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***Demographic Structure and Private Savings:
Some Evidence from Emerging Markets***

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Abstract

This paper investigates the impact of demographic structure on private savings in the case of fourteen emerging markets. Specifically, we tested the implication of the life cycle hypothesis that private saving (as a percent of GDP) should increase with a high percentage of working population and fall with high percentages of the young and retired groups. Consistent with the life cycle hypothesis, the empirical results from annual data over 1960-2001 suggests that the age structure of the population is a prime determinant of national saving. In particular, our findings support the presence of a significant positive (negative) relationship between the national saving ratio and the percentage of working (children) population groups in the majority of the countries. However, the results are less conclusive regarding the statistical relationship between national saving and the elderly population group and we offered several explanations for the apparent weak relationship. Overall, our results generalize the evidence in support of the life cycle hypothesis in the case of emerging markets and suggest that the demographic structure is an important determinant of future trends in national savings.

JEL classification: J11; o11

Keywords: Private Savings, Life Cycle Hypothesis, Demographic Structure, Emerging Markets

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*Demographic Structure and Private Saving:
Some Evidence from Emerging Markets*

I. Introduction

Debate persists among economists regarding the relationship between aging structure and private saving. Generally, research based on microeconomic data fail to detect a robust link between demographic factors and national saving, while macroeconomic studies support a stronger nexus between the two variables¹. In particular, the life cycle hypothesis argues that the working group in the population saves for retirement and thus their saving rates tend to be higher. In contrast, the very young and the elderly save very little primarily due to their low or falling income, respectively. Therefore, the life cycle hypothesis implies that private saving rises with a higher percentage of the working population, and falls with a higher percentage of the young and aging population. The hypothesis also contends that factors like elderly dependency ratio, declining fertility rates, life expectancy, and income levels are all possible determinants of private saving.

Mei (1999) emphasizes the importance of the dependency ratio as a key inhibitor of national saving in the U.S. Given Greenspan's recent warning of a dramatic increase in this ratio in the next few decades, the implication for national saving is equally dramatic. While a larger working force promotes national output, a higher dependency ratio increases aggregate consumption and thus depresses national saving (McDonald, 1999). In addition, higher income levels are usually associated with rising saving rates, although Masson (1998) reports that such a relationship exists only up to a certain income threshold, above which the saving rate tends to fall. Furthermore, in a recent study, Poterba (2004) contends

¹ Besides studies discussed below, research that supports a discernible demographic/saving link include Feldstein (1980), Horioka (1991), Kelley and Schmidt (1996), and Kokila (1994). For skeptical views, see for example, Deaton (1992) and Bosworth (1993).

that income earned during the individual's prime working stage exerts the highest impact on the saving rate.

The main purpose of this study is to investigate the socio-economic factors associated with private savings and demographic trends in several emerging markets. Through its potential effects on national saving, demographic trends can impact a host of many macroeconomic variables including government revenues (taxes) and government spending (particularly for health care and social security), interest rate, inflation, and economic growth. According to the life cycle hypothesis, the working (middle age) group is considered to be the catalyst for fueling economic growth through saving. The life cycle hypothesis also suggests that young and old groups are the least likely to save.

This paper investigates the relationship between saving behavior and age dependency over four decades (1960-2001) for fourteen emerging markets. Most of these countries are located in the Middle East, the rest being from North Africa. These regions have grown relatively fast in the past four decades primarily due to increased oil revenues. The economic expansion in these countries has been accompanied by an increase in population size in the region. It is therefore interesting to assess the possible impact of saving patterns on economic growth in these countries. A given country with a major aging population may shoulder the working group with a burden that could adversely affect its economic development. Understanding the demographic culprit behind the saving patterns is therefore vital for designing effective public policy.

We examine the response of private saving to three population groups; namely, the young (15 years of age or younger), the working population (age 15-64 years) and the

aging group (65 years and older). The sample spans more than four decades and comprises fourteen emerging markets in these regions.

II. Data

Our data is obtained from the World Development Indicators CD-ROM 2003 and span the annual period 1960-2001 and includes fourteen developing countries in the Middle East and North Africa: Algeria, Bahrain, Egypt, Iran, Israel, Jordan, Kuwait, Libya, Morocco, Oman, Saudi Arabia, Syria, Tunisia, and the United Arab Emirates. Data availability is one of the main reasons for selecting these countries. For each country, the variables of interest are: gross domestic savings as a percent of GDP; percent of population of 15 years of age and younger (designated as children); percent of population of 65 years of age and older (designated as retired), and the percent of population between 15 and 64 years of age (designated as the working group).

III. Empirical Results

The main objective of this study is to test the validity of the life cycle hypothesis in the case of fourteen emerging markets. In particular, we tested if the national saving ratio significantly rises with a larger percent of the working population and, moreover, whether the national saving ratio decreases with a larger percent of children and retired population.

Tables 1-3 assemble the empirical results from the estimated regressions. These results suggest the presence of a positive relationship between the percent of the working population and the national saving rate in the vast majority (13 of 14) of the countries examined. The charts to follow (Appendix A) corroborate this verdict and indicate similar trends between the percent of the working population and private savings in most of these

countries. Clearly, these findings are consistent with the implication of the life cycle hypothesis that national saving rate rises with a larger working population.

As to the percent of children in the population, the empirical results, both from the regression estimates and from the charts, overwhelmingly support the presence of a negative relationship with national savings (11 out of 14). However, note that all countries under this study are characterized with a relatively large percent of children in the population, ranging from 25% to 50% (compared, for example, to only 1% to 13% for the aging population). Another notable characteristic of the data in these countries is that this relatively large proportion of children in the population is also rapidly declining which led to a continuous increase in the percent of the working population. Thus, with a rising or a steady national saving rate, the declining percent of children in population resulted in the observed negative relationship between the two variables in most countries.

Finally, the results from both the regression estimates and from the trend charts do not reveal a uniform conclusion across the countries regarding the nature of the relationship between the percent of retired population and national saving. In particular, while three out of fourteen countries display positive relationships between the two variables, the results show eleven countries to possess negative relationships. Perhaps more importantly, most of the estimated equations (3 out of 14) display relatively low R-squared values, implying weak correlations between the percent of retired population and national saving.

Several factors may have contributed to the lack of correlation between the aging group of the population and the saving rate. In particular, note that factors other than population groupings could also influence private savings. Possible candidates include

policy-oriented factors like income taxes and government subsidies, as well as non-policy elements like inflationary expectations and wealth levels. In addition, there are many other aspects that impact national saving which are beyond the scope of this paper. For example, our analysis does not account for the possible impact on the national savings from the infusion of huge oil revenue accruing in these countries (Bahrain, Iran, Kuwait, Libya, Oman, UAE, and Saudi Arabia) as a result of the dramatic increase in the world price of oil in the mid-1970s. A glance at the charts reveals that these oil-based countries witnessed a marked increase in their private saving rates during that period.

National saving patterns can also be influenced by major political events. Indeed, some of the countries in this region have typically been at the center of seemingly unending political turmoil. Examples of such political events include the Israeli invasion of four Arab countries in the mid-1960s, the Iraqi-Iran war in the early 1980s, the Iraqi invasion of Kuwait in the early 1990s, and the U.S. invasion and occupation of Iraq in 2003. These and several other important political episodes have undoubtedly had significant implications not only on the saving behavior in these particular countries, but also on their overall economic, financial, social and political landscape. Of course, this paper does not intend to specify a complete model for private savings that include all possible factors behind changes in private savings. Rather, the main focus of this paper is only to isolate the demographic impact on private saving. The results from such endeavors should still be statistically reliable to the extent that the omitted variables are not highly correlated with the population groupings included in the model.

IV. Conclusion

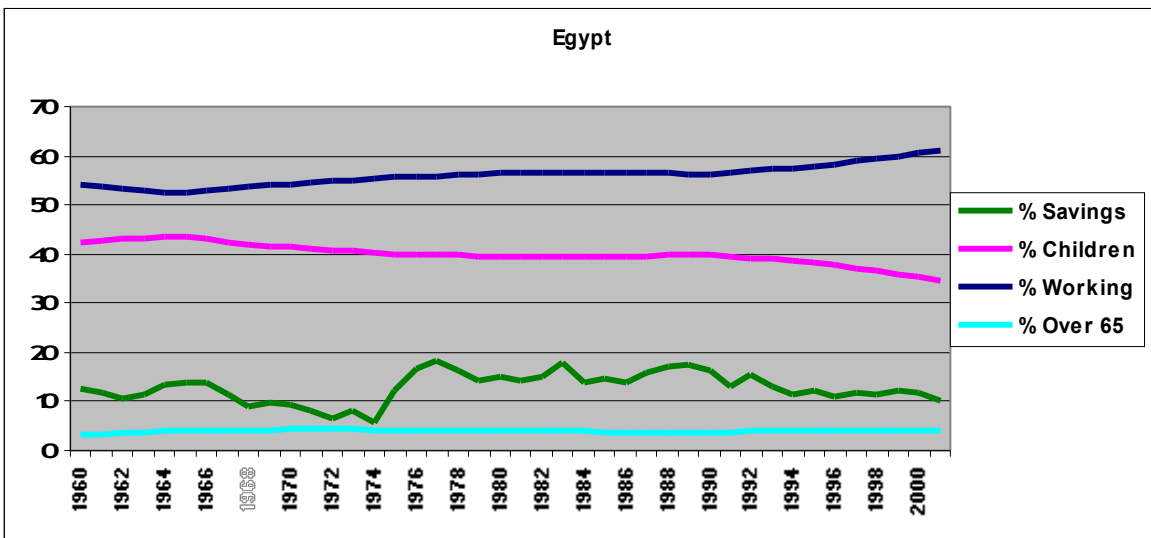
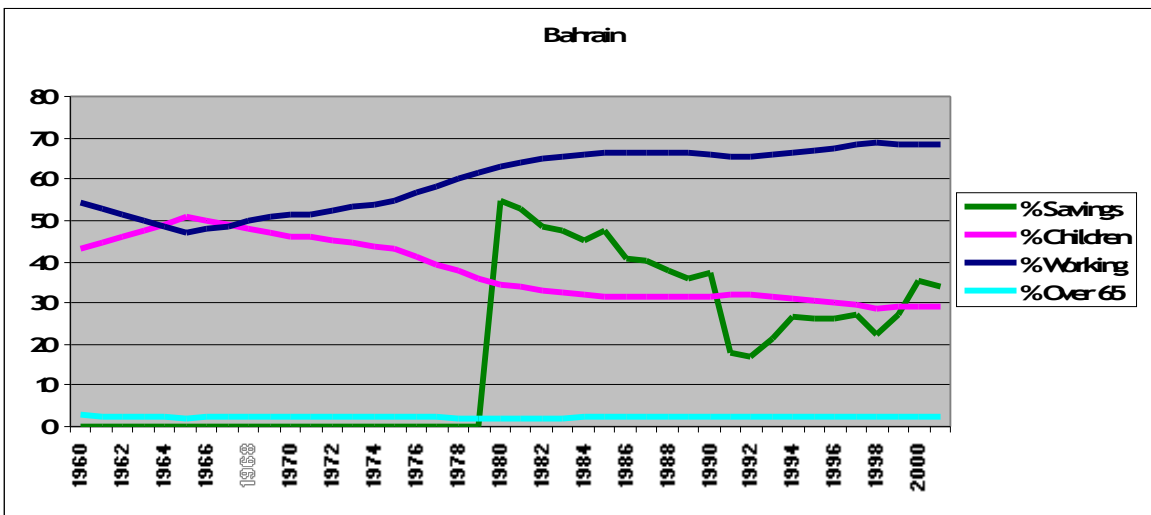
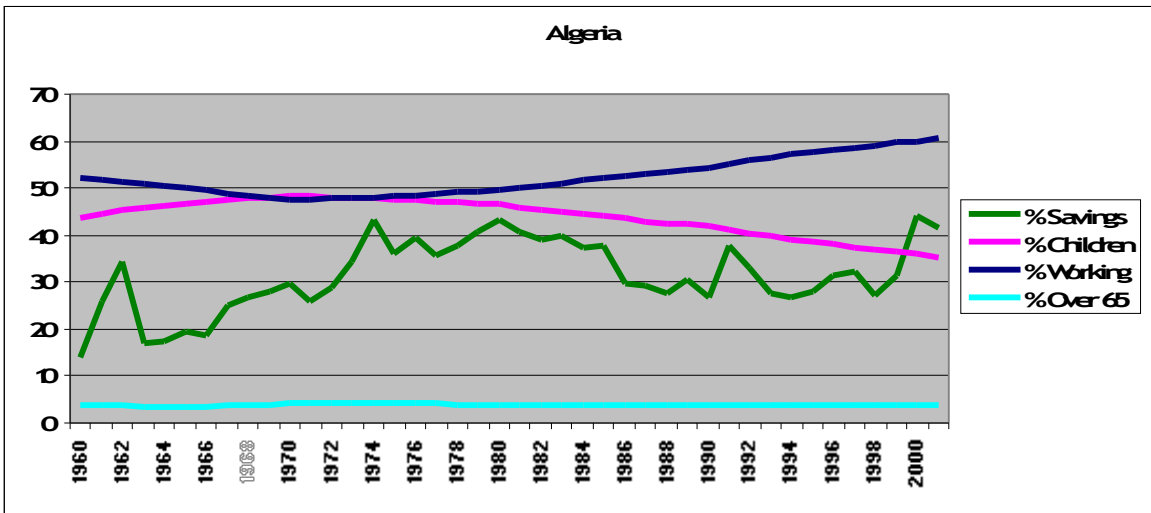
This paper empirically investigates the impact of demography structure on national savings in fourteen emerging markets in the Middle East and North African region. Our results, deduced from annual data over the period 1960-2001, are consistent with the implications of the life cycle hypothesis, particularly for the working and young population groups. In particular, we find evidence for a significantly positive relationship between the percent of working group of the population and the private saving ratio in the majority of the countries studied. The results suggest that the larger the working ratio in the population, the higher the national saving ratio will be. Also consistent with the life cycle hypothesis, our empirical analysis reveals that the children proportion in the population is noticeably falling in most of these countries over the estimation period. Such a trend resulted in an equally marked increase in the percent of the working group in the population, with the latter being positively correlated with national savings. It is therefore not surprising that the results support a negative relationship between the percent of children in the population and private savings in most countries in the sample. Taken together, these results imply that the prospective demographic structures in these countries contain valuable information for predicting future trends in national saving.

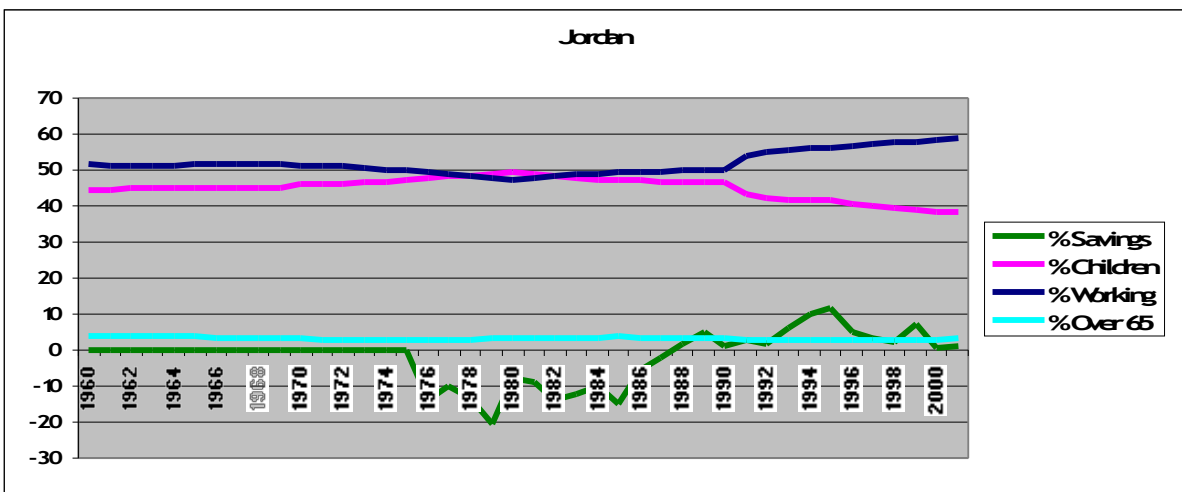
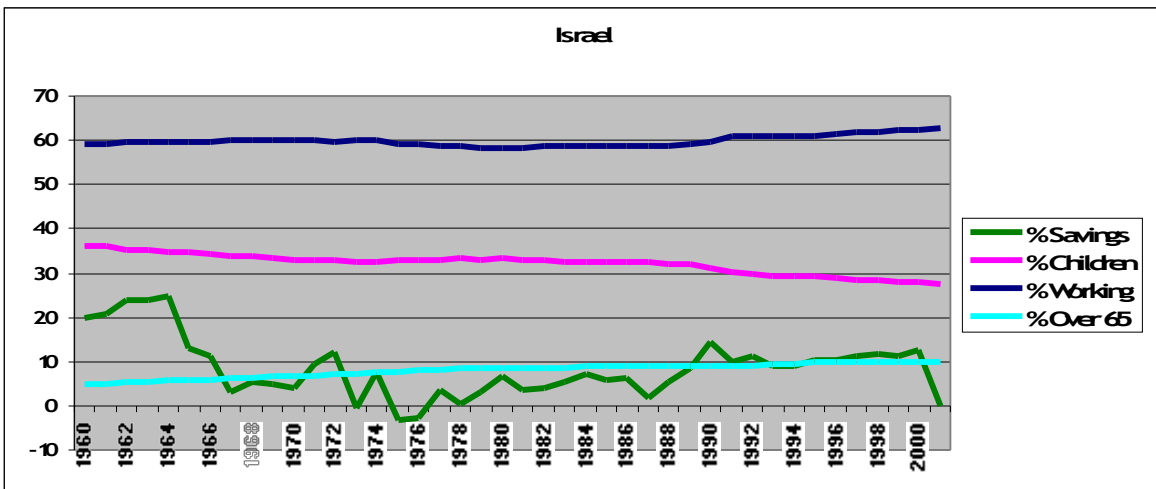
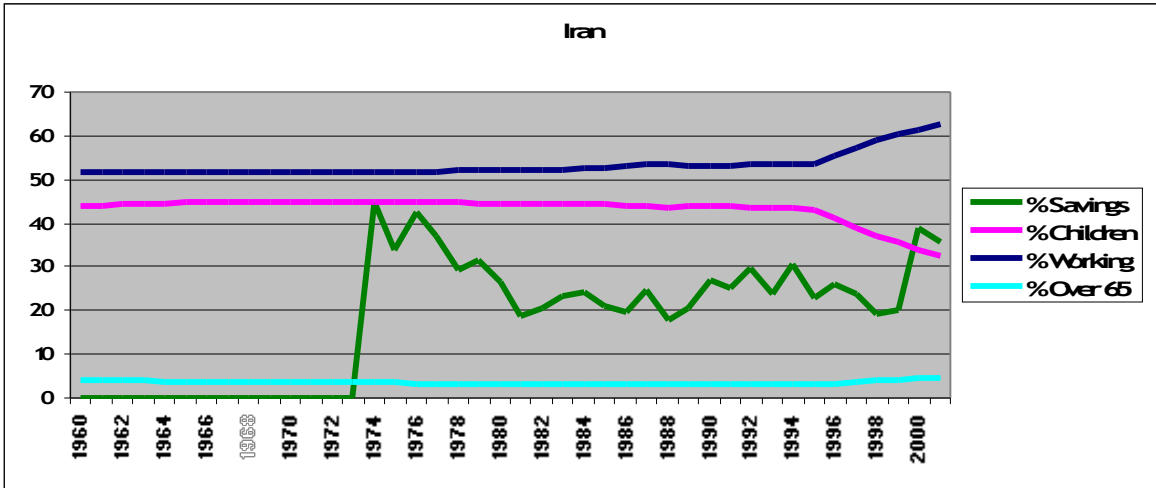
Our findings on the impact of the elderly population group on national savings are somewhat ambiguous. Prior research suggests that as the population ages into retirement, private saving rates should decline. However, our empirical results do not support such a contention uniformly across all countries. The paper discussed several possible reasons behind the inconclusive nature of the results for the elderly group, including the impact of several economic and political factors.

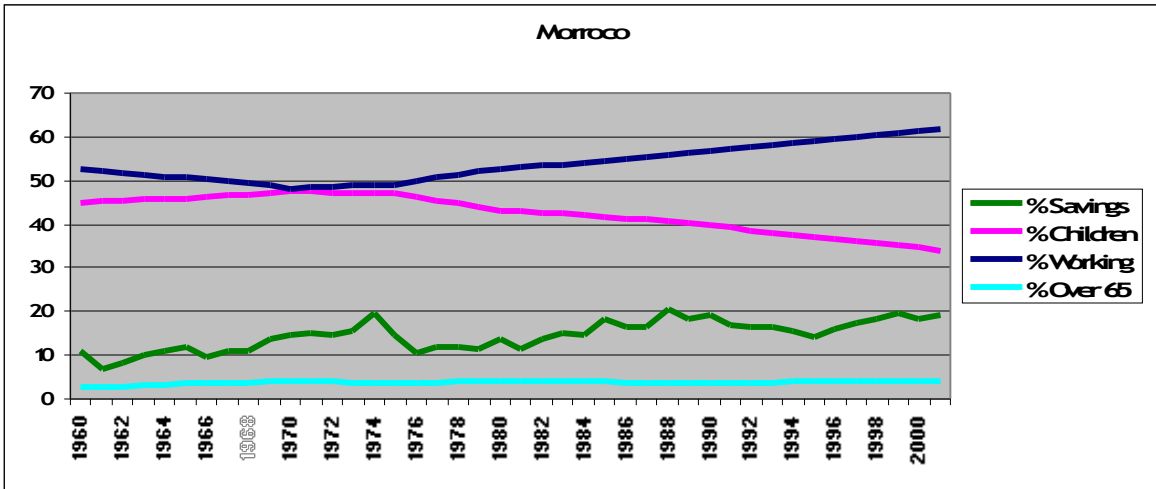
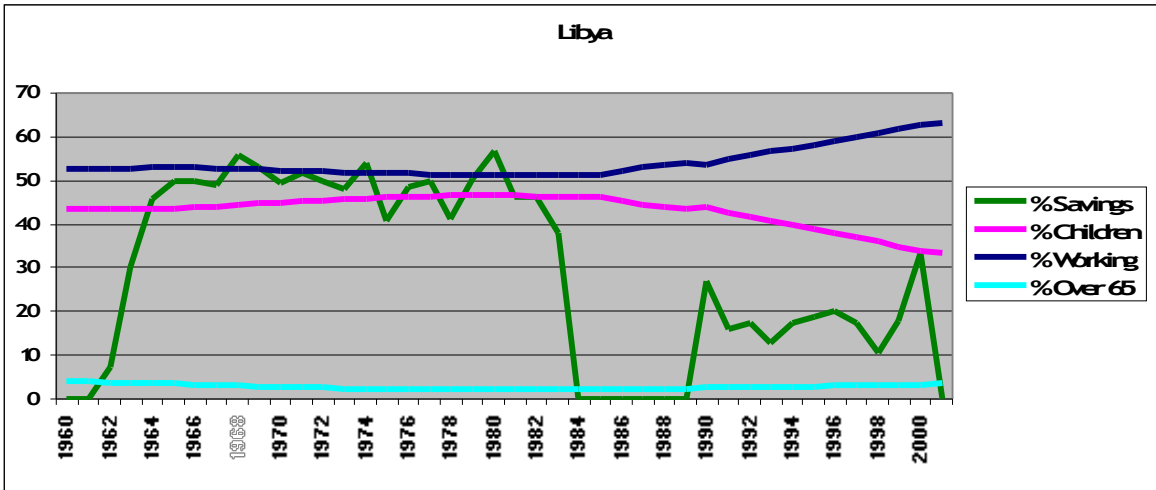
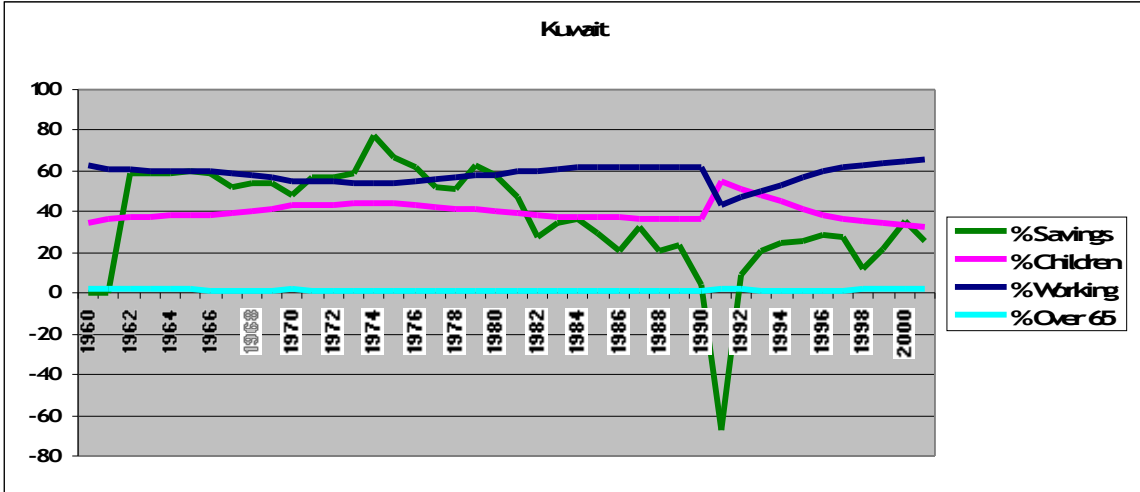
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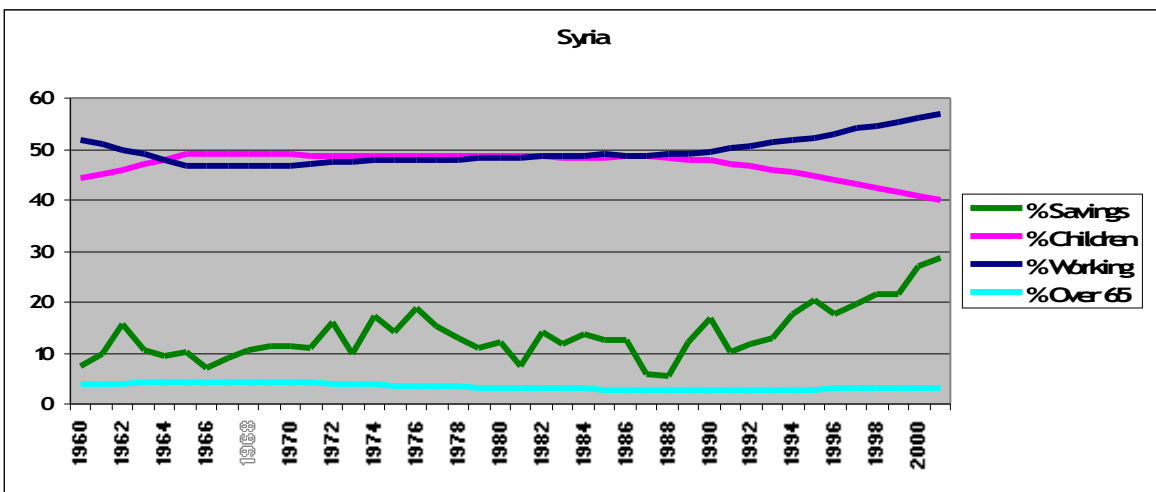
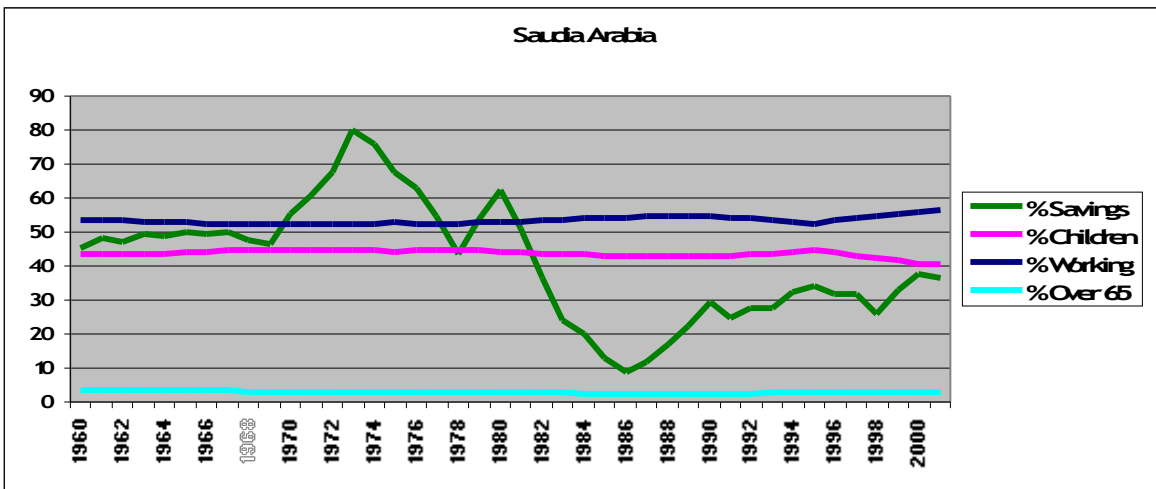
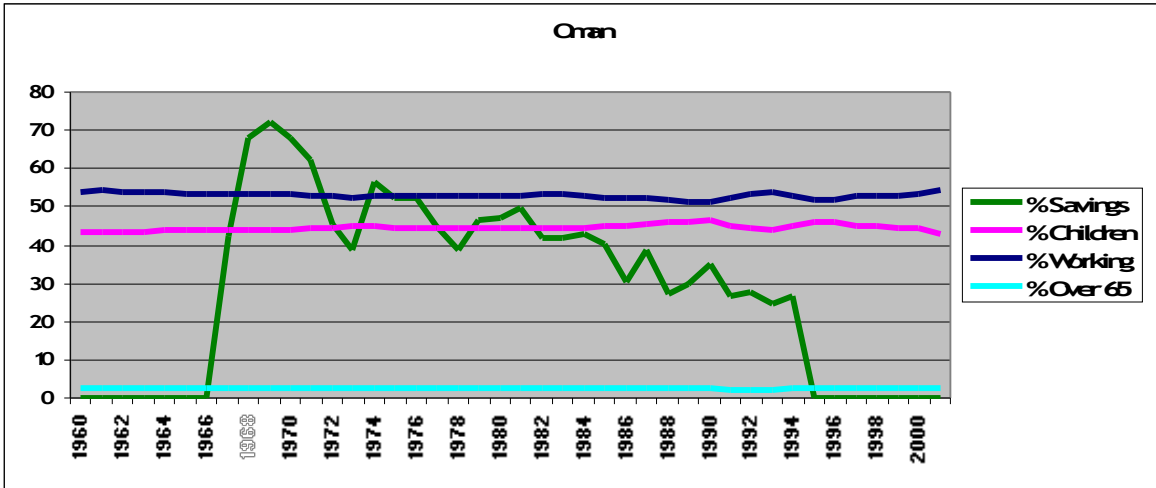
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Appendix A: Trends in Private Saving Rates and Population Groupings in Selected Emerging Markets (1960-2001)









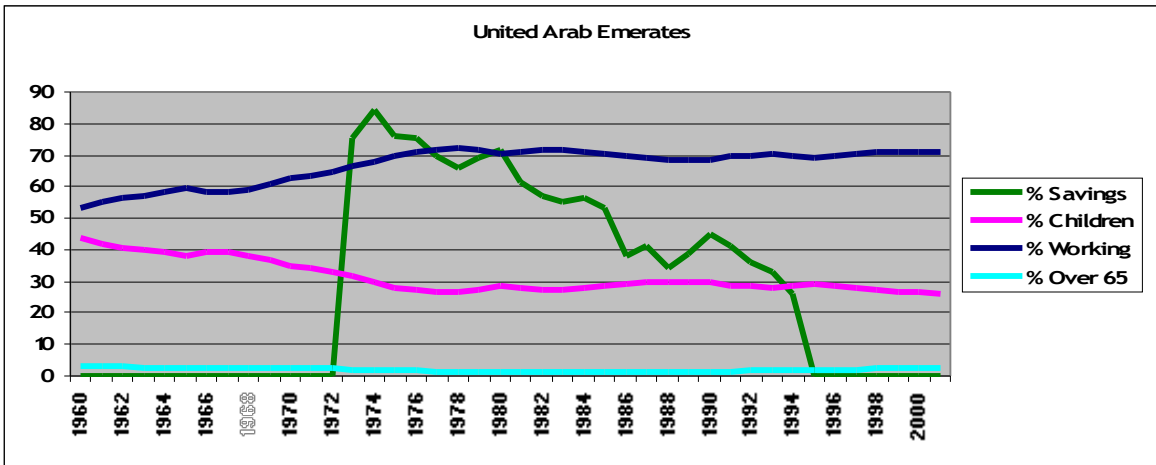
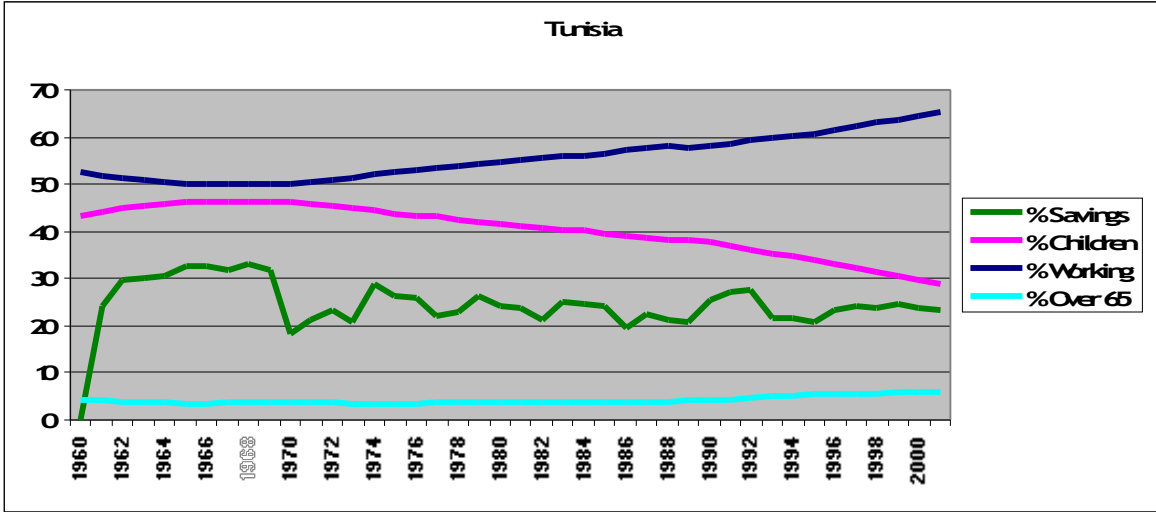


Table (1): Regression Estimates of the impact of Population Groupings on Private Savings in Selected Emerging Markets

Country	Estimated Regression Equation	DW	Adj. R ²	F-Test N
Algeria	Model 1 Saving = 21.73*** - 2.32 Δ children (t-1) - 2.41* log Δ retired + 0.53** Δ saving (t-1) (4.71) (-0.60) (-1.79) (2.18)	1.69	0.32	4.25*** 22
	Model 2 Log(saving) = 1.26*** + 7.15 Δ log working (t-2) + 0.63** log saving (t-1) (2.97) (1.95) (5.01)	1.35	0.55	24.75*** 39
Bahrain	Model 1 Log saving = 6.27*** - 9.48** Δ Log children (t-2) - 3.47 Log retired*** (t-2) + 0.02** Δ saving(t-) (7.63) (-2.15) (-3.57) (2.19)	1.95	0.48	6.54*** 19
	Model 2 Log saving = 1.041* + 8.138 Δ log working (t-2) + 0.682*** log saving(t-1) (1.95) (0.95) (4.33)	1.91	0.58	13.60 19
Egypt	Model 1 Δ saving = -3.47*** - 32.51*** Δ log children(t-3) - 10.35*** Δ retired(t-2) + 0.28*** saving(t-4) (-4.73) (-2.71) (-7.47) (4.71)	1.60	0.64	22.78*** 38
	Model 2 log saving = -1.89 + 0.62** log working(t-1) + 0.75*** log saving(t-1) (-1.54) (1.95) (7.72)	1.30	0.67	41.82 41
Iran	Model 1 Saving = 159.17** - 3.08** children(t-2) - 38.67 Δ retired(t-2) + 3.78 Δ log saving(t-4) (2.50) (-2.12) (-1.40) (0.74)	1.56	0.24	3.33** 23
	Model 2 Log saving = -8.24 + 2.47* log working(t-2) + 0.50 log saving(t-2) (-1.57) (1.99) (2.58)	1.50	0.18	3.79** 26
Israel	Model 1 log saving = 0.38*** - 8.55*** log children(t-1) - 3.07 log retired(t-1)*** + 0.26** Δ saving (t-1) (4.14) (-3.76) (-4.13) (1.96)	2.17	0.34	6.53*** 33
	Model 2 Log saving = 1.83*** + 47.76*** Δ log working(t-2) + 0.03** Δ saving (t-3) (16.42) (2.47) (1.57)	1.33	0.34	6.53*** 33

Note: Numbers in parenthesis below the coefficient estimates are t-statistics.

*P<.05; **p<.01; ***p<.001 indicates the significance of

Table (2): Regression Estimates of the impact of Population Groupings on Private Saving in Selected Emerging Markets

Country	Estimated Regression Equation	DW	Adj. R ²	F-Test N
Jordan	Model 1 log saving = -12.72 + 6.43** log children (t-1) -9.88*** log retired(t-1) + 0.26 Δ log saving(t-2) (-0.74) (1.38) (-2.87) (1.03)	2.46	0.40	3.31* 11
	Model 2 Δ log saving = -0.507 + 0.47 Δ working(t-2) - 0.53 Δ log saving(t-1) (-1.52) (1.73) (-2.28)	2.35	0.37	4.31** 12
Kuwait	Model 1 Δ saving = -1.46 - 3.69*** Δ children -18.39 Δ retired - 0.35 Δ saving(t-1) (-0.70) (-4.02) (-0.77) (-3.27)	1.35	0.57	17.45*** 37
	Model 2 Δ saving = -1.62 + 3.82*** Δ working - 0.35 Δ saving(t-2) (-0.69) (5.68) (0.17)	2.16	0.48	17.40*** 37
Libya	Model 1 log saving= -6.42** + 2.63*** log children (t-1) - 7.69*** Δ log retired (t-2) + 0.49** Δ log saving(t-1) (-2.17) (3.33) (-3.69) (2.19)	1.37	0.74	26.86*** 28
	Model 2 log saving = -6.83 + 1.72 log working(t-3) + 1.001*** log saving(t-1) (-0.87) (0.92) (6.48)	1.91	0.78	51.77*** 29
Morocco	Model 1 log saving= 7.16 - 1.18*** log children(t-1) - 4.64*** Δ log(retired(t-1) + 0.02** Δ saving(t-1) (8.94) (-5.53) (-5.89) (2.15)	1.73	0.68	28.48*** 40
	Model 2 log saving= -1.37 + 0.56* log working (t-2) + 0.02** Δ saving(t-1) (-1.16) (1.76) (7.63)	2.17	0.71	48.69*** 40
Oman	Model 1 log saving = 41.01*** -9.79 ***log children(t-2) + 19.25** Δ log retired(t-2) + 0.00 Δ saving(t-2) (3.52) (-3.19) (2.73) (0.86)	1.42	0.49	8.84*** 25
	Model 2 log saving = -7.73 + 2.15 log working(t-2) + 0.77*** saving(t-1) (-0.51) (0.55) (5.62)	2.48	0.66	25.89*** 26

Note: Numbers in parenthesis below the coefficient estimates are t-statistics.

*P<.05; **p<.01; ***p<.001 indicates the significance of

Table (3): Regression Estimates of the impact of Population Groupings on Private Savings in Selected Emerging Markets

Country	Estimated Regression Equation	DW	Adj. R ²	F-Test N
Saudi Arabia				
Model 1	$\Delta \log \text{ saving} = 5.50 - 1.46 \log \text{ children}(t-3) + 1.81 \Delta \log \text{ retired}(t-1) + 0.38^{***} \Delta \log \text{ saving}(t-1)$ (0.63) (-0.63) (0.59) (2.47)	1.88	0.16	3.39** 39
Model 2	$\Delta \log \text{ saving} = -0.005 + 0.37 \Delta \log \text{ working}(t-3) + 0.43^{***} \Delta \log \text{ saving}(t-1)$ (-0.18) (0.07) (2.86)	1.90	0.14	4.11** 38
Syria				
Model 1	$\log \text{ saving} = 1.74^{***} - 0.44^{***} \Delta \text{ children}(t-2) + 0.62 \Delta \text{ retired}(t-2) + 0.31^{**} \log \text{ saving}(t-1)$ (4.80) (-4.09) (1.21) (2.17)	2.05	0.53	15.78** 39
Model 2	$\log \text{ saving} = 1.58^{***} + 0.35^{***} \Delta \text{ working}(t-2) + 0.37^{***} \log \text{ saving}(t-1)$ (4.32) (3.50) (2.56)	2.06	0.50	20.*** 39
Tunisia				
Model 1	$\log \text{ saving} = 1.97^{**} - 0.031 \log \text{ children} - 2.12^* \Delta \log \text{ retired}(t-2) + 0.422^{***} \log \text{ saving}(t-1)$ (2.51) (-0.16) (-1.80) (2.86)	2.06	0.34	7.46*** 38
Model 2	$\text{Log saving} = 1.90^{***} - 0.12^{**} \Delta \text{ working}(t-2) + 0.41^{***} \log \text{ saving}(t-1)$ (3.97) (-2.01) (2.83)	2.05	0.35	11.25*** 38
U.A. E				
Model 1	$\log \text{ saving} = 0.86 + 0.02 \Delta \text{ children}(t-1) - 0.92^* \Delta \text{ retired} + 0.76^{***} \log \text{ saving}(t-1)$ (1.55) (0.68) (-2.05) (5.38)	2.02	0.87	43.56*** 20
Model 2	$\log \text{ saving} = 0.06 + 0.02 \Delta \text{ working} (t-2) + 0.96^{***} \log \text{ saving}(t-1)$ (0.14) (0.54) (8.25)	2.00	0.83	45.77*** 19

Note: Numbers in parenthesis below the coefficient estimates are t-statistics.

*P<.05; **p<.01; ***p<.001 indicates the significance of