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Mosayeb Pahlavani
University of Wollongong

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A TIME SERIES ANALYSIS OF STRUCTURAL BREAKS, AND EXPORT-GDP NEXUS IN IRAN

A thesis submitted in fulfillment of the requirements for the award of the
degree

Doctor of Philosophy

From

University of Wollongong
School of Economics and Information Systems
Faculty of Commerce
New South Wales, Australia

By

Mosayeb Pahlavani
Master of Arts in Economics (University of Tehran, Iran)

CERTIFICATION

I hereby certify that this dissertation has not been submitted previously as part of the requirements of another degree and that it is the result of my own independent research, unless otherwise referenced or acknowledged.

Mosayeb Pahlavani
December 2005

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ABSTRACT

This dissertation examines the major determinants of GDP growth in Iran using annual time series data spanning the years from 1960 through 2003. The Iranian economy has been subject to a multitude of structural changes and regime shifts during the sample period. Thus after applying conventional unit root tests like Augmented Dickey–Fuller (ADF) and Phillips-Perron (PP) procedures, time series properties of the data are analysed by applying the Zivot-Andrews (ZA, 1992) model, Perron's (1997) Innovational Outlier (IO) and Additive Outlier (AO) models and finally the Lumsdaine and Papell (LP, 1997) approach to determine endogenously the more likely time of major structural breaks in various macroeconomic variables of the Iranian economy. Based on the above models, the presence of one and two unknown structural breaks in the data are considered. After accounting for the single most significant structural break, the results from the ZA, IO and AO models clearly indicate that for all series under examination, the null hypothesis of at least one unit root cannot be rejected, a result consistent with those of conventional unit root tests. In other words, the empirical results based on both the conventional unit root tests as well as on all the above new models of unit root tests which take into account the presence of potential structural breaks, indicate that there is not enough evidence to reject the null hypothesis of unit root for any of the variables under investigation. However, when two structural breaks are incorporated into the testing procedure within the framework proposed by LP, the test results indicate that the unit root hypothesis is indeed rejected for some of the variables under investigation at the 10 per cent level or better.

It should be noted that the critical values reported by LP (1997) cannot be used to make a decision about the stationarity of the series under investigation in this research. The empirical literature shows that the critical values are heavily dependent on the sample size and as the sample size in the present study differs markedly from LP's, applying this testing procedure, only the existence of two significant potential structural breaks in the data can be determined and it is not possible to adequately examine the stationarity of the data under investigation.

Empirical results indicate that for a majority of the variables under investigation the endogenously determined break dates based on the above mentioned methodologies closely correspond to some important phenomena in the economy such as (a) the oil

boom in the 1974-75; (b) the effects of the Islamic Revolution (regime change) in 1979 and finally (c) the outbreaks of the Iraqi war in the 1980s.

In order to address the role of exports in economic growth, i.e. to examine the export-led growth hypothesis (ELG) in an oil based economy, an extended Feder-type aggregate production function model is proposed, which considers the broad range of externality effects of exports (both oil and non-oil) on the economy. In this model, by following the endogenous growth theory as well as recent empirical findings on the trade-GDP nexus, factors such as: physical capital (R&D effects), human capital (representing knowledge spillover effects), export expansion (proxying positive externality effects), and total imports (capturing learning-by-doing effects) are considered in order to determine their effects on economic growth.

A production function approach which includes all of the above-mentioned factors is then used in the cointegration analyses: both conventional cointegration approaches such as the Johansen-Juselius (1990) technique as well as newer cointegration approaches (e.g. Gregory-Hansen (1996) and Saikkonen and Lütkepohl (2000)) are employed to determine the long-run drivers of economic growth in the presence of structural breaks in Iran. This latter cointegration technique accommodates potential structural breaks which could potentially undermine the existence of a long-run relationship between GDP growth and its main determinants.

As both traditional cointegration tests (like Johansen-Juselius), as well as tests for cointegration in the presence of structural breaks (i.e., GH (1996) and SL (2000)) have all shown that there exists only one cointegrating vector, therefore applying the autoregressive distributed lag (ARDL) procedure is the best way of determining long-run and short-run relationships. The ARDL procedure is more appropriate with mixed order $I(0)$ and $I(1)$ processes. For this reason, the error correction version of the ARDL procedure is then employed to specify the short- and long-term determinants of economic growth in the presence of structural breaks. The estimated model tracks the historical data very well and satisfies various specification and stability tests. Empirical estimates indicate that, in the long-term, policies aimed at promoting various types of physical investment, human capital, trade openness and technological innovations will improve economic growth.

More specifically, empirical results show that while the effects of gross capital formation and oil exports are highly significant and important, as expected, for the expansion of the Iranian GDP over the sample period, non-oil exports and human

capital are generally less pivotal and have an even smaller effect than had been anticipated. However, whilst the long run non-oil exports are small, they are statistically significant. It is also found that the speed of adjustment in the estimated models is relatively high with 40-60 percent of disequilibrium eliminated within one year. The empirical findings of this research indicate that in order to achieve high and stable economic growth and to protect the economy from the negative effects of oil price fluctuations, the Iranian government should continue its quest for more efficient and effective non-oil export promotion policies as well as its diversification strategies aimed at weaning the economy from its dependence on the oil sector.

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