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# Are Credit Cycles Different in the MENA Countries Compared to Advanced Countries?

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# Are Credit Cycles Different in the MENA Countries Compared to Advanced Countries?

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**Abstract**

This paper estimates private sector credit cycles for most of the oil-importing and oil-exporting countries in the Middle East and North Africa. Credit cycles are the medium-term component in spectral analysis of real private sector credit growth. Besides, the paper estimates the credit cycles for several developed countries. The analysis finds substantial differences and rare similarities between credit cycles in the Middle East and North Africa and advanced countries. Between 1964–2017, credit cycles in the Middle East and North Africa do not appear to be associated with GDP growth. They only explain a fraction of the growth in private sector credit, and they do not seem to be synchronized across oil exporters and oil importers.

JEL Classification Numbers: E3, E5, B26, E44.

Keywords: Credit Cycles, MENA, Oil-exporters, Oil-importers

# I. INTRODUCTION

There is growing research interest on the topic of credit cycles, which shows the importance of credit fluctuations for the macroeconomy and their role in the propagation of shocks in the economy. Various studies have estimated cyclical components in credit in the advanced economies. Schularick and Taylor (2012) study the credit booms and leverage from 14 countries from 1870 to 2008 and show that there is a relation between credit growth and banking crisis. They show evidence of a deeper recession following credit-intensive booms. Jorda et al. (2013, 2011 a, and 2011 b) provide empirical evidence for a deeper recession and sloppy recoveries after credit-intensive booms. Claessens et al. (2009, 2012) find that recessions that are linked to credit crunches are relatively deeper and more prolonged. Drehmann et al. (2012) using data from five advanced countries from 1960 to 2011 show that financial cycle peaks are related to the financial crisis and that after the changes in monetary policies and financial liberalization the length and amplitude of financial cycles incremented. Credit cycles have important implications for macro-prudential policies. The study of credit cycles has implications for policy coordination, as monetary policy affects banks' balance sheets and risk-taking on financial markets and thereby might interfere with macro-prudential policies (Adrian and Shin, 2011; Gertler and Karadi, 2011). While the literature on this topic is increasingly growing, not much research was done on MENA countries, which led us to investigate this topic in MENA region in this paper.

The general finding of the literature is related to the highly predictive linkage of credit cycles to the emergence of the financial crisis, which leads to attach high importance to their occurrence from a policy point of view. There are a number of indicators that regulators refer to such as the credit-to-GDP ratio that are used to determine appropriate policy responses to address the potential crisis. Also limits on loan-to-value and debt-service-to-income ratios are among the other policy measures at the disposal of regulators (Hanson, Kashyap, and Stein (2011), Cerutti, Claessens, and Laeven (2017)).

In terms of methodology most studies that estimate the cyclical components in credit use univariate bandpass filters (e.g., Aikman, Haldane, & Nelson, 2014; Drehmann, Borio, and Tsatsaronis, 2012). There are other studies that have employed spectral methods (Schüler, Hiebert, and Peltonen, 2015) and autoregressive integrated moving average (ARIMA) models (Strohsal, Proaño, and Wolters, 2015) to assess cyclical properties of the series.

There are issues regarding the properties of real-time estimates of cyclical components. Studies usually report estimates based on symmetric two-sided filters that make use of both past and future observations. Policy makers, however, must rely on one-sided filters, based on past observations only. While booms are easily identified with the benefit of hindsight, real-time estimates are subject to considerable higher uncertainty.

The origin of credit cycles is still a matter of question in the literature. The intensity of costly information production causes strategic interaction between banks. Banks compete for lending and in this context; they produce information about potential borrowers. However, banks are uncertain about the volume of the information that their competitors produce (Gorton and He, 2008). Banks' lending rates are fixed relative to the cost of funds (Ausubel, 1991), thus, instead of their rates, they change their lending standards. The credit crunch that is the direct result of tightening in lending standards is procyclical. Banks seem to determine applicants' risk per lending standards. According to Lown and Morgan (2001, 2002) and Lown and Morgan (2006), the macroeconomic variables do not explain much of the lending standards index in the United States. In a credit crunch, all banks increase their lending standards and thus more loan applications fail to fulfill the new higher criteria for being granted a loan (Green and Porter, 1984). Thus, the credit cycles can be a consequence of banks' changing beliefs.

According to Minsky's financial instability hypothesis, when interest rates are low, companies borrow excessively and invest heavily. Their investment continues, and companies find themselves heavily indebted, thus at some point, investment decreases and the economy enters a recession and the financial stability is impacted. However, there are a number of factors that can interrupt this link between credit and financial stability. This link is weak in countries with a shallower banking sector. Large presence of informal credit markets is another important element that weakens the link between credit cycle peaks and recessions. Limited competition among firms, weak creditor's rights, captive client groups, and an economy that is heavily dependent on natural resources are among the factors that can disconnect the link between credit and economy fluctuations.

Whether or not credit cycles have a strong link to the financial crisis in MENA is a key focus of this paper. We believe that several differences, particularly in the characteristics of the financial sector between the economies of the MENA countries and many other economies including most advanced countries, as well as the dependency of oil-exporters in MENA to oil price make the credit cycles peculiar in this region.

This paper is the first of a series that intends to pave the road for more in-depth studies of credit cycles in MENA. In this paper as an initiation we follow the older version of this research (Aghabarari and Rostom, 2019) and use our empirical framework to show the differences between the credit cycles in oil-importing and oil-exporting countries in the MENA region and some non-MENA advanced countries (hereafter advanced). The topic of details of the distinct characteristics of credit cycles in MENA will remain for the future papers to be investigated employing deeper analysis. We start by explaining our estimated credit cycles following the details of the data we use. Then we show our analysis of credit cycles in a few advanced countries outside MENA region. Next, we compare the credit cycles in the MENA oil-importer and -exporter countries with the cycles in advanced economies. We use Saudi Arabia as the representative of the oil-exporting countries, the Arab Republic of Egypt for non-oil exporting countries and the United States to represent advanced countries.

# II. EMPIRICAL APPROACH

## A. Defining the Credit Cycle

The notion of credit cycles refers to recurring patterns over time in the growth rate of credit. The idea is that credit growth accelerates and decelerates in regular intervals that alternate over time. We estimate the cyclical components for the real credit growth using the frequency based Christiano-Fitzgerald[1] band-pass filters (BP) similar to Aikman, et al. (2014) and Drehmann et al (2012). The BP filter is a standard filter that decomposes time series into frequency bands. The normalized frequency is the inverse of the unit of time of our data set, which is in our case one year. Applying BP to the data let us focus on variation within a particular frequency range. According to the spectral representation theorem, any time series within a broad class can be decomposed into different frequency components. The theory also supplies a tool for extracting those components: the ideal band pass filter, which is a linear transformation of the data that leaves intact the components of the data within a specified band of frequencies and eliminates all other components. The adjective ideal on this filter reflects an

[1] Christiano, Lawrence J., and Terry J. Fitzgerald. "The band pass filter." *international economic review* 44, no. 2 (2003): 435-465.

important practical limitation. Literally, application of the ideal band pass filter requires infinite data. Some sort of approximation is required.

On the reasonable, and commonly used, assumption that the growth rates of macroeconomic series are stationary, the filter implies a zero trend (or drift). To facilitate comparison with the turning-point analysis, we then convert the resulting series into log levels by cumulating growth rates from zero, starting at the beginning of the observation period.

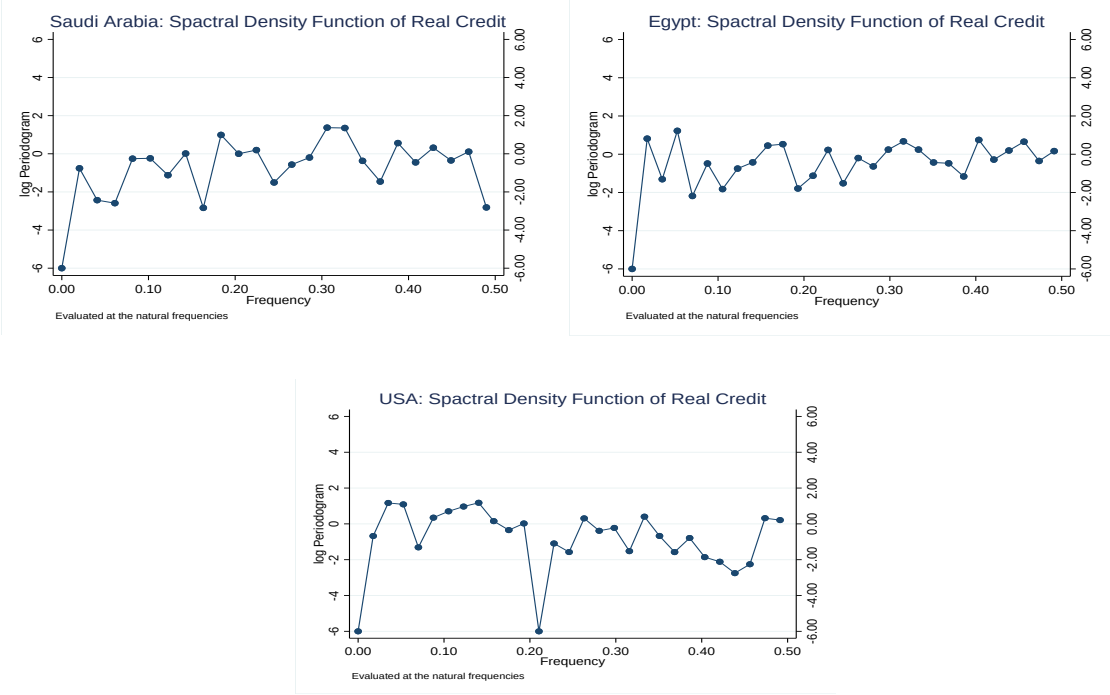
For the BP filter estimates of cyclical components, the credit cycle is 6 to 15 years. Later in this part, we will show the reason for our chosen period of 6 to 15 years. Figure 1 displays the log-periodogram of the data for one oil exporter (Saudi Arabia), one oil importer (Egypt), and one advanced economy (the United States). The periodograms show the importance of the different frequencies. Notice the peak at the frequency of around 0.17 to 0.2 in most of the countries that is related to a period of 5 to 7 years. Although we do not observe a prominent peak in the periodograms, a relative maximum of the 0.06 for some of the countries is the reciprocal of the frequency of approximately 15 years. However, other studies such as Aikman et al. (2014) estimate these cycles for the period of 8 to 20 years. Here in this study due to the limitation of our data we choose the period of 6 to 15 years. In Figure VI-1 we show the spectral density function of real credit for all oil-exporters, oil-importers, and non-MENA countries.

In Figure II-2, we show the periodogram of our filtered series. In an ideal case of having an infinitely long series, one could apply an ideal BP filter that perfectly separates out cyclical components driven by stochastic cycles at the specified periodicities. In the finite samples, it is not possible to precisely satisfy the conditions that a filter must fulfill to separate the specified stochastic cycles perfectly; the extensive filter literature reflects the trade-offs involved in choosing a finite-length filter to separate out the specified stochastic cycles.

The periodograms display the results in natural frequencies. The vertical lines show the lower natural-frequency cutoff (0.06=1/15) and the upper natural-frequency cutoff (0.17=1/6). If the filter completely removed the stochastic cycles at the unwanted frequencies, the periodogram would be a flat line outside the range identified by the vertical lines.

Figure VI-2 in the appendix shows the spectral density funtion of filtered series for all the countries in our sample.

**Figure II-1: Spectral Density Function of Real Credit**

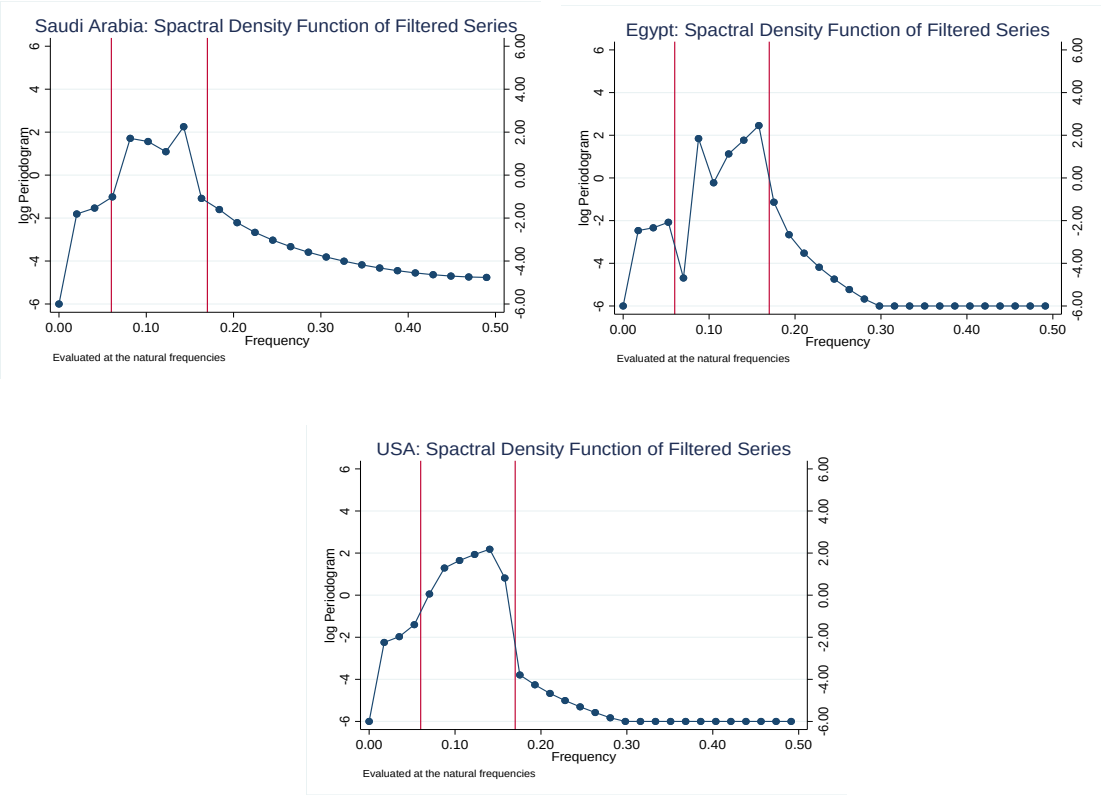



## B. Data

To study the credit cycle, we obtain the annual data on different measures of credit and output from the World Development Indicators (WDI) for countries in MENA and six advanced nations, during the period 1964 to 2017. To the best of our knowledge, this is the most extended and most trustable public source available for the full set of countries in MENA. Our data cover the United States, Japan, Norway, the Netherlands, the United Kingdom, Spain, Saudi Arabia, Jordan, Bahrain, Algeria, Iran, Kuwait, Morocco, Qatar (after 2000), Egypt, Lebanon (after 1990), Oman, Tunisia, West Bank and Gaza (after 2000), Yemen (after 1990), the United Arab Emirates, and Libya (after 2000).

In Table V-1 we show the simple description of the data. This table presents the summary statistics of real GDP growth and growth of real private sector credit for all the countries in the sample for the period 1964-2017.

**Figure II-2: Spectral Density Function of Filtered Series**




In the literature on credit cycles, the primary variable under observation is the real private credit growth. To compute credit growth, we start with a series of stocks of credit. The WDI dataset of the World Bank contains series for the domestic credit to private sectors as a percentage of GDP. We calculate the real private credit growth using different ratios. In Table II-1 we report the three separate measures, that we calculated using this data to obtain the actual credit growth. Given the availability of data for different ratios, we find the private domestic credit (%GDP) * Real GDP to be the most convenient measure of real credit.

**Table II-1: Measures of Credit**

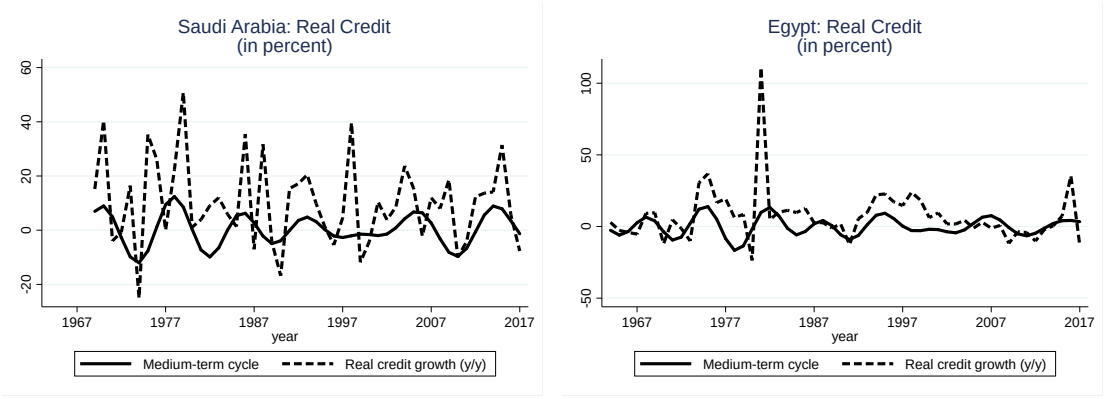
| Variable | Calculation |
|---|---|
| Real_Private_Credit_ USD | private domestic credit (% GPD) * Real GDP |
| Real_Private_Credit_ USD_CPI | private domestic credit (% GPD) * Nominal GDP / CPI |
| Real_Private_Credit_LCU_DEF | private domestic credit (% GPD) * GDP (LCU) / GDP deflator |

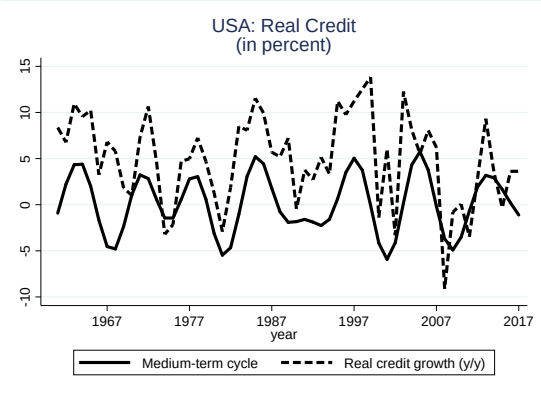
## C. Credit Cycles

Figure II-3 shows our estimated medium-term cyclical component of fluctuations in real credit growth (solid line) compared to the real growth of credit (dashed line) across all the countries. The differences between the solid and dashed lines are the components of credit growth that fall into the short- and long-term frequencies: shorter than 6 years and longer than 15 years. As is evident in the figures for Saudi Arabia and Egypt, the medium-term cycle is much less synchronized with the real credit than what we observe for the United States. As Figure VI-7 in the appendix shows the fluctuations of medium and short-term credit cycles are of the same importance for all the advanced countries in our sample, and this importance is more for short-term cycles for many of the countries in MENA (Bahrain, the Islamic Republic of Iran, Kuwait, Algeria, Libya, etc.).

These analyses show that our study is in line with the literature about the credit cycles in Western countries and Japan, however, for the countries in MENA we did not find evidence for the importance of medium-term cycles compared to short-term cycles.

**Figure II-3: Real Credit Growth and Medium-term Credit Cycle**






# III. MENA VERSUS NON-MENA

We begin by examining four characteristics that seem to define the credit cycle in advanced countries. Confirming earlier results by the BIS, we find that in advanced countries: (i) peaks in credit cycles help predict recessions; (ii) credit cycles account for the majority of fluctuations in overall credit; (iii) credit cycles have become more synchronized across countries over time; and (iv) credit cycles have become more volatile.

This section shows that our methodology gives us relatively similar characteristics to those of credit cycles in advanced non-MENA countries. For these analyses, we use the same data and methodology as we use for countries in MENA. This is used as a robustness check for our results about credit cycles in oil-exporters and oil-importers in the MENA region.

## A. Are credit cycles in MENA associated with recessions?

The substantial importance of credit cycles in advanced countries according to Jorda et al. (2011a) and Aikman t al. (2014) among others is the fact that changes and fluctuations in credit cycles are associated with periods of deep recessions and banking distress. We follow several steps to estimate precisely the relation between credit cycles and economic growth in the countries.

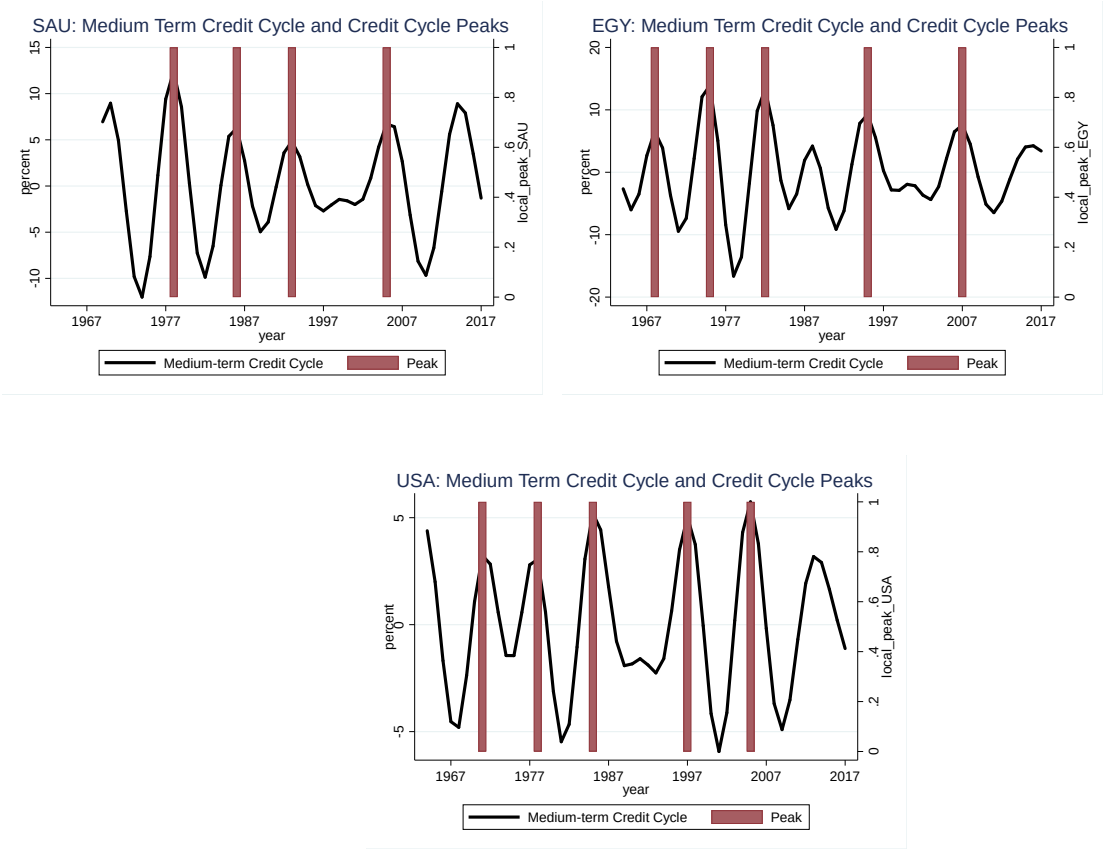
### *Relationship between credit cycle peaks and recessions*

First, we demonstrate our estimation of credit cycle peaks in figures. Credit cycle peaks are the local maximum of credit cycles within a 10-year range. A peak is when a credit cycle is at its maximum compared to the past and next 5 years. Figure III-1 illustrates the estimated credit cycle peaks. The vertical lines show local peaks. For example, in Saudi Arabia, we have a peak in 1978, and next peaks

are in 1986, 1994, and 2006. For Egypt the peaks are 1968, 1975, 1982, 1996, and 2007. For the United States credit cycle peaks are in 1971, 1978, 1985, 1997, and 2005.

Second, we investigate the relation between the peaks in credit cycles and recessions, measured by the GDP growth of the countries in our sample. According to the literature for advanced countries, every peak in a credit cycle is followed by a period of recession with a little lag.

**Figure III-1: Medium-term Credit Cycle and Credit Cycle Peaks**

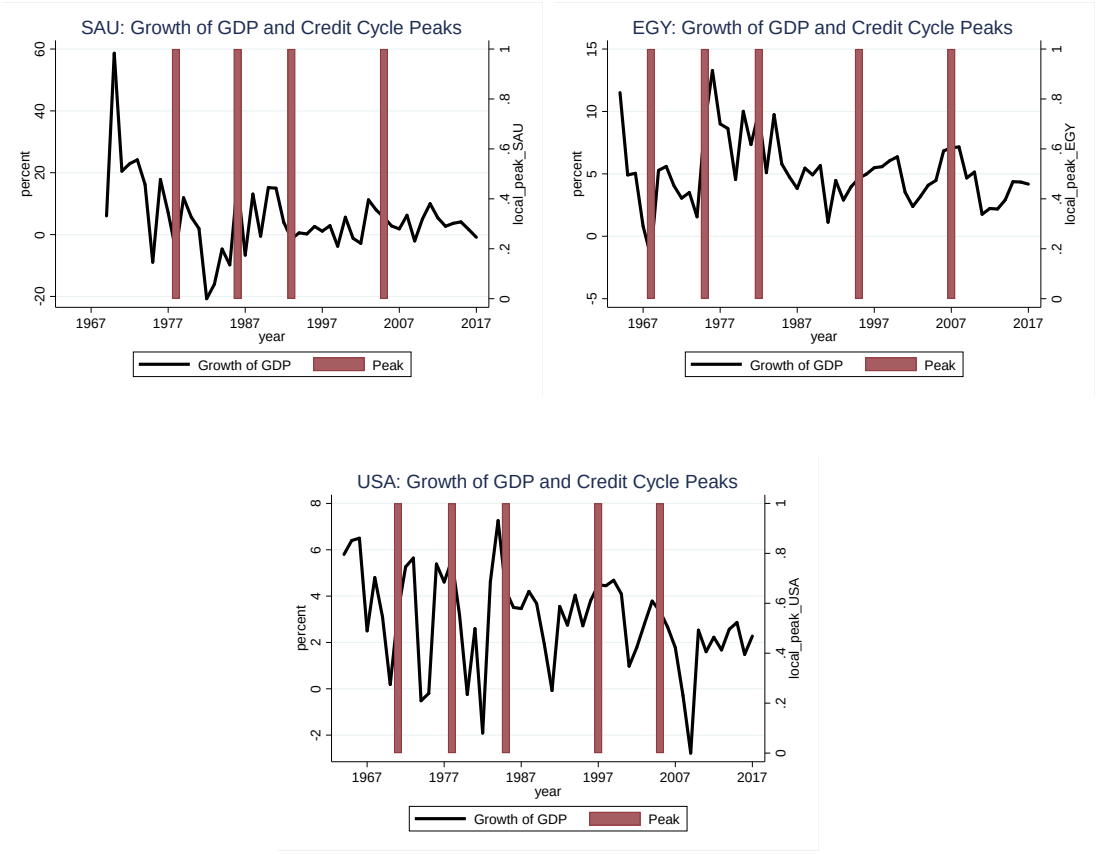



To check the relation between credit cycles and the GDP growth of the countries, Figure III-2 demonstrates the credit cycle peaks with the growth of GDP. In the United States, after every peak in credit cycle a sharp drop in GDP growth follows even if the GDP growth is quite high before and during the peak. Nonetheless, in Saudi Arabia and Egypt the drop in GDP growth after the credit cycle peaks is not as evident and it is not clear whether after the peak GDP growth falls significantly.

Third, we run a few simple regressions where the main dependent variable is the growth of GDP. The results of OLS regressions in Table III-1 and Table III-2 show the relation between the peaks

in credit cycles and the GDP growth and non-oil GDP for oil exporters. If the credit cycle peak can be used as an indicator for recessions, we expect to see negative and statistically significant coefficients in Tables III-2 and III-3. However, the coefficient of interest is non-significant for almost all countries except for Iran, which is slightly significant, but positive. Hence, the strength of credit cycles in predicting the decreases in overall GDP for oil exporters is very limited.

**Figure III-2: GDP Growth and Credit Cycle Peaks**




In Table III-2 which shows the correlation between credit cycles and non-oil GDP in oil exporters, the coefficient of interest is positive and significant for Saudi Arabia and Iran, which implies an increase in GDP growth after a peak in credit cycle. Except for Kuwait where this number is negative and significant, for the rest of oil exporters the coefficient is non-significant showing the low correlation between credit cycle and GDP growth. Given the importance of oil in the oil-exporters' economy, we control for real oil prices in all the regression for these countries. Additionally, we show the graphs of medium-term credit cycles and real-oil price cycle in Figure VI-8 in the appendix.

In Table III-4 we show the results for the same regression for non-MENA countries. As the results show all the coefficients are negative and statistically significant. These outcomes show that credit cycle peaks have a negative correlation with recessions in non-MENA countries. These findings are in line with corresponding literature.

### Table III-1: Oil Exporters and Overall GDP Growth

This table show the result for the regression where the main dependent variable is real GDP growth for the oil exporters and the main explanatory variable is the local peak of medium-term credit cycle growth. The definition of the local peak of credit cycle growth is when the credit cycle growth is in its maximum volume compared to past and next five years. In all the regressions we control for oil-prices. All regressions are estimated using OLS. Standard errors appear in parentheses, and ***, **, * correspond to one, five, and ten percent levels of significance, respectively.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| **VARIABLES** | | | | **GDP Growth** | | | | |
| Saudi Arabia | -3.7 | | | | | | | |
| | (3.41) | | | | | | | |
| Bahrain | | 0.67 | | | | | | |
| | | (1.55) | | | | | | |
| Algeria | | | -1.6 | | | | | |
| | | | (2.44) | | | | | |
| Iran, Islamic Rep. | | | | -5.8** | | | | |
| | | | | (-2.4) | | | | |
| Kuwait | | | | | 0.64 | | | |
| | | | | | (0.21) | | | |
| Oman | | | | | | -3.1 | | |
| | | | | | | (4.6) | | |
| United Arab Emirates | | | | | | | -1.31 | |
| | | | | | | | (2.7) | |
| Qatar | | | | | | | | 2.6 |
| | | | | | | | | (5.8) |
| Observations | 49 | 57 | 57 | 57 | 52 | 52 | 52 | 17 |
| R-squared | 0.027 | 0.221 | 0.416 | 0.207 | 0.272 | 0.304 | 0.073 | 0.04 |

Given the two distinct groups of countries in the MENA region, which are oil-exporters and oil- importers, we run two groups of regressions. For oil-importers the main dependent variable is the growth of GDP, nevertheless for oil-exporters, the main dependent variables are the overall GDP (Table

III-1) and the non-oil GDP (Table III-2). For the oil importers (Table III-3) and non-MENA countries (Table III-4), the main dependent variable is the GDP.

## Table III-2: Oil Exporters and Non-oil GDP Growth

This table show the result for the regression where the main dependent variable is real non-oil GDP growth for the oil exporters and the main explanatory variable is the local peak of medium-term credit cycle growth. The definition of the local peak of credit cycle growth is when the credit cycle growth is in its maximum volume compared to past and next five years. In all the regressions we control for oil-prices. All regressions are estimated using OLS. Standard errors appear in parentheses, and ***, **, * correspond to one, five, and ten percent levels of significance, respectively.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| **VARIABLES** | **Non-oil GDP Growth** | | | | | | | |
| Saudi Arabia | 3.41*** | | | | | | | |
| | (0.9) | | | | | | | |
| Bahrain | | -3.1 | | | | | | |
| | | (3.5) | | | | | | |
| Algeria | | | 1.5 | | | | | |
| | | | (1.9) | | | | | |
| Iran, Islamic Rep. | | | | 2.7 | | | | |
| | | | | (2.2) | | | | |
| Kuwait | | | | | -5.6** | | | |
| | | | | | (3.7) | | | |
| Oman | | | | | | -2.6 | | |
| | | | | | | (2.5) | | |
| United Arab Emirates | | | | | | | -2.9 | |
| | | | | | | | (2.4) | |
| Qatar | | | | | | | | 0.83 |
| | | | | | | | | (4.4) |
| Observations | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| R-squared | 0.02 | 0.08 | 0.04 | 0.23 | 0.23 | 0.03 | 0.13 | 0.02 |

## Table III-3: Oil Importers and GDP Growth

This table show the result for the regression where the main dependent variable is overall GDP growth for the oil importers and the main explanatory variable is the local peak of medium-term credit cycle growth. The definition of the local peak of credit cycle growth is when the credit cycle growth is in its maximum volume compared to past and next five years. All regressions are estimated using OLS. Standard errors are clustered on

the firm level. Standard errors appear in parentheses, and ***, **, * correspond to one, five, and ten percent levels of significance, respectively.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| **VARIABLES** | **GDP Growth** | | | | | | | | |
| Jordon | -0.54 | | | | | | | | |
| | (-2.15) | | | | | | | | |
| Morocco | | 0.17 | | | | | | | |
| | | (1.05) | | | | | | | |
| Egypt, Arab Rep. | | | 2.56*** | | | | | | |
| | | | (0.66) | | | | | | |
| Lebanon | | | | -2.8 | | | | | |
| | | | | (5.1) | | | | | |
| Tunisia | | | | | -0.8 | | | | |
| | | | | | (0.95) | | | | |
| West Bank Gaza | | | | | | 2.3 | | | |
| | | | | | | 3.6 | | | |
| Yemen, Rep. | | | | | | | 1.7 | | |
| | | | | | | | 2.5 | | |
| Syrian Arab Rep. | | | | | | | | 2.1 | |
| | | | | | | | | 1.9 | |
| Libya | | | | | | | | | 6.2 |
| | | | | | | | | | 17.8 |
| Observations | 42 | 51 | 57 | 29 | 23 | 23 | 27 | 57 | 18 |
| R-squared | 0.166 | 0.008 | 0.319 | 0.022 | 0.002 | 0.083 | 0.059 | 0.019 | 0.17 |

The coefficients show no significant negative relationship between the real credit growth peaks and the drop in the GDP growth, except for Kuwait. These results indicate that unlike non-MENA economies, the credit-intensive booms in MENA countries are not followed by recessions. In Table III-4 we report the results of the same regression for advanced countries. The outcomes show the significantly negative coefficients of the credit cycle peaks on the growth of GDP.

**Table III-4: Non-MENA Countries**

This table show the result for the regression where the main dependent variable is overall GDP growth for the non-MENA countries and the main explanatory variable is the local peak of medium-term credit cycle growth. The definition of the local peak of credit cycle growth is when the credit cycle growth is in its maximum volume compared to past and next five years. All regressions are estimated using OLS. Standard errors are clustered on the firm level. Standard errors appear in parentheses, and ***, **, * correspond to one, five, and ten percent levels of significance, respectively.

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **VARIABLES** | | | **GDP Growth** | | | |
| USA | -1.05** | | | | | |
| | 0.55 | | | | | |
| Norway | | -0.89** | | | | |
| | | 0.47 | | | | |
| Netherlands | | | -1.3** | | | |
| | | | 0.59 | | | |
| Japan | | | | -3.7*** | | |
| | | | | 0.93 | | |
| Uk | | | | | -1.04** | |
| | | | | | 0.53 | |
| Spain | | | | | | -1.88** |
| | | | | | | 0.77 |
| Observations | 57 | 57 | 57 | 57 | 57 | 57 |
| R-squared | 0.109 | 0.07 | 0.17 | 0.429 | 0.353 | 0.114 |

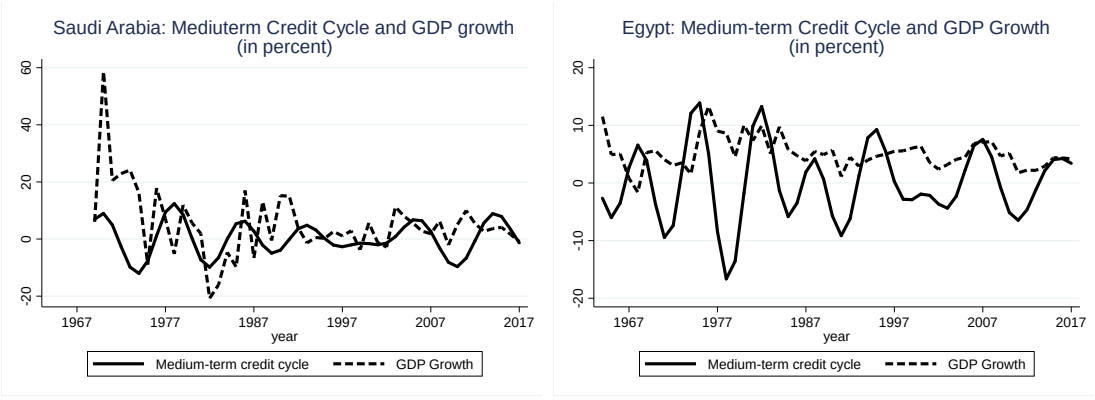
### *Medium-term credit cycle versus GDP growth*

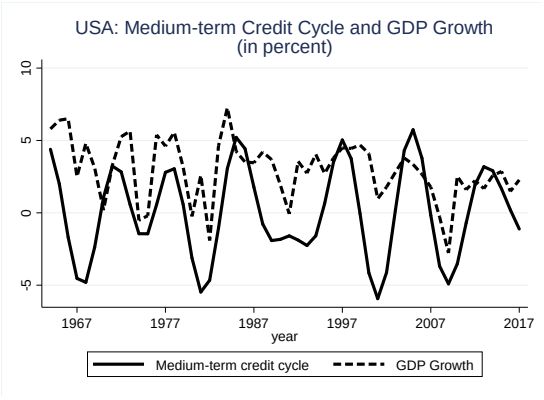
In the next step for analyzing the relation between the credit cycles and GDP growth, we visualize the medium-term credit versus the GDP growth in Figure III-3. For the oil-exporters, we report the graphs for the medium-term credit cycles and short-term non-oil GDP growth, in the appendix. According to these data, there is no clear correlation between the fluctuations of credit cycles and those of GDP cycles for MENA countries (oil and non-oil exporting), while there is a clear correlation after every local peak in a medium-term credit cycle as there is a drop in the GDP growth.

Figure III-4 allows us to test for a lead-lag relationship. Credit cycle peaks should lead the economic cycle, but in MENA countries, that does not appear to be the case. This is evident for the United States as the representative of advanced countries. Similarly, for Saudi Arabia (as the

representative of oil producing countries) the lead-lag relationship between the credit cycle and GDP growth is negligible, this relationship is a bit larger but still negligible for credit cycle and GPD growth in Egypt (representative of non-oil-producing countries). Correlation between the credit cycle and GDP growth in the United States is bigger than this correlation in Saudi Arabia and Egypt. In Figure VI-6 we demonstrate the correlograms for all the countries in our analysis. Similar to what we see for the sample of oil-exporters and -importers the correlogram for all countries in this group shows the negligible correlation while for all advanced countries the correlation is larger and more recognizable.

**Figure III-3: Medium-term Credit Cycle and GDP Growth**

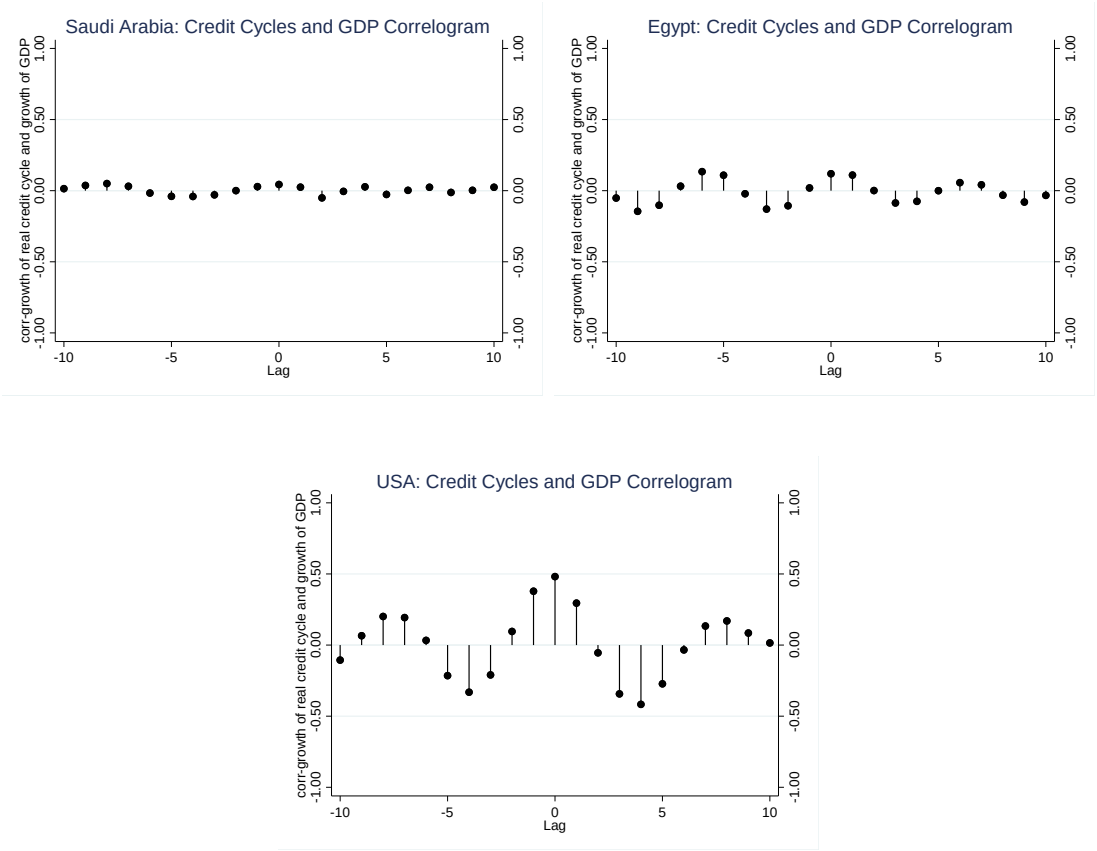



After investigating several aspects of the relationship between credit cycles and GDP growth for the three groups of countries, we can confirm that we did not find enough evidence for this relationship in the MENA region while for all non-MENA countries the link between credit cycles and GDP growth is evident and quite robust. The link between GDP growth and credit fluctuations can be due to several factors. There are fundamental differences between financial markets in MENA countries versus those on advanced economies. Even if we don't provide empirical evidence for all these various

disparities, we can hypothesize that shallowness of financial markets, oil and presence of informal financial services can be among the most important reasons for these differences. Additionally, presence and characteristics of various types of non-commercial banks can affect the link between GDP growth and credit cycles. For example, in a recent paper Aghabarari, et al. (2020) provide evidence for the non-cyclical lending behaviors of credit unions versus other commercial banks during dire times.

**Figure III-4: Correlogram of Credit Cycle and GDP Growth**




## a) Is the medium-term component more important for the overall credit than the short-term component?

What is the relative importance of the credit cycle relative to all other components that drive private-sector credit? To assess the importance of the credit cycle in determining the overall amount of private-sector credit, we compute a ratio of standard deviations: the standard deviation of the cyclical component and the standard deviation of the overall components. A ratio above one would mean that the credit cycle counts for more than half of the overall fluctuation in private sector credit. Table III-5

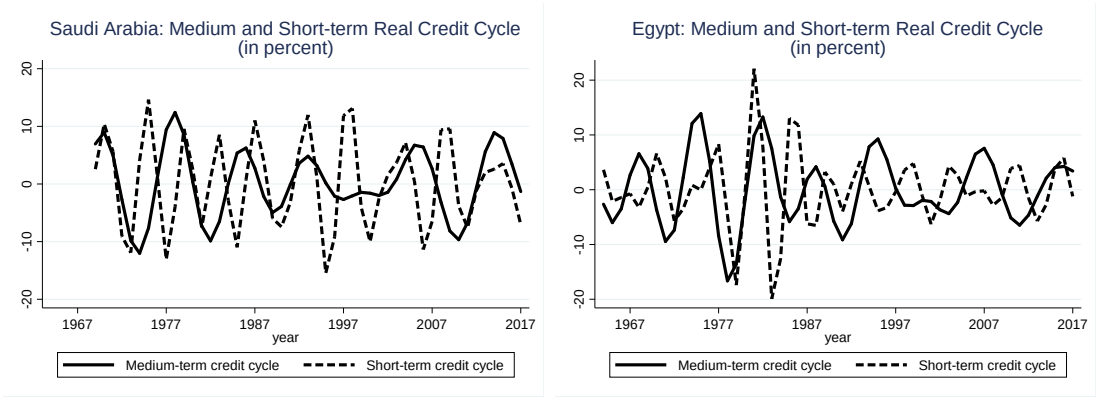
shows these ratios. In this case, the medium-term component is more important for the overall credit. In most of the MENA countries this ratio is lower than one, which means that the medium-term component of the credit cycle is less important than or equally important as the short-term component in most of the countries. This contrasts with what Drehmann et al. (2012) find in their paper about the higher importance of the medium-term component of the credit cycles in developed countries. We show our calculated ratio for non-MENA countries in the second part of Table III-5. The volatility ratio of all MENA countries is less than one except for Bahrain, Oman, the United Arab Emirates and the Syrian Arab Republic. This ratio is above one for all non-MENA countries. This shows that the medium-term component of the credit cycle is less important than the short term component for most of the countries in the MENA region, and it is more important for all the countries in the non-MENA group.

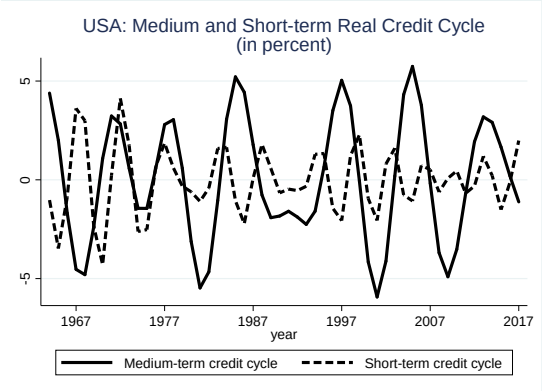
**Table III-5: Volatility ratio**

| Country | Volatility Ratio |
|---|---|
| ***MENA Countries*** | |
| Saudi Arabia | 0.5 |
| Jordon | 0.6 |
| Bahrain | 1.2 |
| Algeria | 0.6 |
| Iran, Islamic Rep. | 0.9 |
| Kuwait | 0.9 |
| Morocco | 0.9 |
| Qatar | 0.6 |
| Egypt, Arab Rep. | 0.9 |
| Lebanon | 0.8 |
| Oman | 1.3 |
| Tunisia | 0.85 |
| Yemen, Rep. | 0.9 |
| United Arab Emirate | 1.1 |
| Syrian Arab Republic | 1 |
| Libya | 0.9 |
| ***Non-MENA Advanced Countries*** | |
| Norway | 1.1 |
| Spain | 1.8 |
| Netherlands | 1.2 |
| Japan | 1.4 |
| United Kingdom | 1.3 |
| United States | 1.8 |

In Figure III-5 we give an impression of the relative volatilities of short- and medium-term components. These figures confirm the results of the previous volatility ratio table. The medium-term component of the credit cycle (solid line) is not more volatile than the short-term component (dashed line) in Saudi Arabia and Egypt. When we check this in the figure related to the United States, the medium and short-term cycles have the same ratio of fluctuations.

**Figure III-5: Medium and Short-term Real Credit Cycle**



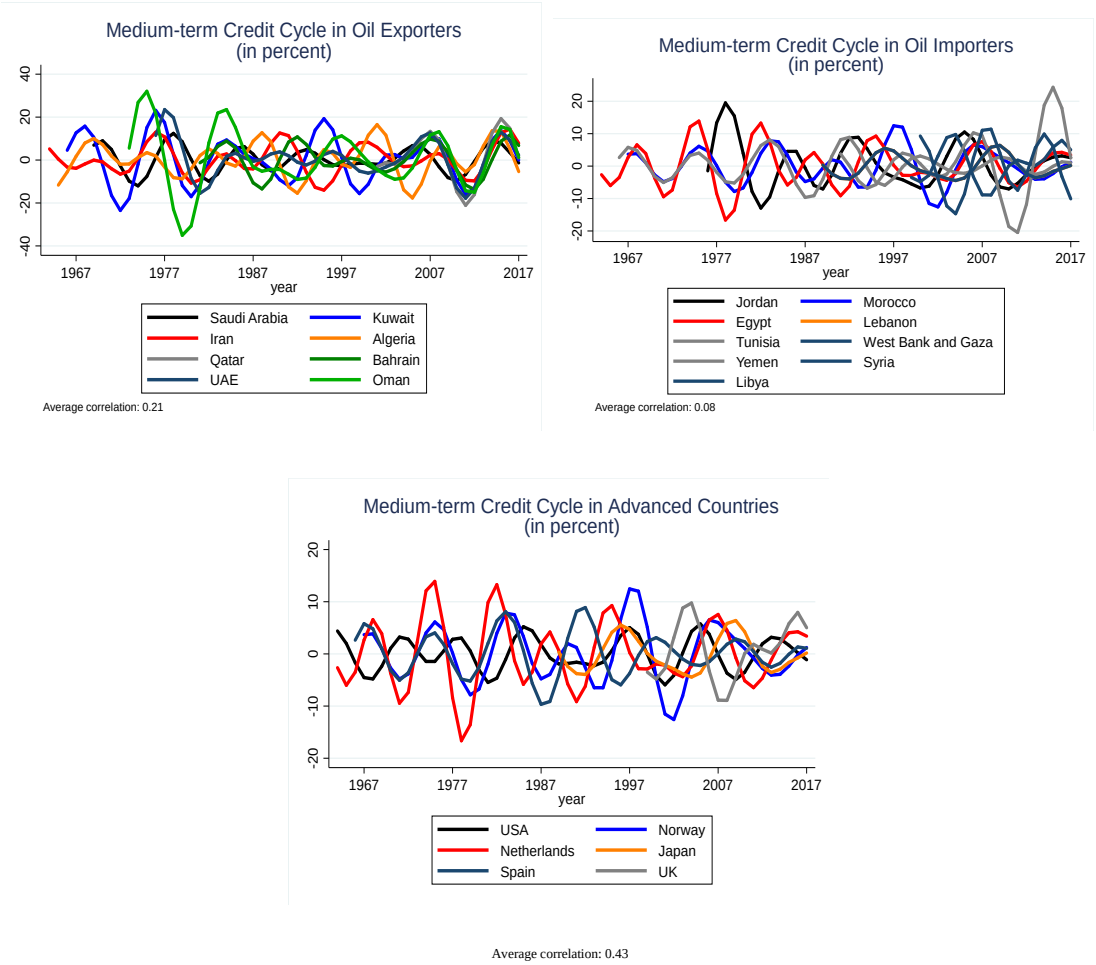




The key result from these data is that the medium-term component of the credit cycle for the MENA countries is not more important and volatile than the short-term component – unlike the advanced economies where the medium-term component plays the primary role in driving the overall credit.

## b) Are the credit cycles synchronized across MENA countries?

The next characteristic of the credit cycles that we examine for the MENA countries is the synchronization of these cycles among the countries. Figure III-6 displays the medium-term credit cycles in MENA countries, separating oil-exporters (left figure) from oil-importers (right figure). Except for a few countries, the medium-term component of the credit cycles is not synchronized. The average correlation is 0.21 for oil-exporters, which does not indicate a high synchronization among these countries. This number is even lower (0.08) for oil-importers. The average correlation for credit cycles in advanced countries is 0.43.

**Figure III-6: Medium-term Credit Cycle Country Groups**

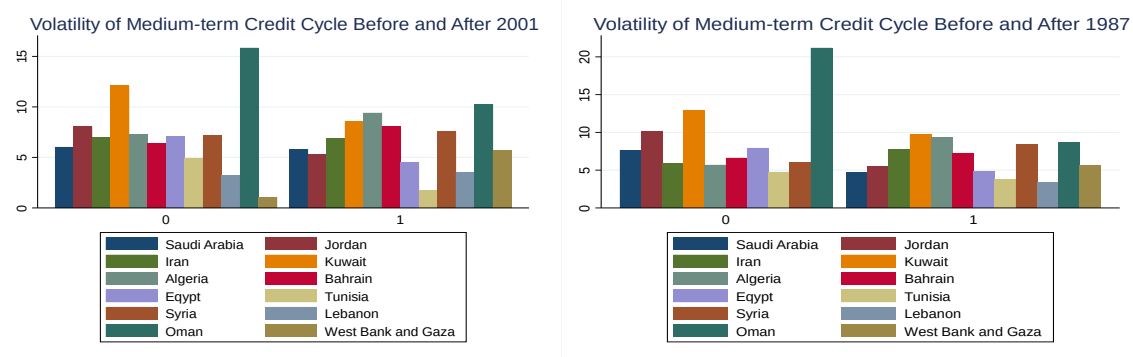


### c) Did the amplitude and the length of the medium-term credit cycle change after break-points in MENA?

In an empirical work, Drehmann et al. (2012) provide evidence that amplitude and duration of the financial crisis in advanced economies are related to the financial and monetary regimes. They use 1980, as a proxy for the financial liberalization and the changes in the monetary regimes. Given the different financial structure between the countries in the MENA region and developed countries, we examine the relation between changes in the volatility of the medium-term component of the credit cycle and two other breakpoints that are related to the dramatic changes in oil prices.

This figure shows the changes in the volatility of medium-term credit cycles before and after the breakpoints of 1985 (figure on the right) and 2001(figure on the left).

**Figure III-7: Volatility of Medium-term Credit Cycle Before and After 2001 and 1987**




## IV. CONCLUSION

Do credit cycles exist in MENA? What are their characteristics compared to non-MENA countries and whether these cycles differ across oil-exporters and -importers? These are the questions we address in this paper.

Our analysis indicates that credit cycles in MENA exist in both oil-exporters and -importers. Also, we found that credit cycles in MENA are distinct from credit cycles in advanced countries. We examine the differences between the credit cycles in MENA and non-MENA countries by using the

same methodology for six advanced countries. The differences between credit cycles in MENA and non-MENA are in three different areas. First, whether the credit cycles in MENA are associated with recessions; second, whether the medium-term component of the credit cycle is more important than the short-term component; and third, if the credit cycles are synchronized across countries within MENA.

In this study, we find that credit cycles in MENA are not associated with recessions closely. Unlike advanced countries, where movements of GDP growth and credit cycles are associated firmly, and credit cycles' peaks are followed by periods of recessions, there is no evidence of such relationship in MENA. Regarding the higher importance of the medium-term component compared to the short-term component, except for a few countries in MENA, the short-term component of the credit cycle seems to have higher fluctuation and importance. This contrasts with the findings for other countries where the volatility of medium-term credit cycles is higher than the short-term. Lately, the co-movement of credit cycles across the countries in MENA is much weaker than the synchronized fluctuations of credit cycles among the other study countries. Lastly, we did not find any significant difference between oil-exporters and -importers in terms of the characteristics of their credit cycles. Our results still hold after controlling for oil price fluctuation in the analysis for oil-exporters.

Further, while our findings are only indicative, given the limited data for MENA countries, they suggest a role for country-specific macro-prudential policies in this region. Further research on cross-country differences may provide more detailed insights. In order to contain cyclical fluctuations in credit, supervisors and regulators have started implementing various macro-prudential policy measures, the most important being countercyclical capital buffers as foreseen by the Basel III regulations (BIS, 2010).

The root causes and reasons for the difference in credit cycles between the MENA countries and advanced countries can be the next topic to be answered in a future paper. We believe that the credit markets in MENA countries are profoundly different from those in advanced countries, and this makes the credit cycles in the two groups distinct. One important factor that has a significant impact on the economy of MENA countries is oil. Even though we have tried to leave the impact of oil out of the equation and factoring out its effect by investigating the non-oil GDP of oil-exporters and adding oil as a control measure to our analysis, still more in-depth analysis needs to be done regarding the spillovers from the oil industry to the credit cycles in oil-exporters. Nevertheless, oil is not the only player with essential influence on these economies. The shallow financial sector, lack of a developed capital market, presence of state-owned banks and alternative forms of financial institutions, large informal

financial sector and many other country-specific elements in the MENA region help explain the differences between their credit cycles and the credit cycles of advanced non-MENA countries. Another important difference between countries in MENA and advanced economics is the quality of institutions which in turn affects the development in financial markets. Additionally, the presence of informal financial services in the region makes can largely affect the link between credit cycles and GDP. Finally, credit cycles in MENA are different not only from those in advanced countries, but even across the countries in the region, which makes the in-depth studies on this topic even more essential and attractive.

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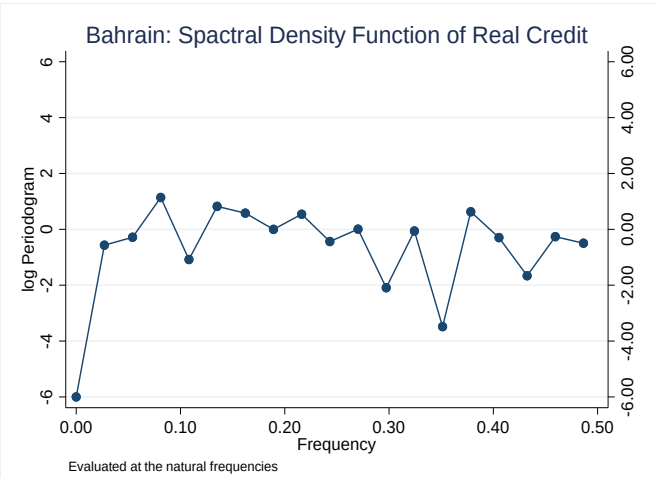
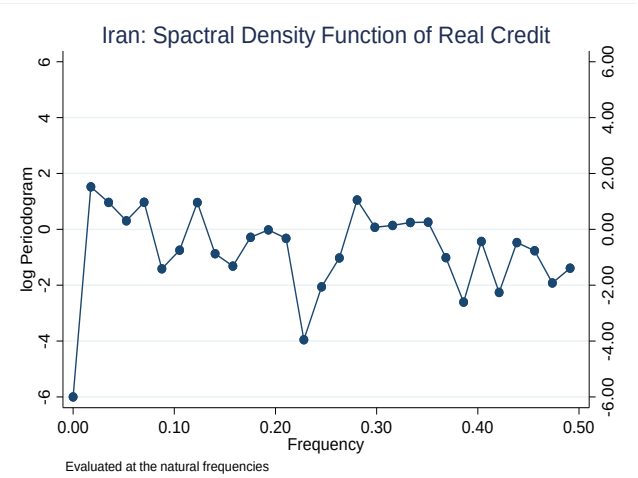
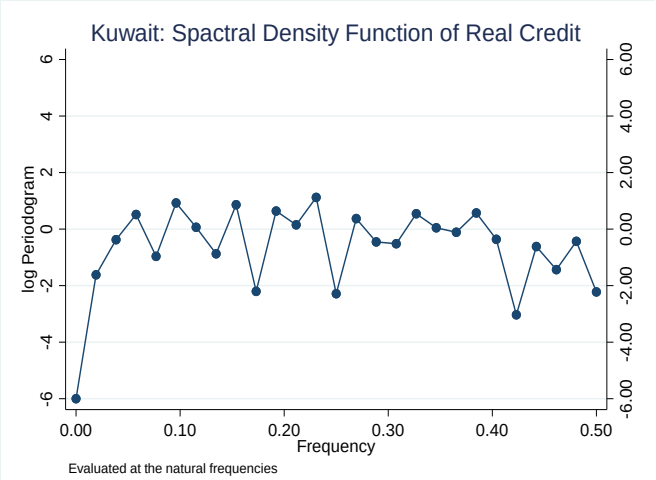
# VI. APPENDIX

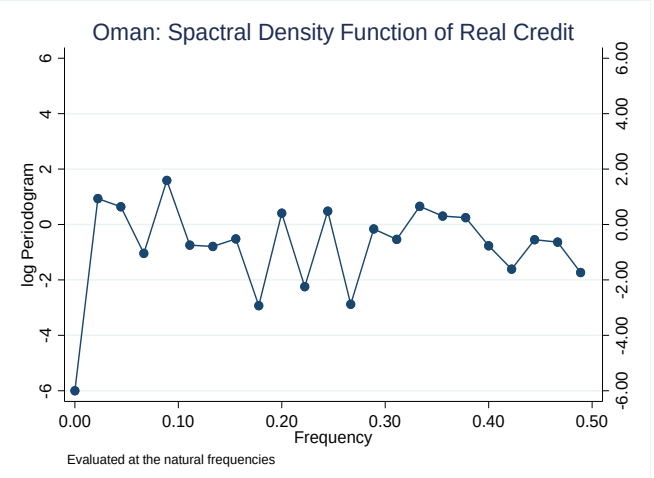
## Figure VI-1: Spectral Density Function of Real Credit

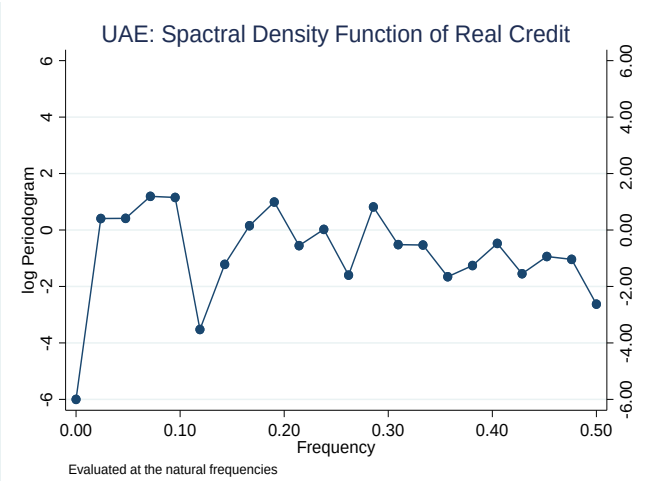
### A- Oil exporter

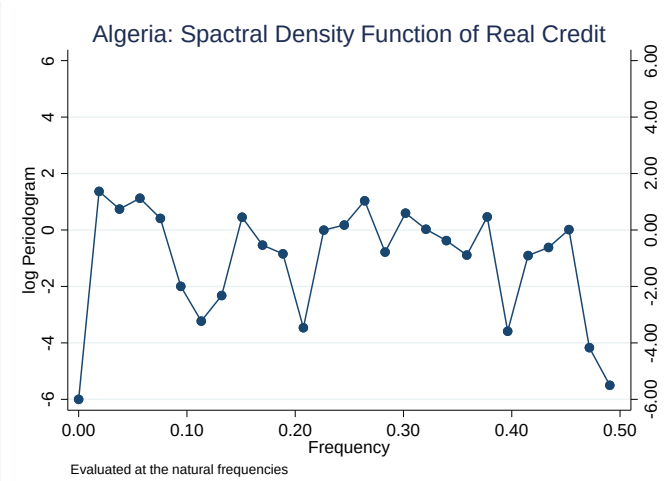


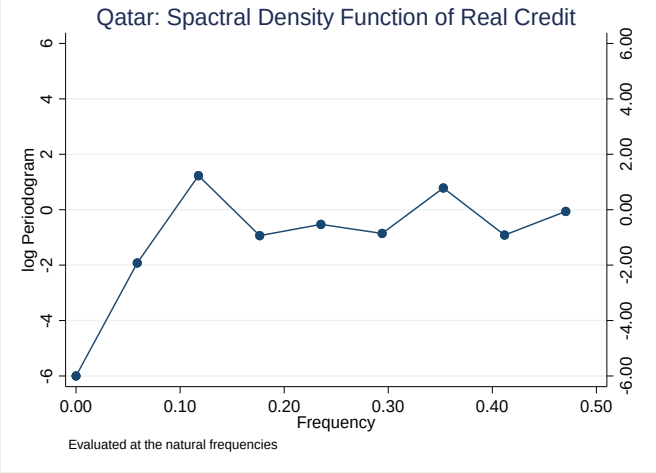




UAE: Spactral Density Function of Real Credit
log Periodogram
-6
-4
-2
0
2
4
6
-6.00
-4.00
-2.00
0.00
2.00
4.00
6.00
0.00
0.10
0.20
0.30
0.40
0.50
Frequency
Evaluated at the natural frequencies


Algeria: Spactral Density Function of Real Credit
log Periodogram
-6
-4
-2
0
2
4
6
-6.00
-4.00
-2.00
0.00
2.00
4.00
6.00
0.00
0.10
0.20
0.30
0.40
0.50
Frequency
Evaluated at the natural frequencies


Qatar: Spactral Density Function of Real Credit
log Periodogram
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4
6
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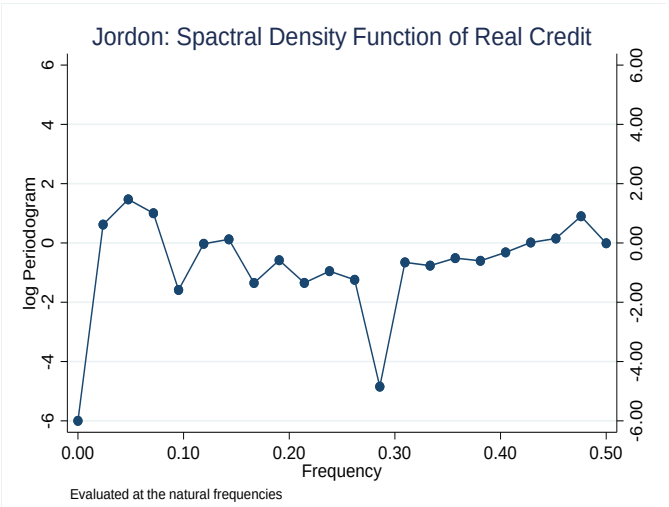
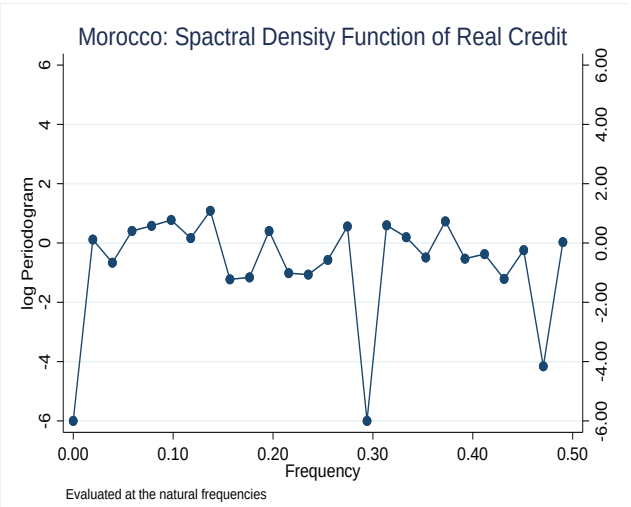
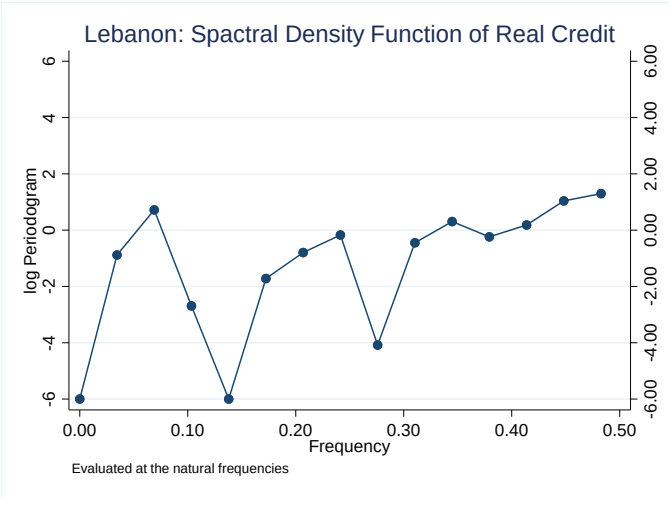
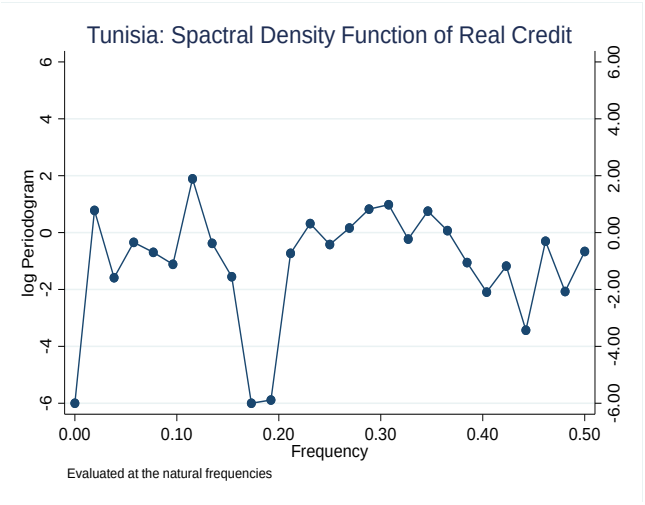
0.00
2.00
4.00
6.00
0.00
0.10
0.20
0.30
0.40
0.50
Frequency
Evaluated at the natural frequencies

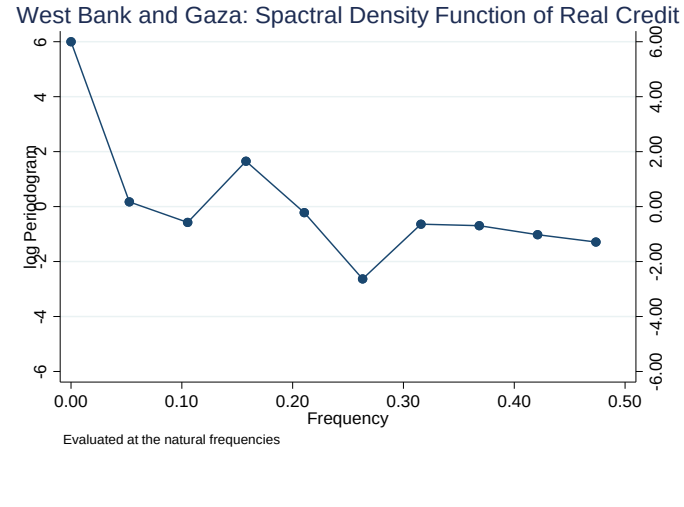
## B Oil importers

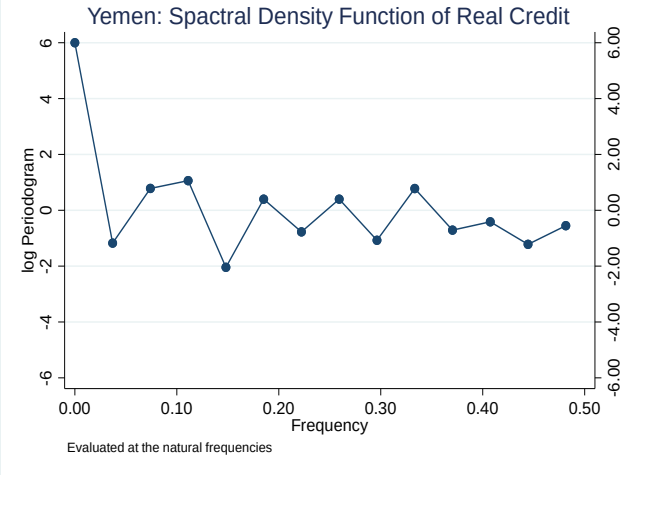


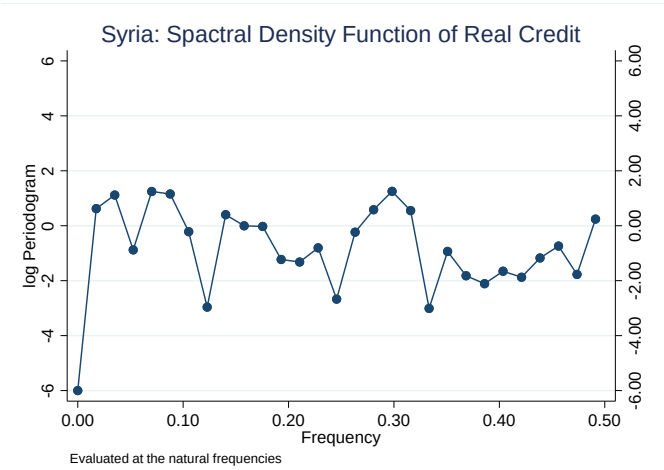



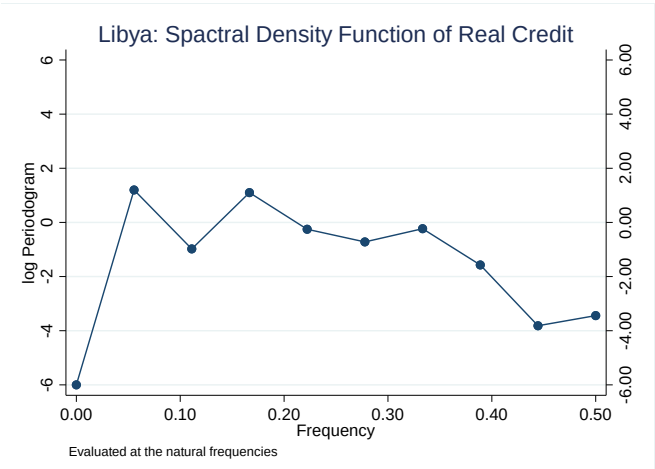



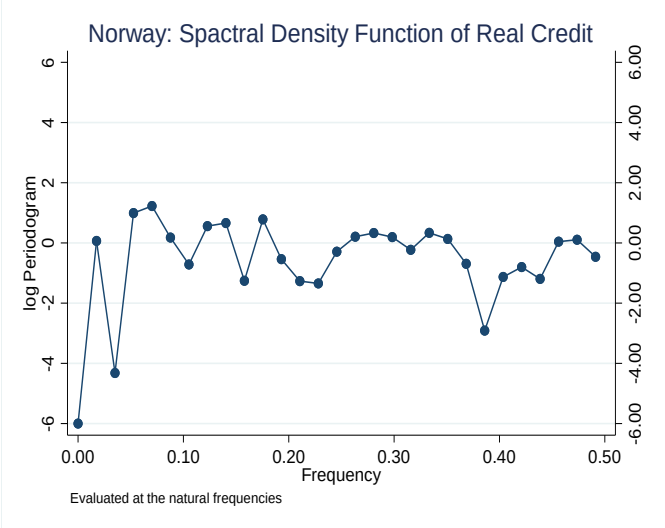



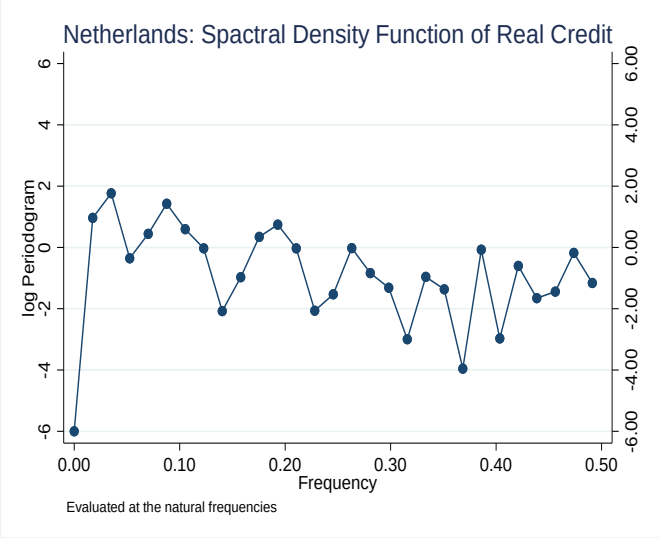



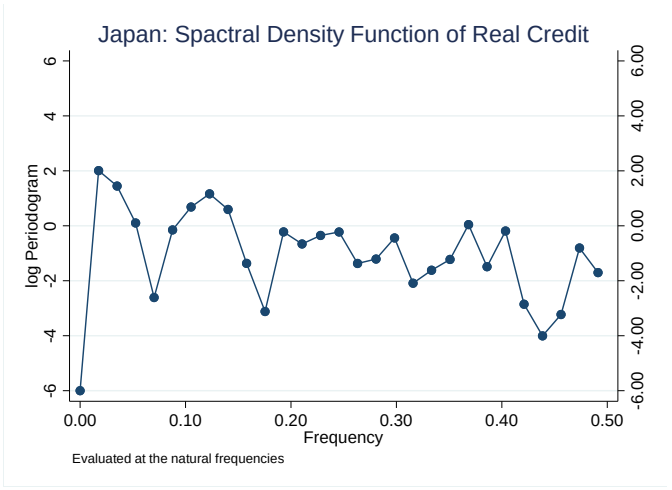


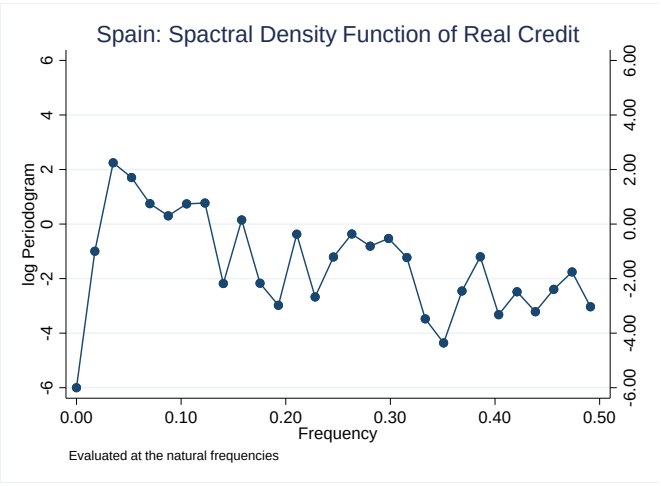




## C advanced countries





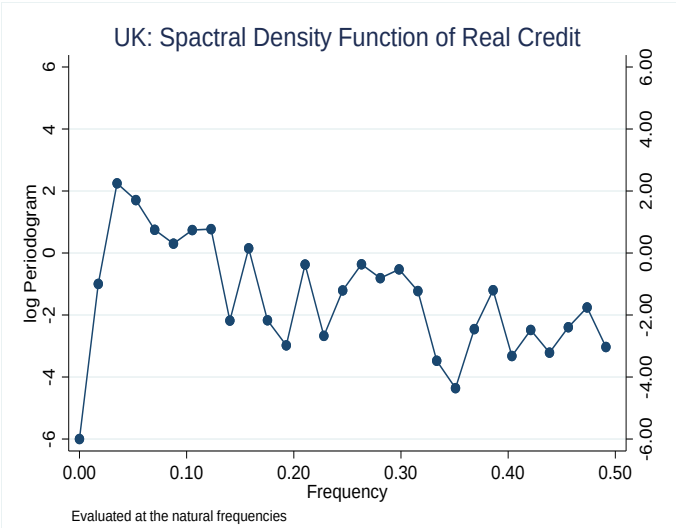
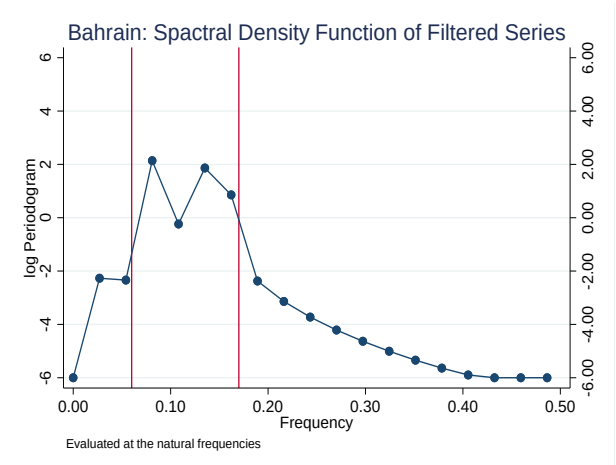
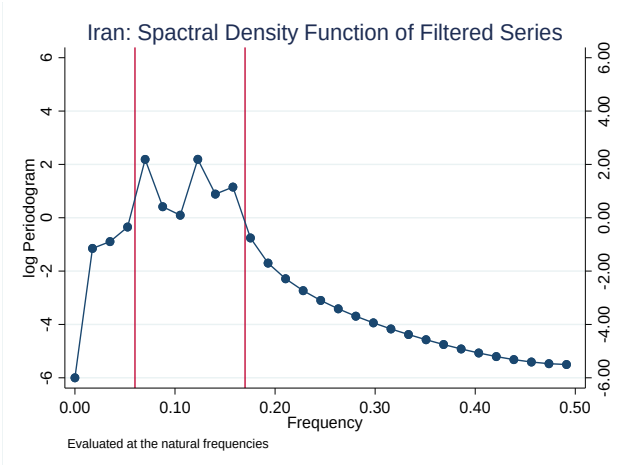
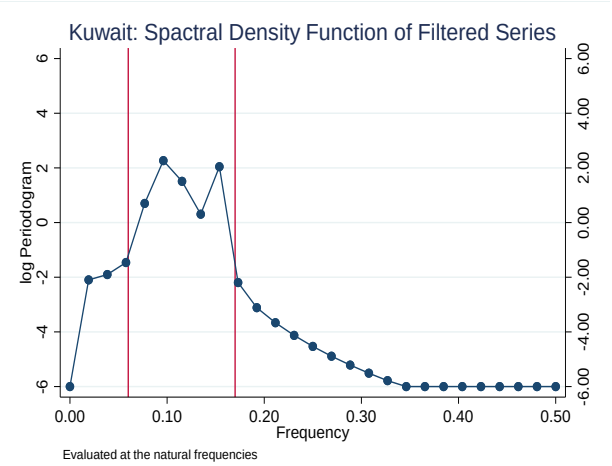



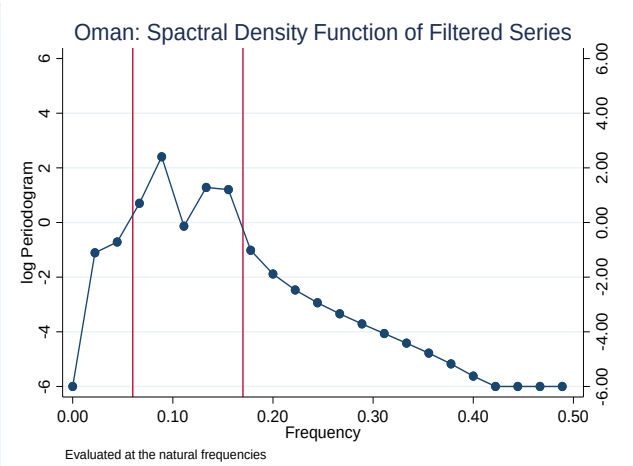

**Figure VI-2: Spectral Density Function of Filtered Series**

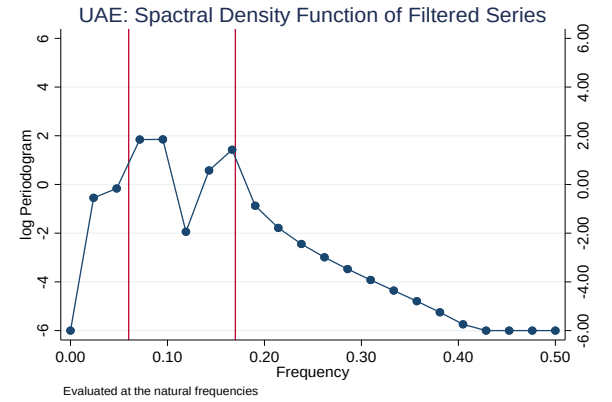
**A- Oil exporters**

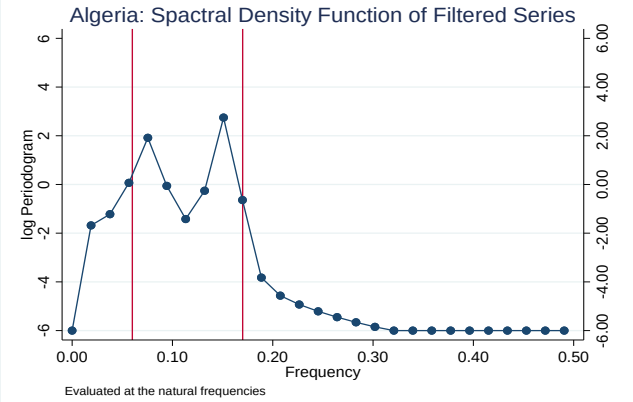


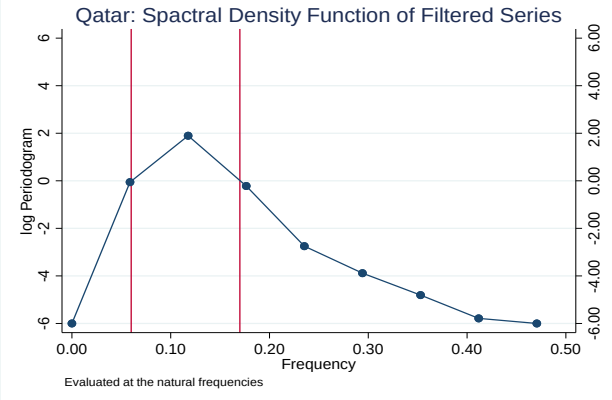




Kuwait: Spactral Density Function of Filtered Series
log Periodogram
Frequency
Evaluated at the natural frequencies

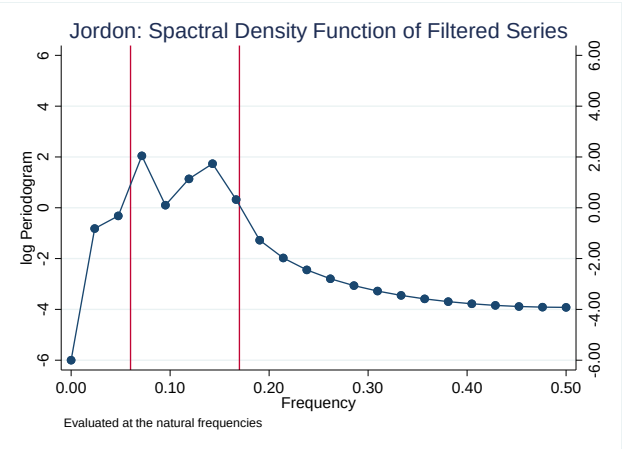

Oman: Spactral Density Function of Filtered Series
log Periodogram
Frequency
Evaluated at the natural frequencies

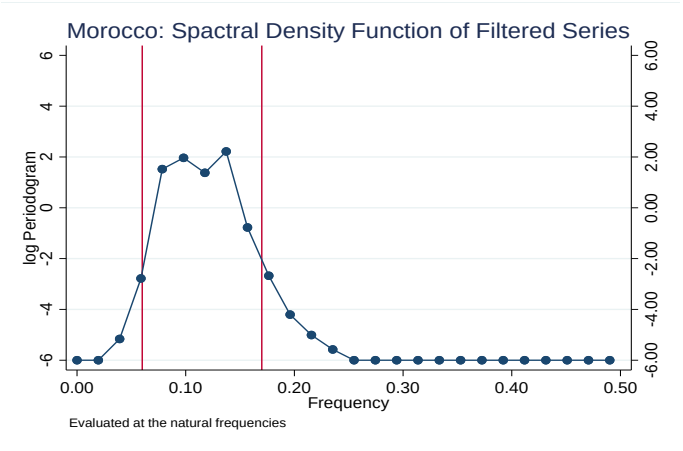

UAE: Spactral Density Function of Filtered Series
log Periodogram
Frequency
Evaluated at the natural frequencies

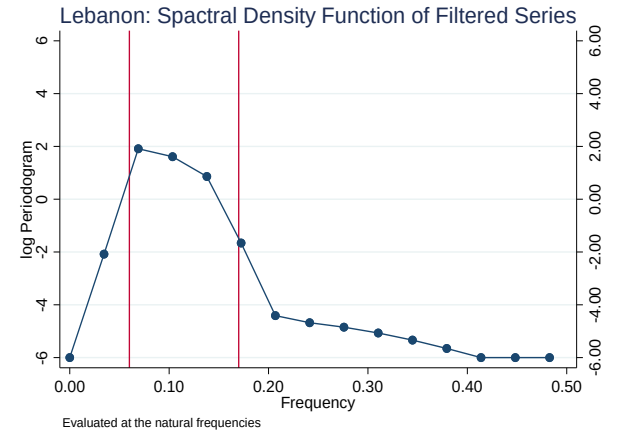

Algeria: Spactral Density Function of Filtered Series
log Periodogram
Frequency
Evaluated at the natural frequencies

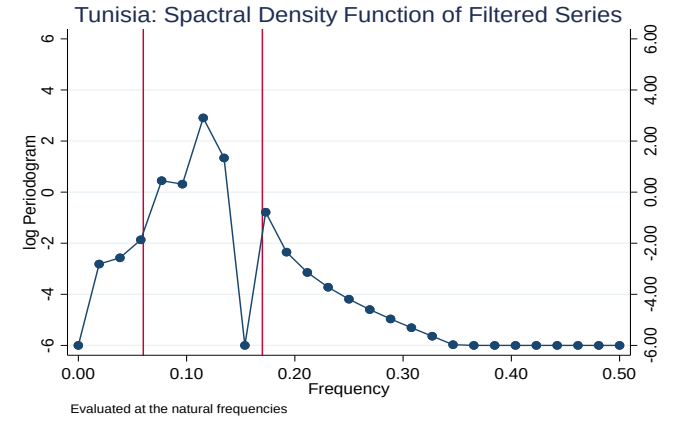

Qatar: Spactral Density Function of Filtered Series
log Periodogram
Frequency
Evaluated at the natural frequencies

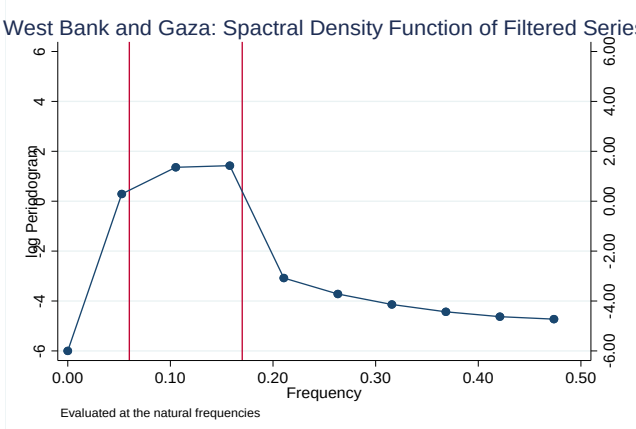
## B Oil importers

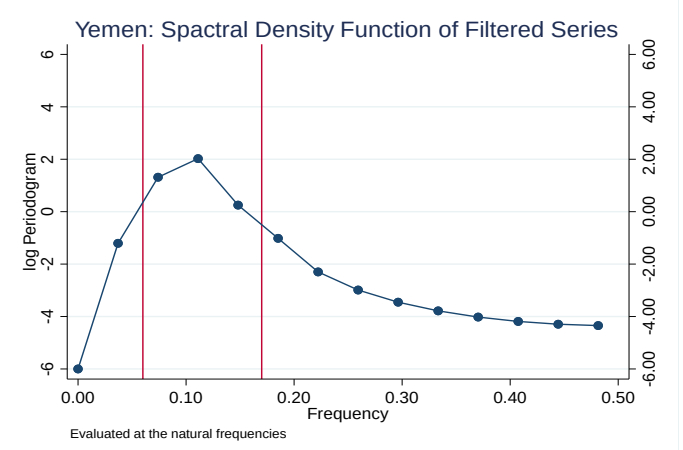


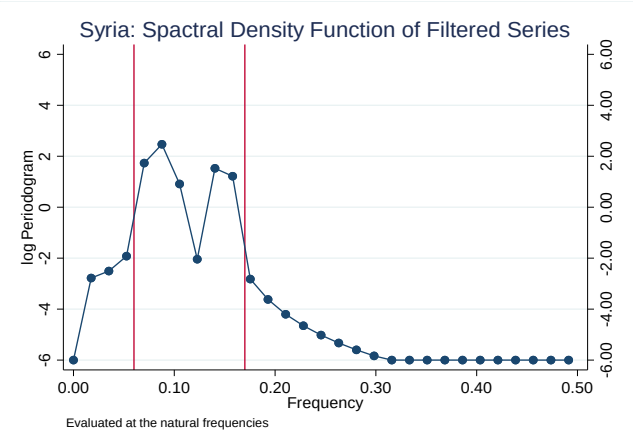



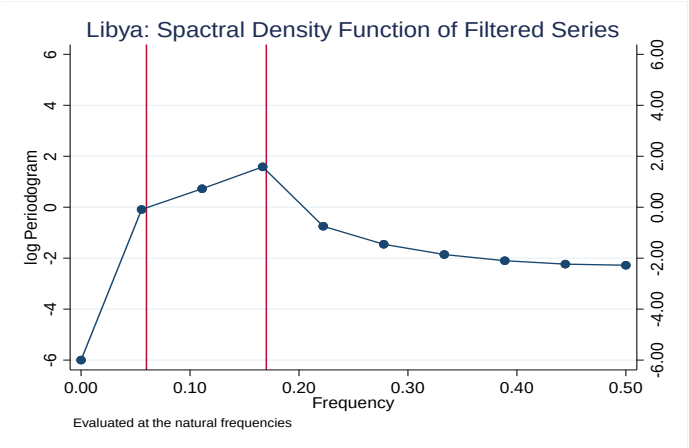



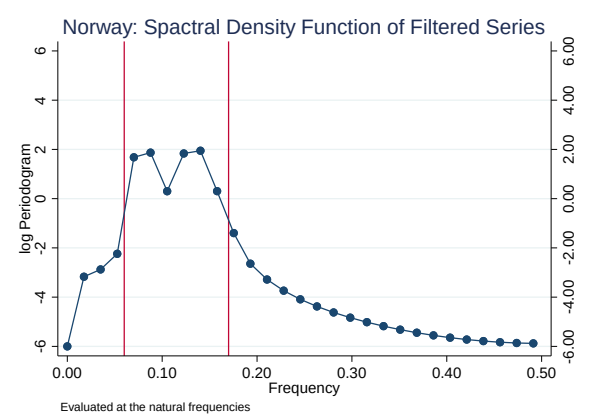



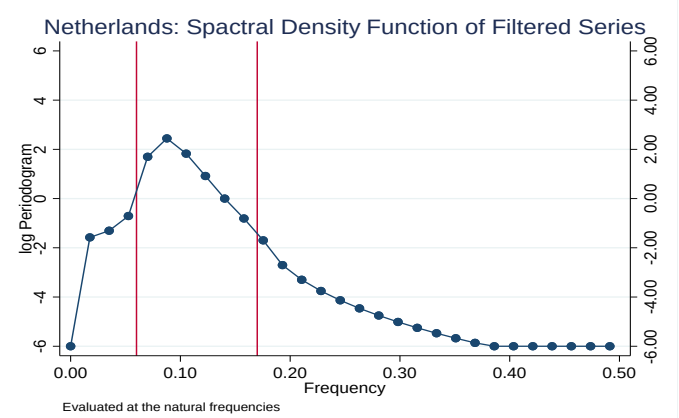



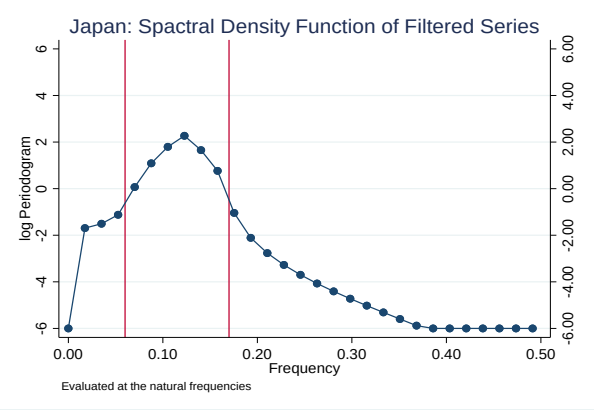


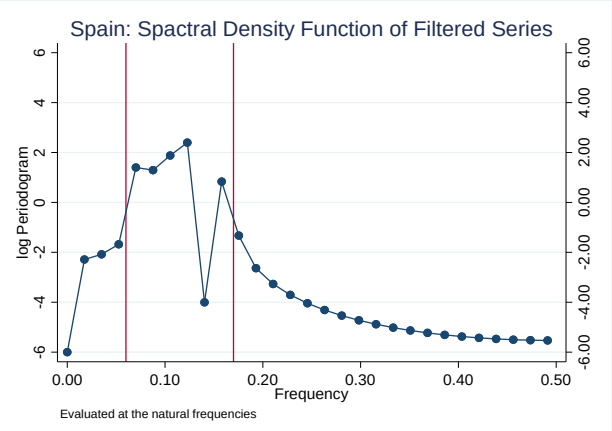



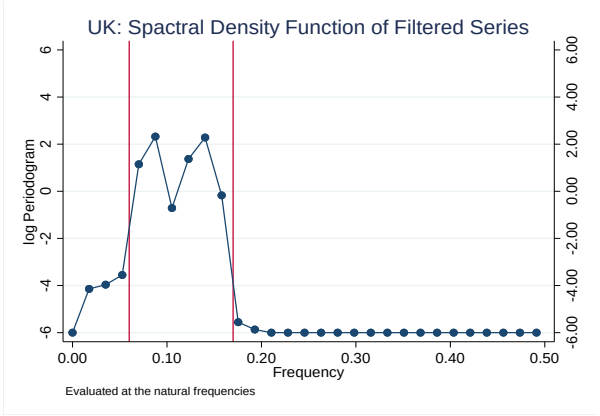

## C Advanced countries



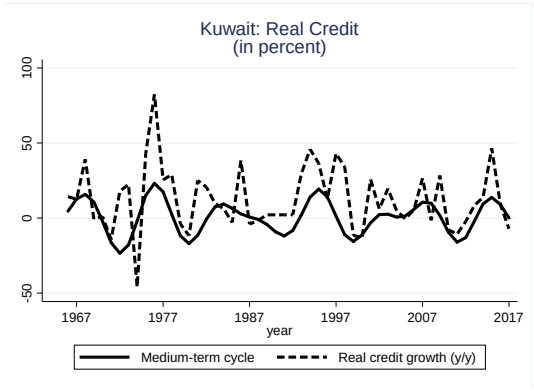



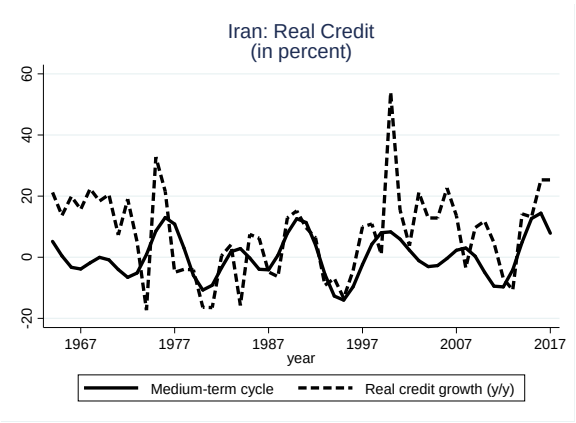



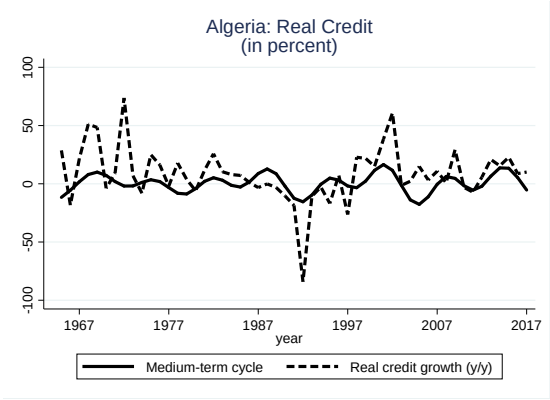


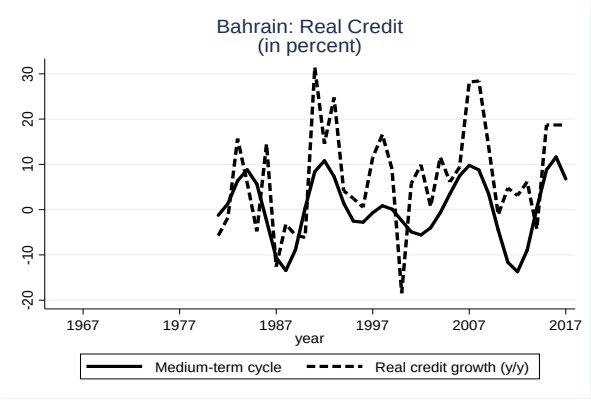

## Figure VI-3: Real Credit Growth and Medium-term Credit Cycle

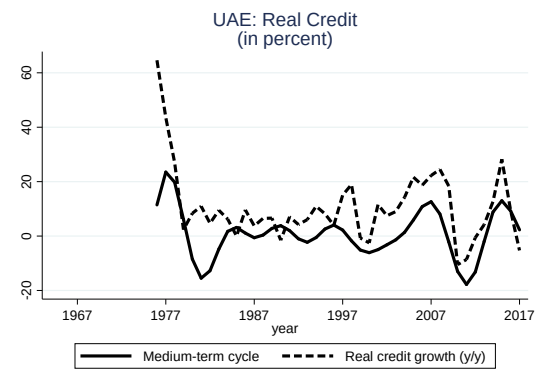
### A- Oil exporter

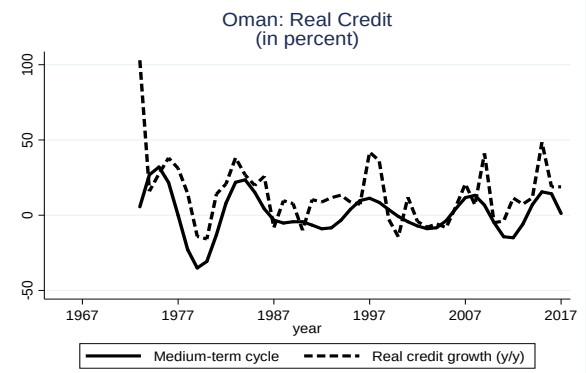


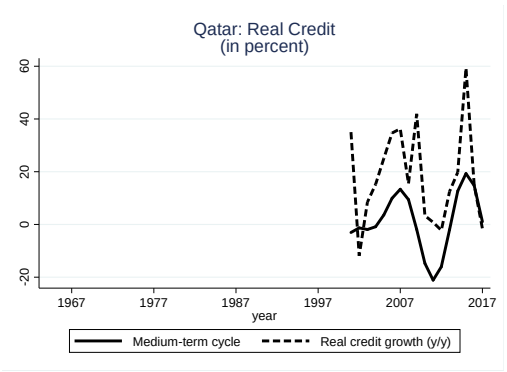



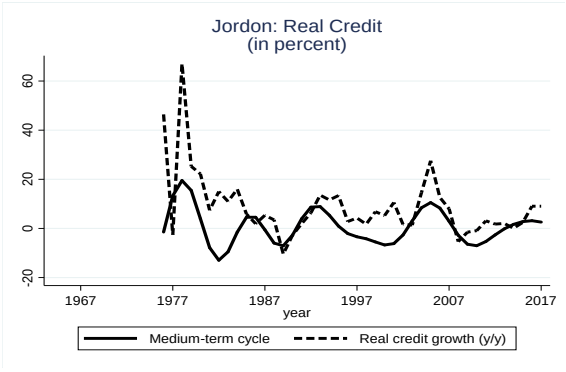



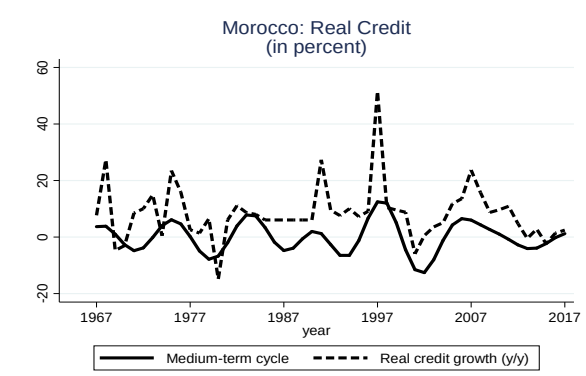


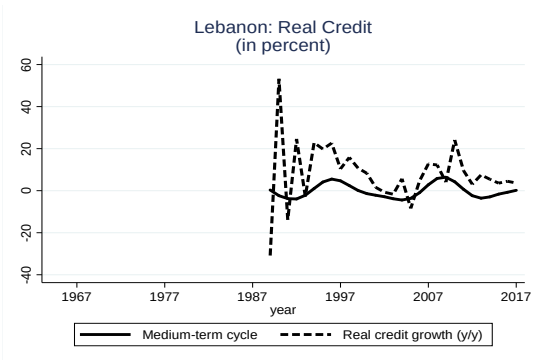



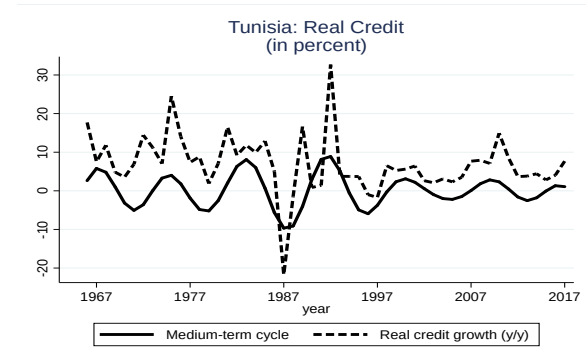



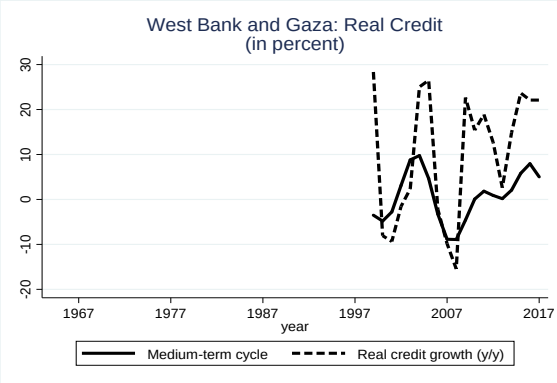

## B- Oil importers

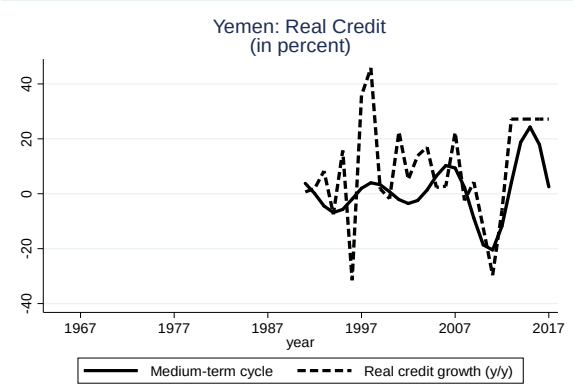


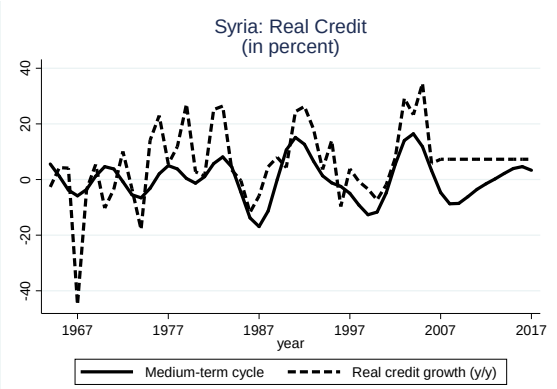



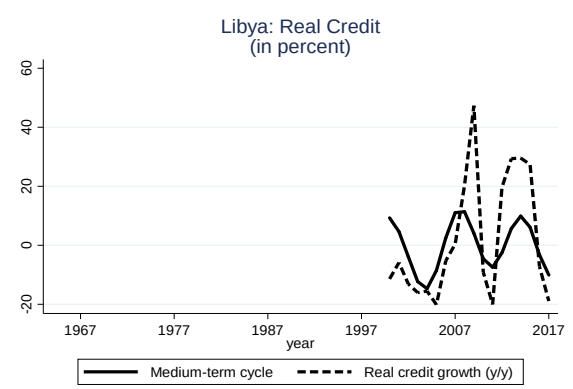



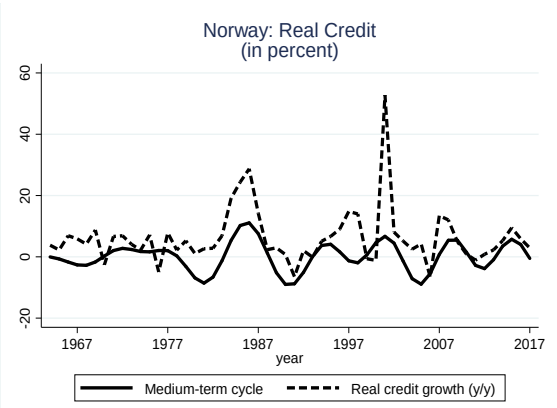


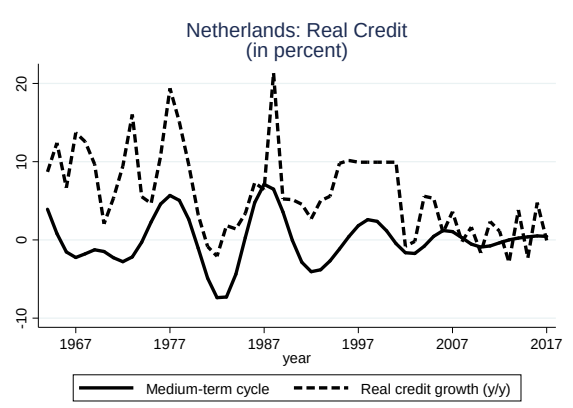



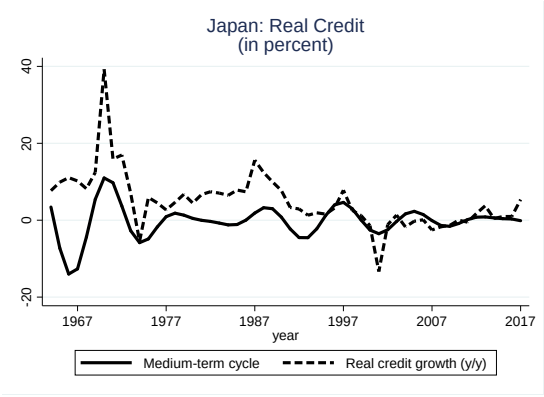



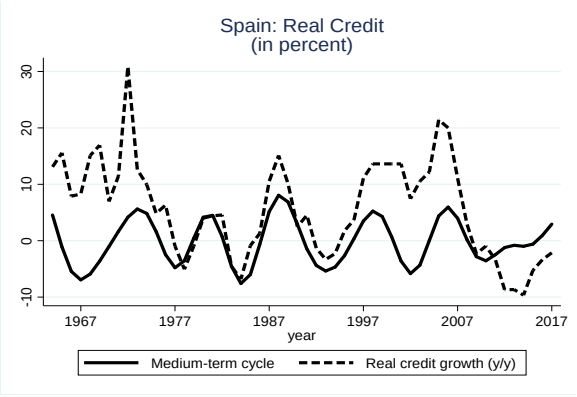




## C- Advanced countries





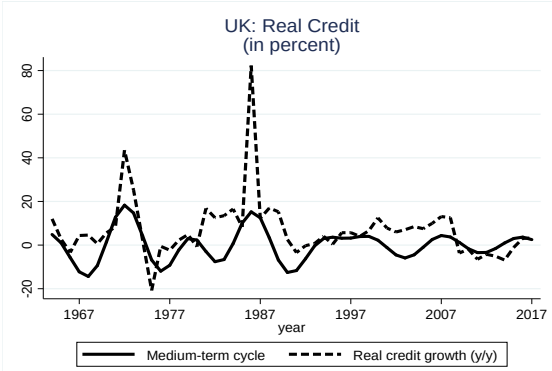
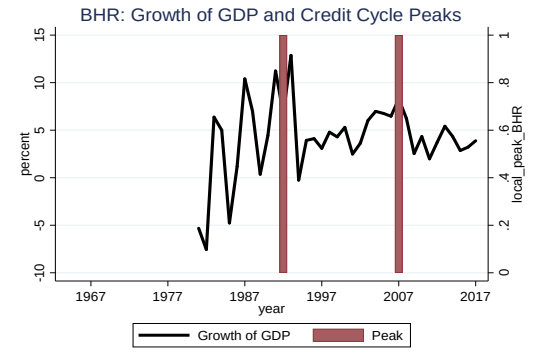
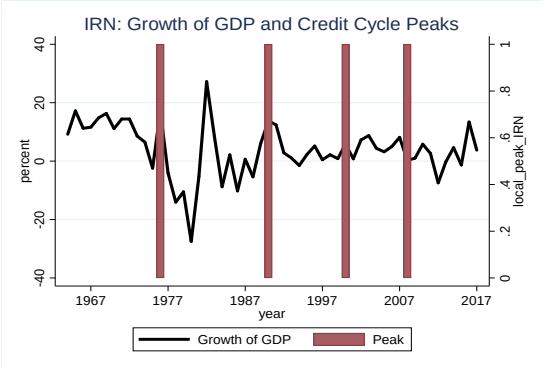
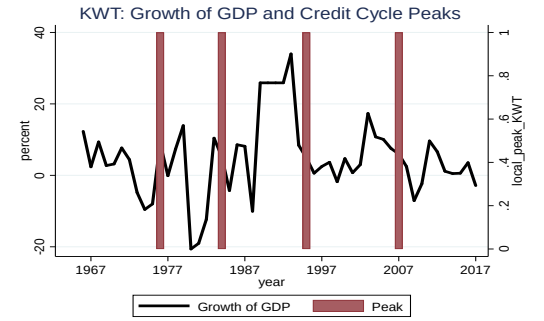



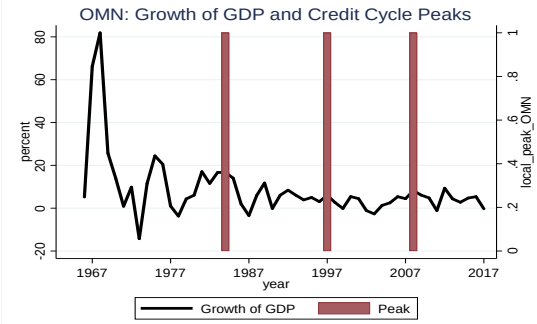

**Figure VI-4: Growth of GDP and Credit Cycle Peaks**

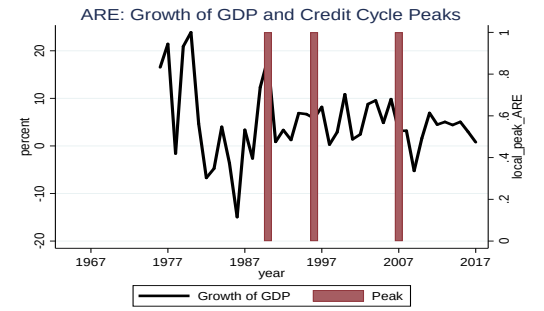
**A- Oil exporter**

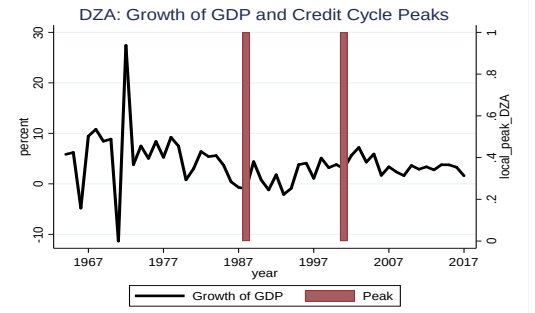


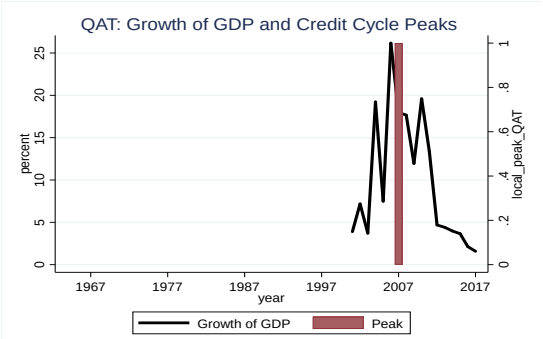





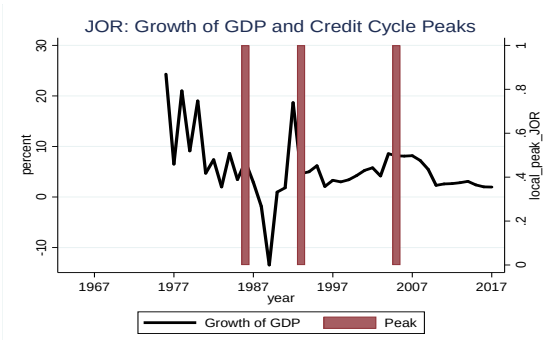



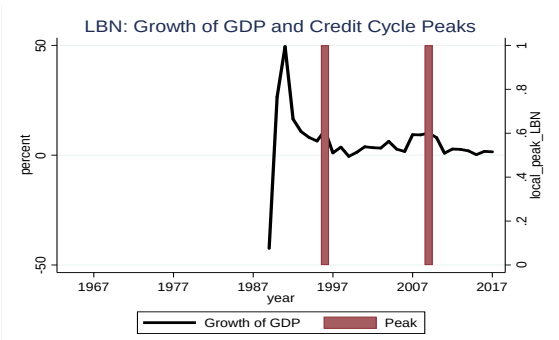



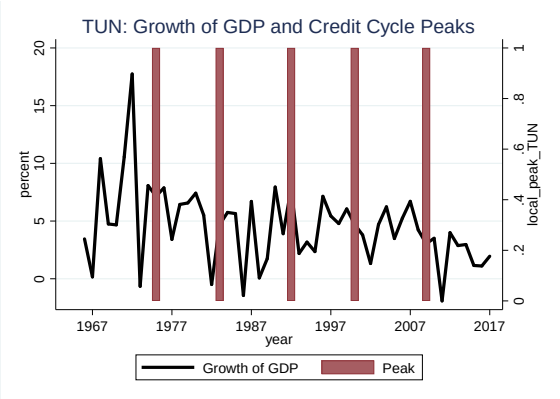



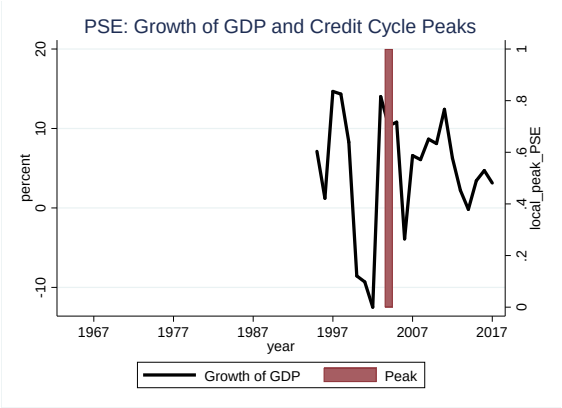



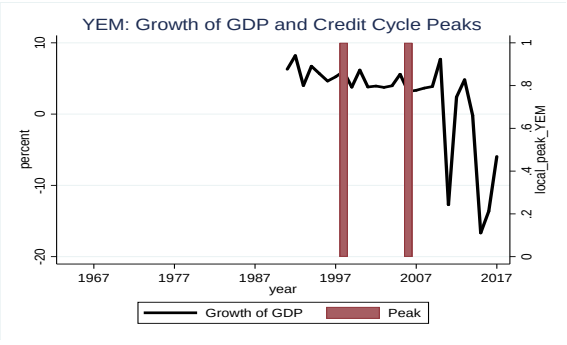

**B- Oil importers**

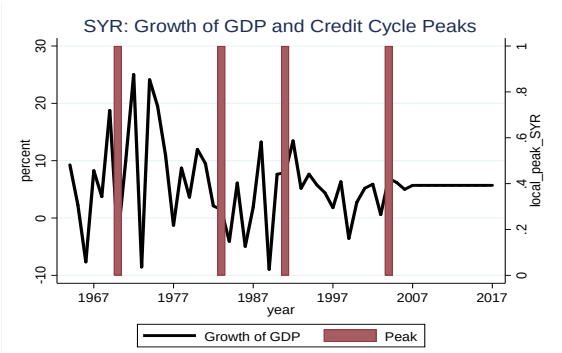


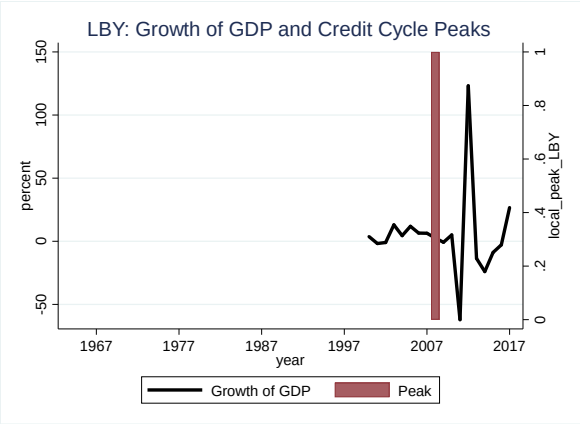




TUN: Growth of GDP and Credit Cycle Peaks
percent
local_peak_TUN
year
Growth of GDP
Peak

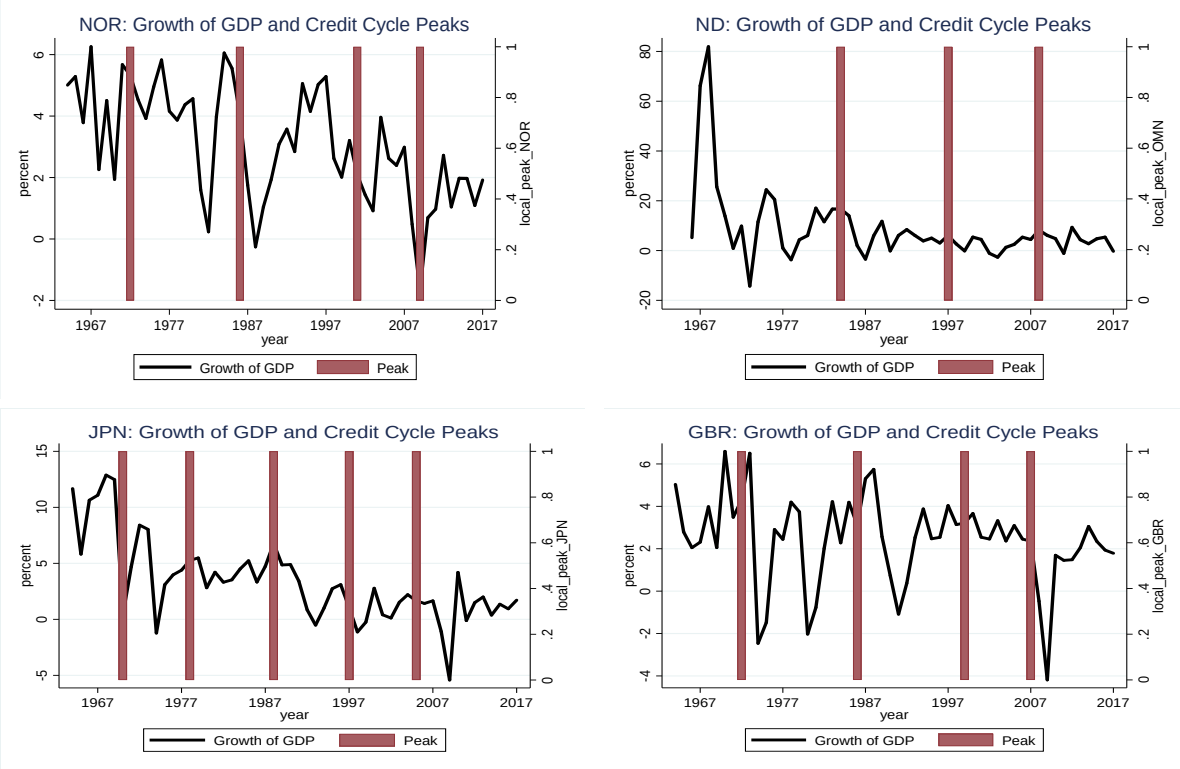

PSE: Growth of GDP and Credit Cycle Peaks
percent
local_peak_PSE
year
Growth of GDP
Peak


YEM: Growth of GDP and Credit Cycle Peaks
percent
local_peak_YEM
year
Growth of GDP
Peak


SYR: Growth of GDP and Credit Cycle Peaks
percent
local_peak_SYR
year
Growth of GDP
Peak

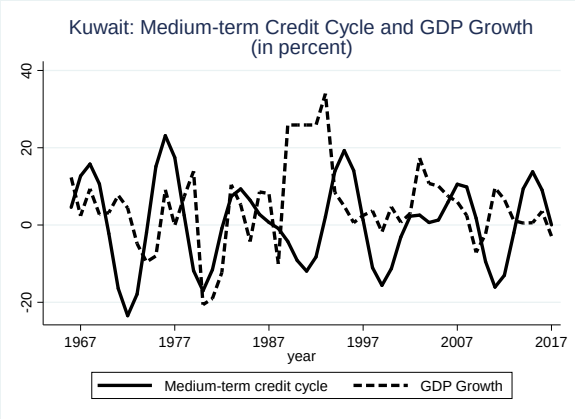

LBY: Growth of GDP and Credit Cycle Peaks
percent
local_peak_LBY
year
Growth of GDP
Peak

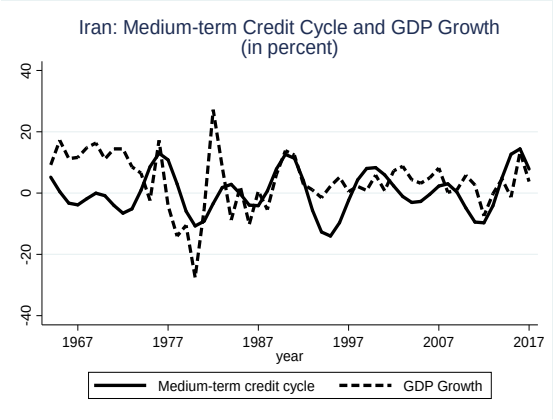
## C- Advanced countries

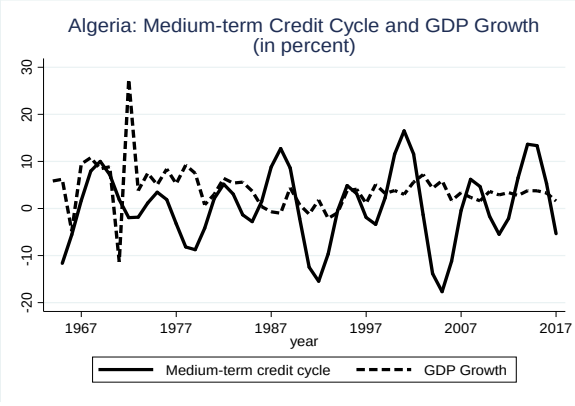


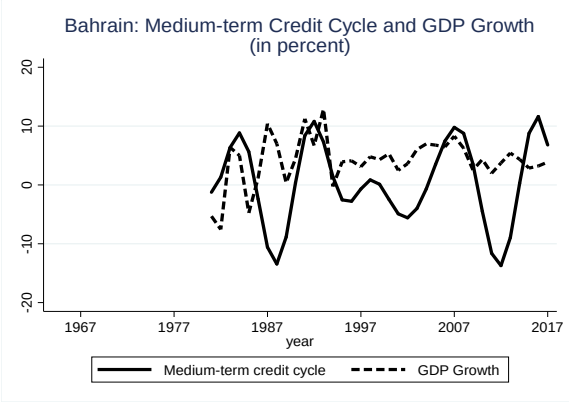
## Figure VI-5: Medium-term Credit Cycle and GDP Growth

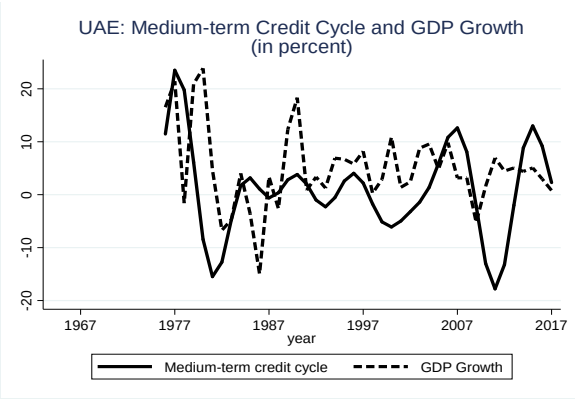
### A- Oil exporters

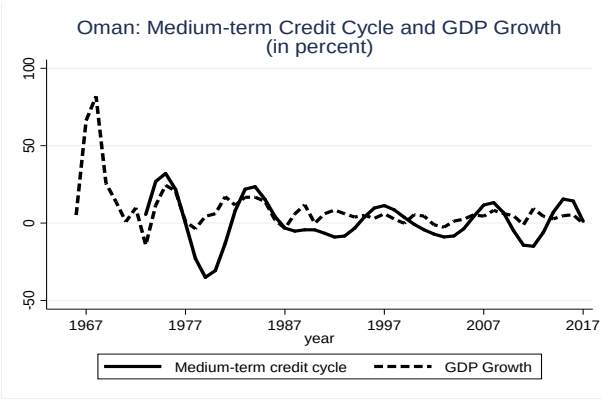


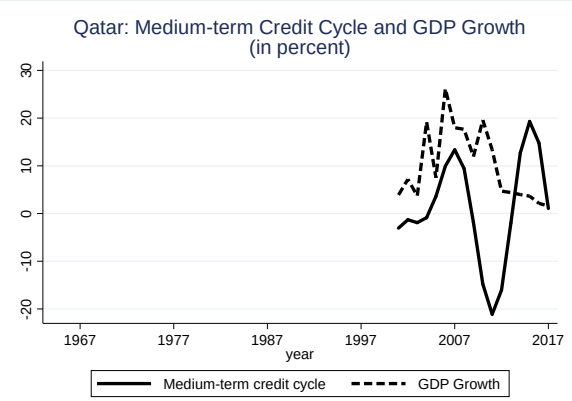



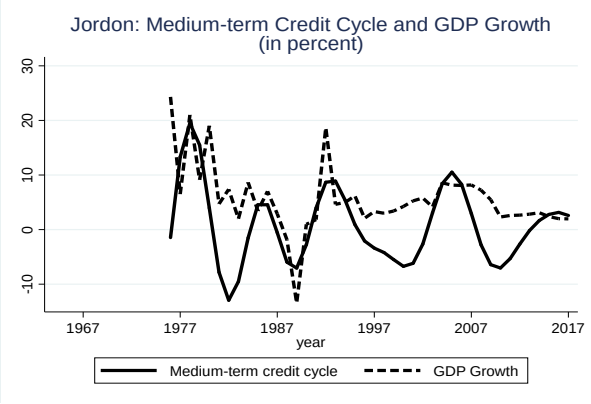



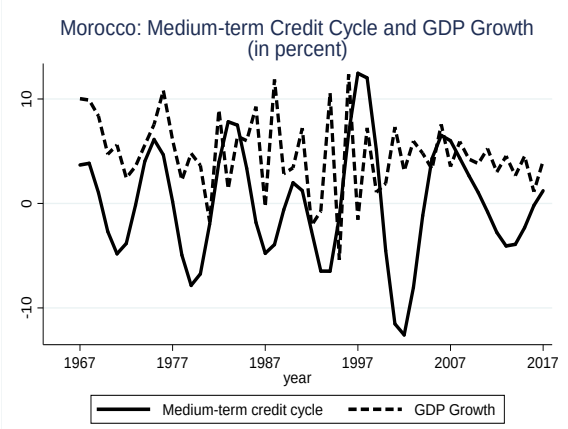



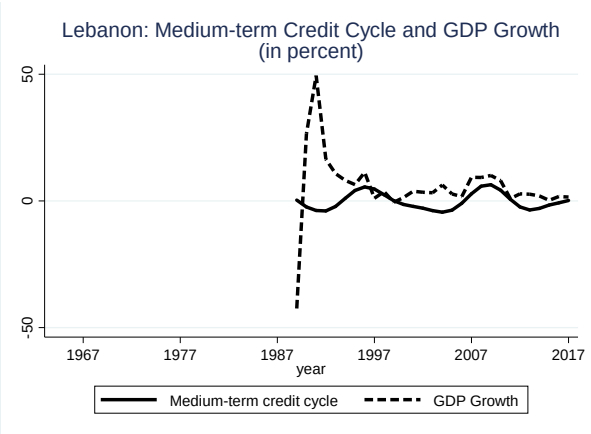



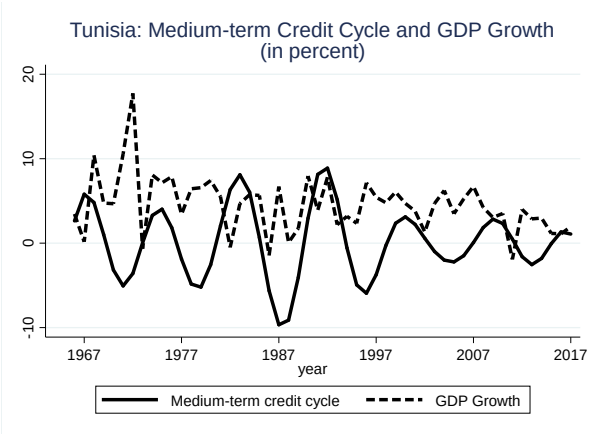


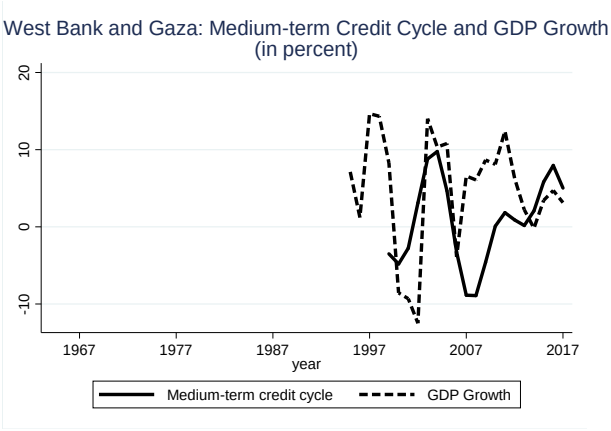

## B- Oil importers

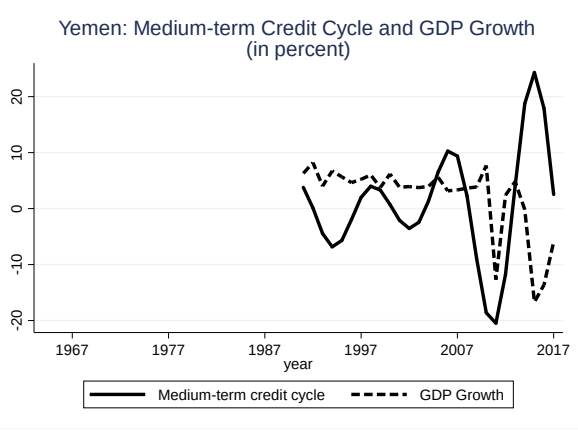


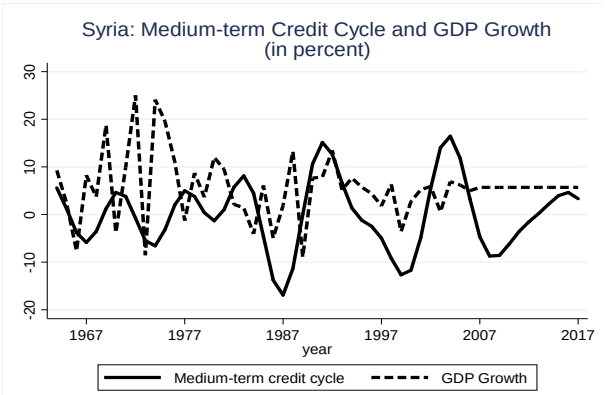



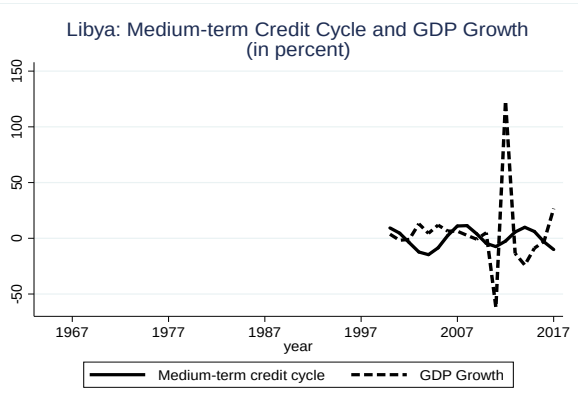



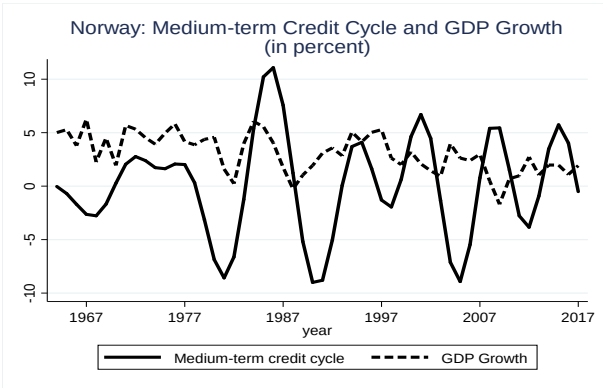


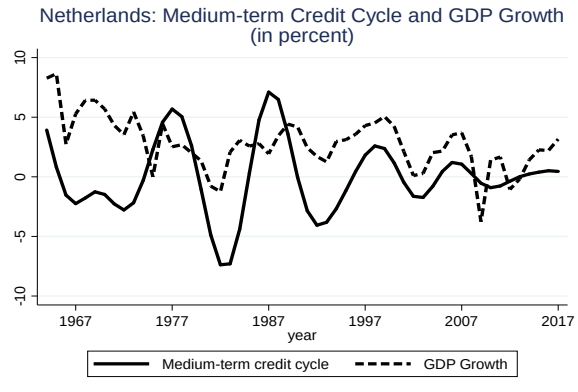



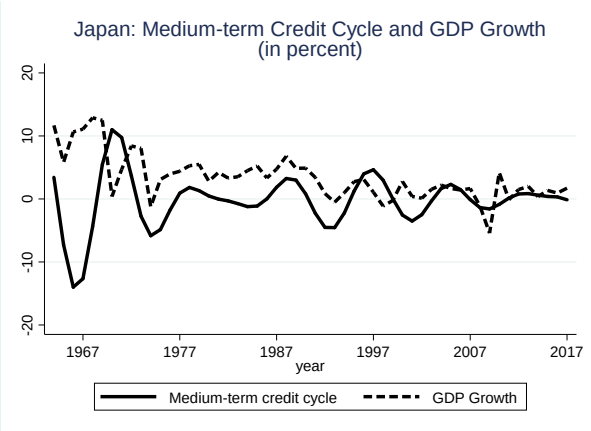



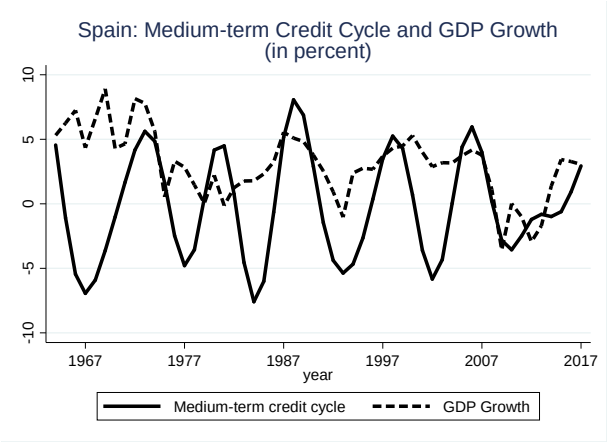



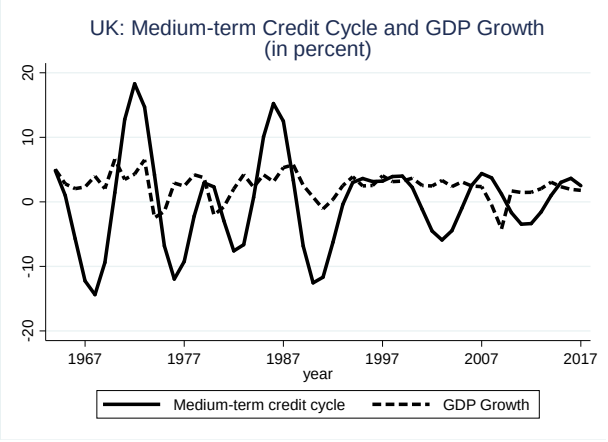

## C- Advanced countries



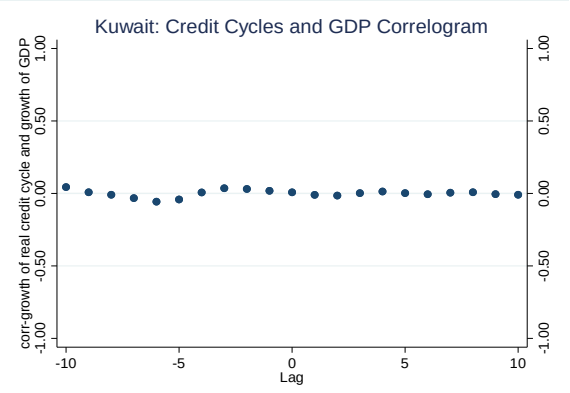


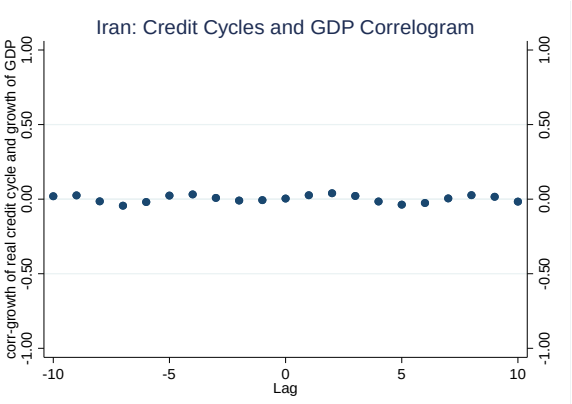



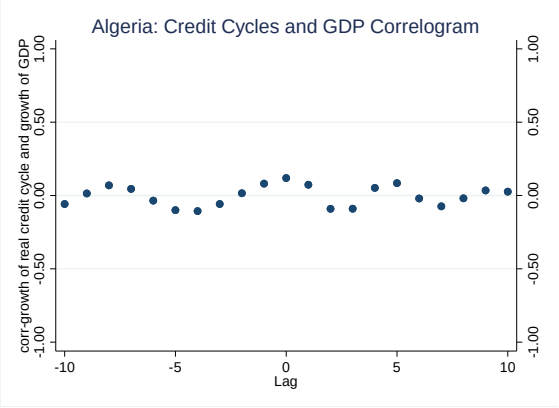



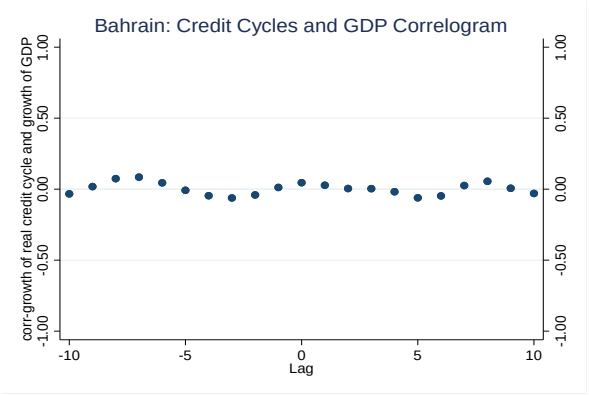

## Figure VI-6: Correlogram

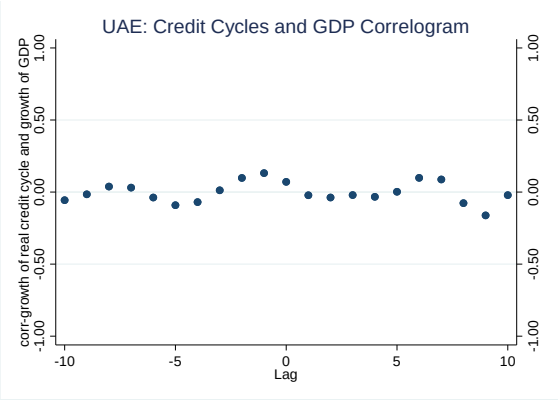
### A- Oil exporters

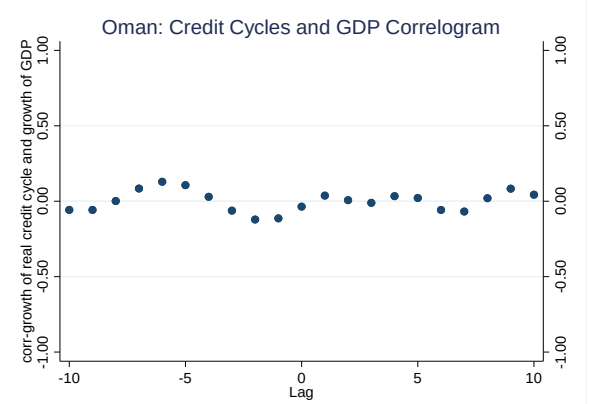


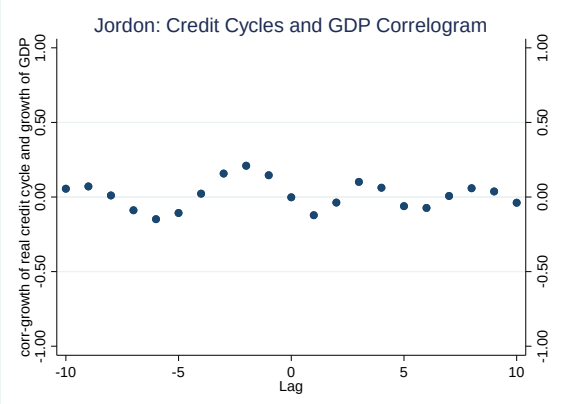


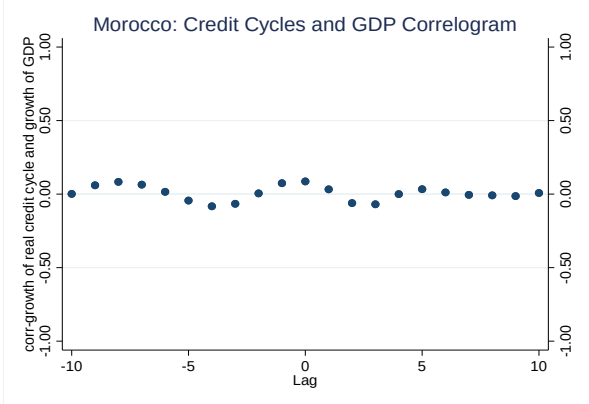



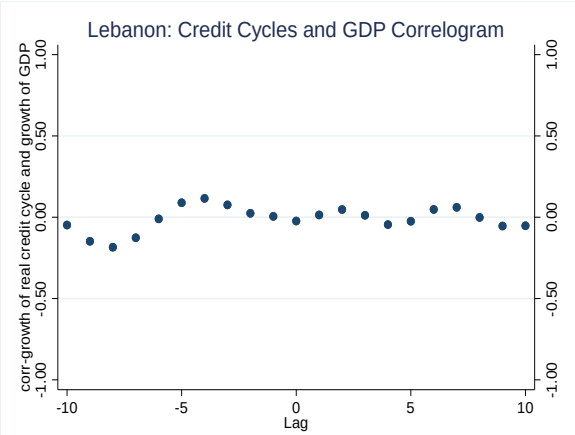



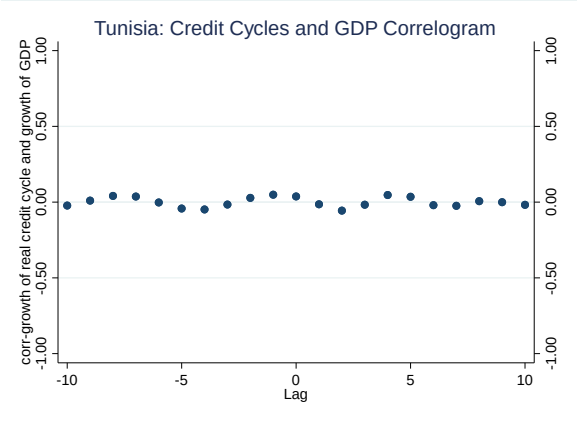



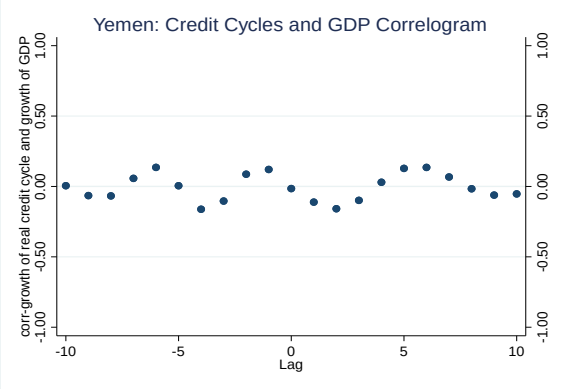

**B- Oil importers**

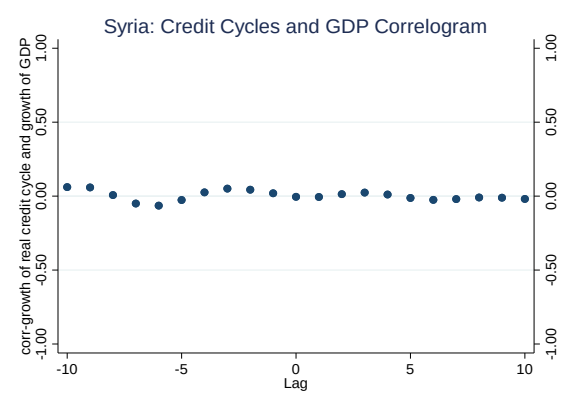


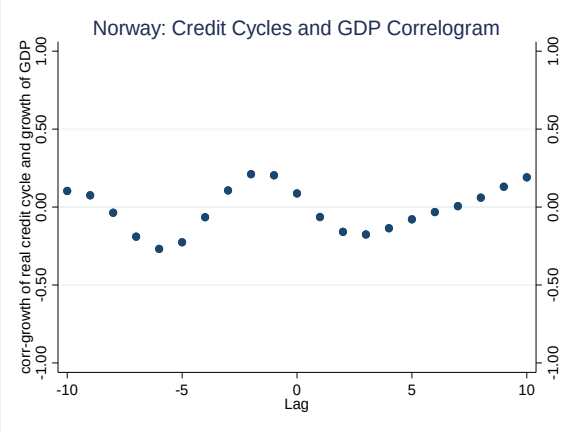


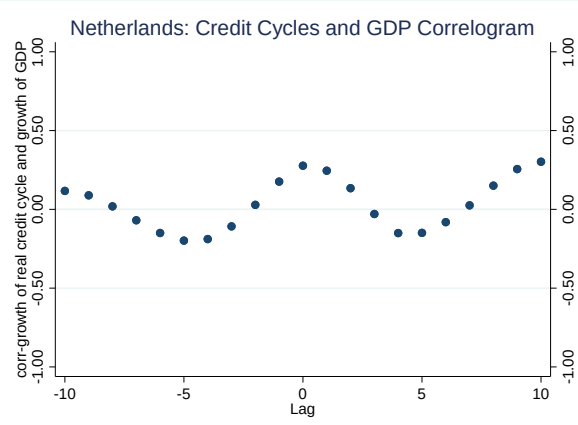




## C- Advanced countries



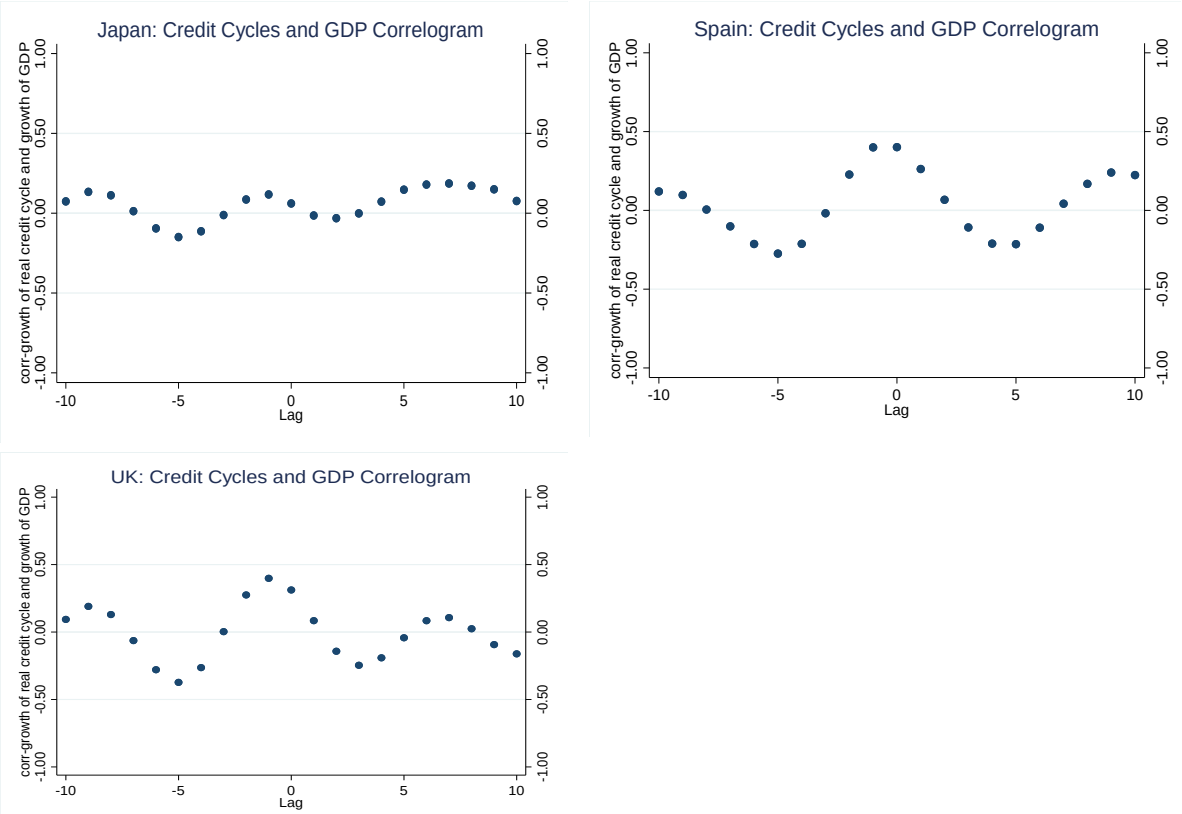
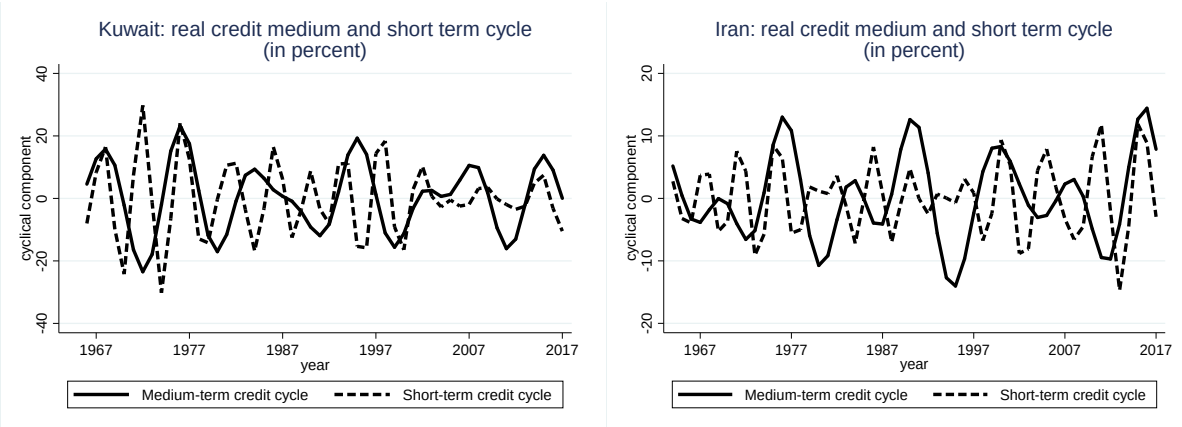
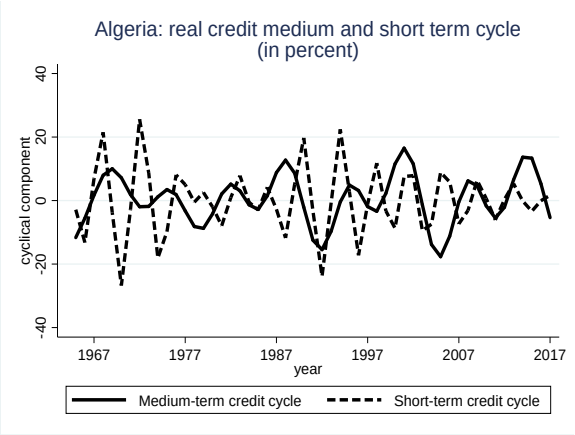
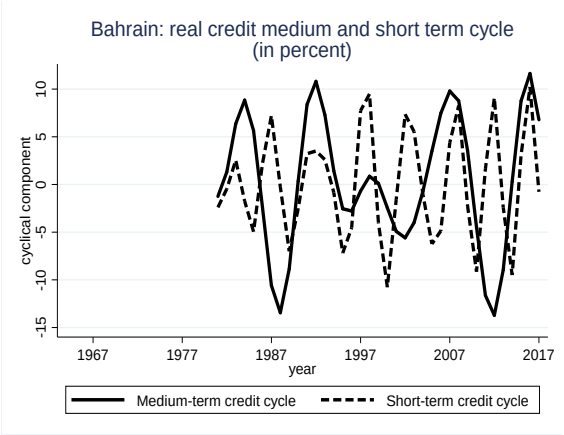


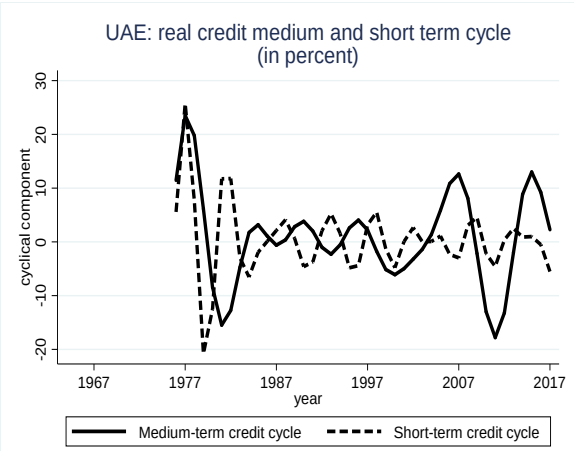

**Figure VI-7: Medium- and Short-term Real Credit Cycle**

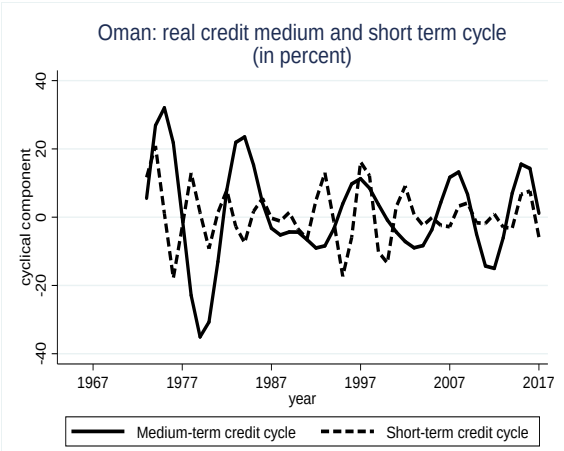
**A Oil exporters**

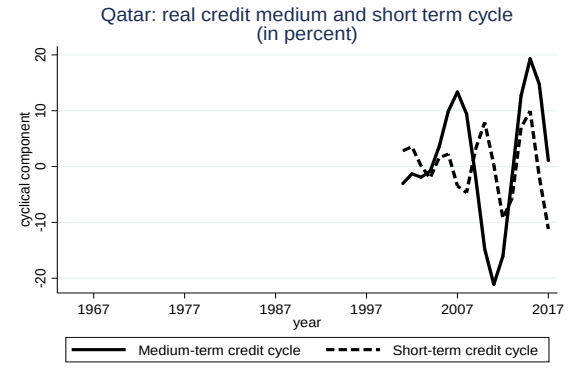



Algeria: real credit medium and short term cycle
(in percent)
cyclical component
-40
-20
0
20
40
1967
1977
1987
1997
2007
2017
year
Medium-term credit cycle
Short-term credit cycle

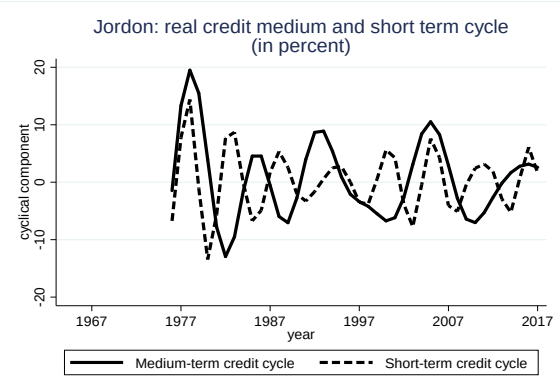

Bahrain: real credit medium and short term cycle
(in percent)
cyclical component
-15
-10
-5
0
5
10
1967
1977
1987
1997
2007
2017
year
Medium-term credit cycle
Short-term credit cycle

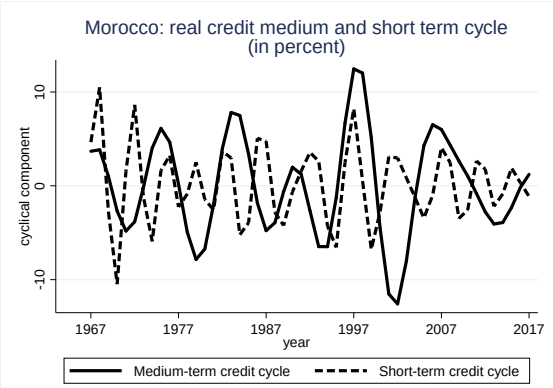

UAE: real credit medium and short term cycle
(in percent)
cyclical component
-20
-10
0
10
20
30
1967
1977
1987
1997
2007
2017
year
Medium-term credit cycle
Short-term credit cycle

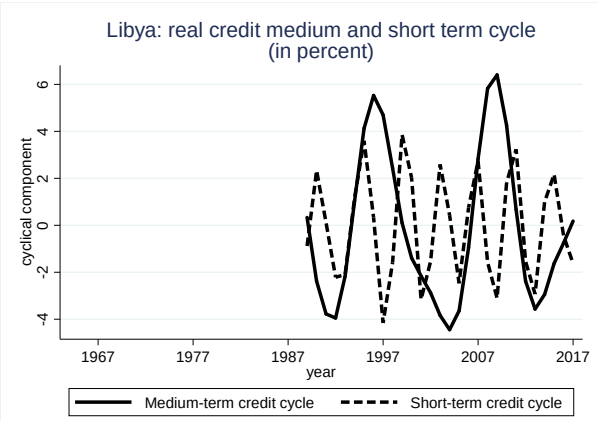

Oman: real credit medium and short term cycle
(in percent)
cyclical component
-40
-20
0
20
40
1967
1977
1987
1997
2007
2017
year
Medium-term credit cycle
Short-term credit cycle

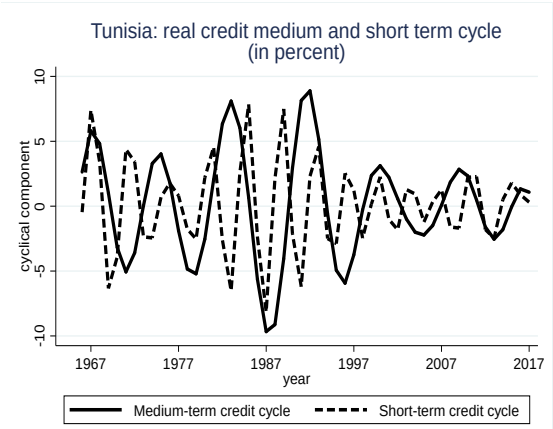

Qatar: real credit medium and short term cycle
(in percent)
cyclical component
-20
-10
0
10
20
1967
1977
1987
1997
2007
2017
year
Medium-term credit cycle
Short-term credit cycle

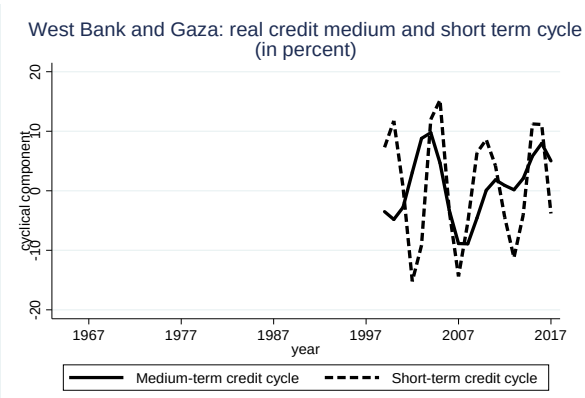
## B Oil importers

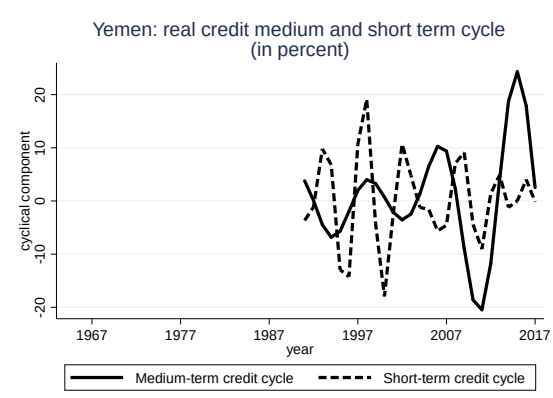


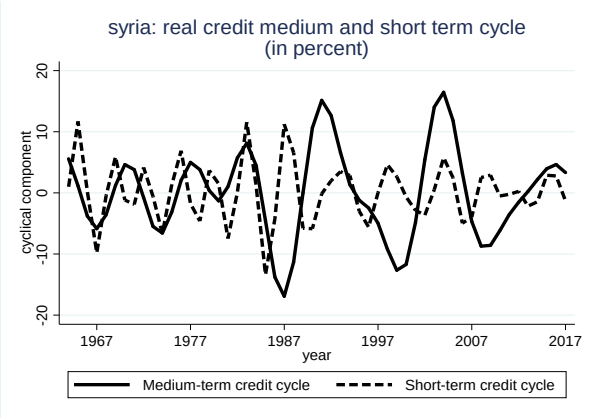



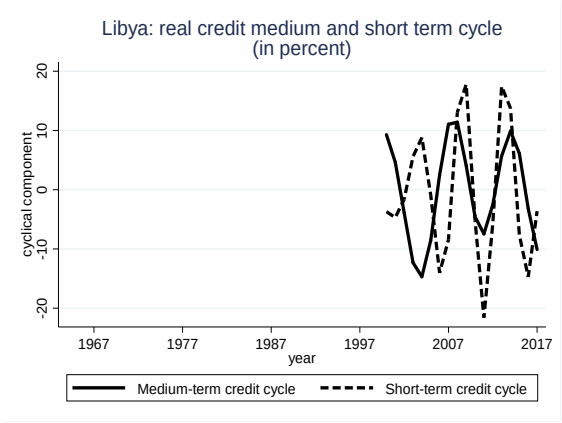



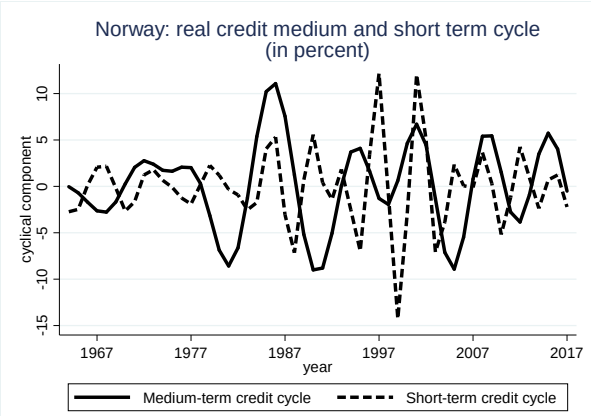



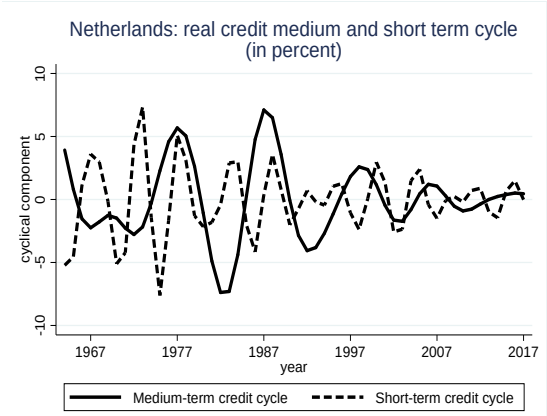



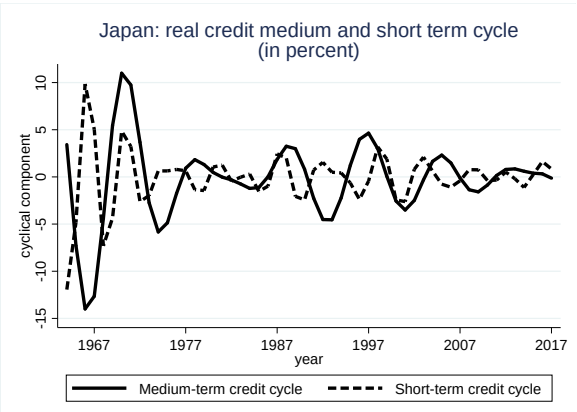


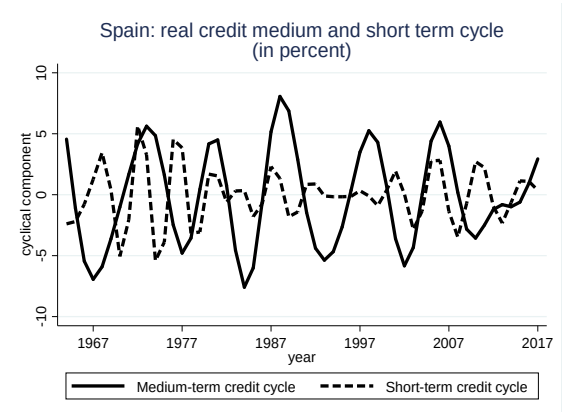



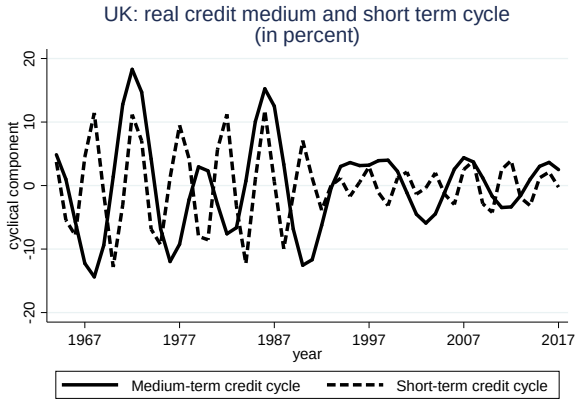

## C Advanced countries





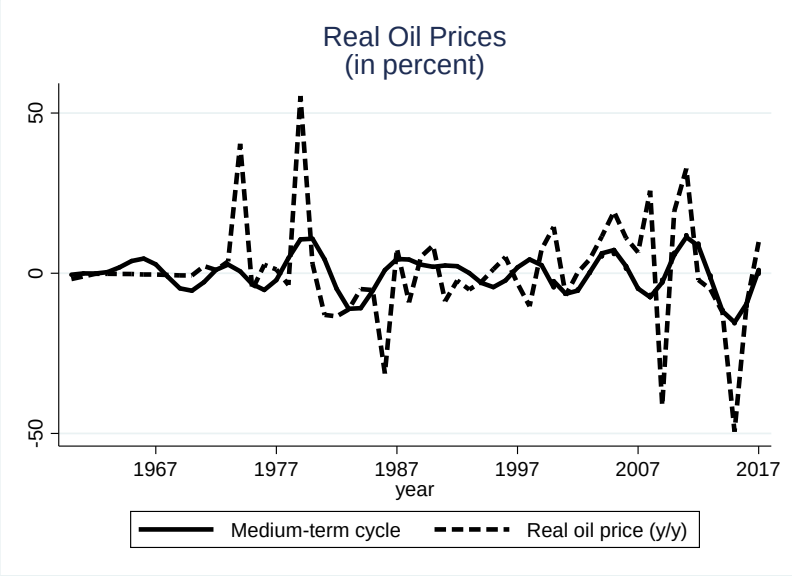

## Table V-1: Summary Statistics per Country

| | Saudi Arabia | | | |
|---|---|---|---|---|
| | Medium | SD | Min | Max |
| **GDP Growth** | 5.2 | 12.0 | -20.7 | 58.6 |
| **Private Credit Growth** | 10.0 | 15.7 | -25.1 | 50.8 |
| | **Jordan** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 5.6 | 6.2 | -13.5 | 24.3 |
| **Private Credit Growth** | 8.9 | 13.5 | -10.4 | 67.1 |
| | **Bahrain** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 4.1 | 4.1 | -7.6 | 12.9 |
| **Private Credit Growth** | 7.3 | 11.5 | -18.5 | 31.4 |
| | **Algeria** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 3.8 | 7.4 | -19.7 | 34.3 |
| **Private Credit Growth** | 8.5 | 23.4 | -84.0 | 73.7 |
| | **Iran, Islamic Rep.** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 4.2 | 8.9 | -27.5 | 27.2 |
| **Private Credit Growth** | 8.1 | 14.0 | -17.3 | 54.0 |
| | **Kuwait** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 4.7 | 10.7 | -20.6 | 34.0 |
| **Private Credit Growth** | 12.5 | 21.2 | -46.0 | 82.4 |
| | **Morocco** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 4.7 | 3.7 | -5.4 | 12.4 |

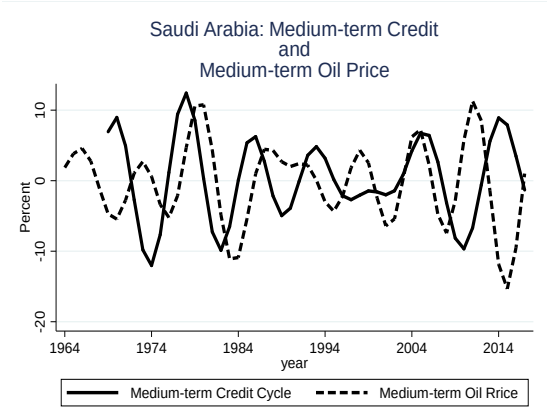
| | | | | |
|---|---|---|---|---|
| **Private Credit Growth** | 8.3 | 9.9 | -14.8 | 51.6 |
| | | **Qatar** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 9.9 | 7.6 | 1.6 | 26.2 |
| **Private Credit Growth** | 18.1 | 18.7 | -11.9 | 59.3 |
| | | **Egypt, Arab Rep.** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 5.2 | 2.8 | -1.6 | 13.3 |
| **Private Credit Growth** | 7.3 | 18.3 | -23.7 | 110.9 |
| | | **Lebanon** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 5.6 | 13.5 | -42.5 | 49.4 |
| **Private Credit Growth** | 8.0 | 14.6 | -30.8 | 53.2 |
| | | **Oman** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 8.7 | 15.1 | -14.3 | 81.9 |
| **Private Credit Growth** | 14.1 | 21.2 | -15.8 | 103.0 |
| | | **Tunisia** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 4.5 | 3.4 | -1.9 | 17.7 |
| **Private Credit Growth** | 6.9 | 7.5 | -21.7 | 32.7 |
| | | **Yemen, Rep.** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 2.1 | 6.5 | -16.7 | 8.2 |
| **Private Credit Growth** | 9.1 | 18.5 | -31.5 | 45.8 |
| | | **United Arab Emirates** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 4.9 | 7.6 | -15.0 | 23.9 |
| **Private Credit Growth** | 10.7 | 13.4 | -10.5 | 64.6 |
| | | **Syrian Arab Republic** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 5.8 | 7.4 | -9.0 | 25.0 |
| **Private Credit Growth** | 5.8 | 13.2 | -45.0 | 34.5 |
| | | **Libya** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 4.9 | 34.8 | -62.1 | 123.1 |
| **Private Credit Growth** | 1.7 | 21.2 | -20.1 | 47.3 |
| | | **Norway** | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 3.1 | 1.8 | -1.7 | 6.3 |
| **Private Credit Growth** | 6.2 | 9.0 | -6.6 | 52.8 |
| | | **Spain** | | |
| | Medium | SD | Min | Max |

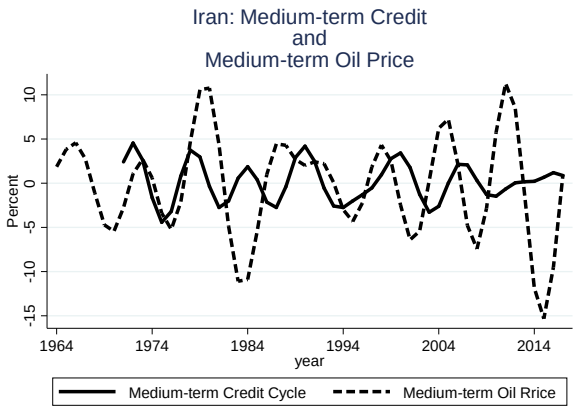
| | | | | |
|---|---|---|---|---|
| **GDP Growth** | 3.4 | 3.0 | -3.6 | 11.8 |
| **Private Credit Growth** | 6.2 | 8.8 | -9.6 | 30.9 |
| | **Netherlands** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 2.8 | 2.3 | -3.8 | 8.6 |
| **Private Credit Growth** | 6.4 | 5.7 | -2.9 | 21.3 |
| | **Japan** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 3.7 | 3.9 | -5.4 | 12.9 |
| **Private Credit Growth** | 6.0 | 8.9 | -13.4 | 42.3 |
| | **United Kingdom** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 2.4 | 2.1 | -4.2 | 6.6 |
| **Private Credit Growth** | 6.9 | 13.7 | -20.8 | 82.3 |
| | **United States** | | | |
| | Medium | SD | Min | Max |
| **GDP Growth** | 3.0 | 2.1 | -2.8 | 7.3 |
| **Private Credit Growth** | 5.0 | 4.9 | -9.1 | 13.8 |

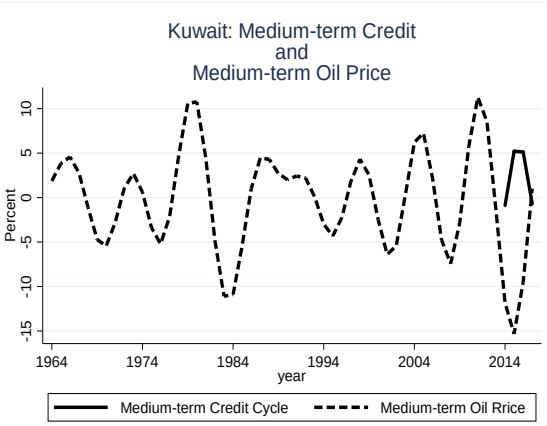
Figure VI-8: Oil and Credit Cycles

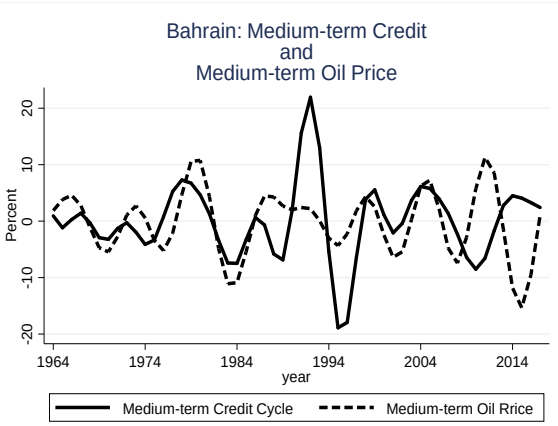


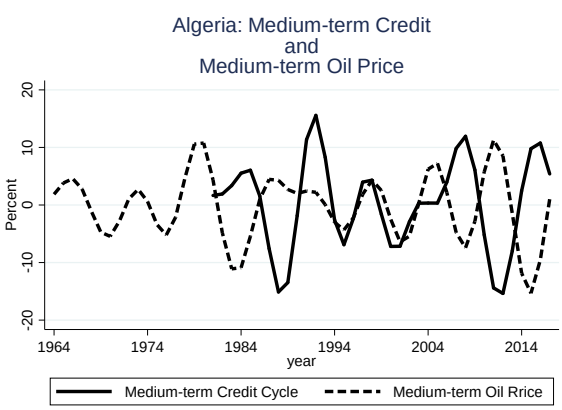

*Source: BP historic data*

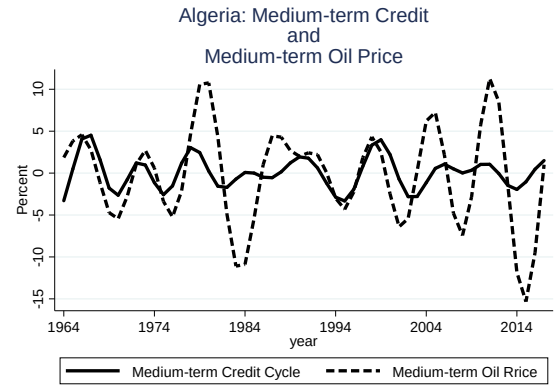

Saudi Arabia: Medium-term Credit
and
Medium-term Oil Price
Percent
-20
-10
0
10
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice

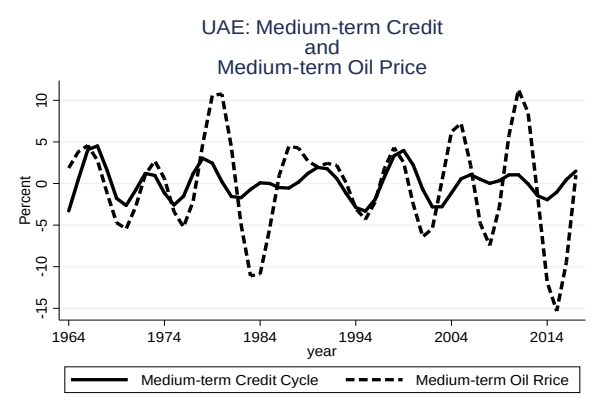

Iran: Medium-term Credit
and
Medium-term Oil Price
Percent
-15
-10
-5
0
5
10
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice

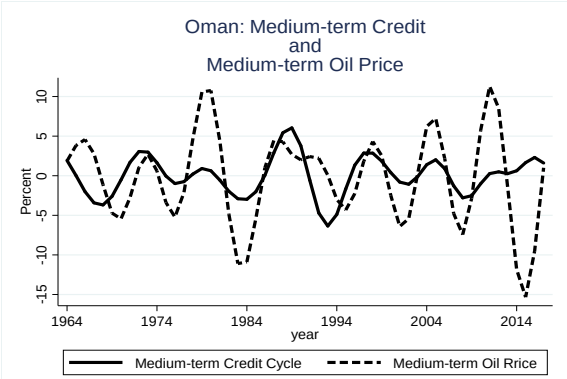

Kuwait: Medium-term Credit
and
Medium-term Oil Price
Percent
-15
-10
-5
0
5
10
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice

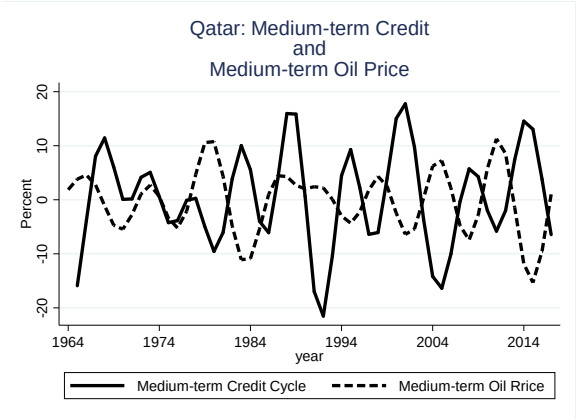

Bahrain: Medium-term Credit
and
Medium-term Oil Price
Percent
-20
-10
0
10
20
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice


Algeria: Medium-term Credit
and
Medium-term Oil Price
Percent
-20
-10
0
10
20
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice


Algeria: Medium-term Credit
and
Medium-term Oil Price
Percent
-15
-10
-5
0
5
10
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice


UAE: Medium-term Credit
and
Medium-term Oil Price
Percent
-15
-10
-5
0
5
10
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice


Oman: Medium-term Credit
and
Medium-term Oil Price
Percent
-15
-10
-5
0
5
10
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice


Qatar: Medium-term Credit
and
Medium-term Oil Price
Percent
-20
-10
0
10
20
1964
1974
1984
1994
2004
2014
year
Medium-term Credit Cycle
Medium-term Oil Rrice