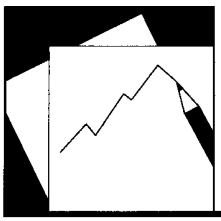
WP/09/220



IMF Working Paper

Oil Prices and Bank Profitability: Evidence from Major Oil-Exporting Countries in the Middle East and North Africa

Tigran Poghosyan and Heiko Hesse

INTERNATIONAL MONETARY FUND

 WP/09/ IMF

IMF Working Paper

Middle East and Central Asia Department

Oil Prices and Bank Profitability: Evidence from Major Oil-Exporting Countries in the Middle East and North Africa [1]

Authorized for distribution by Domenico Fanizza

October 2009

Abstract

This paper analyzes the relationship between oil price shocks and bank profitability. Using data on 145 banks in 11 oil-exporting MENA countries for 1994–2008, we test hypotheses of direct and indirect effects of oil price shocks on bank profitability. Our results indicate that oil price shocks have indirect effect on bank profitability, channeled through country-specific macroeconomic and institutional variables, while the direct effect is insignificant. Investment banks appear to be the most affected ones compared to Islamic and commercial banks. Our findings highlight systemic implications of oil price shocks on bank performance and underscore their importance for macroprudential regulation purposes in MENA countries.

JEL Classification Numbers: G21, C23, L2

Keywords: bank profitability, oil price shocks, system GMM

Authors' E-Mail Addresses: TPoghosyan@imf.org; HHesse2@imf.org

[1] We would like to thank Domenico Fanizza, Todd Schneider, Paul Cashin and participants of the IMF's MCD discussion forum for useful comments and suggestions.

Contents Page

I. INTRODUCTION

The global financial crisis of 2008/2009 accompanied by the sharp fall in oil prices have hit hard many of the oil exporting countries in the Middle East and North Africa (MENA). Exports, government revenues and fiscal balances have dramatically fallen, declining GDP growth and equity/ real estate prices have put strains on both corporate and bank balance sheets and credit growth to the private sector has significantly worsened. In some countries, governments had to intervene in the domestic financial sector with deposit guarantees, liquidity support, capital injections or equity purchases (via their government-owned vehicles such as Sovereign Wealth Funds (SWFs), as financial sector indicators worsened. In particular, banks that lent heavily for real estate purposes and equity purchases have suffered losses with the collapse of these asset prices.

Given the dependence of these countries on oil exports, the link between oil prices and bank performance and stability is of high policy interest not only during the current crisis but also during previous boom-bust oil cycles. Do oil prices influence bank performance and if so, what could be the relevant channels by which bank behavior is affected? Or is there no direct link between oil prices and bank performance if macroeconomic and bank-specific factors are accounted for? Is there any difference in bank performance of commercial versus investment and Islamic banks given that Islamic banks operate according to Shariah principles? What is the impact of the global financial crisis on bank profitability and its link to oil prices? The purpose of this paper is to provide the first empirical evidence on these issues.

Oil prices affect the economy through both direct and indirect channels. In a direct channel, for instance, oil price shocks could affect bank profitability directly via increased oil-related lending, business activity or excess liquidity in the banking system. Indirectly, since oil receipts form a large part of external and government income in MENA countries, prospects of oil income affect fiscal spending, which in turn influences corporate and bank profitability via lending to the private sector. Another indirect channel operates via expectations and the overall business sentiment in the country. Higher oil prices could lead to higher domestic demand which will feed back into higher bank confidence, lending and low nonperforming loans. On the aggregate supply side, the productive capacity of countries is also likely to be expanded with new public and private investments fueled by high oil prices, pushing growth rates even further. This can be illustrated on the example of the pre-crisis boom. Between 2005 and 2008, bolstered by high oil prices, oil-exporting countries have engaged in large investment programs to diversify the domestic economy and develop human capital. Financial institutions reaped sizable profits and appeared financially stable with sound capital adequacy levels and low nonperforming loans.

Our results for eleven MENA countries[2] suggest that oil prices affect bank profitability indirectly, via macro channels. In terms of different bank types, we find that investment

[2] Our sample contains bank-level information on Algeria, Bahrain, Iran, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Sudan, United Arab Emirates, and Yemen for the period 1994–2008.

banks have the highest exposure and sensitivity to oil price shocks, which is likely to be driven by their buoyant advising, fee, trading etc. income during oil price booms and bolstered by excess oil-related liquidity entering the financial system. We also find some tentative evidence that the global financial crisis has diminished the positive impact of oil price shocks on bank profitability.

How does our research relate to the existing academic literature?[3] In general, the banking literature finds that bank profitability depends on both bank-specific and macroeconomic factors. In terms of bank-specific factors, credit risk has been found to be negatively linked to profitability (Miller and Noulas, 1997). Deficient risk management functions and poor asset quality feed into higher amounts of unpaid loans which negatively impacts profitability. The results for the liquidity-profitability relationship have been mixed (Molyneux and Thornton, 1992; and Bourke, 1989).[4]

More efficient banks have higher profits (Bourke, 1989; Molyneux and Thornton, 1992) while bank profitability can also be quite persistent (Athanasoglu and others, 2008) implying a certain level of concentration and market power in the banking industry, both in input and output markets. Findings on ownership have been mixed (Short, 1979; Bourke, 1989; Molyneux and Thornton, 1992; and Flamini and others, 2009)

In terms of macroeconomic variables, researchers have found a link between inflation, interest rates and profitability (Bourke, 1989; and Molyneux and Thornton, 1992) as well as the business cycle and bank performance (Demirguc-Kunt and Huizinga, 2000; Bikker and Hu, 2002; and Flamini and others, 2009). Banks are typically able to adjust interest rates if inflation (expectation) increases which might feed back into higher revenues and profits.[5]

The empirical academic literature on differences in commercial and Islamic banks is very scarce and mainly touches upon financial stability (Cihák and Hesse, 2008) and does not examine their relationship with oil—the main revenue source for government in these oil-exporting countries. Conceptually, since Islamic banks often tend to fund themselves with sukuk besides Shariah compliant deposits, and higher oil prices are associated with higher liquidity and therefore deposits inflows than can be intermediated into lending, a positive relationship between oil prices and bank performance for Islamic banks is likely. But with oil

[3] Studies on bank profitability have covered a wide range of countries and regions. For instance, Flamini and others (2009) cover Sub-Saharan Africa, Athanasoglu and others (2008) Greece, Athanasoglu and others (2006) South Eastern Europe, Demirguc-Kunt and Huizinga (1998) over 80 countries while Gelos (2006) examines Latin America, Angbazo (1997) and Berger and others (1987) the U.S. and Saunders and Schumacher (2000) the EU and U.S. This list is by far not exhaustive.

[4] In addition, researchers found a positive relationship between size and bank performance (Short, 1979; Smirlock, 1985; Demirguc-Kunt and Huizinga, 2000; and Goddard and others, 2004). Larger banks tend to be more able to raise cheaper capital making them more profitable. There is also some evidence of decreasing benefits from economies of scale and cost savings the larger a bank becomes (Berger and others, 1989).

[5] The link in the Gulf Cooperation Council (GCC) countries might be somewhat different since the exchange rate peg to the U.S. dollar implies that inflation is imported from abroad (given that monetary policy is geared towards maintaining the peg).

prices falling from their peak of $140 a barrel recently, the reduced oil liquidity has not only hit Islamic banks but also their conventional peers. Hence, unless conventional banks have invested in subprime related products, the differential impact of oil prices on commercial versus Islamic banks is not certain a priori. It is likely that Islamic banks that focus on a stable deposit base might suffer less than Islamic banks relying mainly on wholesale funding especially when liquidity becomes scarce after adverse oil price shocks. Similarly, one would expect that investment banks with their typically wholesale funded business models and higher leverage than their conventional and Islamic banking peers will be negatively expected from a liquidity squeeze.

This paper makes several important contributions to the literature on bank performance. *First*, as far as we know, no study has explicitly looked at oil exporting countries and bank profitability. *Second*, including oil price changes and shocks as a systemic variable into this framework is novel and by using different definitions for the shocks ensures robustness of the results. *Third*, we explore the impact of bank specialization on bank profitability. The business models of commercial, investment and Islamic banks are likely to exhibit differences so it is important to control for bank specialization. *Finally*, most of the literature makes use of a linear panel framework with a few exceptions. We adopt dynamic panel methods (system GMM) to control for the persistence of profitability and endogeneity in the model.

The paper is organized as follows. Section II provides the data description and introduces different measures for the oil price shock. Section III discusses the hypothesis testing strategy and econometric methodology. Section IV examines the results while Section V concludes and offers policy implications.

II. METHODOLOGY AND DATA

A. Estimation Methodology and Hypothesis Testing Strategy

We adopt dynamic panel data techniques in our empirical analysis for the following reasons. *First*, a common empirical regularity in data suggests that bank profits are highly persistent due to imperfect competition (both in the output and input markets), informational opacity, and serial correlation in regional/macroeconomic shocks (Berger and others, 2000). The system GMM panel data technique of Blundell and Bond (1998) used in our analysis is designed to account for such persistence by including the lagged dependent variable among regressors and correcting for endogeneity bias.[6] *Second*, some of the bank specific determinants of bank profitability (such as capitalization) are likely to be endogenous variables (Athanasoglou and others, 2008), which makes application of alternative estimation techniques (such as, pooled OLS and fixed effects methods) inappropriate. On the contrary, the system GMM methodology allows instrumenting for the endogenous variables and

[6] Alternative estimation techniques for estimating dynamic panel data models, such as pooled OLS and fixed effects methods, produce biased coefficient estimates of the lagged dependent variable (see Baltagi, 2001). We experimented with these specifications and found support for upward bias (pooled OLS) and downward bias (fixed effects model), confirming the appropriateness of using system GMM method in our setup.

provides consistent estimates. Finally, the estimation methods based on the OLS principle are vulnerable to the omitted variable bias if some important determinants of bank profitability are not included among explanatory variables. The system GMM method is robust to the omitted variable problem.[7] Robustness against omitted variable bias problem is particularly useful property for our empirical testing strategy (see below).

There are two types of GMM estimators that have been frequently used. The first one is the first-difference GMM estimator, developed by Arellano and Bond (1991), which uses first-differenced equations with suitable lagged levels as instruments. The second one is the system GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998), which augments the former by addition of equations in levels with lagged first-differences as instruments.

In our framework, the system GMM estimator is more suited to estimate bank profitability equations than the first-differenced GMM estimator applied by some authors previously (e.g., Flamini and others, 2009). As discussed, many explanatory variables such as profitability are highly persistent so their lagged levels might only be very weak instruments for the first differenced equations. In this situation, the first-differenced GMM estimator potentially suffers from a downward bias (Blundell and Bond, 1998) so the additional set of first-differenced instruments and equations in levels make the system GMM estimator more efficient by overcoming the weak instrument problem inherent to the first-differenced GMM estimator.

Our empirical specification takes the following general form:

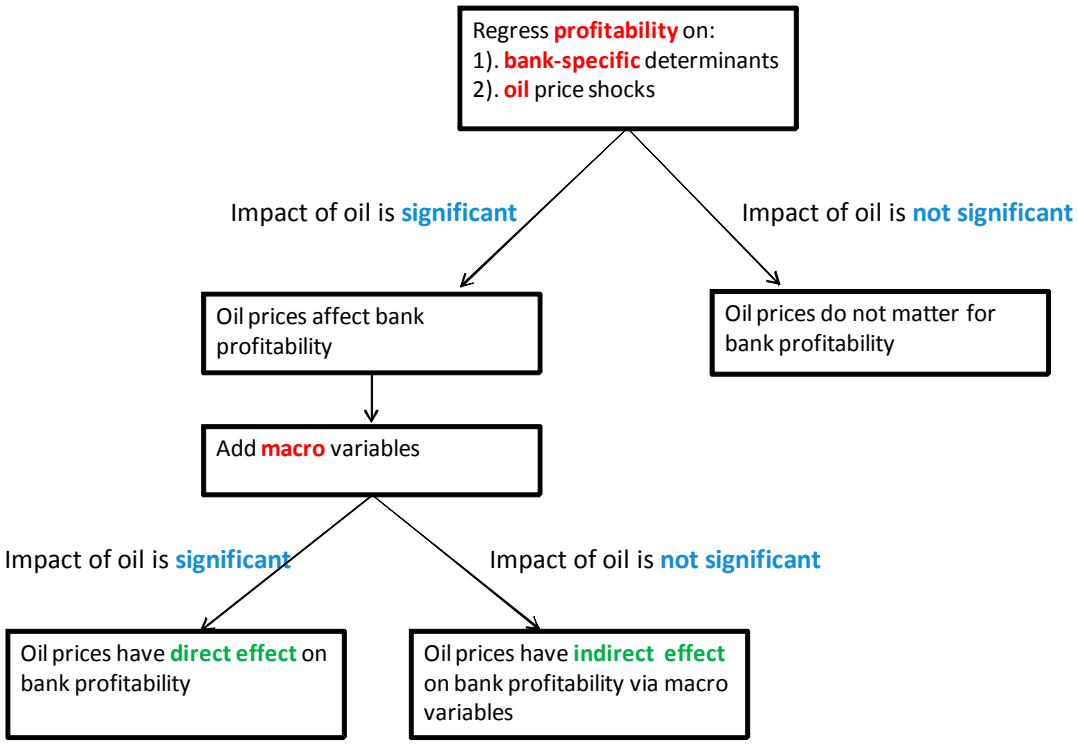
$$y_{ijt} = \alpha + \beta y_{ijt-1} + \gamma bank_{ijt} + \theta macro_{jt} + \delta oil_t + \mu_i + \varepsilon_{ijt}$$

where i, j, and t indices denote bank, country, and time, respectively; y is the bank profitability variable; *bank* and *macro* are vectors of bank-specific and country-specific determinants of bank profitability; and *oil* denotes a measure of oil price shock. Apart from state dependence (y_{ijt-1}) and observed heterogeneity ($bank_{ijt}$, $macro_{jt}$, and oil_t), the model also accounts for bank-specific unobserved heterogeneity, $\mu_i \sim N(0,\sigma_\mu)$, and random idiosyncratic errors, $\varepsilon_{ijt} \sim N(0,\sigma_\varepsilon)$.

The empirical specification above suggests that oil price shocks can affect bank profitability directly (coefficient δ) and indirectly (through their impact on macro variables and, ultimately, coefficient θ). Therefore, distinguishing between these two effects might be difficult if all explanatory variables enter the model simultaneously. To test for the hypotheses of direct and indirect impact of oil price shocks, we adopt the following empirical testing strategy (see Figure 1).

[7] Taking first differences of the regression equation removes the unobserved time-invariant bank-specific effects so there will be no omitted variable bias across time-invariant factors.

Figure 1. Hypothesis Testing Strategy



We start by including only bank-specific and oil price shock variables into the specification (1).[8] If the impact of oil prices is insignificant, then we conclude that oil prices are not related to bank profitability. Otherwise, if the impact of oil price shocks turns out to be significant, we would go one step further to distinguish between the direct and indirect effects of oil prices shocks. For this reason, we would introduce country-specific variables—that proxy for possible transmission channels of oil prices—into the model. If the impact of oil prices remains significant when country-specific variables enter the specification, then we would conclude that oil prices have a direct impact on bank profitability. Otherwise, we conclude that the impact of oil prices is indirect and channeled through country-specific variables. It is important to note that the causality runs from oil price shocks to country-specific variables, and not in the reverse order, because the share of oil exporting countries in the global economy is not that large to drive world oil prices.

[8] Notice that the robustness of GMM to omitted variable bias helps us in this setting, since exclusion of macro variables does not affect the consistency of our results.

B. Data

We use annual data for 11 MENA countries (Algeria, Bahrain, Iran, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Sudan, United Arab Emirates, and Yemen) for the period 1994–2008. The data set consists of information on three levels of aggregation: bank, country, and supra-national (i.e., oil prices, common to all countries). Descriptive statistics of all variables are reported in Table 1.

Table 1. Descriptive Statistics

Variable	Formula	Exp. impact	Mean	St. Dev.	Median	Min	Max
Dependent							
Return on assets	Profits/Total assets		2.25	2.13	1.96	-6.35	17.99
Bank-specific							
Capitalization	Capital/Total assets	+	0.16	0.12	0.13	0.02	0.94
Liquidity	Liquid assets/Deposits	+	0.72	0.73	0.54	0.05	8.67
Credit risk	Loan loss reserves/Loans	-	0.08	0.10	0.05	0.00	0.63
Inefficiency	Costs/Income	-	44.50	19.02	41.67	9.77	171.26
Size	Total assets (log)	?	14.39	1.64	14.39	10.17	17.46
Country-specific							
Inflation	CPI inflation	+	0.92	1.43	0.60	-2.54	18.49
GDP growth	Real GDP growth	+	6.11	5.04	5.49	-5.32	35.85
Fiscal stance	Gov. surplus/GDP	+	6.39	12.27	2.95	-14.03	42.86
Institutional devel.	CPIA index (World Bank)	+	4.33	0.12	4.36	3.50	4.46
Concentration	Herfindahl index (assets)	?	174.79	83.30	147.78	102.94	355.17
Supra-national (oil)							
CH	Annual growth rates		12.99	21.51	14.60	-41.02	49.64
HP	Dev. from HP		0.24	6.22	-0.70	-11.31	14.01
HM	Hamilton (2003) definition		2.21	2.88	1.67	0.00	12.44
F	Dev. from 12m forward rate		11.08	22.60	13.46	-45.78	48.75

Notes: data is winsorized at 1% and 99% percentiles to control for outliers.

Bank-specific data

The bank-level variables are obtained from the Bankscope database. We use balance sheets and income statements of 145 banks in MENA countries, out of which 87 banks are commercial, 40 are Islamic, and 18 are investment. To avoid possible outliers for such a heterogeneous sample, we exclude the 1st and 99th percentile of bank level observations from the sample.

The *dependent variable* is the return on assets (ROA), measured as the ratio of bank profits to total assets. Mean values of ROA across countries reported in Table 2 suggest several important regularities.

Table 2. Mean Bank Profitability Across Countries

	Algeria	Bahrain	Iran	Kuwait	Libya	Oman	Qatar	Saudi Arabia	Sudan	UAE	Yemen
1994	0.142	1.854	0.105	1.863	-0.560	2.038	1.200	1.326	0.720	2.282	1.396
1995	0.362	2.449	0.050	2.722	-0.425	2.560	1.360	1.611	0.980	2.006	0.924
1996	0.296	2.692	0.122	3.502	-0.010	3.381	1.618	1.923	1.932	2.610	0.635
1997	0.383	2.673	-0.012	5.362	0.145	4.325	2.639	2.145	1.129	2.519	1.060
1998	0.700	2.492	0.376	0.892	0.220	3.329	1.976	2.201	1.050	2.480	0.925
1999	0.868	2.439	0.321	3.921	0.343	1.993	1.966	1.945	0.946	2.724	1.466
2000	0.886	3.097	2.049	3.241	0.626	2.411	0.946	2.295	1.145	2.280	1.139
2001	0.894	3.210	2.945	2.351	0.239	2.471	1.815	2.918	0.606	2.251	0.690
2002	0.743	1.670	2.747	2.894	0.774	3.893	3.409	2.456	0.965	0.016	0.552
2003	0.932	2.974	2.981	7.028	0.322	4.366	3.183	2.784	1.389	2.035	0.609
2004	0.533	5.814	2.666	7.276	0.356	4.139	2.977	4.743	2.005	3.057	0.695
2005	1.451	7.670	1.602	11.947	0.574	4.834	4.614	6.702	2.969	4.768	1.177
2006	1.064	5.010	1.545	6.286	0.637	4.071	4.098	5.329	2.668	4.105	1.678
2007	1.441	7.035	1.533	8.086	1.767	4.028	4.117	4.459	2.030	3.862	1.650
2008	2.530	0.719	--	-0.979	--	2.733	3.764	2.025	2.820	1.797	1.215

Notes: reported are averages of individual bank returns on assets.

First, the numbers are relatively high for MENA countries compared to the corresponding figures in developed economies. This finding reiterates results for other emerging markets (see, e.g., Flamini and others, 2009 for Sub-Saharan Africa) and can be interpreted as a premium charged by banks for operating in an environment characterized by a generally higher level of risk. Second, profitability varies to a great extent across countries, which emphasizes the importance of differences in macro environment as well as industry and bank-specific factors for bank profitability. Figures reported in Table 3 suggest that profitability also varies across banks having different organizational structure, with investment banks being generally more profitable, compared to commercial and Islamic banks. Finally, both for different organizational types and for each country, we observe decline of bank profitability in 2008, which has been triggered by the global financial crisis. In particular, countries such as Bahrain, Kuwait, Saudi Arabia or UAE where the banking sector has played a prominent role in recent years have seen their aggregate profitability levels sharply decline during the financial crisis. Incidentally, this was the year when oil prices have peaked, suggesting a possible break in the relationship between oil prices and bank profitability in 2008.

Table 3. Mean Bank Profitability Across Bank Specialization

	Commercial	Investment	Islamic
1994	1.770	1.733	2.090
1995	1.779	2.409	1.637
1996	1.959	2.718	2.235
1997	1.981	3.967	2.434
1998	1.862	2.189	1.479
1999	1.759	2.771	1.215
2000	1.740	1.800	1.359
2001	1.579	0.458	-0.015
2002	1.889	1.930	1.325
2003	1.889	7.629	1.467
2004	2.626	9.390	2.089
2005	3.231	14.322	4.199
2006	2.786	7.231	4.158
2007	2.587	9.591	3.846
2008	1.891	2.337	3.017

Notes: reported are averages of individual bank returns on assets.

Following previous literature, we use the following bank-specific determinants of profitability:

Capitalization. We use the ratio of equity to total assets to proxy bank capitalization. This factor is expected to have a positive impact on bank profitability, because more capitalization provides a signal to the market that bank owners are investing more into the bank expecting better performance in the future. One should also bear in mind a possible reverse causation from higher profitability to more capitalization, since banks frequently put aside part of their profits to boost capitalization (Athanasoglou and others, 2008). For this reason, we model bank capitalization as an endogenous variable in the system GMM set-up.

Liquidity. We proxy bank liquidity by the ratio of liquid assets to deposits. This measure indicates how much coverage deposit liabilities of banks have in terms of liquid assets. Higher ratio indicates more liquidity, implying that banks are doing a better job in terms of liquidity management and, thus, are better-performers. Therefore, we expect a positive relationship between liquidity and profitability.

Credit risk. We proxy bank credit risk by the ratio of loan loss reserves to total loans. We acknowledge that a better credit risk measure could be the ratio of non-performing loans to total loans. However, data on non-performing loans in Bankscope database is filled out very poorly, for which reason we opted for this measure.[9] We expect a negative effect of credit risk, since higher risk exposure is normally associated with lower profitability due to write-offs of existing loans. Following Athanasoglou and others (2008), we model this variable as predetermined, since supervisory authorities usually set up specific standards for loan loss provisions in advance and bank managers try to meet these standards in their daily operations.

Inefficiency. Bank inefficiency is proxied by the cost-to-income ratio. This is a simple measure indicating how well banks manage their total costs (such as, overhead expenses) relative to their income and higher values indicate more inefficiency. It was used as a proxy for bank efficiency in numerous banking studies (see, e.g., Maudos and Fernandez de Guevara, 2004). We expect a negative association between inefficiency and profitability, since more efficient banks are expected to have larger scope for generating extra income.

Size. Bank size proxied by the logarithm of total assets is expected to have a non-linear effect on bank profitability (Boyd and Runkle, 1993; and Miller and Noulas, 1997). On the one hand, larger banks have better opportunities for exploiting scale economies and hence are expected to have higher revenues. On the other hand, the burden of bureaucracy goes up with the size of the bank, especially accelerating for mega-large banks. Hence, the impact of size on profitability is expected to reverse its sign after a size certain threshold. We use both level and squared values of this measure to capture this non-linear effect.

Country-specific data

The country-level variables are obtained from the IMF's International Financial Statistics, World Bank's World Development Indicators, and Bankscope databases. As it was shown previously, bank profitability varies to a great extent across MENA countries, which is partially attributed to the country-specific heterogeneity in terms of economic and institutional environment. Hence, we control for the following country-specific determinants of bank profitability:

Inflation. We use CPI inflation to control for economic uncertainty in the country, which is expected to have a positive effect on bank profitability, since according to the basic finance rule a higher return is expected for operating in a more risky environment. Another reason why inflation can have a positive effect on bank profitability is the mismatch between banks and businesses in terms of ability to predict inflation. Typically, banks are able to adjust interest rates in advance to avoid extra costs associated with inflation. A positive association

[9] A similar measure of credit risk was employed by Athanasoglou and others (2008).

between inflation and bank profitability was reported also in previous studies (see, e.g., Bourke, 1989; Molyneux and Thornton, 1992; and Demirguc-Kunt and Huizinga, 1998).

GDP growth. Another important variable influencing bank profitability is the economic activity in the country, proxied in our study by real GDP growth.[10] Banks are typically able to expand lending when the economy is booming and generate more fee income due to increased activity in the stock market.[11] In addition, banks generate less non-performing loans when businesses are doing well, which boosts profitability. Margins are also typically growing in periods of economic growth, contributing even further to bank profitability. Hence, consistent with previous findings (see, e.g., Demirguc-Kunt and Huizinga, 1998; Bikker and Hu, 2002; and Athanasoglou, and others 2008), we expect a positive association between bank profitability and economic activity.

Fiscal stance. Governments in most oil-exporting countries heavily rely on oil production related state revenues. Therefore, we introduce the ratio of public surplus to GDP as an additional macro control variable important to oil-exporting countries, which is expected to have a positive effect on bank profitability.

Institutional development. The level of institutional development is expected to be positively associated with the ability of banks to generate income (Demirgüç-Kunt and Huizinga, 1998). We proxy institutional development by the World Bank's Country Policy and Institutional Assessment (CPIA) composite index. This index rates countries against 16 criteria clustered in four groups: (i) economic management, (ii) structural policies, (iii) policies for social inclusion and equity, and (iv) public sector management and institutions. Higher level of index indicates better institutional policies, which is expected to have positive association with bank profitability.

Concentration. There are two competing theories exploring the relationship between the level of concentration in the banking industry and bank profitability. According to the structure-conduct-performance (SCP) theory, higher concentration boosts bank profitability, since more concentration might imply greater market power and ability to generate higher profits. In contrast to the SCP, the efficiency market hypothesis (EMH) suggests that banks in more concentrated industries are the most efficient ones, which have survived competition with their peers. Therefore, higher concentration does not necessarily imply market power and relationship between concentration and profitability does not have to be positive. We

[10] In a separate set of regressions, we have used growth of oil production as a proxy for economic activity. The results have remained qualitatively unchanged, which is not surprising given the critical importance of oil revenues in MENA countries.

[11] Unfortunately, stock market information for MENA countries is not available for the whole sample period, which prevents us from using stock prices as additional country-specific determinants of bank profitability.

proxy market concentration by the Herfindahl index (in terms of bank assets) and don't have any prior regarding the impact of this variable on profitability.

Data on oil prices

The recent rapid increase in oil prices has spurred series of studies discussing appropriate measures of oil price shocks (see, e.g., Kilian, 2008; and Hamilton, 2008). Since there is no agreement in the literature on a single measure that would constitute an oil price shock, we employ four different indicators using daily brent oil spot and 12-month forward rates collected from Bloomberg.

The *average annual growth rate* is calculated using the arithmetic mean of daily 12-month growth rates of spot prices (p_t):

$$CH_t = \frac{\sum_{i=1}^{365} [\log(p_{t,i}) - \log(p_{t-1,i})] * 100}{365}$$

This is the simplest possible measure, showing the magnitude of oil price changes over the course of the year. However, this measure does not distinguish whether changes in oil prices were in line with changes in fundamentals. To exploit this dimension, we utilize *deviations of oil prices from their underlying trend* (proxied by the Hodrick-Prescott filter, $p^{HP}{}_t$):

$$HP_t = \frac{\sum_{i=1}^{365} [\log(p_{t,i}) - \log(p^{HP}{}_{t-1,i})] * 100}{365}$$

and *deviation of oil prices from their expected value* (proxied by the 12 month forward rate, $p^f{}_t$):

$$F_t = \frac{\sum_{i=1}^{365} [\log(p_{t,i}) - \log(p^{f}{}_{t-1,i})] * 100}{365}$$

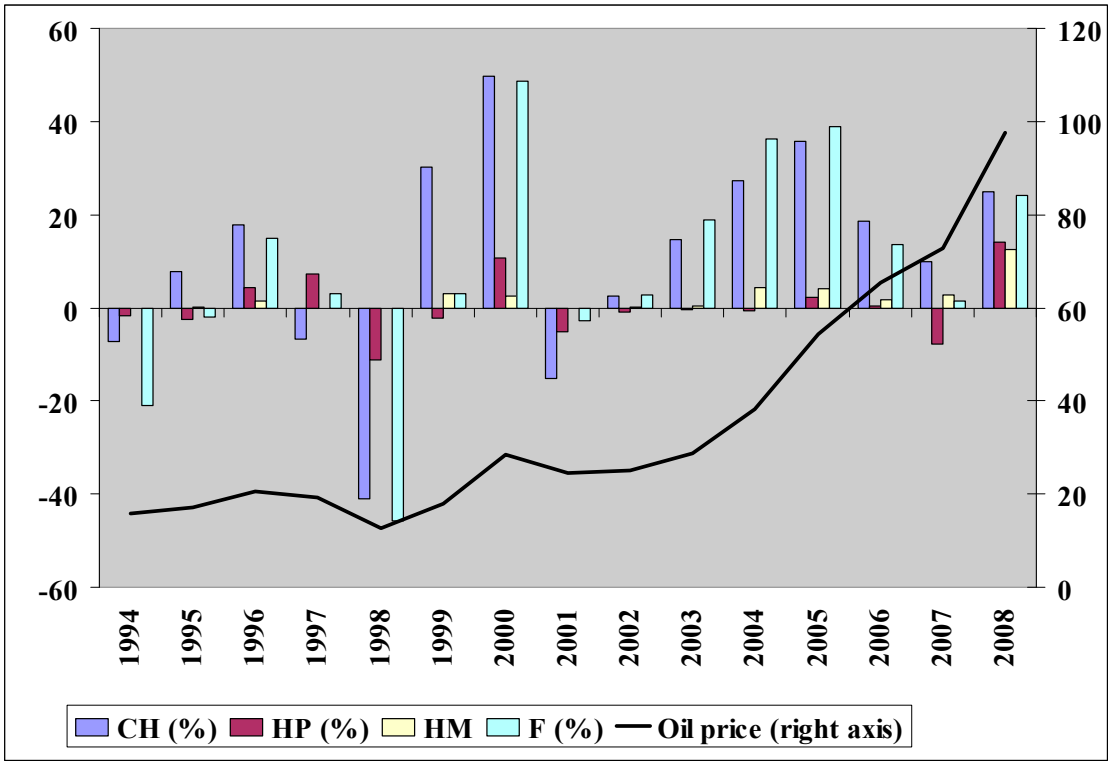
These measures are simple indicators suggesting the extent to which changes in oil prices can't be explained by changes in underlying forces driving oil prices. Lastly, we exploit the *net oil price increase* measure introduced to the literature by Hamilton (2003):

$$HM_t = \frac{\sum_{i=1}^{365} \max[0, p_{t,i} - \max_{i=\{1,365\}} [p_{t-1,i}]]}{365}$$

Hamilton (2003) shows that although the price of oil itself is not exogenous to macroeconomic developments, its non-linear transformation (amount by which current oil price exceeds its maximum value in the course of the previous year) is exogenous.

Figure 2 displays the dynamics of oil prices and four measures of oil price shocks discussed above for the 1994–2008 period. It shows that in most cases, these measures point to the same direction in terms of oil price shock. For instance, all four indicators suggest that the year 2008 features a positive oil price shock, while the year 2001 (the beginning of the Gulf war) features a negative oil price shock, which is in line with common intuition. Only in few years predictions of these different measures do not match, but this is due to the contradictory outcome from only one of the measures.

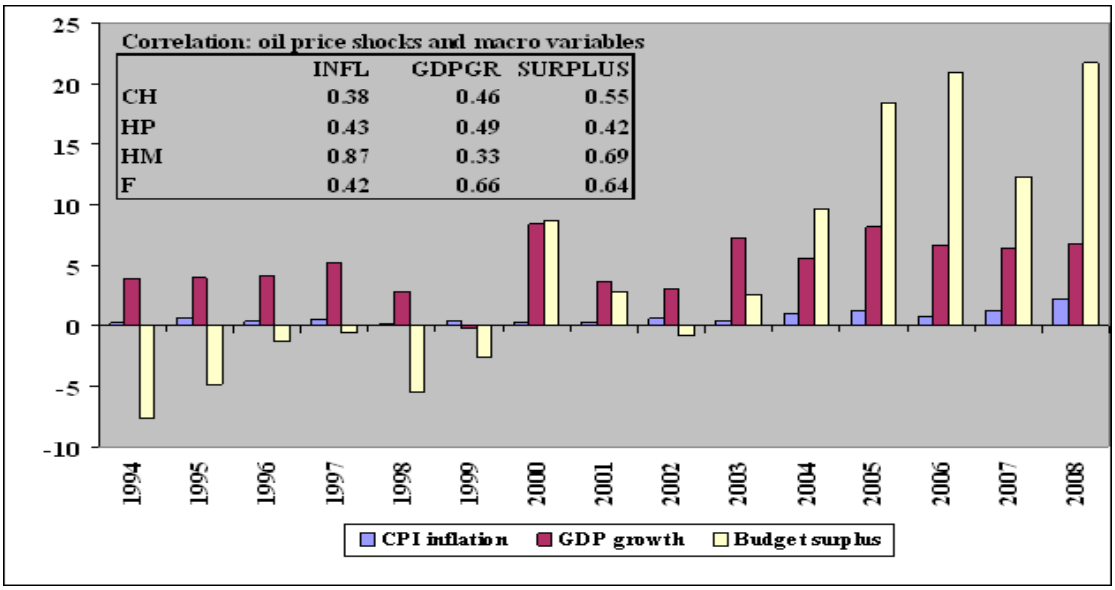
Figure 2. Dynamics of Four Measures of the Oil Price Shock



The correlation of oil price shocks with macroeconomic variables (inflation, GDP growth, and fiscal stance) appears to be quite high (see Figure 3). This high correlation indicates that oil prices have important effect on macroeconomic development in oil exporting MENA countries.[12] Therefore, indirect effect from oil price shocks to bank profitability via effects on macroeconomic variables is possible and will be tested in the next section.

[12] It is important to note that high correlation in this setup also indicates causality from oil price shocks to macroeconomic variables, and not visa versa, since economies of oil exporting MENA countries are not sufficiently large to have feedback effect on international developments in oil prices.

Figure 3. Correlation of Macro Variables and Oil Price Shocks



III. ESTIMATION RESULTS

Do oil prices matter?

We start by regressing profitability on its bank-specific determinants and oil price shocks using pre-2008 data to abstract from the impact of the global financial crisis (see Table 4). The results suggest that the impact of the oil price shock on profitability is positive and significant regardless of the definition of the oil price shock. This robust result suggests that oil prices are indeed relevant for bank profitability in MENA countries that largely depend on oil production. Whether this impact is direct or indirect is the question that we will try to address later.

Table 4. Do Oil Prices Matter?

	Annual growth (average)	Deviation from HP filter	Hamilton (2003) oil shock	Deviation from forward rate
Bank-specific variables				
ROA (lagged)	0.3070***	0.3043***	0.3073***	0.3170***
Capitalization	6.4704**	6.5959***	6.2857**	6.3775**
Liquidity	0.8064**	0.8032**	0.8206**	0.8038**
Credit risk	-1.3340	-1.4421	-1.2557	-1.3144
Inefficiency	-0.0528***	-0.0534***	-0.0514***	-0.0517***
Size	1.0441	0.9888	1.0513	0.9999
Size^2	-0.0316	-0.0289	-0.0324	-0.0301
Oil price shock	0.0035**	0.0128*	0.0614**	0.0049**
Model specification				
Number of obs.	898	898	898	898
Hansen test of OIR (p-value)	0.9899	0.9903	0.9960	0.9960
2nd order AC test (p-value)	0.6057	0.7068	0.6683	0.6922

Notes: Estimations are performed using Blundell and Bond (1998) system robust GMM estimator. Capitalization is modeled as endogenous variable, and credit risk as predetermined variable. ***, **, and * indicate significance at 10%, 5%, and 1% levels, respectively.

Among bank-specific determinants of profitability, we find a positive significant effect of capitalization and liquidity, and a negative significant effect of inefficiency, which is in line with our priors and the academic literature. The impact of credit risk and size was found to be insignificant. These results are robust across all four specifications.

For the lagged impact of profitability, we find a significant coefficient close to 0.3. This indicates the existence of market power in the MENA countries' banking industries, but the departure from perfect competition is not very large. A bit weaker evidence of profit persistence was found for Sub-Saharan African countries by Flamini and others (2009) an for Greek banks by Athanasoglou and others (2008).

Which banks are affected?

To differentiate the impact of oil prices shocks on banks having different organizational structure, we introduce interaction terms for oil price shocks with commercial, Islamic, and investment banks. Results reported in Table 5 suggest that the significant impact of oil price shocks is mainly channeled through investment banks. Apparently, investment banks benefit the most from the boost in economic activity (fee income, launch of new investment projects, cheaper access to liquidity via wholesale funding market) triggered by positive oil price shocks.

Table 5. Which Banks Are Most Affected?

	Annual growth (average)	Deviation from HP filter	Hamilton (2003) oil shock	Deviation from forward rate
Bank-specific variables				
ROA (lagged)	0.3023***	0.3047***	0.2831***	0.3114***
Capitalization	6.2564***	6.8821***	5.3152***	6.4127***
Liquidity	0.8013**	0.7698**	0.8254**	0.8179**
Credit risk	-1.6760	-1.6893	-1.8019	-1.7608
Inefficiency	-0.0528***	-0.0531***	-0.0519***	-0.0515***
Size	0.9672	1.107	0.4858	0.9019
Size^2	-0.0292	-0.0335	-0.013	-0.0271
Oil price shock interaction terms				
Commercial banks	-0.0004	0.0065	0.0122	0.0018
Investment banks	0.0357**	0.0813**	0.6720**	0.0369**
Islamic banks	-0.0047	-0.0207	-0.1915	-0.0079
Model specification				
Number of obs.	898	898	898	898
Hansen test of OIR (p-value)	0.9888	0.9875	0.9872	0.9909
2nd order AC test (p-value)	0.1962	0.4812	0.1710	0.2316

Notes: Estimations are performed using Blundell and Bond (1998) system robust GMM estimator. Capitalization is modeled as endogenous variable, and credit risk as predetermined variable. ***, **, and * indicate significance at 10%, 5%, and 1% levels, respectively.

Similarly to the previous results, the hypothesis of overidentifying restrictions can't be rejected based on the Hansen's J-test. Another test supporting the appropriateness of our specification is the second order autocorrelation test, which is insignificant in all specifications.

Is there a direct effect of oil prices on bank profitability?

To distinguish between direct and indirect effects of oil prices shocks, we augment the baseline specification by a set of country-specific variables. Estimation results reported in Table 6 suggest that the impact of oil prices becomes insignificant when country-specific variables are accounted for. This implies that there is no direct effect from oil price shocks and the overall impact is channeled through macro variables. In particular, inflation and the fiscal stance appear to be the main macro drivers of bank profitability.

Table 6. Is There An Indirect Oil Price Effect?

	Annual growth (average)	Deviation from HP filter	Hamilton (2003) oil shock	Deviation from forward rate
Bank-specific variables				
ROA (lagged)	0.2254**	0.2310**	0.2279**	0.2393**
Capitalization	5.2450**	5.2462**	5.1671**	5.1953**
Liquidity	0.8977**	0.8940**	0.9050**	0.8996**
Credit risk	-0.9558	-1.0138	-0.9419	-0.9534
Inefficiency	-0.0478***	-0.0467***	-0.0474***	-0.0466***
Size	2.1593	2.1287	2.1329	2.1621
Size^2	-0.0768	-0.0751	-0.0761	-0.0764
Macro variables				
Inflation	0.2233**	0.2550**	0.2219**	0.2365**
Real GDP growth	-0.0143	-0.0217	-0.0137	-0.0193
Fiscal stance	0.0315**	0.0293**	0.0313**	0.0279*
Concentration	-0.0038	-0.0035	-0.0038	-0.0037
Institutional devel.	-0.5806	-0.0089	-0.4249	-0.2136
Oil price shock	0.0002	0.0116	0.0107	0.0027
Model specification				
Number of obs.	898	898	898	898
Hansen test of OIR (p-value)	0.9889	0.9889	0.9895	0.9908
2nd order AC test (p-value)	0.8117	0.8237	0.8149	0.7876

Notes: Estimations are performed using Blundell and Bond (1998) system robust GMM estimator. Capitalization is modeled as endogenous variable, and credit risk as predetermined variable. ***, **, and * indicate significance at 10%, 5%, and 1% levels, respectively.

Has the global financial crisis had an impact?

The preliminary examination of descriptive statistics suggests that the relationship between oil price shocks and bank profitability might have been broken in 2008, when positive oil price shocks have coincided with a rapid decline in bank profitability in MENA countries due to the global financial crisis. To evaluate the impact of the financial crisis we re-estimate the first model for the total sample (covering also the 2008 data). Estimation results reported in Table 7 provide support for the hypothesis of a weakened relationship, since the oil price shock coefficients become insignificant for two out of four specifications.

Table 7. Has the Financial Crisis Had An Impact?

	Annual growth (average)	Deviation from HP filter	Hamilton (2003) oil shock	Deviation from forward rate
Bank-specific variables				
ROA (lagged)	0.3091***	0.3005***	0.2999***	0.3170***
Capitalization	7.1781***	7.3261***	7.4165***	7.1011***
Liquidity	0.7497**	0.7529**	0.7360**	0.7499**
Credit risk	-1.0973	-1.1440	-1.1905	-1.0802
Inefficiency	-0.0557***	-0.0570***	-0.0573***	-0.0548***
Size	1.254	1.2648	1.2007	1.2298
Size^2	-0.0406	-0.0406	-0.0378	-0.0398
Oil price shock	0.0031**	-0.0007	-0.0154	0.0043**
Model specification				
Number of obs.	956	956	956	956
Hansen test of OIR (p-value)	0.9940	0.9938	0.9950	0.9920
2nd order AC test (p-value)	0.8677	0.8680	0.8009	0.9579

Notes: Estimations are performed using Blundell and Bond (1998) system robust GMM estimator. Capitalization is modeled as endogenous variable, and credit risk as predetermined variable. ***, **, and * indicate significance at 10%, 5%, and 1% levels, respectively.

This result emphasizes the importance of accounting for the impact of multiple global shocks when analyzing the relationship between oil prices and bank profitability. A decomposition of the impact by banking groups provides outcomes similar to the ones for the pre-2008 sample (see Table 8).

Table 8. Which Banks Are Most Affected? (Total Sample, Including Year 2008)

	Annual growth (average)	Deviation from HP filter	Hamilton (2003) oil shock	Deviation from forward rate
Bank-specific variables				
ROA (lagged)	0.2409**	0.2351**	0.2169**	0.2488**
Capitalization	5.5260**	5.8606**	5.8266**	5.6624**
Liquidity	0.8517**	0.8233**	0.8053**	0.8709**
Credit risk	-1.1469	-0.9657	-1.1542	-1.2612
Inefficiency	-0.0521***	-0.0519***	-0.0505***	-0.0512***
Size	1.8069	1.8975	2.1063	1.7782
Size^2	-0.0671	-0.0709	-0.0747	-0.0661
Macro variables				
Inflation	-0.0028	-0.0035	-0.0033	-0.0030
Real GDP growth	0.1698*	0.1661**	0.2666**	0.1770**
Fiscal stance	-0.0132	-0.0102	-0.0114	-0.0214*
Concentration	0.0307**	0.0365**	0.0369**	0.0281*
Institutional devel.	0.2739	-0.1660	-1.0001	0.5630
Oil price shock interaction terms				
Commercial banks	-0.0032	-0.0094	-0.0499*	-0.0006
Investment banks	0.0310**	0.0562	0.2406	0.0342**
Islamic banks	-0.0100	-0.0615	-0.1961*	-0.0131
Model specification				
Number of obs.	956	956	956	956
Hansen test of OIR (p-value)	0.9929	0.9952	0.9949	0.9938
2nd order AC test (p-value)	0.3224	0.3689	0.3408	0.2687

Notes: Estimations are performed using Blundell and Bond (1998) system robust GMM estimator. Capitalization is modeled as endogenous variable, and credit risk as predetermined variable. ***, **, and * indicate significance at 10%, 5%, and 1% levels, respectively.

IV. CONCLUSIONS

The importance of oil prices for the economic development of oil-exporting countries is widely acknowledged. However, the impact of oil prices shocks on bank performance has lacked a rigorous empirical analysis so far. This paper fills this gap by providing a quantitative assessment of the impact of oil price shocks on bank profitability in oil-exporting MENA countries.

We distinguish between direct and indirect channels through which oil price shocks may affect bank profitability. The former channel assumes that oil price shocks could affect bank profitability directly via increased oil-related lending or business activity. The indirect channel suggests that the impact is transmitted through macroeconomic and institutional characteristics of the countries bolstered by increased expectations and business sentiment in the country. The estimation results lend support for the indirect channel hypothesis. We find no evidence supporting the direct channel hypothesis.

Among the organization structure of banks, we find that the impact of oil prices is most evident for investment banks, while there is less evidence supporting that commercial and Islamic banks are also affected to the same extent. This result suggests that oil price shocks largely affect investment activity in oil-exporting MENA countries. However, this result should be interpreted with caution, since we do not control for the impact of house prices, which might be very influential determinants of profitability for Islamic banks. In addition, given the heterogeneity of the bank balance sheet data across the countries, we might not be fully capturing this relationship between bank type and oil price shocks.

We also find that the relationship between oil price shocks and bank profitability has been distorted by the global financial crisis, when positive oil price shocks have coincided with declining bank profits in 2008. This finding suggests that the impact of global shocks other that oil price developments should be taken into account when analyzing the relationship between oil price shocks and bank profitability.

Our findings have interesting policy implications, since they provide the first evidence of a systemic importance of oil price shocks for bank performance in oil-exporting countries. There has been anecdotal evidence of this link but it has not been tested formally in an empirical setting. In particular, these findings suggest that oil price shocks could be used for macroprudential regulation purposes in MENA countries, since oil prices are easier to monitor than commonly used measures of business cycle (such as deviations of GDP from its potential level). For instance, tying bank capitalization to oil price shocks can help to mitigate procyclical bank lending and allow banks to use their capital cushions created during boom periods for lending purposes during downturns.

REFERENCES

Angbazo, Lazarus, 1997, "Commercial Bank Net Interest Margins, Default Risk, Interest-Rate Risk and Off-Balance Sheet Banking," *Journal of Banking and Finance,* Vol. 21 (January), pp. 55–87.

Arellano, Manuel, and Stephen R. Bond, 1991, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies,* Vol. 58(April), pp. 277–97.

Arellano, Manuel, and Olympia Bover, 1995, "Another Look at the Instrumental Variable Estimation of Error-Component Models," *Journal of Econometrics,* Vol. 68, Issue 1, pp. 29–51.

Athanasoglou, Panayiotis, Matthaios D. Delis, and Christos Staikouras, 2006, "Determinants of Bank Profitability in the South Eastern European Region," Bank of Greece Working Paper No. 47.

Athanasoglou, Panayiotis, S. Brissimis, and M. Delis, 2008, "Bank-Specific, Industry-Specific and Macroeconomic Determinants of Bank Profitability," *Journal of Financial Markets, Institutions, and Money,* Vol. 18, pp. 121–36.

Baltagi, Badi H., 2001, *Econometric Analysis of Panel Data* (Chichester; New York: John Wiley & Sons).

Berger, Allen N., 1995a, "Profit-Structure Relationship in Banking—Test of Market-Power and Efficient-Structure Hypotheses," *Journal of Money, Credit and Banking,* Vol. 27 (May), pp. 404–31.

———, 1995b, "The Relationship Between Capital and Earnings in Banking," *Journal of Money, Credit and Banking,* Vol. 27 (May), pp. 432–56.

Berger, A.N., S.D. Bonime, D.M. Covitz, and D. Hancock, 2000, "Why Are Bank Profits So Persistent? The Roles of Product Market Competition, Informational Opacity, and Regional/Macroeconomic Shocks," *Journal of Banking and Finance,* Vol. 24, pp. 1203–1235.

Bikker, J. and H. Hu, 2002, "Cyclical Patterns in Profits, Provisioning and Lending of Banks and Procyclicality of the New Basel Capital Requirements," *BNL Quarterly Review,* Vol. 221, pp. 143–75.

Bourke, P., 1989, "Concentration and Other Determinants of Bank Profitability in Europe, North America and Australia," *Journal of Banking and Finance,* Vol. 13, pp. 65–79.

Boyd, J. and D. Runkle, 1993, "Size and Performance of Banking Firms: Testing the Predictions of Theory." *Journal of Monetary Economics,* Vol. 31, pp. 47–67.

Cihák, Martin, and Heiko Hesse, 2008, "Islamic Banks and Financial Stability: An Empirical Analysis," IMF Working Paper 08/16 (Washington: International Monetary Fund).

Demirguc-Kunt, A., and H. Huizinga, 2000, "Financial Structure and Bank Profitability," *Policy Research Working Paper Series* 2430 (Washington: The World Bank).

———, 1998, "Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence," *World Bank Economic Review,* Vol. 13, pp. 379–408.

Flamini, V., C. McDonald, and L. Schumacher, 2009, "The Determinants of Commercial Bank Profitability in Sub-Saharan Africa," IMF Working Paper 09/15 (Washington: International Monetary Fund).

Gelos, G., 2006, "Banking Spreads in Latin America," IMF Working Paper 06/44 (Washington: International Monetary Fund).

Hamilton, J., 2003, "What is An Oil Shock?" *Journal of Econometrics,* Vol. 113 (2), pp. 363–98.

———, 2008, "Oil and the Macroeconomy," In *The New Palgrave Dictionary of Economics,* Second edition, ed. Steven N. Durlauf and Lawrence E. Blume. Houndmills, U.K. and New York: Palgrave Macmillan.

Kilian, L., 2008, "The Economic Effects of Energy Price Shocks," *Journal of Economic Literature,* Vol. 46 (4), pp. 871–909.

Maudos, J., and J. Fernandez de Guevara, 2004, "Factors Explaining the Interest Margin in the Banking Sectors of the European Union," *Journal of Banking and Finance,* Vol. 28, pp. 2259–81.

Miller, S.M., and A.G. Noulas, 1997, "Portfolio Mix and Large-Bank Profitability in the USA," *Applied Economics,* Vol. 29, pp. 505–12.

Molyneux, P. and J. Thornton, 1992, "Determinants of European Bank Profitability: A Note," *Journal of Banking and Finance,* Vol. 16, pp.1173–78.

Saunders, A. and L. Schumacher, 2000, "The Determinants of Bank Interest Rate Margins: An International Study," *Journal of International Money and Finance,* Vol. 19, pp. 813–32.

Short, B.K., 1979, "The Relation Between Commercial Bank Profit Rates and Banking Concentration in Canada, Western Europe and Japan," *Journal of Banking and Finance,* Vol. 3, pp. 209–19.

Smirlock, M., 1985, "Evidence on the (Non) Relationship Between Concentration and Profitability in Banking," *Journal of Money, Credit, and Banking,* Vol. 17, pp. 69–83.