability of having an inferior growth performance. Populated Petro States possess some of the above characteristics. Economic performance is further undermined when coordination problems, contractual uncertainties, and rent seeking is pervasive. Such an environment is in most likelihood associated with low rates of increase in TFP and unsustainable economic growth.

The growth potential of the Iranian economy is limited because of poor or misplaced incentives, uncertainties, and underdevelopment of institutions for efficient allocation of resources (including markets). High rates of economic growth may not be achieved at current levels of efficiency, particularly in the government sector, given limited resource endowments of the economy. Institutional reforms should address property and legal rights, policy coordination, strengthening of non-governmental economic institutions, reducing transaction costs, correcting prices, fiscal discipline,[37] and creating incentives for efficiency and innovation by exposing the domestic firms to more competition. These institutional and policy reforms need to be implemented to increase both the quality and quantity of investment in human and physical capital, reduce deadweight losses, and improve allocation of resources. Improved governance standards and higher efficiency in government operations can release resources for more productive use in both the public and private sectors. Such a measure also contributes to fiscal discipline and inflation control.

[36]The average share for the 1975-79 period.

[37] The Third Plan contains some of the above mentioned reforms.

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