UNIVERSITY OF SANTIAGO DE COMPOSTELA

DEPARTMENT OF FINANCE AND ACCOUNTING

UNIVERSIDAD DE SANTIAGO DE COMPOSTELA

DEPARTAMENTO DE ECONOMÍA FINANCIERA Y CONTABILIDAD

HOW MARKET STRUCTURE AND EFFICIENCY INFLUENCE PROFITABILITY AND RISK TAKING OF BANKS IN MENA COUNTRIES?

¿Cómo afecta la estructura de Mercado y la eficiencia a la rentabilidad y al riesgo de los bancos en los países de Oriente Medio y África del Norte?

Alaa Sobhi Razia

Doctoral Thesis

Santiago de Compostela, 2016

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

UNIVERSIDAD DE SANTIAGO DE COMPOSTELA

DEPARTAMENTO DE ECONOMÍA FINANCIERA Y CONTABILIDAD

HOW MARKET STRUCTURE AND EFFICIENCY INFLUENCE PROFITABILITY AND RISK TAKING OF BANKS IN MENA COUNTRIES?

¿Cómo afecta la estructura de Mercado y la eficiencia a la rentabilidad y al riesgo de los bancos en los países de Oriente Medio y África del Norte?

Tesis para obtener el grado de doctor, presentada por el señor licenciado. Alaa Razia, que se realizó en el Departamento de Economía Financiera y Contabilidad de la Universidad de Santiago de Compostela, bajo la dirección de Don Luis Alberto Otero González, profesor titular de Economía Financiera y Contabilidad.

D. Luis Alberto Otero González

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

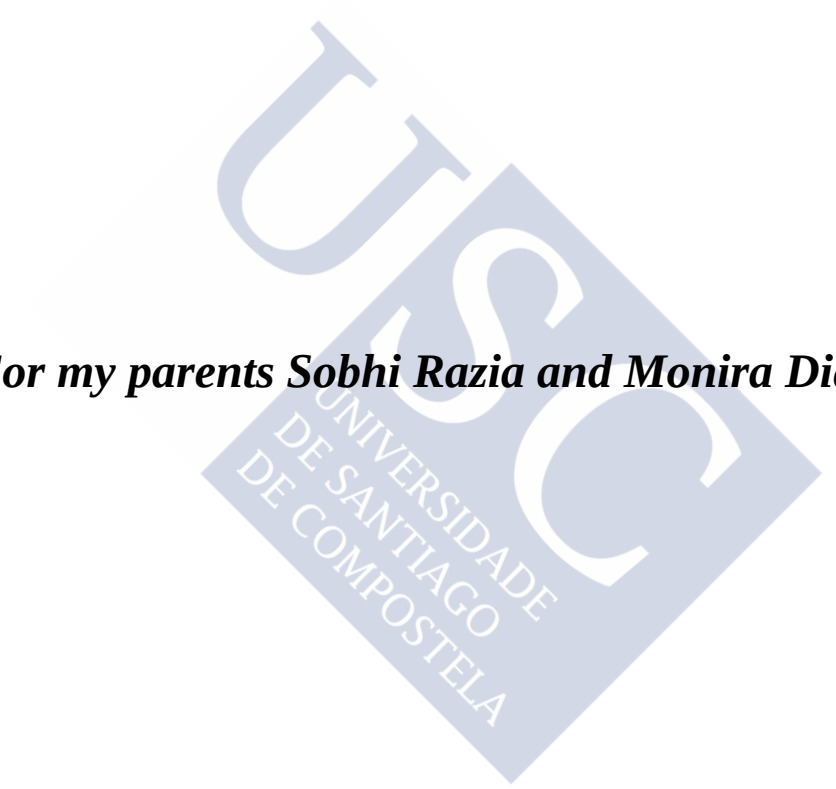
D. LUIS ALBERTO OTERO GONZÁLEZ, profesor titular del Departamento de Economía Financiera y Contabilidad de la Universidad de Santiago de Compostela.

CERTIFICAMOS que D. Alaa Sobhi Razia ha realizado bajo nuestra dirección el trabajo de investigación "¿Cómo afecta la estructura de Mercado y la eficiencia a la rentabilidad y al riesgo de los bancos en los países de Oriente Medio y África del Norte?". Este trabajo reúne las condiciones necesarias para ser presentado y juzgado como tesis doctoral y, por tanto, para optar al grado de doctor en Ciencias Económicas y Empresariales.

Santiago de Compostela, 2016

Prof. Dr. Luis Alberto Otero González
Profesor Titular del Departamento de
Economía Financiera y Contabilidad
Universidad de Santiago de Compostela

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA



For my parents Sobhi Razia and Monira Diab

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

Acknowledgment

Perhaps is this acknowledgement the hardest part to write in this dissertation. This time however, it is not for the lack of ideas or the difficulty to find an interpretation, but because of the intensity of my feelings of gratitude and indebtedness to all those individuals who supported me in every way and supplied me generously with their encouragement and guidance that were my source of confidence and energy all along the path.

I was blessed to have Dr. Luis Alberto Otero González as a supervisor of my thesis. His patience, dedication and knowledge that he reaches out with no hesitation were a crucial source of support without which this thesis could hardly ever have seen the light.

Furthermore, I am grateful to the European Commission and Erasmus Mundus Program for the opportunity to complete my doctoral study in Spain and have such a wonderful international experience here.

A very special acknowledgement should go to my parents back home. Their unconditional encouragement and support was the most important contribution in keeping up high spirits throughout my PhD journey.

I also would like to express my wholehearted feelings of gratefulness to my wife who granted me her unconditional support, and to my kid Omar who embraced me with their love and to whom I owe what I have reached today, I dedicate this dissertation.

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

Abstract

This thesis explores three important topics which contribute to the study of bank efficiency, competition, profitability and financial stability. In the Chapter 2 "The Impact of Bank Competition on Risk-Taking: the case of MENA countries", we empirically analyze the effect of bank competition and other determinants on risk-taking for banks in MENA countries. Next Chapter 3 "Determinants of bank efficiency in MENA countries", measures cost efficiency, and empirically analyzes the factors that affect bank efficiency. Finally, in the Chapter 4 "Market Structure, Performance, and Efficiency of the MENA Banking Sector", we test the four competing hypotheses that explain bank performance (SCP, RMP, ES and QLH). The chapters are independent of each other in terms of theoretical grounding and methodology but complement each other by investigating the three different angles related.

The relation between bank competition measures and financial stability, in terms of H-statistic and Herfindhal support "competition fragility hypothesis" for the main model. This result could be explained by "Contestability" literature, where more competition could be associated with more concentration, which is supported by Bikker and Haff (2002). This relationship is symmetric in the case of Gulf countries. However, when we analyze the result for the Non-Gulf countries sample we find the opposite relationship, supporting "competition stability hypothesis. This could mean that the effect of the level of competition on banking stability may vary depending on the level of competition. Since in Non-Gulf countries the level of competition is less than in Gulf ones, an increase in competition could be positive in terms of financial stability. Increased competition could encourage more efficient and profitable behavior of banks. However, in the case of the Gulf countries, otherwise occur as a result of operating in a competitive environment. This would mean that, moderate levels of competition seem to be good for financial stability.

Furthermore, our findings indicate that there is a rise in the cost efficiency scores of banks in MENA region from 2005 to 2012, but the improvement in efficiency was not continuous over the sample period. Moreover, the results indicate that there is a notable wide range of variation in efficiency levels over the countries covered in the sample. Another interesting result indicate that conventional commercial banks, on average, are most cost efficient than Islamic banks. Also, the results find that bank size and profitability affect positively bank efficiency.

Last chapter reveals that neither the structure conduct performance nor the efficient structure hypotheses hold in MENA countries. Our evidence goes with the relative market power hypothesis that suggests that banks with higher market share are able to exercise their market power to obtain higher profits by setting higher prices. Furthermore, Cost efficiency has a significant effect upon bank profitability and the policy makers should adopt policies that promote further competition in some countries with concentrated markets and low level of competition.

Overall, to improve the performance and efficiency of MENA commercial banking industry and to create a more competitive environment, the supervisory authorities in these countries should continue to reinforce reforms by further liberalizing the banking sector and financial market, completing legal and regulatory reforms, and expanding the role of private sector in the process of economic development. Moreover, commercial banks in MENA countries have to draw suitable strategies to obtain an optimal size and to establish large entities in order to be more efficient and to face the challenges and risks of banking activities, locally and internationally.

Resumen

Esta tesis analiza tres temas importantes que contribuyen al estudio de la eficiencia bancaria, la competencia, la rentabilidad y la estabilidad financiera. En el Capítulo 2 "El impacto de la competencia bancaria en la toma de riesgos: el caso de los países de Oriente Medio y Norte de ÁFRICA", se analiza empíricamente el efecto de la competencia bancaria y otros factores determinantes en la toma de riesgos para los bancos en los países de la región MENA. Como una medida aproximada del riesgo, usamos la ratio Z-score. Esten indicador se utiliza a menudo en los estudios empíricos para determinar el riesgo y la estabilidad financiera de un banco. En términos de la competencia bancaria, utilizamos el índice de Herfindahl (IHH), que es una medida de concentración de la industria, que se define como la suma de los cuadrados de las cuotas de mercado de cada empresa que opera en un mercado dedicado. Al mismo tiempo, se utiliza el estadístico H para evaluar el nivel de competencia bancaria inherente a cada país. A través de esta prueba se puede determinar si la industria opera en términos de competencia perfecta, monopolio puro o competencia monopolística. El estadístico H se calcula a partir de una forma reducida de la ecuación de ingresos y mide la suma de las elasticidades de los ingresos totales de la empresa con respecto a los precios de los inputs. Además de esto, utilizamos variables específicas bancarias y variables específicas de cada país que puedan afectar a la estabilidad financiera. En tercer lugar, evaluamos el efecto de la competencia y de otros factores sobre la toma de riesgos de la banca.

Un objetivo principal de nuestro trabajo se refería a la identificación de los determinantes de la toma de riesgos en los países de la región MENA. En concreto, se pretende analizar cómo afecta la competencia bancarian al riesgo asumido. Tenemos la intención de averiguar si el nivel de competencia bancaria puede afectar el comportamiento de los bancos en términos de riesgo. Además, se trata de analizar el efecto de otras variables tales como, tamaño de los bancos, el nivel de capital, el crecimiento de los préstamos, y el crecimiento de los activos, además de considerar asimismo otros factores macroeconómicos. En concreto, se incluyen variables macroeconómicas como el crecimiento, el PIB per cápita y la inflación. Además, analizamos si los países del Golfo tienen un mayor nivel de competencia en comparación con los demás o no.

En el cumplimiento de nuestros objetivos de investigación anterior, hemos utilizado los datos obtenidos de la base de datos BankScope, proporcionada por Fitch / Bureau Van Dijk, que contiene información relativa a los bancos comerciales, tomando como período de

estudio los años comprendidos entre 2005 y 2012. La modelización se hace utilizando paneles dinámicos a través del método generalizado de los momentos (GMM).

Nuestros resultados resultan significativos para un número importante de variables. En primer lugar, en cuanto a la totalidad de la muestra, nos encontramos con que el estadístico H de Panzar-Rosse es de 0,42, lo que indica que la banca MENA está en un estado de competencia monopolística. Mientras tanto, el índice de Herfindahl es 0,13, que significa moderadamente concentrado, lo que implica que ambos índices apuntan en la misma dirección. En segundo lugar, en cuanto a los países del Golfo, los resultados muestran que tienen un mayor nivel de competencia que los países que no son del Golfo, en términos del estadístico-H.

La relación entre las medidas de la competencia bancaria y la estabilidad financiera, en términos del estadístico-H, es compatible con la " hipótesis de fragilidad" para el modelo principal, dominada por los países del Golfo. Sin embargo, hemos encontrado que la concentración se correlaciona positivamente con la competencia, si bien hemos encontrado mercados en los que la correlación puede ser positiva o negativa. Esto significa que la competencia puede existir en mercados concentrados o no concentrados. Este resultado, en el caso de correlación positiva, podría explicarse por la literatura de "disputabilidad", donde más competencia podría estar asociada a una mayor concentración. Esta relación es simétrica en el caso de los países del Golfo para el promedio, pero los que no son del Golfo no es significativa.

Sin embargo, cuando analizamos el resultado para la muestra de países que no son del golfo encontramos la relación opuesta, apoyando la hipótesis de "competencia-estabilidad". Al mismo tiempo, el efecto se explica por el estadístico-H pero no por Herfindahl. Esto podría significar que el efecto del nivel de la competencia en la estabilidad bancaria puede variar dependiendo del nivel de la competencia. Dado que en los países que no son del Golfo el nivel de competencia es menor, un aumento de la competencia podría ser positivo en términos de estabilidad financiera. El aumento de la competencia podría fomentar un comportamiento más eficiente y rentable de los bancos. Sin embargo, en el caso de los países del Golfo, ocurre lo contrario como consecuencia de operar en un entorno más competitivo. Esto significaría que los niveles moderados de la competencia parecen ser buenos para la estabilidad financiera.

En términos de variables específicas bancarias, nuestros resultados indican que la capitalización (capital / activos) tiene relación negativa con la estabilidad financiera en el modelo que incluye todos los países.

En cuanto a las variables macroeconómicas, nuestros resultados indican que el crecimiento del PIB tiene efectos positivos sobre la estabilidad financiera en todos los casos (modelo principal, países del Golfo, los países no del Golfo) mientras que la tasa de inflación tiene un efecto negativo.

La principal implicación de nuestro estudio es el apoyo a políticas de incremento de competencia en la industria bancaria, espcialmente en los países que no son del Golfo, en particular, Túnez, Argelia y Jordania, debido a que en estos países el indicador de competencia se conrrelaciona negativamente con la concentración, que a su vez mejora la estabilidad financiera. Por esto motivo, se pueden reducir las barreras a la entrada de bancos, un menor número de restricciones a las actividades bancarias, mayor libertad económica y una mayor calidad de la regulación.

Si bien la competencia puede conducir a la fragilidad financiera en un marco institucional débil, es importante centrarse en la mejora del marco institucional, en lugar de limitar la competencia. Es cierto que existen maneras de minimizar las posibles relaciones entre la competencia y la estabilidad, como crear herramientas de gestión del riesgo adecuadas, así como el establecimiento de marcos de supervisión y regulación fuertes.

En general, para mejorar la competencia sin poner en peligro la estabilidad financiera, las autoridades deberían centrarse en el fomento de un marco de incentivos adecuado. Estos incentivos consistirán en el diseño de políticas de entrada y salida y la regulación prudencial y la supervisión. Ante una crisis, la manera en que se aplican las disposiciones de acción y resolución bancaria y reestructuración correctivas rápidas puede ayudar a minimizar los posibles problemas de riesgo moral y evitar la excesiva toma de riesgos, así como minimizar los costes fiscales a los contribuyentes. El marco regulador también tiene que encontrar el equilibrio adecuado entre poner freno a los excesos, evitando los posibles efectos contrarios a la competencia. Por ejemplo, los requisitos de capital, la divulgación de información, así como el funcionamiento y una mayor transparencia en la fijación de precios son los tipos de acciones que mejorarían la supervisión sin menoscabo de la competencia. Por el contrario, el aumento de los costos regulatorios que elevan las barreras de entrada en el sector financiero

hacen que los mercados menos competitivos, privando a los países de muchos de los beneficios de un sistema bancario eficiente e innovador.

Por otro lado, las autoridades monetarias deben adoptar regulaciones para promover el crecimiento del PIB y luchar contra la inflación, ya que esto conducirá a la estabilidad financiera.

En el capítulo siguiente, "Determinantes de la eficiencia bancaria en los países de la región MENA", se mide la eficiencia de costes, y se analizan empíricamente los factores que afectan la eficiencia bancaria. En este estudio, se estudia la eficiencia de costes en lugar de la eficiencia técnica, debido a que la eficiencia de costes es un concepto más amplio que la eficiencia técnica, ya que se refiere tanto a la eficiencia técnica y como a la asignativa. La definición de la eficiencia de costes corresponde a un objetivo económico importante: la minimización de costes. Esta se define como una medida de a que distancia los costes de banco se encuentran de los costes del banco con mejores prácticas si ambos producen el mismo output bajo las mismas condiciones del entorno. Se mide como la relación entre el coste mínimo en el que es posible alcanzar un volumen dado de la producción y los costos observados de la empresa.

Usamos el análisis de frontera estocástica (SFA), como el desarrollado por Aigner et al. (1977), para estimar la frontera de eficiencia de costes. La principal ventaja de la SFA sobre Análisis Envolvente de Datos (DEA), es que nos permite distinguir entre la ineficiencia y otros shocks estocásticos en la estimación de los niveles de eficiencia. Además, mediante el uso de este modelo, es más fácil para agregar variables de control en la ecuación de este modelo, como las variables a nivel de país, que en las técnicas no paramétricas. Por lo tanto, este enfoque nos permite comparar la eficiencia entre el país y la eficiencia de los bancos convencionales e islámicas.

La frontera estocástica es estimada utilizando modelos que permiten que el término de ineficiencia sigua una determinada distribución Greene (2005). Este estudio considera la estimación del modelo de "verdaderos" efectos fijos (TFE) de Greene (2005), tratando de resolver el problema de los parámetros incidentales que afecta a su estimador de máxima verosimilitud de variables ficticias (MLDVE). Estos modelos se conocen como "verdaderos modelos de frontera", ya que son una extensión directa de la frontera marco original (en consonancia con Aigner et al., 1977) para datos de panel. Por lo tanto, tal como se formula, el

término ineficiencia se mantiene en el modelo y el efecto fijo está destinado únicamente para capturar la heterogeneidad específica de la empresa.

Al igual que en muchos otros estudios, el enfoque de intermediación se aplica con el fin de medir la eficiencia, lo que supone que la principal función de un banco es la de intermediar fondos entre los depositantes y prestatarios al menor coste posible. De acuerdo con el enfoque de intermediación, los bancos están produciendo dos salidas (préstamos, y otras actividades fuera de balance), y el empleo de tres entradas (capital, mano de obra y depósitos). Todas las variables se miden en millones de dólares estadounidenses.

Utilizando una función translogarítmica con tres precios de entrada, dos salidas y tres variables a nivel de país, teniendo todos los bancos de la región MENA en conjunto, los resultados del análisis muestran un valor medio de eficiencia del 77%. También es interesante observar que hay un aumento en los índices de eficiencia de costes de los bancos en la región MENA 2005-2012, pero la mejora en la eficiencia no es continua durante el período de la muestra.

En cuanto a los índices de eficiencia de los bancos en diferentes países de esta región, los resultados empíricos indican que hay una amplia variedad en lo que respecta a la variación en los niveles de eficiencia. La variación en términos de eficiencia de costes es del 19% entre los países. Geográficamente, Israel (86%) es la más eficiente, mientras que los bancos kuwaitíes (67%) son los menos eficientes. Los resultados también muestran que los bancos en Jordania (82%), Túnez (82%) y Omán (80%) en promedio tienen una puntuación más alta en comparación con otros países. En vista de estos resultados, parece que todavía hay espacio para la mejora de la eficiencia de los bancos en esta región. Estos países, especialmente Kuwait y Marruecos, necesitan continuar el proceso de reformas con el fin de mejorar las condiciones de coste y mejorar el desempeño del sector financiero.

Entre otros resultados interesantes de este estudio, nos encontramos con que los bancos comerciales convencionales en los países MENA, en promedio, son más eficientes en costes que los bancos islámicos en los países que no pertenecen al Golfo. La menor eficiencia de los bancos islámicos podría explicarse por varias razones. En primer lugar, debido menor tamaño de los activos de los bancos islámicos en comparación con los bancos convencionales, estos bancos no se benefician de las economías de escala y en consecuencia aún no están listos para competir con sus homólogos convencionales. En segundo lugar, muchos estudios concluyen que el costo de los fondos y mano de obra en los bancos

islámicos es mayor cuando se compara con los de los bancos convencionales. Este hallazgo puede explicarse por la estructura de los bancos islámicos, que tiende a ser más compleja y por la mayor remuneración ofrecida para retener experiencia en la banca islámica. Por último, los bancos islámicos son relativamente menos eficientes en la contención de costes debido a que operan en el entorno reglamentario general que no penaliza sus operaciones.

Después de haber calculado los niveles de eficiencia de costes de los diferentes sistemas bancarios de los países de esta región, es interesante identificar las posibles fuentes de ineficiencia entre los bancos. Los resultados indican que el tamaño del banco medido por el total de activos tiene un efecto positivo en la eficiencia de costes. Esto sugiere que la consolidación de los bancos más pequeños en la región contribuiría a una mayor eficiencia de costes en el sector bancario, así como la estabilidad financiera, pero al mismo tiempo, esta acción debe ser mediante el control de la concentración.

Además, los resultados del estudio también muestran que los bancos con mayor nivel de capital y la rentabilidad económica (ROAA) tienden a ser más eficiente, lo que significa que los bancos bien capitalizados y altamente rentables tienen costes menores. En cuanto a las variables a nivel de país como, la inflación y el PIB per cápita, el análisis de regresión indica que esta variable es inversamente proporcional a la eficiencia en costes. Esto implica que los bancos con menor inflación y mayor PIB per cápita exhiben un mayor nivel de eficiencia. Varios estudios afirman que los países con un ingreso per cápita alto se asocian con una gran demanda de productos financieros, los cuales conducen a un menor control de sus gastos. Mientras tanto, la tasa de inflación provoca un aumento de los costes, tipos de interés y morosidad; esto reduciría la eficiencia de los bancos.

Las políticas bancarias deben promover el aumento de la rentabilidad, ya que como vemos unas mayores ganancias afectan a los niveles de eficiencia. Por otra parte, las autoridades monetarias deberían adoptar políticas que podrían aumentar el tamaño de los bancos, controlando el nivel de concentración, ya que, según nuestro análisis, esto se asocia con una mayor eficiencia y estabilidad.

También las autoridades bancarias deberían adoptar políticas que reduzcan el nivel de concentración, especialmente en países que no son del Golfo, ya que esto aumentará el nivel de la eficiencia en costes.

Además, los bancos en los países MENA deben innovar en productos y modos de financiación mediante la introducción de nueva tecnología innovadora. También los bancos de MENA tienen que controlar mejor sus costes, mejorar sus políticas relativas a la gestión y supervisión de los diversos riesgos bancarios, y para mejorar el control de calidad de los activos, ya que esto dará lugar a los bancos más eficientes.

Por último, según lo sugerido por muchos estudios, la banca islámica en los países no pertenecientes al Golfo tienen que llevar a cabo varias acciones para mejorar su eficiencia y competir con sus homólogos convencionales. De hecho, los bancos islámicos deben tratar de ampliar las actividades en línea con los de los mercados financieros y desarrollar productos innovadores y modos de financiación que se ajusten a la ley Shariah (ley islámica). También es necesario que los bancos islámicos aumenten su tamaño, mediante una fusión entre las instituciones financieras islámicas con el fin de lograr economías de escala. Además, para disminuir sus costes, deben abrir sus servicios a una clientela más amplia (es decir, no necesariamente musulmanes) y mejorar su sistema bancario a través de la utilización de las nuevas tecnologías.

Por último, en el capítulo 4 "Estructura del mercado, el rendimiento y la eficiencia del sector bancario MENA", ponemos a prueba las cuatro hipótesis competidoras que explican la rentabilidad bancaria: Estructura- Conducta-Rentabilidad (SCP), poder de mercado relativo (RMP), Eficiencia (ES) y la Hipótesis de Vida Tranquila (QLH).

Hemos elegido el rendimiento de los activos totales (ROAA) como proxy de la rentabilidad. Esta ratio muestra como es de eficiente una empresa utilizando sus activos y también es útil para hacer comparaciones entre los competidores de la misma industria.

En el análisis empírico, utilizamos un conjunto de variables que representan las características de cada uno de los bancos para poner a prueba las hipótesis que explican la rentabilidad del banco, así como las particularidades macroeconómicas de los diferentes países.

En este contexto, se investiga el impacto de la concentración en la rentabilidad de los bancos para poner a prueba la hipótesis SCP. Utilizamos el índice de Herfindahl de concentración, que es la suma de las cuotas de mercado al cuadrado. Varios estudios afirman que los costes de la colusión entre las empresas líderes son bajos en un mercado altamente

concentrado. Por lo tanto, las empresas líderes tienen más poder de mercado para fijar los precios más altos y obtener mejores ganancias.

También añadimos una variable de la cuota de mercado (MS), para poner a prueba la hipótesis RMP. Según varios estudios, los grandes bancos tienen más capacidad para diferenciar sus productos, y por lo tanto pueden convencer a más clientes para operar en sus sucursales, hacer una intensa publicidad y, por lo tanto, el ejercicio de poder de mercado para obtener beneficios supranormales. Por lo tanto, la cuota de mercado es un determinante importante de los beneficios.

En cuanto a la hipótesis de la estructura de la eficiencia (ES), consideramos la eficiencia como uno de los principales determinantes de la rentabilidad. En este sentido, muchos estudios sostienen que la eficiencia es la principal fuente de la conformación de la estructura del mercado, en particular, una mayor eficiencia dará lugar a una mayor utilidad para tal empresa, y por lo tanto, una mayor participación en el mercado, esto a su vez dará lugar a mayor nivel de la concentración. Simplemente el punto de vista afirma una relación positiva entre la eficiencia y la rentabilidad. Por el contrario, en un mercado concentrado, los bancos podrán disfrutar de poder de mercado, y esto dará lugar a la pérdida de bienestar de los consumidores debido al aumento de los precios y la reducción de la cantidad ofrecida por los bancos.

Con el fin de contrastar la hipótesis Quiet Life (QLH), Hicks (1935) observó que las empresas que operan en un ambiente relajado pueden no tener ninguna motivación para mejorar su eficiencia de costes. En otras palabras, un mercado concentrado y una mayor participación en el mercado pueden estar asociados con menor una menor eficiencia.

También vamos a añadir algunas variables específicas bancarias que podrían afectar a la rentabilidad. En este sentido, se incluye el logaritmo del total de activos como proxy del tamaño de los bancos. Mientras tanto, hay estudios que ponen de relieve la ventaja del tamaño para reducir el coste de riesgo moral entre los prestatarios y los ahorradores, y afirman que los bancos más grandes están asociados con una mayor rentabilidad. Otros estudios concluyen que la ventaja del tamaño de los grandes bancos está en la diversificación y el hecho de ser "demasiado grandes para quebrar".

Se analiza también el efecto de la capitalización a través de ratio de capital como porcentaje del total de activos de cada banco. La literatura proporciona varios efectos del

capital sobre la rentabilidad de los bancos. Por ejemplo, hay teorías que explican que el aumento de capital, podría dañar el desempeño de los bancos y dar lugar a una reducción del crédito. En cambio, algunos estudios confirman que los bancos bien capitalizados tienden a tener un alto rendimiento sobre sus activos. En este sentido, hay contribuciones que indican que durante la actual crisis financiera, los bancos bien capitalizados lograron mejores ratios de rentabilidad.

También incorporamos una variable dummy para para controlar el resultado de los bancos islámicos sobre la rentabilidad. En este contexto, muchos estudios sostienen que los factores relacionados con los bancos islámicos ayudaron a contener el impacto adverso sobre la rentabilidad, mientras que las debilidades en las prácticas de gestión del riesgo en algunos bancos islámicos llevaron a una mayor disminución de la rentabilidad en comparación con los bancos convencionales.

En cuanto a las variables macroeconómicas, introducimos tres variables. En primer lugar se introduce el crecimiento del PIB para controlar el efecto de las fluctuaciones en el ciclo económico y la tendencia de crecimiento económico en general. En este contexto, muchos estudios concluyen que el crecimiento del PIB hace que los bancos consigan una elevada tasa de rendimiento sobre los activos.

Se espera que el PIB per cápita pueda afectar a numerosos factores relacionados con la oferta y la demanda de préstamos y depósitos. A mayores ingresos, la gente tiende a ahorrar más y los bancos son capaces de movilizar más recursos. Por lo tanto, más que financiar proyectos de inversión es probable que generen más beneficios.

Otra condición macroeconómica importante, que puede afectar tanto a los costes e ingresos de los bancos, es la tasa de inflación. Muchos estudios sostienen que la inflación podría afectar la rentabilidad bancaria directamente (por ejemplo, aumento en el precio de la mano de obra) o tal vez indirectamente (por ejemplo, cambios en las tasas de interés y los precios de los activos). De acuerdo con algunos estudios, el efecto de la inflación sobre el desempeño de los bancos depende de si la inflación es esperada o inesperada. En el primer caso (es decir, la inflación esperada) las tasas de interés se ajustan afectando a los ingresos, que aumentan más rápidamente que los costes, con un impacto positivo en la rentabilidad. En este último caso (es decir, la inflación no anticipada) los bancos pueden ser lentos en el ajuste de sus tasas de interés, lo que se traduce en un aumento más rápido de los costes bancarios

que los ingresos bancarios y por lo tanto tienen un impacto negativo en la rentabilidad de los bancos.

Los resultados empíricos sugieren que el poder de mercado y la eficiencia son dos inductores principales del desempeño de los bancos. Al mismo tiempo, ni la estructura-conducta-rendimiento (SCP) ni la estructura eficiente hipótesis (ES) explican la rentabilidad en los bancos de la región. En este sentido, si bien la eficiencia es importante para explicar el rendimiento, no es responsable de la concentración del mercado (ES). Por otro lado, la relación entre la estructura del mercado y la rentabilidad de los bancos es negativa y contraria a la hipótesis SCP. Este resultado es consistente con nuestros hallazgos, que los bancos en los mercados más concentrados son menos eficientes, apoyando la hipótesis de vida tranquila (QLH) para los países de la región MENA. Esto también apoya el efecto negativo de la concentración en la estabilidad financiera. El apoyo más fuerte es para la hipótesis de poder de mercado relativo (PGR) en todos los casos analizados (Todos los países, los países del Golfo y los países no-Golfo) que sugiere que las empresas con mayor participación en el mercado son capaces de ejercer su poder de mercado para obtener mayores beneficios mediante el establecimiento de márgenes más altos.

La eficiencia X y el poder de mercado tienen efectos positivos sobre el rendimiento, permitiendo a las entidades proporcionar un servicio competitivo pero rentable. Sin embargo, hemos observado que hay mercados que siguen muy concentrados en donde los bancos están obteniendo rentabilidad, pero a costa de un alto nivel de ineficiencia, lo que afecta negativamente a la competitividad del sistema bancario. Esta situación puede estar relacionada con los países con sistemas financieros altamente protegidos, con barreras legales de entrada o donde la inestabilidad política reduce la entrada de competidores. En este sentido, parece oportuno hacer políticas que reduzcan el grado de concentración, lo que favorece la entrada de nuevos operadores tradicionales y digitales y mejorar el nivel de eficiencia a través de la mejora tecnológica. Por otra parte, mientras que las fusiones y adquisiciones pueden ser una estrategia para aumentar la cuota de mercado, la eficiencia y la rentabilidad del sector bancario, no parece la estrategia más adecuada para aquellos mercados más concentrados y entre los bancos más grandes, ya que estas operaciones conllevan aumento de la concentración y perpetuar la ineficiencia y la asunción de riesgos. Por último, los políticos deberían ser conscientes de las prácticas que tienden a fijar los precios de los

productos relacionados con créditos y que a la larga perjudican el bienestar de los consumidores.

Por último, podemos decir que estos capítulos son independientes el uno del otro en términos de los fundamentos teóricos y metodológicos pero se complementan entre sí mediante la investigación de tres aspectos interrelacionados.

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

List of Contents

Abbreviations

BDN - Boyd and De Nicolo (Authors)

CVH - Charter Value Hypothesis

DPD - Dynamic Panel Data

EU - European Union

MENA - Middle East North Africa

FE - Fixed Effect

RE - Random Effect

OBS - Off balance sheet activities

PL - Price of labor

PD - Price of deposit

PK – Price of capital

GDP - Gross Domestic Products

GMM - Generalized Methods of Moments

ROAA - Return on Average Assets

HHI - Herfindahl index

MS - Market share

ES - Efficiency structure

SCP - Structure - Conduct – Performance

RMP - Relative market power

QLH - Quit life hypothesis

SFA - Stochastic frontier analysis

DEA - Data envelopment analysis

OLS - Ordinary Least Square

PTE - Pure technical efficiency

CE – Cost efficiency

SE - Scale efficiency

VRS -Variable return to scale

CRS - Constant return to scale

MLDVE - maximum likelihood dummy variables estimator

TFE - True fixed effect

TRE - True random effect

LI – Lerner Index

List of Tables

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

Chapter 1

Introduction

The recent years have witnessed significant changes in the banking sector. These changes are related mainly to deregulation of financial services, increasing use of advanced technology, and revolution in the disclosure of the financial information, which make banking industry under highly competitive environment domestically and internationally. These competitive pressures pressure bank industry to look for alternative ways to lower the production costs by enhancing bank efficiency, and trying to achieve scope and scale economies. Besides that, monetary authorities also are trying to find ways to improve the performance of the banks.

Moreover, the financial crisis that hit the banking sector recently make academics and policymakers in front of questions of what generated the crisis and what can be done to stop it or at least minimize its potentially devastating effects. Maybe one of the most important measures usually taken by authorities was to promote market concentration through mergers in order to increase efficiency and profitability of banks. In this sense, Allen and Gale (2004) argue that less concentrated banking sector is likely to suffer from financial crises compared with a concentrated banking sector. As Beck et al. (2006), the proponents of the "concentration stability" view hold that large banks can diversify better, and therefore enhance profits and lower bank fragility. According Hellmann et al. (2000) High profits increase the franchise value of the bank and therefore lower the incentives for bank to take excessive risk. At the same time, concentrated banking system is easier to monitor than less concentrated ones, so that corporate control of concentrated banks will be more effective.

Nevertheless, it´s not clear if this strategy can get the desired effect. According to Boyd and Runkle (1993) large banks will face implicitly "too big to fail", because these banks frequently receive subsidies and therefore will lead large banks intensify risk-taking policies, which in turn increasing the fragility of concentrated banking systems. At the same time, Boyd, and De Nicolo (2003) demonstrate that banks with greater market power tend to charge higher interest rates, which makes firms to adopt greater risk policies.

In terms of relation between efficiency and profitability, (Isik and Hassan, 2002); Pasiouras , 2008); Perera et al., 2007), have reported that profitability is inversely related to cost inefficiency. Hence, banks with higher profit tend to be more efficient. Nevertheless

Ataullah and Le (2006) who indicates that relationship between ROAA and efficiency could be positive or negative depending on the specification of the model. In terms of size of banks, Perera et al. (2007), argue that larger banks are more cost efficient than smaller banks, because large size has ability to increase his market share, and therefore, increase the revenue with relatively less costs. However, some studies did not find any efficiency advantage related to large banks (Girardone et al., 2004); (Berger and Mester, 1997) or reported a negative relationship between efficiency and size (Allen and Rai, 1996); Christopoulos et al., 2002).

Regarding the equity, well-capitalized banks are more efficient than their poorly capitalized counterparts (Berger and Bonaccorsi di Patti, 2006); (Casu and Molyneux, 2000). On the contrary, Staikouras et al. (2008) and VanHoose (2007) report a negative relationship between capital adequacy and profit efficiency. They explain this result by the fact that banks, in light of stricter capital standards, may decide to switch loans with other less risky assets.

Finally, there are different hypotheses in the banking literature that explains the relationship between bank performance and market structure. In this sense, Bikker and Haff (2000) have divided the literature of competition measurements into two major streams. The Structure–Conduct-Performance (SCP) and the efficiency hypothesis. The SCP hypothesis analyzes whether highly concentrated market causes collusive behavior among large banks resulting in superior market performance Bain (1951), whereas, efficiency hypothesis tests whether bank efficiency of large companies lead to better performance (Demsetz, 1973). Besides this, there are two related hypotheses that explain the relationship between market structure and bank performance, Relative Market Power (RMP) and Quit Life hypothesis (QLH).

RMP predicts a positive relationship between a firm's market share and its performance. The RMP put forward by Roades (1983), focuses on the role of market share on profit and prices. As Ye, et al. (2012) indicate, RMP argues that concentration situation for banks are not necessary to raise the prices, because large banks in a large market can differentiate their products and services, therefore, can charge a higher prices and obtain profit. In terms of Quit Life Hypothesis (QLH), this hypothesis was developed by Hicks (1935). QLH suggests that a bank with greater market power will be more risk-averse, and

thus will be able to achieve some combination of both higher returns and lower risks compared with banks possessing less power in the market.

Consequently, in last few years a large number of studies investigated the previous relationship between banks performance, financial stability and efficiency market structure. Whilst most of these studies have examined the relationship in US and Europe industries, very few studies have been conducted to investigate this relationship in Middle East and North Africa (MENA) and other emerging economies. The implications of the studies conducted in US and Europe cannot be extended to MENA countries, this is because the banking industry is highly regulated, and these regulations that affect market structure and performance are not similar across countries, especially when we compare between developing and developed countries. This is why in this study we try to analyze the effect of market competition, efficiency and market structure on financial stability and profitability of banks in MENA countries.

This thesis consists of five chapters. In the next chapter; we investigate the impact of bank competition on financial stability. In this sense we have measured banks competition, and evaluate whether MENA countries are experienced competition environment or not. Then we examined that impact of bank competition on financial stability. In the third chapter we measured bank efficiency in MENA countries using stochastic frontier analysis (SFA), and then investigate the main determinates of bank efficiency. Finally, chapter four analyzes four different hypotheses that explain the relationship between market structure and performance. In this chapter, the emphasis is to analyze the relationship between market structure, efficiency and bank profitability, checking the explanatory power of different theories (Structure- Conduct- Performance (SCP), the Relative Market Power (RMP), Efficiency hypothesis (ES) and Quit Life hypothesis (QLH)).

Motivation of the study

Many studies have been conducted related to bank performance, market structure and efficiency, but at the same time, little attention has been taken into account to study these relations in MENA countries. This study is motivated by researchers to fill the gap in the literature and also by the fact that commercial banks play a vital role in the economy. Evaluating the overall performance and efficiency is very important for depositors, shareholders, potential investors, and so on. In addition, examining the theoretical aspects of

market power, competitive condition, cost efficiency and their effects on profitability and financial stability, this thesis makes important contributions. First, this study guide the policy makers about the importance of market structure and his effect on financial stability, in other words, should market structure be closer to perfect competition shape or monopoly shape to achieve more financial stability?. At the same time, is concentration associated with lack of competition? Second, it assists policy makers and monetary authorities in ways to minimize the inefficiency in banking sectors in order to realize number of benefits. As banks become more profitable, investors expect higher dividends, and thereby attracting more capital, thus, boosting capital accumulations. This leads to improve the soundness of banking system reducing the probability of banking failure.

Another motivation is derived from recent wave of mergers and acquisitions in banking industry, which raises important questions concerning public policy tradeoff between possible gains in operating efficiency versus possible social efficiency losses from a greater exercise of market power. In this context, policy makers are suspicious of concentrations and seek to limit it, because they believe it enables banks to exercise monopoly power, thereby harming depositors and borrowers.

Contribution of the study

MENA countries banks faced with increased competition locally and internationally, which forced them to increase the level of efficiency, productivity and profitability to increase or even maintain their market share and profit. Risk exposures will have to be made transparent and adequately provided for it the balance sheets; such banks are compelled to deliver their services to customers with lowest possible cost. Therefore, an investigation of the market structure, financial stability, performance, efficiency and competition of banks operating in MENA countries is an important topic for several reasons. First, bond and other debt markets is not developed and efficient in MENA countries. Hence, the role of banking system as financial intermediaries becomes so important. Second, in response to deregulation of the global financial system, and therefore, increased the challenges that are associated with the new competitive environment, makes this study worthwhile. Third, no similar comparison studies conducted between conventional and Islamic banks in MENA countries. Fourth, this study has another important aspect, because it involves of the period before and after the global financial crises. Finally, the results may help the managers and policy makers to establish optimal managerial strategies and public policies.

Structure of the study

The thesis is organized as follows: in chapter 2, we analyze bank competition for banks in MENA countries, and the impact on financial stability. In this chapter, we have measured bank competition by using two measures. First, Herfindhal-Hirschman index (HHI) and H-statistic are considered the main competition proxies (Berger and Hannan, 1998) ; Claessens and Laeven, 2004). The (HHI) is defined as the sum of the squares of the market shares of each individual firm operating in a dedicated market. Large HHI means more concentrated market. The second measure, H-statistic, developed by Panzar and Rosse (1987) to distinguish between market structures. Through this measure is possible to determine if the industry is perfect competition, pure monopoly or monopolistic competition. Claessens and Laeven (2004) argue that H-statistics is a more appropriate measure compared with other alternatives. H-statistics is calculated from a reduced form from revenue equation and measures the sum of elasticities of total revenue of the firm with respect to firm's input prices.

Regarding financial stability, we use Z-score as a measure of financial stability (De Nicolo et al., 2004); Boyd De Nicolo and Jalal, 2006); Laeven and Levine, 2008); Demirgüç-Kunt and Huizinga, 2010). This measure is calculated by adding return on average assets (ROAA) to balance of capital relative to total assets of the entity (equity/total assets) , all these divided by the standard deviation (volatility) of ROAA. Therefore, the Z-score ratio calculates the distance to the insolvency of a bank. Thus, a higher ratio of Z-score implies a lower probability of insolvency risk.

In chapter 3, we analyze cost efficiency for banks in MENA countries and their determinants. We prefer to analyze cost efficiency rather than technical efficiency, because according to Pasiouras et al. (2008), cost efficiency is a wider concept than technical efficiency, since it refers to both technical and allocative efficiency. The definition of cost efficiency corresponds to important economic objective: cost minimization. Isik and Hassan (2002) defined cost efficiency as a measure of how far bank's cost is from the best practice bank's cost if both were to produce the same output under the same environmental conditions. It is measured as the ratio between the minimum cost at which it is possible to attain a given volume of production and the observed costs for firm. We use the Stochastic Frontier Analysis (SFA), as developed by (Aigner et al.., 1977), to estimate cost efficiency frontier.

Similar to many other studies, the intermediation approach is applied in order to measure efficiency, which assumes that the main function performed by a bank is to intermediate funds between depositors and borrowers at the lowest possible cost (Gilbert and Wilson, 1998); Kraft and Tirtiroglu , 1998); Rezvanian and Mehdian, 2002); Isik and Hassan, 2002). According to the intermediation approach, banks are producing two outputs (Loans, and other Off Balance Sheet Activities), and employing three inputs (capital, deposits and Labor). All variables are measured in millions of US dollar.

In chapter 4, four hypotheses have been tested, to explain the relationship between market structure and bank profitability. These hypotheses are Structure- Conduct-Performance (SCP), Relative Market Power (RMP), Efficiency hypothesis (ES) and Quiet life hypothesis (QLH). This chapter investigates the profit- structure relationship in the banking industry in MENA countries. The emphasis of this chapter is, first, analyzing the relationship between market structure and bank profitability. Then, it seeks to assess the relevance of Structure- Conduct- Performance (SCP), Relative Market Power (RMP) and Efficiency hypothesis (ES) in explaining the performance of banking in MENA countries. Third, it tries to test the existence of Quit life hypothesis (QLH) in these markets.

In chapter 5, we provide a conclusion of the main findings, policy implications and recommendations. It also presents the limitations of this research and proposes areas for future research.

Objectives

The purpose of this thesis is to provide some insights into the understanding how market structure and efficiency affect bank profitability and risk-taking, and to determine the most important factors that might affect bank efficiency and risk-taking within the MENA banking system. The questions we addressed are as follows:

- What is the effect of bank' competition on risk-taking for MENA banks?
- What are the main determinants of banks' excessive risk-taking for the years 2005-2012 for MENA banks?
- What are the main determinants of banks' efficiency for MENA banks?
- How market structure and efficiency affect bank performance for MENA banks?

In order to achieve these objectives, we are going to test the following hypotheses

Hypotheses Testing

- H1: Bank Competition has a negative effect on financial stability.
- H2: Bank Concentration has a positive effect on financial stability.
- H3: Bank profitability (ROAA) has positive impact on cost efficiency.
- H4: Bank Size has a positive impact on cost efficiency.
- H5: Market Structure has significant impact on cost efficiency.
- H6: Conventional banks are more efficient than Islamic banks.
- H7: Gulf countries are more efficient than non-Gulf countries.
- H8: Banks with large market share are more profitable.
- H9: Bank efficiency has a positive impact on bank profitability.
- H10: Bank efficiency increases the level of market concentration.
- H11: Bank efficiency affects positively the market share of the bank.

Methodology

The development of the empirical part of our work uses a database covering the period 2005-2012, and has 356 banks in the nineteen countries located in the Middle East North Africa (MENA). The source of information is BankScope database which includes balance sheets and other financial indicators for large number of banks from different countries.

The panel data methodology has been used most similar to our work. For example, Calomiris and Wilson (2004), Laeven and Levine (2007 and 2009), Demirgüç-Kunt and Huizinga (2010) and Beltratti and Stulz (2011) estimate static models of panel data fixed effects. This method allows controlling and preventing unobservable heterogeneity, thus biased estimators. This aspect is very important in our analysis because each bank has its own credit policy and way of taking and managing risk. Also, each country also has its particular situation, especially as regards the country risk and macroeconomic indicators. The proposed models are appropriate in the presence of strictly exogenous variables, is very questionable assumptions in microeconomic studies. Therefore, this assumption is not met, the estimation results may be inconsistent, which is why we have opted for a methodology based on

dynamic panel data, which have been estimated using the Generalized Method of Moments (GMM).

Our methodology has been proposed by Arellano and Bond (1991) and has been used by Rauch et al.. (2009). By applying dynamic modelling we not only take into account temporal autocorrelation in the residuals, but we are also able to reduce the amount of potential spurious regression, which may lead to incorrect inferences and inconsistent estimation in static models. Besides, the coefficient of the lagged dependent variable itself is of interest to us. DPD models contain one or more lagged dependent variables, allowing for the modelling of a partial adjustment mechanism. According to Wooldbridge (2012), models with lagged dependent variables are hard to estimate when heterogeneity and other sources of endogeneity are present. The problem of endogeneity usually appears when explanatory variables are not fully exogenous. When one applies Fixed Effect and Random Effect methods to dynamic models in the presence of unobserved heterogeneity and endogeneity, estimators are inconsistent and biased. A serious difficulty arises when using the one-way fixed effects model in the context of a DPD model when the number of years is small while the number of individual units is large - "small T, large N" data Baum (2012). This happens because of a demeaning process which subtracts the individual's mean value of y and each X from the respective variable creating a correlation between regressor and error. The resulting correlation creates a bias in estimating the coefficient of the lagged dependent variable which is not mitigated by increasing N. Similar problems affect the one-way random effects model where the lagged dependent variable cannot be independent of the composite error process. Since each bank has its own culture and its own way of managing risk, and considering the possibility of an endogenous relationship between variables, we have opted for a methodology based on dynamic panel data, making estimates using the system generalized method of moments (GMM). System GMM is designed for dynamic models and is well suited to tackle the endogeneity problem. By applying Generalized Method of Moments (GMM), we believe we can construct more efficient estimates of the dynamic panel data model.

In terms of efficiency measurement, stochastic Frontier Analysis (SFA) is employed for measuring cost efficiency; this model is developed by Aigner et al. (1977). We have applied SFA rather than Data Envelopment Analysis (DEA), because SFA allow us to distinguish between inefficiency and other stochastic shocks in the estimation of efficiency

levels. In addition, it would be easier to add control variables, such as country-level variables, in the equation of this model than in DEA. Hence, this approach allows us to compare efficiency between country, and the efficiency of conventional and Islamic banks.

We estimate stochastic frontier for cost using Green (2005) models. The advantage of this model is that allow inefficiency term follows a distributional form. This study considers the estimation of the "true" fixed-effects (TFE) model in Greene (2005) trying to solve the incidental parameters problem affecting his maximum likelihood dummy variables estimator (MLDVE). Green´s model can be estimated using maximum likelihood estimation methods. These models are referred to as "true frontier models" in that they are a straightforward extension of original frontier framework (in line with (Aigner et al., 1977) to panel data. Thus, as formulated, the inefficiency term remains in the model and the fixed effect is intended only to capture the firm specific heterogeneity.

Overall, we believe that our study provides important insights for regulators into setting up more efficient policies for controlling bank risk-taking factors and highlight the determinants of banks efficiency and profitability.

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

Chapter 2

The Impact of Competition on risk-taking in the MENA countries

1. Introduction

Seventies and eighties in the last century have witnessed kind of financial deregulation; these changes took place in terms of financial innovations, advance information technology and globalization in financial market, which in turn lead banks to adopt much more aggressive and competitive policies. Excess risk-taking by financial institutions is regarded by many as key factors contributing to the 2007-09 crises, which pushed some countries to adopt strategies to increase the level of concentration, trying to reduce the level of competition and in order to increase financial stability.

In this context, the competition impact of banks has long been a public policy debate issue. Economic theory and empirical studies provide contradictory predictions about the relationship between market concentration or competiveness and financial stability in the banking system.

In this chapter we empirically examine the relationship between bank competition and risk taking of Middle East and some other African countries (MENA). The relationship between bank competition and financial stability has been an important subject with much discussion in the economic literature. The main stream believes in the competition-fragility hypothesis. The supporters of this hypothesis (Hellman et el (2000), Kelley (1990), Allen and Gale (2004)), believe that bank competition will lower the interest income for banks, therefore, banks profit will erode, which will lead to increase the probability of default or bankruptcy, and, consequently the overall disruption of the financial system. On the other hand, the supporters of competition-stability Boyd and Nicolo (2005), Boyd et al. (2006) , Schaeck, Čihák and Wolfe (2006) , De Nicolo and Loukoianova (2007)), adopt a different viewpoint where concentration will lead to financial instability in different ways. Banks with more market power tend to charge higher interest rates, which might cause higher possibility of defaulting, and at the same time, incentive to borrowers to engage in risky activities. So they simply find a positive relationship between banks competition and financial stability.

This study differs from previous work in terms of sample coverage and methodology. First, there is a lack of studies addressed the interaction between competition and financial stability in the context of Middle East countries. Second, we investigate this relationship in

such region with different features compared with developed countries. One of these features is this region has such different style of banks institutions which is Islamic banks, these banks are different from conventional banks in terms of sources of funds, and uses of these funds. For example, Islamic banks constitute 17% market share in UAE, 53% market share in Saudi Arabia, 24% market share in Qatar. (World Islamic Banking Competitiveness Report (2013–14)). Another difference is country risk, this variable should be taken in our account because of its importance especially in last years like what happened (Tunisia revolution 2010, Egypt revolution 2011, Syria revolution 2011, Libya revolution 2011, and unstable situation in Palestine). All these unstable events make the banks in these regions have exceptional regulations (like more conservative, challenges for transfer money between countries, …etc). So the importance of this study comes up from a lack of studies related to developing countries especially in this region, analysing the behaviour of banks under exceptional circumstances, and the presence of Islamic banks which have different behaviour compared to conventional banks. According to Ariss (2010), this region also needs to consider the availability of regulations, which in developed countries, consider: the degree of market power, bank cost and profit efficiency, and overall firm stability. Per Ariss (2010), it´s also important to consider the fact of underdeveloped capital markets in most of Middle East countries because it could affect market power and bank efficiency.

Regarding the empirical part, we conduct our analysis of this relationship using data from bankscope from 2005-2012 covering (Middle East countries, Tunisia, Morocco, Libya, and Algeria). Then, we will examine whether the relationship between competition and default is positive, as suggested by the franchise value paradigm, or negative as suggested by Boyd and Nicolo.

Even though many academic studies have analyzed these issues in developed markets there are still many debates which demand further investigation. The current work aims to add to the literature by consolidating major factors of risk-taking and fitting them into a new model using the most recent data of MENA banks.

This investigation of the MENA countries banks is important for a number of reasons. As far as we are aware, this study is the only one in the empirical literature which examines the competitive conditions of the MENA banking sector using both the Herfindhal index and the Panzar-Rosse H-statistic. Moreover, because of the financial crisis that happened in Asia and around the world in 2007-2008, the banking sector risk or the stability of the banking sector is focused on by the government officials, banking regulatory authority and academic

researchers as well. Furthermore, this study provides a comprehensive analysis of the MENA banking sector, including bank competition and bank risk. Although the banking sector profitability is reported in the annual statement from MENA countries banking regulatory commission, the situation of bank competitive condition are not available. In addition, the estimation of the effect of bank competition on risk-taking behavior of MENA countries banks provides useful information to the government in these countries and banking regulatory authorities.

The paper is organized as follows: first, it presents review and discussions of the related literature. Secondly, the methodology part describes the statistical model and data used in the model. Next section shows results and discussions and the final concludes the study.

2. Literature Review

Due to its Importance on financial stability, bank competition takes a big concern in banking literature (Beck et al.,2006, Boyd and Nicole 2005, Hellman et al., 2000, Allen and Gale, 2004, and Tabak et al., 2012). This literature wisdom has contradictory predictions about the relationship between bank competition and financial stability in both theory and empirical studies.

Regarding the supporters of concentration stability, they argue that concentrated banks will earn higher profit, thereby, prevent from excessive risk (Kelley, 1990, Hellman et al., 2000, Allen and Gale, 2004, Salas and Saurina, 2003, Jimenez et al., (2010) and Hellman et al., (2000)). This key is the association between charter value and risk taking behaviour. Charter value is the benefit that accrues to the bank's owners from its future operation, and it represents the opportunity cost of going bankrupt. In determining it risk-taking behaviour, a bank must balance the gains from increased risk-taking with the loss of charter value if it fails. So banks with market power have higher rents and therefore higher charter values. And this provides a higher opportunity cost of bankruptcy, which deters the risk-taking behaviour. On the other hand, an increase in competition will decline the charter value, and as results, the managers of banks might take excessive risk, because competition lower the prices for the products, and therefore, reduce the profits for CEOs of banks and shareholders (Kelley, 1990). This viewpoint was supported by (Allen and Gale, 2004) who argue that banks in competitive markets will have more risk exposure than in concentrated due to adverse shock

can cause a bank to go to bankrupt, which may trigger a chain reaction where all banks that were exposed to the first bank also go bankrupt, and so forth. Because there banks are price takers under perfect competition, and thus small compared to the whole industry, no bank will have an incentive to provide liquidity to troubled bank, thereby causing the contagion to spread. Another viewpoint supports this stream; Tabak et al. (2012) argue that competitive market is one of the main causes of adverse selection problem. The presence of many banks will increase the probability of a bad credit borrower who applying for a loan, increasing the probability of bankrupt. At the empirical level, Keeley (1990) argues that increased competition in the U.S. banking sector in the eighties of the last century reduced the incentives for banks to act prudently and resulted in greater risk taking. The empirical result of the paper highlights a negative relationship between competition and Charter Values of banks and a positive relationship with bankruptcy. Ogura (2006) and Jiménez and López (2007) provide similar evidence. Meanwhile, Dick (2006) provides evidence of a positive and significant relationship between bank deregulation (competition) and increased credit risk. Another study supporting this stream is Salas and Saurina (2003) who argue when markets are liberalised and regulations are relaxed, competition decreases profit and banks' charter value. In their study they have analysed 21 Spanish commercial banks within the years 1968-1998 to reveal the effects that regulatory changes have on banks' market power. The data covers 31 years, involving the principle steps to deregulation which contributed to key changes in the Spanish financial market. The results generally confirm the measures of liberalization have influenced bank competition resulting in reduced market power and a decrease in banks' economic profits. Furthermore, lower economic profits caused by deregulation and increased competition fostered banks' risk-taking as their charter values decreased and they had less to lose. In this context, Jimenez et al. (2010), supports the franchise value paradigm in limiting bank risk taking. The source of franchise value is assumed to be the market power of a bank and decreased competition among banks, diminishing their appetite for risk. Conversely, an increase in competition erodes their quasi-monopoly rents. Additionally, the value of the charters may lead to greater bank risk-taking and greater financial instability. The results of loan market Learner measures indicate a negative relationship between banks' market power and risk-taking. Similar but weaker results are shown for deposit markets, although the joint loan and deposit Learner indexes indicate a negative and very significant impact on NPL ratios. Hence, the findings based on the Spanish Banking system support the franchise value paradigm while disproving Boyd and

Nicolo's risk shifting effect i.e. the BDN model. Also, they find little evidence of a U-shaped relationship between competition and risk suggested by (Miera and Repullo, 2010). This evidence is also supported by a study addressed the relationship between market power and bank efficiency and stability in developing countries made by (Ariss 2010). The author used data from 821 banks in 60 developing countries from 1999-2005. He measured bank power using Lerner index and stability using Z index. The findings support a significant negative relationship between market power and cost efficiency, along with a significant positive relationship between market power and each of bank profit efficiency and stability.

On the other hand, the study of Boyd et al. (2006) and Boyd and Nicolo (2005) argue that the conclusions of previous theoretical research are fragile since they allow competition only for deposits and not for loans, while in fact banks are simultaneously involved in both markets. The study compares two banking models, CVH (Charter Value Hypothesis) and BDN (Boyd and De Nicolo) and examines whether there is a trade-off between bank competition and stability. CVH is based on earlier work by Allen and Gale (2000, 2004) and allows for competition in deposit markets, but not for loans and it assumes that there is no contracting problem between bank and borrower. Unlike CVH, the BDN model allows for competition in both deposit and loan markets and assumes that banks solve an optimal contracting problem with their borrowers. Empirical tests conducted on 2500 cross sectional US banks' data and a large set panel data collected from non-industrialized countries find that more competition is *ceteris paribus* associated with a lower probability of failure. In other words, there is a positive relationship between competition and bank stability. Furthermore, the test reveals a positive link between bank competition and willingness to lend. As competition declines, banks earn more income in their loan markets through charging higher loan rates. This implies a high bankruptcy risk for borrowers due to a moral hazard problem i.e. borrowers faced with high interest costs choose higher risk-higher return projects. Consequently, the CVH model is rejected while the results are still consistent with the BDN model's predictions. This evidence agrees with the results of studies (Schaeck, Čihák and Wolfe, 2006) and (De Nicolo and Loukoianova, 2007).

In this context, Martinez-Miera and Repullo (2010) supports the Boyd and Nicolo (2006) proposition that bank competition reduces a loan's probability of default due to reduced loan rates, referred to as the risk-shifting effect. However, they argue the margin

effect where increased competition may also reduce the interest payments from performing loans, which serves as a buffer to cover loan losses. Unlike the above mentioned models, the study suggests a U-shaped relationship between competition and banks' risk of failure, where risk first decreases before starting to increase in a very competitive market. At some point, more competition leads to lower loan rates and reduces banks' interest income from non-defaulting loans used as buffer for loan losses. This inverted U-shaped relationship between regional bank competition and stability is found by (Liu et al., 2013). The study examines joint impact of competition and regional economic conditions on the risk and stability of European banks from 2000–2008. Arguing many studies of competition and risk-taking apply national measures of competition and/or national economic activity, even though the majority of banks have a regional customer focus. National measure may therefore be inadequate in certain market segments like retail deposits or small business loans, in which banks operate mainly at a regional level. Consequently, in analysing the risk-taking behaviour of these banks, the authors advocate regional competitive and economic conditions may be more relevant. By analysing the relationship between regional economic conditions, competition, and their subsequent impact on bank risk in European banking, they confirm the prevalence of a U-shaped relationship between regional competition and banks. Particularly, risk-shifting effects appear to dominate in concentrated markets while margin effects appear prevalent in competitive banking markets as suggested by (Miera and Repullo, 2010).

Tabak et al. (2012) investigate the effects of bank competition on the risk-taking behaviours in 10 Latin American countries between 2003 and 2008, in particular, examining how size and capitalization change the relationship between competition and stability. The study applies the Boone indicator method (Boone, 2008) to measure the competition by assessing the impact of efficiency on performance. They find supporting evidence for how competition influences banks' risk-taking behaviour in a non-linear way and how both high and low competition levels enhance financial stability, with the opposite effect for average competition. The authors suggest the non-linearity of the effect supports both the concentration-stability (anti competition views) and the concentration-fragility (pro competition views) theories. They advocate banks facing both high and low competition are, on average, lower level risk-takers than banks experiencing average competition. In this context, Fu, Lin, and Molyneux (2013) studied the relationship between bank competition and financial stability from 2003-2010, using data related to 14 Asian- Pacific economics. Both market-based (probability of bankruptcy) and accounting based risk (Bank's Z score)

measures are used to measure individual banks fragility. They find a neutral view between competition and stability. In other words, competition-stability, and competition-fragility can apply at the same time for Asian-Pacific banking markets. They also find the restrictions entry may help bank stability while deposits insurance might cause bank fragility.

Finally, some authors researched the ambiguous relationship between competition and stability like Bretschger, Kappel and Werner (2012). They investigated the relationship between bank concentration and financial crises by collecting data from 160 countries for over 39 years from 1970-2009. They used one and two stage binary response models to gauge the effect of return on assets on financial stability hypothesis as a testing channel and the effect of net interest margins on financial fragility hypothesis, as another testing channel. They found no direct effect of market concentration and financial crises. However, there are two conflicting theories. The first is when a bank's financial stability is enhanced as long as the financial system allows for increased profitability, when there is a large market concentration. Conversely, they also found a positive relationship with a banks financial stability in a large market concentration when the markets require the banks to charge higher interest rates. This has a higher potential for destabilizing the local economy, as borrowers may take on too much risk. As there is a positive relationship between concentration and return on assets and net interest margins, the concentration support stability (return on asset channel) on one hand, while the concentration support financial fragility (net interest margins channel) on the other hand. Concluding the net effect of concentration on stability is ambiguous.

Table 2-1: Summary of main articles related to bank competition

Author(s)	Data analysed	Period of study	Type of bank's competition measure	Effect	Conclusions
Keeley (1990)	US banking system	1970-1986	ratio of banks' market value of assets to their book value which is called Tobin's q	(+)	Decline in market power leads to a higher risk premium that banks have to pay on certificates of deposits and results in lower capital-to-asset ratios.
Bikker and Haff (2002)	23 European and non-European countries	1988-1998	H-statistic , concentration ratios and Herfindahl index		H-values indicating competition are used as proxies of conduct and are related both to the concentration indices considered. Therefore The impact of both market structure measures on competition appears to be significant.
Claessens and Laeven (2003)	50 countries	1994-2001	H-statistic		Imperfect competition describes each of countries to varying degree, some countries have large numer of banks exhibits low level of competition like USA.
Beck et al. (2003)	70 countries	1980-1997	Concentration is measured by CR based on assets	(+)	1- Supports concentration-stability view. 2- both concentrated and competitive banking systems increase stability shows that concentration is not a robust measure of competition. 3- countries with better-developed institutions are less likely to suffer systemic banking crises.
Salas and Saurina (2003)	21 Spanish commercial banks	1968-1998	Tobin's q ratios (the ratio between the market to book value of the bank in a given moment of time)	(+)	The results confirm the measures of liberalization have influenced bank competition resulting in reduced market power and a decrease in banks' economic profits. Furthermore, lower economic profits caused by deregulation and increased competition fostered banks' risk-taking as their charter values decreased and they had less to lose.
Dick (2006	United States	1993-1999	Herfindahl index	(+)	There is a positive and significant relationship between bank deregulation (competition) and increased credit risk.
Boyd, De Nicolo and Jalal (2006)	United States and 134 other countries	2500 US banks (2003) and 2600 of 134 countries (1993-2004)	Theoritical model and Herfindahl index	(-)	The more concentrated banking markets are associated with an increased risk of bank failures. In other words, a positive and significant relationship between market concentration and the probability of bank failures found.
Jimenez et al. (2007)	Spanish banking	1988-2003	Lerner Index and HHI, CR and the number of banks	(+)	Support of the franchise value paradigm which suggest a negative relationship between market power and risk-taking.
Beck(2008)				(+)	Due to market liberalization, free competition and scarcity of appropriate regulatory and supervisory measures, banks have been more fragile. In a market with restricted entry to banks and therefore limited competition, banks often have better profit margins.

Berger et al. (2009)	23 industrialized countries.	1999-2005	Lerner index and HHI	(-)	that more market power leads to riskier loan portfolios consistent with competition-stability view.
Ariss (2010)	821 banks in 60 developing countries	1999-2005	Lerner Index	(+)	significant negative relationship between market power and cost efficiency, along with a significant positive relationship between market power and each of bank profit efficiency and stability.
Liu and Molyneux (2010)	11 European banking countries	1997-2008	Lerner index, H-statistic and Profits Persistence parameters	Unrelated	Competition measures provide inconsistent results, and the measures are statistically unrelated. banking sector risk measures are unrelated to the various competition measures.
Tabak et al. (2012)	10 Latin American countries	2003-2008	Boone indicator method	Nonlinear	non-linearity of the effect supports both the concentration-stability (anti competition views) and the concentration-fragility (pro competition views) theories.
Bretschger, Kappel and Werner (2012)	160 countries	1970-2009	One and two stage binary response model	Ambiguous	Concentration support stability (return on asset channel) on one hand, and on the other hand concentration support financial fragility (net interest margins channel). So we can say the net effect of contraction on stability is ambiguous.

3. Data and Methodology

Our data source is BankScope database which includes balance sheets and other financial indicators for large number of banks from large variety of countries. Our database covers the period 2005-2012, and has 356 banks in Middle East North Africa (MENA) Countries. That is, 13 banks of Algeria, Bahrain 35, Egypt 30, Iraq 8, Islamic Republic of Iran 15, Israel 12, Jordan 18, Kuwait 32, Lebanon 27, Libya 8, Morocco 21, Oman 12, Qatar 14, Saudi Arabia 17, Sudan 20, Syrian Arab Republic 9, Tunisia 30, United Arab Emirates 26 and Yamen 9. Given the absence of some data banks that make up the study sample during the above period, the end result of our data collection 2848 observations. However, Palestine has been dropped from analysis due to the absence of most of the information on banks of Palestine. It should be noted that the composition of the sample depended on the available data on Bankscope database. That is, we have taken into account all available data banks on the basis Bankscope, except the case of Palestine. In the following we will show the major indicators that we will use in our analysis, as well as, other control variables.

3.1 Dependent variables

As a proxy measure of risk, we use the Z-score ratio. This ratio is often used in empirical studies to determine the risk and financial stability of a bank. This measure is determined as follows (De Nicolo et al., 2004; Boyd, De Nicolo and Jalal, 2006; Laeven and Levine, 2008; Demirgüç-Kunt and Huizinga, 2010; Otero and Ezcurra, 2012):

$$Z \equiv \frac{\mu + k}{\sigma}$$

Where:

μ is the variable ROAA (return on assets)

k is the balance of capital relative to total assets of the entity (equity / total assets) and

σ is the standard deviation (volatility) of ROAA.

In this study, we calculated the variable Z-score for each bank in the sample and in each of the years studied (2005-2012). Therefore, the Z-score ratio calculates the distance to the insolvency of a bank. Thus, a higher ratio of Z-score implies a lower probability of insolvency risk, or what is the same, greater financial stability, and vice versa.

3.2 Competition Measures

There are two classifications for several methods to estimate competition. First, we highlight the Structure – Conduct – performance (SCP) paradigm; whose authors use concentration measures as proxies for competition (Williams et al., 1994 and Berger and Hannan, 1998). The new methodology is the New Empirical Industrial Organization (NEIO) approach, which estimates the parameters that reflect the competition level of a given market. As Tabak, Fazio and Cajueiro (2012) explain, the idea behind the SCP paradigm is that as structure reflects conduct, the market concentration is the same as collusion. Therefore, the SCP assumes that banks operating in concentrated markets have a higher profit due to monopoly rents. In fact, concentration measures, such as Herfindhal-Hirschman index (HHI), are the main completion proxies employed by these authors (Berger and Hannan, 1998, Claessens and Laeven, 2004).

The (HHI) is an industry concentration measure which is defined as the sum of the squares of the market shares of each individual firm operating in a dedicated market. It can range from 0 to 10 000, moving from a very large number of small firms jostling for market share (resulting in a low HHI) to a single producer dominating the market (resulting in an HHI of 10 000). HHI explained as follow:

- below 1000 as "unconcentrated,"
- between 1000 and 1800 as "moderately concentrated",
- And above 1800 as "highly concentrated."

The HHI takes into account not only the number of participants in an industry but also the relative size and distribution of the firms in a market. The formula of HHI is the sum of the squares of market shares of all the banks and has the following form:

$$HHI=\sum_{i=1}^{n} Si \quad ^2$$

Where *Si* is the market share of bank i and n is the total number of banks in the system. In calculating market shares, total assets are usually taken as a measure of bank size. Contrary to the n-bank concentration ratios, in the calculation of HHI, all banks in the market are taken into account. HHI stresses the importance of larger banks by giving them a higher weight than smaller banks. If n is the total number of banks, HHI ranges between 1/n and 1. It reaches its lowest value, the reciprocal of the number of banks, when all banks in a market are of equal size and it reaches unity in the case of monopoly (Bikker and Haaf, 2002).

According to Allen and Engert (2007) traditionally, it has been believed that a more concentrated industry is less competitive, and liable to compromise economic efficiency. However, empirical research on this idea provides mixed results. Bikker and Haff (2002) on analysed 23 European countries, their result support of the traditional view that concentration impairs competition. In contrast, the study by Clasessen and Laeven (2005), using a data set of almost 4000 banks from 50 countries, concludes that competition is not negatively related to concentration. These authors find that greater competition in financial services is almost clearly related to an absence of barriers to entry (foreign bank entry), and a policy framework that places few restrictions on the activities of financial services firms. That latter paper points to the notion of "contestability", which refers to the ability of firms to enter a market and compete with incumbents. Specifically, a market is considered to be contestable if barriers to entry are not prohibitive and if firms can exit from the industry without enduring punitive costs, so that firms are not discouraged from entering in the first place. The key idea is that a firm may be compelled to be more competitive and efficient by the prospect of new entrants. Another study undertaken in non-European markets by Liu et al. (2012) obtain the same positive relationship between competition and concentration. The concluding evidence casts doubt on the traditionally expected inverse link between concentration and competition. As a result, instead of considering only simple concentration measures to assess the degree of competition in the industry, economists tend to focus more on measures of market conduct to gauge the degree of contestability in the industry.

Panzar and Rosse (1987) developed a test that can distinguish between market structures. Through this test we can determine if the industry is perfect competition, pure monopoly or monopolistic competition. About this test, called H-statistics, Claessens and Laeven (2004) argue that is a more appropriate measure of degree of competition compared with other measures. H-statistics is calculated from a reduced form from revenue equation and measures the sum of elasticities of total revenue of the firm with respect to firm's input prices which can be written as follows:

$$H = \sum_{k=1}^{m} \frac{\partial Ri}{\partial Wki} \frac{Wki}{Ri}$$

Where R_i refer to revenue of bank i, W_i is the input factor i.

Panzar and Rosse explain H-statistics as follows:

If H = 0 : this refers to monopoly industry, that means increase in the cost will cause output to fall and price to rise, and because the profit maximizing firm should work on price elastic demand portion, total revenue will fall.

If H = 1: this refers to perfect competition, a proportional increase in factor input prices raises both marginal and average costs and induces an equi-proportional change in revenues without distorting the optimal output of any firm.

If 0 < H < 1: this refers to monopolistic competition, increase in the cost causes revenue to increase at the rate lower than the rate increase in the cost.

In this study, we compute H-statistics using a set up similar to (Bikker and Haaf, 2002 and Claessens and Laeven, 2004). The following reduced form revenue equation is estimated for each country for small and large banks for the years 2005-2013, in order to derive the Panzar-Rosse H-statistics:

$$LnTR_{it} = \beta_1 LnP1_{it} + \beta_2 LnP2_{it} + \beta_3 LnP3_{it} + \gamma_1 LnEQAST_{it} + \gamma_2 LnAST_{it} + \gamma_3 LnLOANAST_{it} + \varepsilon_{it}$$

For $t = 1 \ldots T$, where T is the number of period observed and $i = 1, \ldots I$, where I is the total number of banks. Subscripts i and t refer to bank i at time t. The dependent variable is $\ln TR_{it}$ refer to revenue of bank i which is calculated as ratio of total revenue (net interest revenue and other operating income) to total assets, *P1* is average cost of deposits input calculated as ratio of interest expenses to customer and short term funding, *P2* is the average cost labour input calculated as the ratio of personnel expenses to total assets, *P3* is the average cost physical capital input which is calculated as ratio of total capital expenses to total fixed assets. These input prices are followed by such explanatory variables which reflect differences in cost, risk, size, structure. These variables include: $\ln EQAST_{it}$ is the ratio of total equity total assets; $\ln AST_{it}$ is the total assets; $\ln LOANAST_i$ is the ratio of total loans to total assets. As mentioned before H-statistics is the sum of elasticities of total revenue of the firm with respect to firm's input prices, hence it is calculated as the sum of input prices coefficients $\beta_1 + \beta_2 + \beta_3$.

There are also some measures of bank competition like Lerner index. Lerner index was developed in 1934 by the American economist, Abba Lerner. The Lerner index is defined as the difference between price and marginal cost, divided by price. The value of Lerner index ranges from a minimum of zero to a maximum of one. When P=MC, the Lerner index is zero, which indicates that the firm has no pricing power. As the value of Lerner

index increases, the difference between price and marginal cost becomes bigger which indicates that banks have higher market power (Ariss, 2010). In other words, LI=0 indicates that there is perfect competition, while LI=1 means the market is in a condition of Monopoly. Casu and Girardone (2009) argue that Lerner index of Monopoly power measures the degree of market power very well and it is a good and widely used indicator in measuring competition in banking literature. It represents the extent to which banks have the market power to set their price above the marginal cost (Berger et al., 2009). There are also some arguments relating to the disadvantages of the Lerner index. Fernandez de Guevara et al. (2005) argue that there are several problems with regards to the estimation of the Lerner index. First, the value of the Lerner index changes according to different revenues used. Second, the cost of risk, which is very important in the profit and loss account of banking system, is not considered in general practice. The ignorance of the cost of risk can be attributed to reasons such as data insufficient and calculation difficulties. If the cost of risk in not included in the estimation of cost function, it will lead to wrong interpretation of the Lerner index due to the fact that the margin is over-estimated.

Boone Indicator is also another competition measure, as proposed by Boone (2000) and Boone, van der Wiel, and Van Ours (2007), is that a more efficient bank is more profitable than less-efficient banks. That is, markets map efficiency differentials into profit differentials. Boone (2000) is able to show within a broad set of theoretical models that this mapping of efficiency differentials into profit differentials becomes steeper as competition increases. That implies that the more competitive the market, the more harshly a bank is punished for inefficiencies in terms of relative profits. This last result enables the measurement of competition via the response of profits to changes in marginal costs. The economic argumentation behind the idea of measuring the degree of competition by analysing the relationship between profit and efficiency ratios is based on the selection effect of competition stressed by (Vickers, 1995). Boone (2000) argues that this selection effect is constituted by the reallocation effect of competition. A rise in competition reallocates output from less-efficient to more-efficient banks, measured by marginal costs. Firms with lower marginal costs are able to offer their product at a lower price. Increasing competition allows efficient banks to use their cost advantage more aggressively, which draws customers away from banks with higher marginal costs. This effect increases the output of more- efficient banks. It is this reallocation of output that raises the profits of efficient banks relative to less

efficient competitors. The above discussion supports the following log-linear relationship between relative profits and relative efficiency, measured by marginal costs (see also Boone, van der Wiel, and van Ours, 2007):

$$Ln(\pi_{ijt}) = \alpha + \beta_{jt} Ln(MC_{ijt})$$

Where π_{ijt}, MC_{ijt} indicate the time *t* profit and marginal cost of bank *i* located in State *j*. The Boone Indicator, given by the parameter β_{jt}, measures the effect of changes in marginal costs on profits. The specification in logs allows us to interpret the Boone Indicator as elasticity. As indicated by the subscript *jt*, we estimate the above regression separately for each federal state and for each year. The Boone indicator thus varies between federal states and over time. The Boone indicator β_{jt} should generally be negative. Regardless of the degree of competition, banks with higher marginal costs are expected to realize relatively lower profits. Furthermore, changes in competition over time should result in appropriate changes in the Boone Indicator β_{jt}. This means that, according to the idea that the negative relationship between marginal costs and profit is steeper in more competitive banking markets, the Boone Indicator β_{jt} should take on higher values in absolute terms (i.e., more negative values) when competition increases.

In our work will compute bank competition via H-statistic and Herfindhal index, and will ignore the other measures due to impossibility of calculations based on the information availability.

3.3 Hypothesis and Other Control Variables

In this part, we calculate banks specific variables. The first one is the measure of liquidity which is measured by the ratio between loans and assets. This factor may explain the business model of each bank and, therefore, allows us to test the relationship between the composition of bank assets and its risk-return profile; therefore, we can calculate the percentage of net non-interest income and the percentage of net interest income in relation to total revenues. Net non-interest income is defined as the difference between the non-financial income and expenses not related to the interest rate (commission and fee income and trading income). While, financial income is those generated by performing credit activities primarily related to the interest rate.

In this sense, the literature provides several views. For example, Stiroh (2004) shows that the dependence of the non-interest income is related to lower gains and higher risk

adjusted. Others suggest that diversification of active operations provides some security for financial institutions plus the ability to improve profitability ratios (Demirgüç-Kunt and Huizinga, 2010). Meanwhile, Baele, De Jonghe and Vander Vennet (2007) argue that a higher proportion of non-interest income in total income of banks positively affects the value of their shares, but also increases the systematic risk. Considering the different evidence, we can establish that traditional activities (lending) have a positive effect on profitability and negative effect on bank risk.

Second, we analyze the effect of capitalization through the ratio of equity as a percentage of total assets of each bank. The literature provides different effects of capital over risk-return profile of banks. For example, there are theories states that capital increase could jeopardize the performance of banks and lead to a reduction in credit (Diamond and Rajan, 2001). However, there are studies that confirm that well-capitalized banks tend to have a high return on assets (Demirgüç-Kunt and Huizinga, 2010). In this sense, some studies that indicate that during the current financial crisis, well-capitalized banks achieved higher profitability ratios (Demirguc-Kunt et al., 2010). According to this view, some argue that when banks are better capitalized, the greater its ability to withstand the risk and absorb losses (Von Thadden, 2004 and Coval and Thakor, 2005). Other authors emphasize the role of capital in times of crisis (Gambacorta and Mistrulli, 2004).

There are also works argued that capital reduces the moral hazard created by deposit insurance (Furlong and Keeley, 1989 and Keeley and Furlong, 1990) and increases the likelihood of survival of banks (Altunbas, Manganelli and Marques-Ibanez, 2011). Taking into consideration the views of different signs previously explained, we hypothesized namely that the capital has a positive effect on profitability and, in turn, reduce bank risk.

Third, bank size which is measured by the natural logarithm of total assets is expected to be negatively related to bank risk, as many studies that highlight the advantage of size to reduce the cost of the moral problem between borrowers and savers, and claim that the larger, more profitable bank will be less risk will (Ramakrishan and Thakor, 1984). Other studies conclude that the advantage of the size of the big banks are diversifying and being a "too-big-to-fail" which is a particularly important guarantee from the point of view of state authorities (Demirgüc- Kunt and Huizinga, 2010).

Forth, we evaluated the relationship between the growth of bank assets and the level of risk. In this context, we underline the result of Demirgüç-Kunt and Huizinga (2010), in

which, the authors argue that banks are growing rapidly in terms of assets, tend to have higher risk and higher return on assets.

Similarly, in fifth place, we use the variable total credit growth to test the effect of credit expansion in the risk profile of banks. In this regard, recent literature shows that banks experienced significant growth in credit extended generally have a higher risk exposure (Altunbas, Manganelli and Marques-Ibanez, 2011). Furthermore, it has been shown that credit growth is related positively and significantly with unpaid loans, non-performing loans and the interest rate on loans "loan charge-off rate". (Sinkey and Greenawalt, Clair 1991 and 1992)

In terms of macroeconomic variables, we introduce three variables. First we introduce GDP growth to monitor the effect of fluctuations in the business cycle and the trend of economic growth in general. In this context, we have found evidence that economic growth encourages banks to reduce financial restrictions intended to increase lending, which in turn generates more risk (Matsuyama, 2007). Second, we use the variable GDP per capita as an indicator of the general level of economic development. According to Demirgüç-Kunt and Huizinga (2010), banks in developed countries get less return on assets, and have less risk than in developing countries. Third, we control for inflation as work Demirgüç-Kunt and Huizinga (2010), in which the authors conclude that the high inflation rate makes banks achieve a high rate of return on assets, but also a high level of risk.

Based on previous analysis we suggest the following hypotheses regarding Bank Competition:

H1: Bank competition has a negative effect on financial stability.

H2: Bank concentration has a positive effect on financial stability.

H3: Bank competition is not associated with bank concentration.

H4: Gulf countries have higher level of Bank competition than other countries.

Table 2-2: Summary of variables and predictions

Variable	Prediction Z-Score	Definition	Source
Total Risk of default [Z-Score]	Dependent variable	Ratio of the sum of equity capital to total assets and ROAA regarding the standard deviation of ROAA (sdROAA)	Bankscope, Authors' calculation
H-Statistic	+/-	Sum of elasticities of total revenue of the firm with respect to firm's input prices.	Bankscope, Authors' calculation
Herfindhal Index	+/-	Sum of the squares of market shares of all the banks.	Bankscope, Authors' calculation
Control variables			
Equity ratio [*EqtotAssets*]	+	Equity/Total Assets ratio	Bankscope
Growth of loans[Growthloans] Type equation here.	-	annual loan growth rate	Bankscope
Growth of Assets [GrowthAssets]	-	Annual assets growth rate	Bankscope
Bank size[Logtotassets]	-	Logarithm of Total Assets; controls for bank's size	Bankscope
Extent of bank's lending [Netloantoas]	-	Net loans/Total Assets; control for extent of bank's involvement in lending activity	Bankscope
GDP growth as Macroeconomics Variable	-	Annual GDP growth rate	International Monetary Fund (IMF) database
GDP per capita as Macroeconomics Variable	+	Annual GDP per capita	International Monetary Fund (IMF) database
Inflation as Macroeconomics Variable	-	Annual Inflation rate	International Monetary Fund (IMF) database
Years [Year]		Year dummies	

4. Descriptive statistical analysis

In this section we will describe the study sample at the aggregate level and focused on bank competition risk taking. In Table 2-3 the main descriptive statistics of these variables are collected, giving a general representation of the characteristics of the behavior of banks comprising the sample in terms of our variables.

In terms of overall risk, we found that the entities included in the sample have on average an indicator of Z-score risk of 2.95, a very low value compared with the result of (Demirgüç-Kunt and Huizinga, 2010), where Z -score amounted to 30.74. At the same time, the data obtained pointed out to a significant credit risk, with a rate of allowances for doubtful accounts on total credit (loanlossprovisions) of 2% and 10% for (Impairedtototalassets).

In terms of bank competition measures, we can notice that overall Herfindahl index (HHI) is 0.13, which is considered "moderately concentrated" for all countries in the sample study. It is also noted that H-Statistic measure for overall countries is equal to 0.41, which means MENA countries market on average considered "Monopolistic Competition" market as overall average. So we can conclude that overall average indexes Herfindahl index and H-Statistic are consistent.

We also noted that banks examined represent a capitalization level of 21% regulatory-capital. It also notes that the growth of total assets of banks and credit represent a very important growth rate of 20% and 21%, respectively, but also, with very scattered values. Moreover, the average GDP growth in the sample countries is 4.9% and the inflation rate exceeds 6%. Also, the average income per capita in the sample is $17.306 annually, with a minimum of $ 751.41 in a country and a maximum of $ 99731.1 in another. These data show the large gap in GDP per capita between the countries forming the sample.

Table 2-3: Descriptive statistics of the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Z-score_	2500	2.95	4.32	-3.27	77.89
LOANLOSSPR~N	2066	0.02	0.29	-5.50	9.49
IMPAIREDLO~N	1356	0.10	0.13	0.00	1.50
Credit_Ass~_	2501	0.47	0.28	0.00	1.39
NetLoan_As~_	2374	46.47	24.84	0.00	98.95
OOI_TR_	2492	0.40	1.62	-74.46	20.80
NetIntere~R_	2492	0.60	1.62	-19.80	75.46
Equity_ass~_	2501	0.21	0.22	-0.96	1.00
AS	2501	7404.83	13490.26	3.88	100827.2
GrowthTota~_	2383	20.50	43.14	-56.64	761.02
GrowthGros~_	2252	21.94	58.98	-100.00	922.22
Herfindhal_	2848	0.13	0.11	0.04	0.87
h_stata	2328	0.42	0.54	-0.67	2.80
Capital_	1101	1380.87	2109.31	-2.38	12468.79
GDPgrowth	2830	4.96	7.54	-62.08	104.48
GDPpercapita	2830	17306.59	20116.44	751.42	99731.10
Inflation	2830	6.31	6.53	-4.87	53.25

For us to have a good knowledge about the behavior of selected banks and macroeconomic characteristics of the countries of our study, Table 2-4 summarizes the means of the variables in each country. In principle, we can see that in terms of profitability, Oman shows the highest level between neighboring countries. However, Kuwait banks show the highest overall risk level (low Z-score) 0.982, while in other countries it moves between 1.10 in Syria to 7.17 in Morocco.

When we look to bank competition indexes, it can be observed that Syria represents the highest level of Herfinfhal index, which is 0.47, which means highly concentrated area. Instead, Tunisia represents the lowest level by 0.05, which means unconcentrated area. In terms of H-Statistic, it can be noted that Lebanon represents the lowest level by -0.05%, which refers to Monopoly market, meanwhile, the rest of sample countries show monopolistic competition market.

In regards to loan portfolio, we can see that Iraq institutions maintained an average of 15.3% of its total assets in the form of net credit, the lowest level in the sample countries, while Tunisia ranks the highest one with an average of 73.4%.

These data also demonstrate banking activities; we can see according data that most of countries depend on lending activities as the main source of bank income, except Bahrain, Iraq, Iran, Kuwait, Sudan, with 31.4%, 42.7%, 47.4%, 42.4%, 41.9%, respectively. Israel banks show lower average level of capital than other banks in other countries with 6%.

Table 2-4: Main Economic Indicators for MENA Countries

Variable		[*ROAA_*]	[*Z-Score_*]	[*loanlossp~s_*]	[*Impairedto~_*]	[*cred_ta_*]	[*netloansto~_*]	[*OOI_TR_*]	[*NetInterest_TR_*]	[*equitytota~_*]	[*assets~_*]	[*GrowthACT_*]	[*GrowthCRED_*]	[*Herfindahl_*]	[*H-stata_*]	[*CR_*]	[*GDP growth_*]	[*GDP per capita~_*]	[*inflation_*]
Aljeria	Obs	100	104	98	22	101	101	100	100	101	101	99	98	104	65	11	104	104	104
	Mean	1.95	2.61	0.02	0.02	0.45	45.13	0.39	0.61	0.16	5887.73	24.96	29.38	0.18	0.13	46.58	2.90	4421.26	4.41
Bahrain	Obs	256	257	163	112	257	195	256	256	257	257	240	182	280	280	165	280	280	280
	Mean	2.02	1.78	0.03	0.13	0.29	37.37	0.69	0.31	0.40	4145.51	13.70	24.13	0.09	0.35	754.20	5.39	22055.55	2.12
Egypt	Obs	235	235	208	80	235	235	235	235	235	235	230	229	240	120	98	240	240	240
	Mean	1.25	2.21	0.02	0.12	0.45	39.74	0.06	0.94	0.12	5435.71	18.66	15.70	0.07	0.23	498.22	4.92	2248.78	10.41
Iraq	Obs	52	52	22	6	52	50	52	52	52	52	45	41	64	0	4	64	64	64
	Mean	3.24	1.98	0.89	0.09	0.15	15.40	0.57	0.43	0.23	1921.89	60.12	91.73	0.36		1196.70	6.40	3884.61	16.96
Iran	Obs	94	94	60	20	94	94	94	94	94	94	89	89	120	75	33	120	120	120
	Mean	1.62	3.28	0.02	0.06	0.64	61.79	0.53	0.47	0.13	17762.21	38.26	43.71	0.10	1.31	1346.26	3.60	4987.07	17.66
Israel	Obs	87	87	83	67	87	83	87	87	87	87	85	82	96	84	51	96	96	96
	Mean	0.73	3.37	0.00	0.05	0.63	63.78	0.41	0.59	0.06	28589.25	9.60	9.15	0.13	1.21	3540.17	4.29	26823.00	2.47
Jordan	Obs	139	139	132	126	139	139	139	139	139	139	136	135	144	144	123	144	144	144
	Mean	1.59	3.74	0.01	0.10	0.51	48.32	0.36	0.64	0.17	5883.98	14.17	16.99	0.24	0.39	694.34	5.60	3693.28	5.23
Kuwait	Obs	229	228	179	113	229	208	228	228	229	229	219	197	256	256	66	256	256	256
	Mean	2.16	0.98	-0.02	0.10	0.33	33.08	0.58	0.42	0.39	6455.84	10.32	6.31	0.12	0.68	1899.33	3.50	36114.45	4.87
Lebanon	Obs	189	190	189	161	190	190	189	189	190	190	184	184	216	216	110	216	216	216
	Mean	0.77	4.68	0.00	0.15	0.27	25.22	0.33	0.67	0.08	4644.51	13.14	17.55	0.09	-0.05	457.24	4.76	8087.71	4.61
Libya	Obs	46	46	20	3	46	45	43	43	46	46	39	38	64	0	0	64	64	64
	Mean	0.404	2.27	0.024	0.04	0.19	17.47	0.45	0.54	0.13	7510.16	24.34	18.77	0.31			9.25	10380.8	5.95
Morroco	Obs	122	122	108	48	123	121	122	122	123	123	114	111	168	168	14	168	168	168
	Mean	1.90	7.18	0.00	0.05	0.62	62.15	0.20	0.80	0.13	8408.17	21.11	21.25	0.08	0.77	1442.58	4.43	2653.77	1.80
Oman	Obs	91	91	84	74	91	86	91	91	91	91	89	83	96	84	60	96	96	96
	Mean	3.75	4.70	0.01	0.09	0.73	71.38	0.32	0.68	0.30	2874.19	18.66	15.10	0.20	1.02	614.67	5.97	18874.51	4.69

Variable		[ROAA_]	[Z-Score_]	[loanlossp~s_]	[Impairedto~_]	[cred_ta_]	[netloansto~_]	[OOI_TR_]	[NetInterest_TR_]	[equitytota~_]	[assets~_]	[GrowthACT_]	[GrowthCRED_]	[Herfindahl_]	[H-stata_]	[CR_]	[GDP growth_]	[GDP per capita~_]	[inflation_]
Qatar	Obs	87	86	76	75	87	81	87	87	87	87	81	76	112	112	68	112	112	112
	Mean	3.73	4.13	0.00	0.04	0.50	51.26	0.35	0.65	0.33	9806.48	45.69	40.94	0.19	0.37	1542.86	14.69	73186.55	5.74
Saudi Arabia	Obs	128	128	107	105	128	122	128	128	128	128	117	110	136	136	89	136	136	136
	Mean	3.61	2.71	0.01	0.03	0.50	54.58	0.37	0.63	0.27	21610.55	14.34	14.26	0.11	0.16	4059.00	6.48	18803.85	3.52
Sudan	Obs	128	128	64	8	128	115	128	128	128	128	115	103	160	140	5	160	160	160
	Mean	2.62	3.00	0.04	0.07	0.30	31.66	0.58	0.42	0.19	705.22	26.56	28.20	0.17	0.13	112.86	2.79	1405.18	14.48
Syria	Obs	44	44	25	21	44	39	44	44	44	44	38	33	72	0	21	54	54	54
	Mean	0.19	1.11	0.01	0.07	0.32	34.95	0.37	0.63	0.17	2364.88	76.63	96.45	0.47		86.89	5.13	2190.48	7.44
Tunisia	Obs	225	225	218	119	225	225	225	225	225	225	223	222	240	240	32	240	240	240
	Mean	0.99	3.07	0.01	0.17	0.80	73.41	0.34	0.66	0.16	1196.25	14.49	13.45	0.05	0.19	33.61	3.54	3962.23	3.95
Emirates	Obs	190	190	180	153	191	191	190	190	191	191	187	186	208	208	119	208	208	208
	Mean	2.52	2.14	0.02	0.06	0.59	56.32	0.41	0.59	0.22	12515.32	24.07	23.77	0.09	0.37	2753.88	4.36	56760.21	5.35
Yamen	Obs	54	54	50	43	54	54	54	54	54	54	53	53	72	0	32	72	72	72
	Mean	1.04	2.85	0.04	0.24	0.29	24.94	0.35	0.65	0.10	592.98	22.15	16.52	0.12		41.34	2.12	1109.44	11.62

Considering Table 2-5, we can see the evolution of bank risk (Z-score) by country during period of study. It can be seen that the evaluation of Z-score also showed a considerable degree of volatility, especially in the countries who witnessed "Arab Spring" at the end of 2010 like Yamen, Tunisia, Syria, Libya, with significant downtrend by more than half at 2012 compared with 2005. In terms of Gulf Countries, we can clearly notice slight volatility in the study period except Kuwait with highly downtrend from 2008 to 2012, which reflect kind of financial stability in Gulf Countries. It should be also mentioned that Morocco maintained the highest level of Z-score a long period of study except 2011, which also reflect a greater financial stability compared with other countries in the study. Globally, we can see that the financial stability of all banks forming the sample has experienced generally negative developments, particularly from 2008 to 2012, which means they have not remained untouched by the global financial crisis.

Regarding bank competition measures, Table 2-6 summarizes the H-Statistic and Herfindhal (HHI) by country during the period of study. For instance, we can see in terms of H-statistic that Lebanon has the lowest level of competition among other countries by -0.05, in the contrast, Iran, Israel and Oman have achieved the highest level of competition by 1.31, 1.21 and 1.02 respectively.

It is also important to look deeply to the banking concentration measure, which is Herfindhal index (HHI). First of all, we can notice clearly that Syria, Iraq, Libya and Jordan achieved high level of HHI, which means concentrated countries, which is 0.74, 0.36, 0.31 and 0.24 respectively.

It should be mentioned here as we can see in table below, that competition measure and concentration measure are not consistent in all cases, for instance, we can observe, that Lebanon has very low level of competition and at the same time very low level of concentration. And this also applied for Saudi Arabia. In case of Jordan we can observe that Jordan has good level of competition and at the same time concentration.

So we can say in general, measure of bank competition in some cases reflect concentration status, but in other cases no. So we can conclude the HHI measure is not necessarily good measure of competition.

Table 2-7 summarizes the evolution in H-Statistic by country during the period of study. For instance, we can see at 2005, the banking system in Algeria, Jordan and Lebanon

has experienced such monopoly market with -0.25, -0.53, and -0.48 respectively, but with the following years, countries have moved towered fostered competition with higher competition measure. Meanwhile, we can notice at 2012, Israel, Morocco and Oman, have achieved the highest level in H-Statistic comparing with other MENA countries, which means the highest competition countries in terms of banking.

Globally, we can say, that all MENA countries on average have moved from monopoly structure to foster competition markets in terms of banking, by higher level in H-Statistic especially in last years. It is also important to look deeply to another banking competition measure, which is Herfindhal index (HHI), which used to calculate bank concentration (proxy of competition). First of all we can look at Table 2-8 and notice that Algeria and Jordan represent the high level of (HHI) in 2005 by 0.25 and 0.24 respectively, which means "highly concentrated banking structure". And this result is consistent with what we reached by H-Statistic, and both countries have exercised more competition banking structure in the following years, and this is the same as H-Statistic. Meanwhile, if we look at the first year and last year of the study we can notice that Tunisia has maintained the lowest (HHI) comparing with other MENA countries. In 2005 Tunisia achieved 0.051, and in 2012 0.048, which is considered very competitive market in term of banking sector. In the case of Sudan, we can see very significant change during the period of study, in 2005 (HHI) was 0.74 and in 2012 reached to 0.11, which means that the banking industry in Sudan moved from highly concentrated to moderately concentrated, and this result is consistent with H-Statistic where 0.53 in 2005 to 1.26 in 2011.

Table 2-5: Evolution of Z-Score by Country

Country	2005	2006	2007	2008	2009	2010	2011	2012
Algeria	1.53	1.81	2.09	2.92	2.85	3.15	3.27	3.29
Bahrain	2.16	2.35	2.64	1.78	1.13	1.05	1.52	1.82
Egypt	2.12	1.99	2.25	2.30	2.19	2.46	1.89	2.48
Iraq	1.95	1.28	2.54	2.46	1.96	1.26	1.97	2.30
Iran	3.64	3.40	2.98	3.28	3.03	3.26	3.19	3.72
Israel	3.78	4.05	4.70	2.13	3.47	2.91	2.88	2.79
Jordan	4.72	4.14	3.78	3.99	3.23	3.30	3.15	3.52
Kuwait	2.10	1.79	2.03	0.10	0.09	0.53	0.53	0.51
Lebanon	4.09	4.12	4.48	4.74	4.96	5.32	5.07	4.82
Libya	2.74	3.41	2.54	2.57	2.84	2.00	0.43	1.38
Morocco	9.18	10.50	9.58	5.38	5.23	6.05	4.96	4.97
Oman	5.49	5.21	5.71	4.94	4.34	4.62	4.20	3.18
Qatar	5.84	4.96	4.81	4.36	2.73	3.55	3.88	3.56
Saudi Arabia	3.77	3.94	3.13	2.58	2.10	2.01	1.96	2.18
Sudan	3.32	3.03	2.90	3.03	3.01	2.84	2.91	3.08
Syria	1.23	0.72	1.49	1.21	1.01	0.97	1.38	0.23
Tunisia	4.28	4.67	2.59	2.82	3.02	2.69	2.03	2.19
Emirates	3.28	2.64	2.69	1.74	1.61	1.74	1.66	1.63
Yamen	4.08	4.47	3.04	2.36	2.21	1.61	1.14	2.08

Table 2-6: Evolution of H-Statistic and HHI by Country

	ALGERIA	BAHRAIN	EGYPT	IRAQ	Iran	ISRAEL	Jordan	Kuwait	Lebanon	Libya
H-stata	0.13	0.35	0.23		1.31	1.21	0.39	0.68	-0.05	
HHI	0.18	0.08	0.07	0.36	0.1	0.13	0.24	0.12	0.09	0.31

Continued Table 2-6

	Morocco	Oman	Qatar	Saudi Arabia	Sudan	Syria	Tunisia	Emirates	Yamen
H-stata	0.77	1.02	0.37	0.16	0.13		0.19	0.37	
HHI	0.08	0.2	0.19	0.11	0.17	0.47	0.05	0.09	0.12

Table 2-7: Evolution of H-Statistic by Country

Country	2005	2006	2007	2008	2009	2010	2011	2012
Algeria	-0.25	-0.09	0.23	0.25	0.51			
Bahrain	0.71	0.53	0.66	-0.28	0.21	0.24	0.41	0.30
Iran		1.78	1.34	1.20	1.88	0.34		
Israel	1.21	1.87	2.00	0.83	0.99		0.32	1.24
Jordan	-0.53	0.30	0.27	0.33	0.44	1.38	0.34	0.61
Kuwait	0.63	0.97	0.94	1.55	0.58	0.08	0.18	0.50
Lebanon	-0.48	-0.61	-0.13	-0.01	0.00	0.44	0.20	0.21
Morocco	0.32	0.68	0.78	0.85	0.83	0.87	0.79	1.03
Oman		1.31	1.66	0.68	0.50	0.63	-0.44	2.80
Qatar	1.12	0.77	1.23	-0.03	-0.41	0.04	0.02	0.20
Saudi Arabia	1.04	0.70	0.19	0.09	0.37	-0.67	-0.32	-0.14
Sudan	0.53	0.07	0.18	-0.37	-0.25	-0.50	1.26	
Tunisia	0.09	0.02	0.26	0.16	0.13	0.16	0.20	0.50
Emirates	0.73	0.30	0.46	0.54	0.15	0.15	0.19	0.47

Table 2-8: Evolution of Herfindahl Index by Country

Country	2005	2006	2007	2008	2009	2010	2011	2012
Algeria	0.25	0.24	0.16	0.16	0.18	0.15	0.14	0.14
Bahrain	0.06	0.06	0.15	0.07	0.09	0.11	0.08	0.09
Egypt	0.09	0.08	0.08	0.07	0.06	0.09	0.06	0.07
Iraq	0.32	0.47	0.34	0.33	0.35	0.32	0.25	0.48
Iran	0.12	0.09	0.08	0.08	0.08	0.08	0.13	0.16
Israel	0.12	0.14	0.13	0.11	0.10	0.14	0.13	0.13
Jordan	0.24	0.26	0.26	0.26	0.24	0.22	0.20	0.20
Kuwait	0.06	0.07	0.09	0.22	0.11	0.12	0.14	0.14
Lebanon	0.07	0.09	0.10	0.10	0.08	0.08	0.09	0.09
Libya	0.49	0.42	0.26	0.19	0.21	0.25	0.35	0.32
Morocco	0.08	0.08	0.06	0.08	0.08	0.09	0.09	0.10
Oman	0.17	0.20	0.19	0.21	0.22	0.18	0.20	0.19
Qatar	0.22	0.20	0.17	0.16	0.16	0.17	0.21	0.21
Saudi Arabia	0.10	0.09	0.12	0.11	0.12	0.12	0.11	0.11
Sudan	0.74	0.15	0.07	0.06	0.06	0.07	0.08	0.11
Syria	0.87	0.81	0.64	0.32	0.44	0.42	0.12	0.17
Tunisia	0.051	0.049	0.05	0.048	0.047	0.045	0.045	0.048
Emirates	0.09	0.08	0.08	0.08	0.09	0.09	0.09	0.08
Yemen	0.12	0.10	0.14	0.13	0.11	0.12	0.13	0.14

Table 2-9: Evolution of H-Statistic and HHI by year in Main model, Gulf and Non-Gulf

Main model, (Countries with 20 banks and more)								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
H-Stata	0.37	0.30	0.47	0.36	0.24	0.22	0.37	0.46
Herfindahl	0.13	0.08	0.09	0.09	0.08	0.09	0.08	0.09
Gulf Countries								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
H-Stata	0.78	0.70	0.78	0.46	0.27	0.09	0.11	0.53
Herfindahl	0.10	0.10	0.12	0.13	0.11	0.12	0.12	0.13
NON-Gulf Countries								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
H-Stata	0.07	-0.00	0.24	0.15	0.17	0.25	0.43	0.49
Herfindahl	0.17	0.08	0.07	0.07	0.06	0.07	0.07	0.07

In Table 2-9, we can observe that Gulf counties have higher level of bank competition than the Non-Gulf countries as we expected, this is also confirmed if we look at Table 2-10. Meanwhile, we can notice also that in all cases (main model[1], Gulf, non-Gulf), competition measure (H-stata) increases with either increase or decrease in concentration measure (Herfindahl index), which means higher competition is associated with higher or lower concentration. This is related with "Contestability" literature. This discussion is also confirmed in Table 2-11, as we can see in the main model, gulf countries, and non-Gulf countries, competition can be correlated positively or negatively with concentration and thus, concentration is not always a condition for noncompetitive markets

Table 2-10: H-stata, Herfindahl, Z-Score, and Assets, by Countries Groups

	Non-Gulf Countries	**Gulf Countries**	**t-stat**
H-Stata	o.37	0.46	-3.69***
Herfindhal	0.14	0.11	5.79***
Z-score	3.39	2.61	6.46***
Assets	6392	8967	-4.68***

[1] Countries who have 20 banks or more.

Table 2-11: Correlation between H-stata and Herfindahl index

Main model, (Countries with 20 banks and more)							
Bahrain	**Egypt**	**Kuwait**	**Lebanon**	**Morocco**	**Sudan**	**Tunisia**	**Emirates**
0.23	0.43	0.31	0.21	0.38	0.3	-0.11	-0.42
Gulf Countries							
	Bahrain	**Kuwait**	**Oman**	**Qatar**	**Saudi Arabia**	**Emirates**	
	0.23	0.31	-0.38	0.41	-0.66	-0.42	
Non-Gulf Countries							
Algeria	**Tunisia**	**Iran**	**Israel**	**Jordan**	**Lebanon**	**Morocco**	**Sudan**
-0.85	-0.11	0.52	0.54	-0.31	0.21	0.38	0.30

Table 2-12: Matrix of correlation

	Zscore_	h_stata	Herfin~_	ROA_	Credit~_	NetLoa~_	OOI_TR_	NetIn~R_	Equit~s_	lnAS	Grow~ts_	Grow~ns_	Capital_	LOANLO~	IMPAIREDLO~N	gdpgrowth	gdpper~a	inflat~n
Zscore_	1.00																	
h_stata	0.04	1.00																
Herfindhal_	0.10	0.18	1.00															
ROA_	0.25	0.08	0.08	1.00														
Credit_Ass~_	-0.06	0.22	0.01	0.21	1.00													
NetLoan_As~_	-0.02	0.21	0.03	0.22	0.98	1.00												
OOI_TR_	-0.04	0.06	-0.01	0.11	-0.26	-0.25	1.00											
NetIntere~R_	0.04	-0.06	0.01	-0.11	0.26	0.25	-1.00	1.00										
Equity_ass~_	-0.08	0.03	0.17	0.26	0.04	0.02	0.05	-0.05	1.00									
lnAS	0.08	0.05	-0.06	0.00	-0.02	0.05	0.07	-0.07	-0.37	1.00								
GrowthTota~_	0.06	0.09	0.06	0.28	0.01	0.03	0.02	-0.02	0.19	-0.07	1.00							
GrowthGros~_	0.06	0.05	0.09	0.11	0.04	0.06	0.04	-0.04	0.08	-0.05	0.71	1.00						
Capital_	-0.06	-0.02	-0.08	0.05	0.16	0.20	0.04	-0.04	-0.11	0.72	-0.06	-0.07	1.00					
LOANLOSSPR~N	-0.19	-0.06	-0.04	-0.63	-0.16	-0.17	0.01	-0.01	0.00	0.00	-0.15	-0.14	-0.02	1.00				
IMPAIREDLO~N	-0.22	-0.07	-0.07	-0.23	-0.22	-0.34	0.00	0.00	0.18	-0.42	-0.12	-0.16	-0.24	0.33	1.00			
gdpgrowth	0.20	-0.02	0.27	0.21	-0.07	-0.04	0.07	-0.07	0.15	0.00	0.34	0.31	-0.02	-0.11	-0.09	1.00		
gdppercapita	-0.12	0.00	0.00	0.11	0.20	0.25	-0.01	0.01	0.16	0.31	0.19	0.19	0.28	0.00	-0.21	0.30	1.00	
inflation	0.04	0.08	0.02	0.08	-0.02	-0.03	0.00	0.00	-0.02	-0.08	0.21	0.20	-0.16	-0.06	0.00	0.16	-0.11	1.00

5. Methodology and Results

The relationship between risk taking and their determinants is analyzed in previous studies using different methodologies. For example, Altunbas, Manganelli and Marques-Ibanez (2011) used the quantile regression technique. This method is used to estimate linear regressions of the conditional distribution. Furthermore, data can treat heteroscedastic and is flexible enough to be applied to various fields. However, this type of regression needs a large set of data for consistent results. The regression results are sensitive to functional form if not correctly interprets the error term, which can lead to very different conclusions. Similarly, performance scores are very sensitive to outliers.

That said, the panel data methodology has been used most similar to our work. For example, Calomiris and Wilson (2004), Laeven and Levine (2007 and 2009), Demirgüç-Kunt and Huizinga (2010) and Beltratti and Stulz (2011) estimate static models of panel data fixed effects. This method allows controlling and preventing unobservable heterogeneity, thus biased estimators. This aspect is very important in our analysis because each bank has its own credit policy and way of taking and managing risk. Also, each country also has its particular situation, especially as regards the country risk and macroeconomic indicators. The proposed models are appropriate in the presence of strictly exogenous variables, is very questionable assumptions in microeconomic studies. Therefore, this assumption is not met, the estimation results may be inconsistent, which is why we have opted for a methodology based on dynamic panel data, which have been estimated using the Generalized Method of Moments (GMM). Our methodology has been proposed by (Arellano and Bond, 1991) and has been used by (Rauch et al. 2009). By applying dynamic modelling we not only take into account temporal autocorrelation in the residuals, but we are also able to reduce the amount of potential spurious regression, which may lead to incorrect inferences and inconsistent estimation in static models. Besides, the coefficient of the lagged dependent variable itself is of interest to us. DPD models contain one or more lagged dependent variables, allowing for the modelling of a partial adjustment mechanism. According to Wooldbridge (2012), models with lagged dependent variables are hard to estimate when heterogeneity and other sources of endogeneity are present. The problem of endogeneity usually appears when explanatory variables are not fully exogenous. When one applies Fixed Effect and Random Effect methods to dynamic models in the presence of unobserved heterogeneity and endogeneity, estimators are inconsistent and biased. A serious difficulty arises when using the one-way fixed effects model in the context of a DPD model when the number of years is small while

the number of individual units is large -"small T, large N" data (Baum, 2012). This happens because of a demeaning process which subtracts the individual's mean value of y and each X from the respective variable creating a correlation between regressor and error. The resulting correlation creates a bias in estimating the coefficient of the lagged dependent variable which is not mitigated by increasing N. Similar problems affect the one-way random effects model where the lagged dependent variable cannot be independent of the composite error process. Since each bank has its own culture and its own way of managing risk, and considering the possibility of an endogenous relationship between variables, we have opted for a methodology based on dynamic panel data, making estimates using the system generalized method of moments (GMM). System GMM is designed for dynamic models and is well suited to tackle the endogeneity problem. By applying Generalized Method of Moments (GMM), we believe we can construct more efficient estimates of the dynamic panel data model.

The difference and system GMM estimators developed by Arellano and Bond (1991); Arellano and Bover (1995) and Blundell and Bond (1998) are designed for situations with "small T, large N" panels such as ours. They deal well with independent variables that are not strictly exogenous i.e. correlated with past and possibly current realizations of the error, with fixed effects, heteroskedasticity and autocorrelation within individuals (Roodman, 2009). In difference GMM all regressors are usually transformed by differencing (also referred to as Arellano–Bond estimation). System GMM is an extension of difference GMM (also referred as the Arellano–Bover/Blundell–Bond estimator) which augments Arellano–Bond by building a system of two equations -the original equation and the transformed equation - and making an additional assumption that first differences of instrument variables are uncorrelated with the fixed effects. System GMM was invented to tackle the weak instrument problem and allows for the introduction of more instruments and the improvement of the models' efficiency.

Our model is as follows:

$$Y_{it} = \alpha_{it} + \beta_1 Y_{it-1} + \beta[X]_{it} + \gamma[C]_{it} + \sum_{t=1}^{8} Year_t + \varepsilon_{it}$$

Where Y_{it} a dependent variable representing risk is measures of a particular entity *i* in period *t* and Y_{it-1} is its one period lag. $[X]_{it}$ is a set of independent variables and $[C]_{it}$ a set of

control variables which we have already presented above. ε_t represents the error term, whereas α, β and γ denote the parameters to be estimated.

We will start our estimation based Pooled OLS, fixed effect and random effect estimators, and later on, we will use GMM method of estimation due to problems in in OLS estimator that we discussed above. Equation below is Baseline model for Insolvency risk - Z-score

$$LnZscore_{it} = \alpha_{it} + \beta_1 LnZscore_{it-1} + \beta_2 Hstata_{it} + \beta_3 HHI_{it} + \gamma_1 EQAST_{it} + \gamma_2 LnAST_{it} + \gamma_3 NetLoanAST_{it} + \gamma_4 Grwothloan_{it} + \gamma_5 GrowthAST_{it} + \gamma_6 GDPgrowth_{it} + \gamma_7 LnGDPpercapita_{it} + \gamma_8 Inflation_{it} + \sum_{t=1}^{8} Year_t + \varepsilon_{it}$$

Where

- ln $Zscore_{it}$ - *Ln* of Z-score of bank *i* in period *t* and log of $Zscore_{it-1}$ is its one period lag.
- *H-Stata* – H-Statistic as a competition measure in year *t*.
- *HHI* – Herfindhal index as a concentration measure in year *t*.
- *EQAST* – (Equity/Assets) ratio of bank *i* in period *t*.
- *LnAST*- measure of bank size of bank *i* in period *t*.
- $NetLoanAST_{it}$ – (Net loans/Assets) as a measure of control for extent of bank's involvement in lending activity for the current period of bank *i* in period *t*.
- $Grwothloan_{it}$ - Growth of Total loans of bank *i* in period *t*.
- $GrowthAST_{it}$ – Growth of Total Assets of bank *i* in period *t*.
- $GDPgrowth_{it}$, $GDPpercapita_{it}$ and $Inflation_{it}$ – macroeconomics variables.

We start by applying classical linear estimation OLS (pooled OLS) and linear models which are mostly used with panel data estimations such as Fixed Effect and Random Effects to our models. Accordingly, we can see why simpler methods are not appropriate in our case by demonstrating the preponderance of the selected method - system GMM.

We make sample estimates using pooled OLS regression and ignore the dynamic nature of our data. We are aware that OLS does not address the potential impact of unobserved heterogeneity on the conditional mean which gives rise to 'Nickell bias', and the lagged dependent variable will be correlated with the fixed effects in the error term (Nickell,

1981). This positive correlation between a repressor and the error violates an assumption necessary for the consistency of OLS estimation.

We use fixed effect estimation, assuming that something within the entities may impact or bias the predictor or outcome variables and the need to control for this i.e. assuming the correlation between the entity's error term and predictor variables. Fixed effect (FE) removes the effect of those time-invariant characteristics from the predictor variables enabling assessment of the predictors' net effect. According to Kohler et al. (2005) fixed-effects models cannot be used to investigate time invariant causes of the dependent variables as time-invariant characteristics of the individuals are perfectly collinear with the entity dummies.

Nickell states (Nickell, 1981) that in pooled OLS regression, the lagged dependent variable is positively correlated with the error, biasing its coefficient upward. In contrast, in the fixed effects model, the coefficients are biased downward due to the negative sign in the transformed error. Given the opposite directions of bias present in these estimates, these two estimations may provide us with a coefficient range also referred to as a "credible range" by (Roodman, 2009) with consistent GMM estimates supposed to lie between these values. As Bond (2002) noted, these bounds may provide a useful check on results from theoretically superior estimators. However, in the presence of endogeneity we think the reliance on this range is questionable.

We also apply Random Effect estimation by assuming that differences across entities have some influence on our dependent variable. Unlike the fixed effects model, in the random effect (RE) model the variation across entities is assumed to be random and uncorrelated with the predictor or the independent variables included in the model. Baum (2013) states that Nickell bias also affects the one-way random effects model when applying DPD and the lagged dependent variable cannot be independent of the composite error process. Estimates may be biased because we are not controlling for omitted variables; we therefore believe that we may construct more efficient estimates by applying system GMM model.

5.1 Z-score (Insolvency risk)

The preliminary results of the baseline model with pooled OLS regression (see Table 2-13) Baseline model estimations with dependent variable (*Z-score*) show that banks´ Z-score decreased significantly with the H-Statistic and GDP per-capita, while it positively affected

the lag of Z-score, with (*lnAST*) as indicator of size of bank, and with GDP growth. The problem in applying OLS is that $logZscore_{it-1}$ is correlated with the fixed effects in the error term which causes "dynamic panel bias" (Nickell, 1981) violating an assumption necessary for the consistency of OLS.

In the fixed effect model we see that Z-Score increasing significantly with most significant regressors, except inflation rate, meanwhile, the random effect model shows the exact results as pooled OLS estimator. The baseline model GMM coefficients are mostly significant. Coefficients consistent with Pooled OLS and RE models and test statistics are robust. The results of the estimates suggest that the impact of bank competition on risk taking is negatively related, as competition index (H-statistic) increase by 1 unit the Z-score (the index of stability) will decrease by 13%, which corresponds with "competition fragility hypothesis", that states bank competition will lower the interest income for banks, therefore, banks profit will erode, which will lead to increased risks taken by banks. And therefore, increases possibilities of defaulting or bankruptcy, and overall disruption of the financial system. This is confirmed by (Hellman et al., 2000, Kelley, 1990, Allen and Gale, 2004, Jimenez et al., 2010, and Salas and Saurina, 2003).

At the same time, capital (*EQAST*) has a negative influence on Z-score. The evidence is supported by Koehn and Santomero (1980) and Kim and Santomero (1988) who argue that increase in ratios, institutions will attempt to increase their returns on equity in order to take advantage of their limited liability in the face of adverse events. In terms of macroeconomics variables, we can see clearly that GDP growth has a positive effect on financial stability; because booming period is characterized by high employment with high stability in terms of payments to banks by borrowers. These results are supported by (Asekome and Oni, 2014), (Laker, 1999). Meanwhile, inflation rate have negative effect on stability, this evidence is supported by Ahmad and Bashir (2013), Babouèek and Janèar (2005), because during inflation the real wages declines interest rates grow, and therefore, higher possibility of defaulting.

Table 2-13: H-statistic model (all countries)

LogZ	PooledOLS	FE (within)	RE	sysGMM
logL1.Zscore	0.817***	0.090**	0.817***	0.689***
H-stata	-0.201***	0.144**	-0.201***	-0.130**
equity/assets	0.008	3.657***	0.008	-0.770**
logAST	0.040**	0.170	0.040**	0.005
NetloanAST	0.000	-0.000	0.000	-0.001
Growthloans	-0.000	-0.000	-0.000	-0.000
GrowthAST	0.002	0.008***	0.002*	0.002*
GDPgrowth	0.022**	0.003	0.022***	0.020***
logGDPpercapita	-0.097***	0.730***	-0.097***	-0.079**
Inflation	-0.006	-0.016**	-0.006	-0.011*
Cons	0.774***	-8.359***	0.716***	1.016***
R2_within		0.293	0.096	
corr(x_i,mu_Xb)		-0.787		
sigma_u		2.05	0	
sigma_e		0.495	0.495	
Rho		0.945	0	
F	94.81	12.92		
Wald CHi2 (17)			1688.43	
Diff AR (2)				0.076
Hansen Test				0.299
NO. of Instruments				199
No. of groups				201
NO.of observations	983	983	983	983

NOTE: Table reports the panel data estimates for Pooled OLS, Fixed Effect, Random Effect and the system Generalized Method of Moments where the dependent variable is the Log of Z-score [logZ] and GMM style lag limits (1 3) and estimates are robust. Year dummies are included. Hansen is a test for over-identifying restrictions, asymptotically distributed. Legend: * p<.1; ** p<.05; *** p<.01

In the next step, we will analyze the effect of bank competition on risk taking using Herfindhal index (*HHI*), and other explanatory variables. Table 2-14 summarizes the impact of (HHI) on risk taking. The results of the model with pooled OLS regression shows that banks 'Z score decreased significantly with the Herfindhal index (*HHI*), with GDP per-

capita, while it positively affected the lag of Z-score, with (*lnAST*) as indicator of size of bank, and with GDP growth. For (HHI), we can see that if bank concentration rises by 1%, the financial stability will decrease by 2.24%. This is supported by "concentration fragility" viewpoint, in another word; bank concentration is associated with higher financial instability.

In the fixed effect model we see that Z-Score increasing significantly with lag Z-score, with bank capital *(EQAST)* with (*growth of assets*) and with (*GDP per capita*), and decreasing significantly only with (*HHI*). In terms of random effect we can notice clearly that coefficients have the same signs as Pooled OLS estimator. The baseline model GMM has a lot of significant coefficients. These coefficients in general consistent with Pooled OLS and RE models and test statistics are robust. The results of the estimates suggest that the impact of bank competition on risk taking is positively related, as concentration index (HHI), as proxy of competition, increase by 1% the Z-score (the index of stability) will decrease by 1.8%, which corresponds with "competition stability hypothesis", that states banks concentration will lead to financial instability in different ways, bank with more market power tends to charge higher interest rates, which might cause higher possibility of defaulting, and at the same time, incentive to borrowers to engage in risky activities via moral hazard. So they simply find a positive relationship between banks concentration and financial stability. This is confirmed by (Boyd et al., 2006), (Boyd and Nicolo, 2005), (Schaeck, Čihák and Wolfe , 2006) , and (De Nicolo and Loukoianova, 2007).

Meanwhile, capital (*EQAST*) has a negative influence on Z-score; Blum (1999) and Hellman, Murdock and Stiglitz (2000) stress that despite the fact that capital requirements reduce the incentive to take on risk as they bring more equity into play, this effect can be more than counteracted if one considers the dynamic impact of regulations. First, in reducing the expected return to the banking business, one reduces the value of the franchise, which means that the cost of taking on additional risk decreases. Secondly, capital regulations increase the value of future equity. If access to the capital markets is excessively costly, the banks will have an incentive to generate capital internally by increasing current risk (Blum, 1999).

Table 2-14: Herfindhal model (all countries)

LogZ	PooledOLS	FE (within)	RE	sysGMM
logL1.Zscore	0.816***	0.113**	0.816***	0.686***
Herfindhal	-2.243**	-3.102***	-2.243**	-1.897*
equity/assets	-0.090	3.769***	-0.090	-1.09***
logAST	0.026*	0.222	0.026*	-0.018
NetloanAST	0.000	-0.003	0.000	-0.001
Growthloans	-0.000	0.000	-0.000	-0.000
GrowthAST	0.000	0.005***	0.000	0.001
GDPgrowth	0.021**	0.003	0.021***	0.018**
logGDPpercapita	-0.059**	1.067***	-0.059***	-0.032
Inflation	-0.000	0.002	-0.000	-0.004
Cons	0.418**	-11.456***	0.638***	0.904***
R2_within		0.272	0.100	
corr(x_i,mu_Xb)		-0.841		
sigma_u		2.324	0	
sigma_e		0.528	0.582	
Rho		0.950	0	
F	94.51	13.60		
Wald CHi2 (17)			1488.53	
Diff AR (2)				0.068
Hansen Test				0.476
NO. of Instruments				203
No. of groups				201
NO.of observations	1066	1066	1066	1066

NOTE: Table reports the panel data estimates for Pooled OLS, Fixed Effect, Random Effect and the system Generalized Method of Moments where the dependent variable is the Log of Z-score [logZ] and GMM style lag limits (1 3) and estimates are robust. Year dummies are included. Hansen is a test for over-identifying restrictions, asymptotically distributed. Legend: * p<.1; ** p<.05; *** p<.01.

According Northcott (2004), the ambiguous results above are not strange, because with H-statistic, the evidence supports "competition fragility hypothesis", but with herfindhal index, the evidence supports "competition stability hypothesis". This is related to contestability literature that says competitive behavior of banks is not necessarily related to the numbers of banks in a market or to their concentration. So contestability literature focuses on the competitive behavior of banks rather than on concentration or number of banks. The growing consensus in this idea is that contestability improves with less-severe entry restrictions, the presence of foreign banks, and few restrictions on the activities that banks can perform and well developed financial system. Because it requires an understanding of these various factors, an assessment of contestability in the banking sector can be very difficult and is likely to be specific to a particular country and a particular time. Contestability is tested by Bikker and Haff (2002), who examine competitive condition in 23 countries using PR model. Their results typically consistent with contestability literature, for example they found that Netherland is most concentrated and most competitive at the same time. At the same time, maybe we can indicate that we have found that Herfindhal and H statistic presents negative and positive correlation depending on the country. This can mean that concentration is compatible with competition and with lack of competition. Only when there is a positive and high correlation, both variables meaning the same.

In next step, we will analyze the effect of bank competition on risk taking in Gulf countries (Saudi Arabia, Emirates, Oman, Qatar, Bahrain, and Kuwait), Table 2-15 shows the results for sample countries, and we started as before with H-statistic effect on risk taking. In Pooled OLS estimator, as we can notice clearly that Z-score decreased significantly with H-statistics, growth of loans, and inflation. In contrast, Z-score increased significantly with lag of Z-score, growth of assets, net loans to assets and with GDP growth. Regarding fixed effect estimator, we can see that Z-score decreased significantly with H-statistic and inflation rate, while increased significantly with capitalization (*EQAST*) and with growth of total assets. In terms of random effect, we can see the same results as Pooled OLS effect.

When we look to dynamic panel data estimator (GMM), we can see that most of coefficients are significant. Regarding (*H statistics*), we can say if the banks competition rises by 1 unit, the financial stability (*Z-score*) will decline by 14.5%, and as you can see all estimators present negative effects between bank competition and risk taking. This viewpoint

(competition fragility) supported by (Hellman et al., 2000), (Kelley, 1990), (Allen and Gale, 2004), (Jimenez et al., 2010) and (Salas and Saurina, 2003). As they mentioned that bank competition will lower the interest income for banks, therefore, banks profit will erode, which will lead to increased risks taken by banks. This increases possibilities of defaulting or bankruptcy, and overall disruption of the financial system.

In terms of macroeconomics variables, we can see also inflation rate has a negative effect on bank stability, because during inflation period, Central Banks may higher the interest rates, and therefore, increase the probability of default, which will lead unstable in financial system. The viewpoint is supported by Baboucek and Jancar (2005), Uhde and Heimeshoff (2009). In contrast, we can see that (*netloansAST*) and (*GDP growth*) has positive effect on financial stability. Most of the literature states that higher rates of growth are associated with a more stable macroeconomic environment and a relatively low likelihood of bank distress. (Borio and Lowe, 2002), (Festić et al., 2011); (Poghosyan and Čihak, 2011). It is remarkable to mention here, that the impact of bank competition measured by (H-statistic) on risk taking, has the same effect either in case of enough observation countries or in case of Gulf countries, so both cases are consistent.

Table 2-15: Estimation for Gulf Countries (H-Statistic only)

LogZ	PooledOLS	FE (within)	RE	sysGMM
logL1.Zscore	0.737***	0.089	0.737***	0.616***
H-Stata	-0.105*	-0.092*	-0.105*	-0.145*
equity/assets	-0.131	2.819***	-0.131	0.255
logAST	-0.015	0.251	-0.015	-0.062
NetloanAST	0.006***	-0.006	0.006***	0.013***
Growthloans	-0.001**	-0.000	-0.001**	-0.001***
GrowthAST	0.002**	0.003*	0.002***	0.002**
GDPgrowth	0.020***	0.000	0.020***	0.022**
logGDPpercapita	-0.061	0.197	-0.061	-0.031
Inflation	-0.020**	-0.021**	-0.020***	-0.025**
Cons	0.258	-3.539	0.599	0.304
R2_within		0.322	0.147	
corr(x_i,mu_Xb)		-0.514		
sigma_u		1.254	0	
sigma_e		0.549	0.549	
Rho		0.839	0	
F	43.42	10.83		
Wald CHi2 (17)			1140.24	
Diff AR (2)				0.092
Hansen Test				1
NO. of Instruments				190
No. of groups				117
NO.of observations	609	609	609	609

NOTE: Table reports the panel data estimates for Pooled OLS, Fixed Effect, Random Effect and the system Generalized Method of Moments where the dependent variable is the Log of Z-score [logZ] and GMM style lag limits (1 3) and estimates are robust. Year dummies are included. Hansen is a test for over-identifying restrictions, asymptotically distributed. Legend: * p<.1; ** p<.05; *** p<.01.

Now we will turn to analyze the effect of bank competition on risk taking in Gulf countries using Herfindhal index. Table 2-16 summarizes the main results.

Regarding GMM estimator, most of coefficients are significant. In the competition measure, we can see that if HHI index raises by 1%, the Z-score will lower by 1.35%, and this support "competition stability viewpoint" that states banks concentration will lead to financial instability in different ways. Banks with more market power tends to charge higher interest rates, which might cause higher possibility of default. So they simply find a positive relationship between banks concentration and financial stability. This is supported by (Boyd et al., 2006), (Boyd and Nicolo, 2005), (Schaeck, Čihák and Wolfe, 2006) and (De Nicolo and Loukoianova, 2007). Also, the inflation rate is inversely related with financial stability, as we mentioned above this is related to behavior of Federal Reserve Bank, and besides that, the effect of inflation on real wages. All of these inflation effects will cause higher possibility of defaulting and higher possibility of bankruptcy. This viewpoint also supported by (Baboucek and Jancar, 2005), (Uhde and Heimeshoff, 2009). In terms of GDP growth, we can see that GDP growth affect financial stability positively. This view point is supported by (Borio and Lowe, 2002), (Festic et al., 2011), (Pophosyan and Cihak, 2011); among others. So we can notice now, that the relationship between bank competition (using *HHI* index), and financial stability is the same in both case, in enough observation case and in Gulf countries case.

Table 2-16: Estimation for Gulf Countries (Herfindhal index only)

LogZ	PooledOLS	FE (within)	RE	sysGMM
logL1.Zscore	0.738***	0.093	0.738***	0.599***
Herfindhal	-0.868	-1.846*	-0.868	-1.356*
equity/assets	-0.113	2.827***	-0.113	0.305
logAST	-0.012	0.226	-0.012	-0.054
NetloanAST	0.006***	-0.005	0.006***	0.014***
Growthloans	-0.001**	-0.000	-0.001**	-0.001**
GrowthAST	0.002**	0.003	0.002***	0.002**
GDPgrowth	0.026***	0.000	0.026***	0.031***
logGDPpercapita	-0.068	0.380	-0.068	-0.057
Inflation	-0.020**	-0.018*	-0.020***	-0.026***
Cons	0.323	-5.792*	0.659	0.410
R2_within		0.323	0.145	
corr(x_i,mu_Xb)		-0.551		
sigma_u		1.284	0	
sigma_e		0.548	0.548	
Rho		0.845	0	
F	42.59	11.32		
Wald CHi2 (17)			1149.48	
Diff AR (2)				0.095
Hansen Test				0.985
NO. of Instruments				190
No. of groups				117
NO.of observations	609	609	609	609

NOTE: Table reports the panel data estimates for Pooled OLS, Fixed Effect, Random Effect and the system Generalized Method of Moments where the dependent variable is the Log of Z-score [logZ] and GMM style lag limits (1 3) and estimates are robust. Year dummies are included. Hansen is a test for over-identifying restrictions, asymptotically distributed. Legend: * p<.1; ** p<.05; *** p<.01.

Also we confirm here the above ambiguous results between H-statistic measure and Herfindahl measure on risk taking in Gulf countries could be related to contestability literature that discussed above.

We can now compare between behavior in Gulf countries, and non-Gulf countries. First of all, we can see in terms of bank competition in case of Non-Gulf countries that both FE estimator and GMM have positive effect on financial stability (Table 2-17). According GMM if bank competition rises by 1 unit, the financial stability will rise by 14%, which is related to "competition stability hypothesis". In contrast, Gulf countries have different story. In Gulf countries, as we have seen in Table 2-15 if bank competition rises by 1 unit, the financial stability will decline by 14.5%, which enhance "competition fragility hypothesis".

Regarding Herfindahl index, we have seen that concentration measure have a little significance on financial stability in case of Gulf countries as Table 2-16, and no significance in case of Non-Gulf countries as Table 2-18.

Table 2-17: Estimation for Non- Gulf Countries (H-Statistic only)

LogZ	PooledOLS	FE (within)	RE	sysGMM
logL1.Zscore	0.869***	0.146***	0.824***	0.839***
H-Stata	0.071	0.174**	0.086	0.149**
equity/assets	0.303	4.114***	0.559	0.010
logAST	0.035**	0.118	0.046**	-0.016
NetloanAST	-0.000	0.002	-0.001	-0.003**
Growthloans	-0.000	-0.000	-0.000	-0.000
GrowthAST	0.000	0.005***	0.000	-0.000
GDPgrowth	0.016*	0.001	0.016*	0.012
logGDPpercapita	0.051	0.663**	0.055	0.033
Inflation	0.010	-0.010	0.008	0.002
Cons	-0.632	-6.544**	-0.776*	0.153
R2_within		0.276	0.119	
corr(x_i,mu_Xb)		0.039		
sigma_u		1.118	0.124	
sigma_e		0.382	0.382	
Rho		0.895	0.095	
F	106.42	6.48		
Wald CHi2 (17)			1029.75	
Diff AR (2)				0.349
Hansen Test				0.998
NO. of Instruments				176
No. of groups				123
NO.of observations	604	604	604	604

NOTE: Table reports the panel data estimates for Pooled OLS, Fixed Effect, Random Effect and the system Generalized Method of Moments where the dependent variable is the Log of Z-score [logZ] and GMM style lag limits (1 3) and estimates are robust. Year dummies are included. Hansen is a test for over-identifying restrictions, asymptotically distributed. Legend: * p<.1; ** p<.05; *** p<.01.

Table 2-18: Estimation for Non-Gulf Countries (Herfindahl only)

LogZ	PooledOLS	FE (within)	RE	sysGMM
logL1.Zscore	0.848***	0.166***	0.848***	0.791***
Herfindhal	1.445	1.782	1.445	2.404
equity/assets	0.325	4.326***	0.325	0.037
logAST	0.036**	0.272	0.036**	-0.002
NetloanAST	0.000	-0.002	0.000	-0.000
Growthloans	-0.000	0.000	-0.000	0.000
GrowthAST	-0.000	0.002**	-0.000	-0.000
GDPgrowth	0.011	0.009	0.011	0.004
logGDPpercapita	0.071*	1.102***	0.071*	0.060
Inflation	0.009*	0.004	0.009*	0.002
Cons	-0.864*	-10.853***	-0.947**	-0.481
R2_within		0.263	0.111	
corr(x_i,mu_Xb)		-0.239		
sigma_u		1.141	0	
sigma_e		0.455	0.455	
Rho		0.862	0	
F	99.74	11.31		
Wald CHi2 (17)			1369.15	
Diff AR (2)				0.279
Hansen Test				0.998
NO. of Instruments				184
No. of groups				123
NO.of observations	687	687	687	687

NOTE: Table reports the panel data estimates for Pooled OLS, Fixed Effect, Random Effect and the system Generalized Method of Moments where the dependent variable is the Log of Z-score [logZ] and GMM style lag limits (1 3) and estimates are robust. Year dummies are included. Hansen is a test for over-identifying restrictions, asymptotically distributed. Legend: * p<.1; ** p<.05; *** p<.01.

As we can see in Table 2-19, in terms of all countries, we can observe that our evidence support "competition fragility hypothesis", according H1. But at the same time, the evidence also supports "concentration fragility hypothesis". The overall evaluation expects that all countries case goes with "contestability literature", that says that concentration is not associated with low competition, which is consistent with H3. In terms of Gulf countries, it seems very similar to all countries case in terms of significance level and the direction of coefficients, which is support also "contestability literature, which also is consistent with H3.

In the contrast, Non-Gulf countries case seems quite different from last two cases. We can see clearly that Non-Gulf countries support significantly "competition stability hypothesis" according H1. This final result is also consistent with the other two cases, that concentration is not related with competition, which means is also consistent with H3.

So we can conclude, that the difference could mean that the effect of competition on Bank risk depends on the level of competition in the market. The introduction of greater competition could be positive in terms of solvency for Non-Gulf countries because banks operate under lower levels of competition. In Gulf countries it happens the contrary, the higher level of competition impacts negatively on financial stability. This result reflects that the effect of competition is dependent on the market and the level of competition. At the same time concentration is not a measure of the level of competition because we can find markets where a high concentration is related with high competition but the contrary is also possible.

Table 2-19: Summary results of Testing Hypothesis

Hypothesis		All Countries	Gulf Countries	Non-Gulf Countries
H1	Sign	-	-	+
	Significant	Yes	Yes	Yes
H2	Sign	-	-	+
	Significant	Yes	Yes	No
H3	Sign	-	-	-
	Significant	Yes	Yes	Yes
H4	Sign		+	-
	Significant		yes	yes

Chapter 3

Determinants of Efficiency in MENA Banks

1. Introduction

Banks contribute significantly to the economic activity, particularly in developing countries, where they represent the main channel for the flow of capital. So Efficiency of banking system for any country became a strategic issue in order to enhance the effectiveness and resilience of the financial system as a whole, especially in the face of the financial and economic shocks. Further, most of Middle East countries are involved in the phenomenon of liberalization and globalization of the financial system. The globalization of financial markets and institutions which has been accompanied by government deregulation, financial innovations, information revolution and advanced application in communication and technology, has created a competitive banking environment and modified the technology of bank production. Due to these developments and changes in the modern banking field, banks are trying to operate more efficiently in terms of cost and profit in order to stay competitive.

Beside this, efficiency is a vital need of both bankers and policy makers to track improvements and understand mechanisms through which banking efficiency is achieved. As well as, advancing efficiency will improve financial services and lead to a higher volume of funds available in the market. This in turn opens more doors for the banking system to contribute to economic development. Moreover, as efficiency is an important indicator of good performance of individual banks and the productivity of the industry as a whole, measuring efficiency enables banks management, supervisory institutions and policy makers to spot weaknesses in the banking system and identify banks that might face future problems, giving way for precautious measures. All these reasons make studying banking efficiency in any economy as something vital for operational purposes, as well as academic (Berger and Humphhery, 1997). The estimation of efficiency is also useful for individual investment, and judgment on the past and current positions of the banks as well as the future potential and risk associated (Sharmaa et al., 2012).

So measuring efficiency levels of banks, and discover whether these reforms have led to a marked improvement in their performance takes the utmost importance. For several reasons, first, it is a vital factor for financial institutions seeking to succeed in their

objectives, given the increased competition in the financial system. Second, the rapid changes in the financial system and the trend towards globalization have led to fears of investors over the efficiency of the banks in converting their savings to different financial products and services. Third, the efficiency standards are critical aspects in the banking sector which enables us to distinguish between banks that have the ability to survive and prosper than those that may have problems. Meanwhile, minor's important questions appear like, whether small and medium-sized banks have an opportunity to continue in the era of financial globalization, whether the entry of foreign banks is healthy or not for economy, and whether it is better for banks to be private oriented or government oriented. For all of this, our primary goal is measuring efficiency in MENA countries.

Another goal of this chapter is to identify the determinants of banking efficiency in MENA; in this regard, the effect of some factors will be examined on efficiency. First we want to investigate how bank size affects efficiency. Another set of variables are included to capture the influence of different institutional aspects, such as a dummy variable to capture the impact of gulf countries and Islamic banks dummy also included. Furthermore, another set of variables used, such as capitalization, ROA has been included. In addition, our model contains some country level variables, such as GDP growth, GDP per capita and inflation rate to capture the heterogeneity between countries.

However, our study has another important aspect that is related to the area of study, as we study banks in MENA countries. Firstly, geographically MENA countries are located in the middle between Europe and Asia, and this location is advantage for these countries as plays an important role of transmission of culture, experiences, also fund between Europe and Asia. So studying of the differences in efficiency among MENA countries will explain the competitive starting position of each country, which may also shed light on the capacity to respond to the new changing environment.

Secondly, MENA countries include Gulf countries which represent an important source of funds from oil business. Thirdly, Islamic banks phenomenon especially in Gulf countries, which have different characteristics compared with conventional banks, which allow us make an interesting comparison in efficiency between those types of banks. Finally, the lack of studies in MENA countries that related to efficiency, as Bos and Schmiedel (2007), indicated that comparative studies are still few, and most of these studies focus on US and Europe.

To fill this gap and to contribute to the existing literature, the main objective of this study is to provide more information on the efficiency of the banking industry in the MENA countries. Thus, we analyze the cost and determinants of efficiency in MENA banking employing a parametric approach, and using a panel data of 201 commercial and Islamic banks over a recent period 2005–2012. This paper has extended the literature in two directions. First, this is the one of the few empirical studies that has analyzed cost efficiency in MENA region. Second, cost efficiency levels are compared between countries, as well as between conventional and Islamic banks in this region.

This study, using the bank-scope database, focuses on the analysis of cost efficiency of the banks in MENA countries in order to provide some interesting insights on the efficiency of the MENA banking systems that could be used by managers and policy makers operating in these countries. Thus, the purpose of this paper is threefold. First, we estimate stochastic cost frontiers using a specific functional form (standard translog function). To follow Perera et al. (2007) and Mamatzakis et al. (2008), country-level variables are incorporated in the common cost frontiers to account for variation in banking technologies that may be related to macro-economic conditions and to structural and institutional features of a country.

In this research, we use the maximum likelihood procedure of Greene (2005a) true fixed effect model that permits estimate the parameters of the cost frontiers. As a second step in the analysis, we calculate and compare the cost efficiency scores between country and type of banks. In the third step, we have used GMM model to estimate the main determinants of banking efficiency.

The paper is structured as follows: in the next section, we discuss the studies on efficiency. Section 3 presents the methodology and the econometric model used to estimate the common cost frontiers. The data and variables concerning outputs, input prices, country-level and bank specific are described in Section 4. Section 5 explains the empirical results of the cost efficiency of banks in MENA countries, while the final section summarizes and concludes this study.

2. Types of efficiency

The term efficiency can be interpreted in different ways when it is applied to bank-based financial systems as well as the way market-based systems are analyzed. According to conventional microeconomic theory, firms are supposed to reduce costs irrespective of their operation spheres, either economic environment or market structure. Nevertheless, a theory of the organization of the firm together with its relation to its environment is introduced by Liebenstein (1975) and comprehends explanations on the non-reduction of costs of firms (called X-inefficiency) even in competitive environments. Having different organizational circumstances, the same range of inputs at equal prices would lead to a great variety of outputs. An unknown factor responsible for a non-allocative type of inefficiency is represented by the X in X-efficiency. The absence of motivation, human inertia or biases in human decision making could be examples of unexploited opportunities. These would be forms of inefficiency not of allocative inefficiency since they are not linked to markets or prices per se, they are linked to intra-firm issues and errors made by humans belonging to those firms.

Continuing these thoughts, Berger (1995) separates the efficiency hypothesis into the X-efficiency (XE) and scale-efficiency (SE) hypotheses. In one hand, the X-efficiency represents those firms with lower costs and higher profits due to its superior management or production technologies and those firms that generate larger market shares that may result in higher concentration. On the other hand, the scale-efficiency accepts that all firms may have essentially equally good management and technology, however, some firms have a better production at more efficient scales than others, which leads to lower unit costs and higher unit profits. Both leads show a positive relationship between profit and market structure, though efficiency runs profit and market structure in a different way: the profit-structure relationship is a spurious outcome.

Fiordelisi (2004) focused on three different dimensions of the Efficiency- Structure (ES) hypothesis. Specifically, recourses allocation, production technique and production scale in order to develop three different measures. Firstly, allocative efficiency used to come up with outputs in technology, optimal proportions and given prices. Secondly, technical efficiency measures the firms which are greatest in terms of quantity. Lastly, scale efficiency. Three different levels of efficiency have been identified by (Mester, 1996). These are: *scope efficiency* to find out if the banks are running with an effective mix of outputs. *Scale*

efficiency for identifying if banks are functioning with sufficient output. And X-efficiency, is to find if the banks are making efficient use of their inputs.

In the following, we will analyze the three distinct types of efficiency, cost efficiency, Standard profit and alternative profit.

Cost efficiency

Cost efficiency compares the similarity of a bank's cost to a best-practice bank's cost if they were to produce the same output. The dependent variables are prices, costs and inputs (usually labor, funds and deposits). And outputs are quantities of securities and loans. The function of the cost is given by:

$$C=C(w,y,z,v,uc,\varepsilon c) \rightarrow \ln C=f(w,y,z,v)+\ln uc+\ln \varepsilon c \ ,$$

C represents variable costs, w input prices, y output quantities, z quantities of fixed inputs (inputs or outputs: e.g. off-balance-sheet items, physical capital, equity capital), v environmental variables (e.g. nonperforming loans over total loans), uc the inefficiency factor, and εc random error. The cost efficiency of a bank is expressed as a ratio between the estimated cost needed to produce its output vector if it were as efficient as the best-practice bank in the sample, divided by the actual cost of the bank, and adjusted for random error. The ratio ranges over (0, 1)

Studies about bank efficiency are then separated into those considering only scale and scope efficiency, and those considering X-efficiency (Mester, 1996). The first type of studies estimates an average practice cost function relating bank cost to output levels and input prices, assuming that there is no X-inefficiency and that the same technology is being used by banks. The next type of studies estimate a best practice cost function. This signifies the predicted cost function of X-efficient banks, and calculates the scale of inefficiency of other banks in the sample. X-efficiency measures would vary in the way they determine the inefficiency term ln uc from the random error ln εc.

Standard profit efficiency

Standard profit efficiency measures how near a bank is to generating the greatest achievable profit when using a specific level of input and output prices. Dependent variables in standard profit efficiency are: profits, inputs are prices (of deposits, other funds, labor) and

outputs are prices too (of loans, securities). Other variables (input, environmental, inefficiency and error term) are included as in the cost function. The function is given by

$$\ln(\pi + \theta) = f(w, p, z, v) + \ln u\pi + \ln \varepsilon\pi \,,$$

where π is variable profits (interest and fee income earned on the outputs minus variable costs, (C), θ is a constant added to every firm's profit so the natural log is taken of a positive number; p are output prices, uπ the inefficiency that reduces profits, and επ random error. Standard profit efficiency ascertains that revenues could be made when differing in inputs as well as outputs.

As said by Berger and Mester (1997), when assessing general achievements of the firm, profit efficiency is better than cost efficiency because the profit efficiency is based on the more popular economic goal of profit maximization. This needs the same level of managerial consideration to be given to raising a marginal dollar of revenue as is given to reducing a marginal dollar of costs. As cost efficiency appraises performance keeping output consistently at its current level.

Alternative profit efficiency

Alternative profit efficiency measures how near a bank is to making maximum profits based on output levels instead of output prices. The inputs are prices (of deposits, other funds, labor) and outputs are quantities (of loans, securities). Alternative profit function uses the same dependent variable as standard profit function (profit) but the same exogenous variables as the cost function (input prices, output quantities).

It is not necessary to estimate the alternative profit measure under the usual assumptions (Berger and Mester, 1997), but it may provide useful information if one or more of the following conditions hold: substantial unmeasured differences in the quality of banking services; outputs not completely variable (banks cannot achieve every output scale or product mix); output markets not perfectly competitive (banks have market power to charge prices); output prices not accurately measured.

3. Efficiency Measurement

Banking efficiency can be measured either by parametric techniques or by non-parametric techniques. In this context, efficiency estimates are fairly robust to differences in methodology (Berger and Mester, 1997). A bank is labeled inefficient if its costs are higher or profits are lower than the best-practice bank after removing random error. Different parametric methods differ in the way the inefficiency term ln*u* is disentangled from the composite error ln*u* + lnε (inefficiency plus random error). In this sense, there most common parametric techniques are the stochastic frontier approach (Aigner, Lovell and Schmidt, 1977), the distribution-free approach (Berger, 1993), and the thick frontier approach (Berger and Humphrey, 1991).

First, the stochastic frontier approach, SFA allows for random errors associated with the choice of the functional form, resulting in a stochastic frontier. It is often referred to as a composed error model where the part representing statistical noise follows a symmetric distribution and the other part, representing inefficiency, follows a particular one-sided distribution. The most common distributional assumption is the normal distribution for ln ε, and the half-normal or exponential distribution for ln u, proposed by (Aigner et al., 1977) and (Mester, 1993). The assumption of half-normal or exponential distributions term on inefficiency imposes a restriction that most firms are clustered near full efficiency, with higher degrees of inefficiency being increasingly unlikely (Berger, 1993). But this is not necessarily true and the inefficiencies could be more evenly distributed.

The parameters of the frontier model and the composed error, εi, can be estimated using either the maximum likelihood (ML) estimation or the corrected ordinary least squares (COLS) directly. Some studies suggest that ML estimation is the preferred method. For example, Coelli (1995) and Olesen et al. (1980) show that ML estimation tends to outperform COLS in large sample sizes. Inefficiency measures are taken as the conditional mean or mode of the distribution of the inefficiency term, given that the observation of the composed error term, that is, E[exp(u|ε)] is used to measure inefficiency.

Second, the distribution-free approach follows (Berger, 1993). DFA is a panel estimation method which avoids imposing distributional assumptions on the error component. DFA specifies a functional form for the efficiency frontier as does SFA, but it uses a different way to separate the inefficiencies from the residual. DFA disentangles inefficiencies from random errors by assuming that inefficiencies are relatively stable and should persist over

time. Random errors are ephemeral and should tend to cancel one another out over time by averaging. In particular, a cost or profit function is estimated for each period of a panel data set. The residual in each separate regression is comprised of the inefficiency and random error terms. Since the random error component is assumed to average out over time, the average of a bank's residuals from all of the regressions is an estimate of the inefficiency of the bank. Because no restrictive assumptions are imposed on the distribution of either inefficiency or the random error, the distribution-free approach is easier to implement than the stochastic frontier approach because it does not require the use of maximum likelihood methods to estimate the cost or profit function. We can estimate the function either by generalized least squares (GLS), as in Schmidt and Sickles (1984) or by using ordinary least squares (OLS), as in (Berger, 1993). The inefficiency is then estimated for each firm as the difference between its average residual and the average residual of the firm on the frontier.

Third, the thick frontier approach was developed by (Berger and Humphrey, 1991). TFA specifies a functional form for the frontier cost function as do the other parametric frontier approaches. But this approach estimates a thick frontier rather than a frontier edge for measuring efficiencies and also avoids distributional assumptions for cross-sectional data. As it is usually implemented, this method estimates the cost function for both the lowest average cost quartile of firms and the highest average cost quartile of firms. Firms in the lowest average cost quartile are assumed to be of greater than average efficiency and to form a thick frontier. Similarly banks in the highest performance quartiles are assumed to have less efficiency than average. The differences in predicted performance between the highest and lowest average-cost quartiles reflect a combination of inefficiencies and exogenous differences in the regression. The error terms within each of the frontiers are assumed to represent random error and luck. In most applications, TFA predicts cost efficiency using the differences in the parameters of the upper and lower cost frontiers, whereas the differences in the lowest and highest cost function are estimated as exogenous factors. TFA does not provide point estimates of efficiency for individual DMUs but instead provides an estimate of the overall level of efficiency.

Non-parametric techniques focus on technological optimization (a.k.a. technical efficiency) rather than economic optimization, and do not correspond to the cost and profit efficiency concepts discussed above. These techniques cannot account for allocative inefficiency because they generally ignore prices. Another drawback is that their estimations

usually do not allow for a random error —alternatively, they disentangle ln u and ln ε by setting random error equal to zero.

The most common non-parametric technique is the data envelopment analysis, DEA (Farrell, 1957; Charnes, Cooper and Rhodes, 1978). DEA is a well-established method in the literature that aims to evaluate technical efficiency by defining a frontier envelopment surface for all sample observations. We may distinguish two types of techniques: input-oriented DEA minimizes the inputs necessary to produce a given output set (inputs are endogenous, outputs are exogenous); output-oriented DEA, instead, looks for the maximum outputs achievable given inputs.

Some studies use DEA techniques to measure bank efficiency like Charnes et al. (1978) who introduced the term DEA to describe the mathematical programming used in the construction of production frontiers and the measurement of efficiency. Their model, known as the CCR model, is probably the best-known and most widely used (Barros and Garcia-del-Barrio, 2010). They assumed constant returns to scale (CRS), while Banker, Charnes and Cooper (1984) (a.k.a. BCC model) were the first to introduce variable returns to scale (VRS). The CCR model measures the overall efficiency for each firm, aggregating pure technical and scale efficiency into one value. The BCC model, instead, measures pure technical efficiency (managerial skills) alone. This way, using both DEA models may decompose efficiency into technical and scale efficiencies. Finally, there are at least five other basic DEA models: the multiplicative model (Charnes et al., 1982); the additive model (Charnes et al., 1985); the cone-ratio DEA model (Charnes, 1990); the assurance region DEA model (Thompson et al., 1990); and the super-efficiency model (Andersen and Petersen, 1993).

Other classic non-parametric techniques are the non-parametric Malmquist productivity index (Malmquist, 1953), the free disposable hull analysis (Deprins, Simar and Tulkens, 1984), and the two-stage DEA bootstrapping technique (Simar and Wilson, 2007). They are summarized in what follows. The Malmquist productivity index follows after Malmquist (1953), who proposes a quantity index that uses input distance functions to compare two or more consumption bundles, using an indifference curve of one of the consumers as a reference. Caves, Christensen and Diewert (1982) adapt the index from consumption analysis to production analysis, defining the Malmquist input, output and productivity indexes for general structures of production for two or more firms.

The free disposable hull analysis was first introduced by Deprins et al. (1984). They compare two previous models ―one of adjusting a Cobb-Douglas production frontier to data, other of computing the convex hull of the data― to introduce a third method, FDH. The best feature of FDH is that it relies on the sole assumption that production possibilities satisfy free disposability. Its main drawback, as it was later demonstrated by Thrall (1999), is that it can give a technically efficient classification to output-input vectors that are inefficient in terms of profit maximization. However, some other authors disagree on this conclusion (e.g., Cherchye, Kuosmanen and Post, 1999).

Finally, the DEA bootstrapping technique enhances the original DEA, which is simply to estimate but is criticized for being a non-statistical (deterministic) technique. Developed by (Simar and Wilson, 2007), the bootstrapping technique allows to benefit from the advantages of DEA, while performing statistical hypothesis testing on the DEA efficiency scores. It consists of a two-stage procedure: in the first stage, a bootstrapped DEA is used to estimate the relative efficiency scores; then, in the second stage, a procedure is implemented to bootstrap the DEA scores with a truncated regression.

4. Literature Review

During the last decades there have been many studies conducted to investigate and analyze the efficiency of banking sector. The majority of these studies covered developed countries (Berger and Humphrey (1997); Dietsch and Lozano-Vivas (2000); Altunbas et al., 2001; Weill 2004; Pasiouras 2008). More recently, there have been some studies on countries in transition (e.g., Fries and Taci 2005; Bonin et al., 2005; Kasman and Yildirim, 2006). However, empirical research on bank efficiency in developing countries, in particular, Middle East countries appears relatively scarce. Our aim in this study is to fill this gap by analyzing efficiency in Middle East and North Africa (MENA) countries.

Meanwhile, Karim (2001) investigated banks in four countries. His sample contains banks from Indonesia, Malaysia, Philippines and Thailand respectively, from 1989-1996. The Author use three inputs variables (interest expenses, expenses on land and building, and wages and salaries for employees), and five output (commercial and industrial loans, other loans, time deposits, demand deposits, and securities and investment). The study found out that there is a significant difference in mean technical efficiency scores across countries.

Furthermore, the highest score of technical efficiency was in Thailand although the lowest one was in Philippine. In this line, Weill (2003) study the technical efficiency of banks in two transition countries (31 Polish banks and 16 Czech banks) in 1997. He use Stochastic Frontier Analysis (SFA) as a tool of analysis. The study use three input variables (personnel expenses, non-interest expenses and interest expenses), and two outputs (total loans and investment assets), and found out that foreign banks in transition countries were more technically efficient than domestic ones. This result is consistent with Bonin et al. (2005), who analyzed the technical efficiency in 225 banks in eleven transition economies from 1996-2000, using the same statistical method. The study use one input (Capital) and four outputs (total deposits, total loans, liquid assets and investment). The results show also that foreign banks are more technically efficient compared with domestic banks. The research of Casu and Molyneux (2003) is focused on the technical efficiency of European banks since the creation of the EU single internal market. The countries covered in the sample are France, Germany, Italy, Spain and the UK. The numbers of banks included are 530 banks from these countries. The authors applied two inputs (total costs and short term funding) and two outputs (total loans and other earning assets). The results of the study found out that most of banks in the study have averages of 65% in frequency distribution of mean technical efficiency. Moreover, the most technically efficient were UK banks with a score of 78.2%, followed by Germany with 71.3%. Italy was found to be the least technically efficient banking industry in the EU with a score of 53.8%.

Other two interesting papers using Data Envelopment Analysis (DEA) approach are made by Chen et al. (2005) and Grigorian and Manole (2006). The first study research the cost, technical and allocative efficiency of 43 Chinese banks from 1993- 2000. The authors employ intermediation approach where the inputs are (price of labor, price of deposits and price of capital) and the output ((loans, deposits and non-interest income). The results of the study show an improvement in the efficiency of Chinese banks after a program of deregulation in 1995, and that large state-owned banks and smaller banks were more efficient than medium sized banks. In this line, the work of Grigorian and Manole (2006) examine technical efficiency of banks in 17 transition economies from 1995–1998. They estimate different models, each of them have three inputs and three outputs. The inputs in both models are (Labor, fixed assets and interest expenses). Regarding the output, Model A has as output variables (revenues, net loans and liquid assets), while model B output variables are (total deposits, net loans and liquid assets). The results shows that model A's technical efficiency

ranged from 23.7% for Belarus, and 79.9% for Czechoslovakia, while B's technical efficiency ranged between 15.5%, for Belarus and 84.3% for Slovenia. In addition, there are five countries in model A have a decline in Technical efficiency ((Slovakia, Latvia, Romania, Moldova and the Ukraine), at the same time, there are three countries have a decline in technical efficiency in model B (Slovakia, Kazakhstan and Moldova).

Meanwhile, Ariff and Can (2008) examined the cost and profit efficiency in Chinese commercial banks. The number of banks included in the study are 28 banks, and the study period from 1995-2004. The results shows that joint-stock banks are more efficient than state-owned banks, and they also recommend opening banking industry as soon as possible to increase the efficiency of Chinese banks. Other interesting results were reached by Dong (2009). He analyses the cost efficiency of Chinese banks over the liberalization period, 1994–2007 by using SFA and DEA. His results reveal that both state owned banks and foreign banks were more efficient than domestic private banks, and larger banks tend to be relatively more efficient than smaller banks. In this context, a study made by Yao and Jiang (2010), over 1995-2008, by using One-step SFA approach, found out those Chinese joint-stock commercial banks and city commercial banks perform better than state-owned commercial banks.

Regarding Middle East studies several studies analyses this subject. Ahmad (2000) evaluates cost and profit efficiency of 20 banks in Jordan from (1990–1996) using both non-parametric (DEA) and parametric (SFA) techniques. Regarding DEA method, the study used two outputs (total loan, other investments (defined as investment in bonds and securities plus deposits at foreign banks) and two inputs (number of full-time workers and total deposits). The study also uses prices of labor and capital. In terms of SFA approach, cost efficiency was estimated based on the Cobb-Douglas cost function which employed two banking outputs (loans and other investments) and prices of labor and capital, in addition to the number of branches. The results showed that the large banks were more profit efficient than other banks, and the efficiency scores obtained using DEA were higher than those obtained from the SFA. Also Limam (2001) analyzes the technical efficiency of eight banks in Kuwait from 1994–1999, using SFA approach. The study uses three inputs (fixed assets, labor and financial capital), and one output (earning assets).). His results showed that larger size, a higher share of equity capital in assets and greater profitability was associated with better efficiency. In this context, Darrat et al. (2003) made a study for eight banks in Kuwait using an input-

oriented DEA approach to investigate their performance. The results shows that banks experience inefficiently in both allocative and technical efficiency and smaller banks appeared more efficient compared with larger banks. Another study made by Mostafa (2007) investigated bank efficiency in Gulf Cooperation Council (GCC). The sample of the study consists of 50 banks using cross sectional data for year 2005. The study used DEA approach with two inputs (assets and equity) and three outputs (net profit, returns on assets, and returns on equity). The results show when applying Varying Returns to Scale (VRS) model; the average efficiency was 73%. But when applying Constant Returns to Scale (CRS), the average efficiency drops to 55%. Moreover, the study made by Al-Tamimi (2008) examine the bank performance in United Arab Emirates (UAE) from 1997-2001. The study use DEA approach with two inputs ((interest expense and non-interest expense) and two outputs ((interest revenue and non-interest revenue). The results show that the most of UAE commercial banks were inefficient; and domestic banks have higher level of efficiency than foreign banks.

In the meantime, Ariss (2008) analyzed cost efficiency in Lebanon banks following to a period of deregulation using SFA approach. His results indicate that domestic banks are as efficient as foreign banks, and the average cost inefficiency of Lebanese banks is small (around 12%). Likewise, a study made by Bdour and Al–Khouri (2008), tested the efficiency of 17 domestic commercial banks in Jordan from 1998-2004. The study use DEA with an intermediation approach. The inputs variables are (net-operating expenses, total assets and number of employees), while the output variables are (net operating income, demand deposits, and net direct credits). The results indicate that the liberalization program has improved the efficiency of the Jordanian banks for all years except in 2003 and 2004.

In this context, Said (2012) investigated the efficiency of Islamic banks during the financial crisis 2006-2009, using the intermediation approach to measure efficiency in Islamic banking. The study employed Data Envelopment Analysis (DEA) three inputs (labor cost, fixed assets, and total deposits) and three outputs (total loans, liquid assets, and other income). The sample of the study is compound by 47 banks, 21 banks from non-Middle Eastern Islamic banks, and 26 banks from Middle Eastern Islamic Banks, and the same sample was used to compare 24 large Islamic Banks to 23 small to medium size Islamic banks. The results of the study show that large Islamic banks have experienced an increase in efficiency during 2006 to 2008, and a decrease during 2009. Meanwhile, small to medium

size banks started at lower level of efficiency. Finally, Islamic banks in Middle Eastern and non-Middle Eastern Counties have experienced an increase in efficiency level during financial crises. Another study made by Said (2013) has tried to examine the correlation between risks and efficiency in MENA counties in period 2006 to 2009. Data Envelopment Analysis (DEA) has been used to measure bank efficiency. However, the study has been measuring three kinds of financial risks (Credit risk, liquidity risk and operational risk) through financial ratios. The study has used three inputs (labor cost, fixed assets, and total deposits), and three output (total loans, liquid assets, and other income). The results of the study reveal that credit risk and operational risk correlated negatively to efficiency, while liquidity risk shows insignificant correlation to efficiency. The same author evaluates the overall technical efficiency of Islamic banks in MENA countries during the financial crises 2007 to 2009. The study uses intermediation approach to measure efficiency using Data Envelopment Analysis (DEA). The input variables of the model were labor cost, fixed assets, and total deposits, while the output variables were total loans, liquid assets, and other income. The sample of the study consists of 32 banks from the MENA countries, which is consisted of 18 banks operating in GCC Countries, 8 banks operating in North Africa, and 6 banks operating in other MENA Countries. The results of the study find out that Islamic banks in MENA countries on average are technically inefficient. However, Islamic banks in GCC countries show on average, higher level of pure technical efficiency and scale efficiency scores compared with Islamic banks in North Africa counties and other MENA counties.

Finally, the paper of Sarsour and Daoud (2015), who analyzed the cost and technical efficiency in Palestine during the period 2000-2009 using the SFA. They conclude that the overall cost (technical) efficiency of banks in Palestine is declining during the period of research. The mean of cost and technical efficiency was found to deteriorate through the years. Cost efficiency declined from 0.730 in 2000 to 0.666 in 2009, while technical efficiency declined from 0.733 to 0.713 during the same period. Moreover, the lower allocative efficiency (incorrect input mix rather than utilization or wasting resources) is the main cause of the decline in cost efficiency over the period of analysis. In addition, large banks have lower cost efficiency, which indicates the presence of diseconomies of scale for Palestinian banks.

Table 3-1: Sample of Articles used in the Study

Author(s)	Data	Period of study	Methodology	Type of Efficiency Analysed	Conclusions
Karim (2001)	Four Asian Countries	1989-1996	SFA	Technical Efficiency	There is significant difference in mean technical efficiency scores across countries, and the highest score of technical efficiency was in Thailand, and the lowest one was in Philippine.
Weill (2003)	two transition countries Polish and Czech	1997	SFA	Technical Efficiency	Foreign banks in transition countries were more technically efficient than domestic banks.
Bonin et al. (2005)	225 banks in eleven transition economies	1996-2000	SFA	Technical Efficiency	Foreign banks more technically efficient compared with domestic banks.
Chen et al. (2005)	43 Chinese banks	1993- 2000	DEA	cost, technical and allocative efficiency	The study shows an improvement in the efficiency of Chinese banks after a program of deregulation in 1995, and the large state-owned banks and smaller banks were more efficient than medium sized banks.
Grigorian and Manole (2006)	17 transition economies	1995–1998	DEA	Technical Efficiency	Model A's technical efficiency ranged from 23.7% for Belarus, and 79.9% for Czechoslovakia, while B's technical efficiency ranged between 15.5%, for Belarus and 84.3% for Slovenia.
Ariff and Can (2008)	28 of Chinese Banks	1995-2004	non-parametric approach and the second-stage Tobit regression	Cost and Profit Efficiency	Joint-stock banks are more efficient than state-owned banks, and also the study recommend opening banking industry as soon as possible, because this associated with increasing the efficiency of Chinese banks.
Dong (2009)	Chinese banks	1994-2007	SFA and DEA	Cost Efficiency	Both state owned banks and foreign banks were more efficient than domestic private banks, and larger banks tend to be relatively more efficient than smaller banks.
Ahmad (2000)	20 Jordanian banking	1990–1996	SFA and DEA	Cost and Profit efficiency	Large banks were more profit efficient than other banks. And the efficiency scores obtained using DEA were higher than those obtained from the SFA.
Limam (2001)	Eight banks in Kuwait	1194-1999	SFA	Technical Efficiency	Larger size, a higher share of equity capital in assets and greater profitability was associated with better efficiency

Ariss (2008)	Lebanon banks	1990-2001	SFA	Cost Efficiency	Domestic banks were found to be as efficient as foreign banks, and the average cost inefficiency of Lebanese banks is small (around 12%).
Said (2013)	32 Islamic banks in MENA countries	2007-2009	DEA	Technical Efficiency	Islamic banks in MENA countries on average are technically inefficient. However, Islamic banks in GCC countries show on average, higher level of pure technical efficiency and scale efficiency scores compared with Islamic banks in North Africa counties and other MENA counties.
Sarsour and Daoud (2015)	Palestinian Banks	2000-2009	SFA	Cost and Technical Efficiency	Overall cost (technical) efficiency of banks in Palestine is decline.The mean of cost and technical efficiency was found to deteriorate through the years.

5. Data and Methodology

Our data source is BankScope database which includes balance sheets and other financial indicators for a large number of banks from a large variety of countries. Our database covers the period 2005-2012, and has 201 banks in Middle East North Africa (MENA) Countries.

According to Isik, and Hassan (2002), panel data has such beneficial characteristics such as enabling us to observe each bank more than once over a period of time, which is a critical issue in a changing business environment. And it should be noted that panel data provide us with large sample size, and therefore, more degrees of freedom, accounting for time variations in efficiency, and at the same time, generating a more satisfactory solution to biases produced by heterogeneity within the dataset (Irsova, 2010). Especially our database contains different countries with different characteristics in terms of development, number of banks, inputs prices, and so on.

In this study, we examine cost efficiency rather than technical efficiency. According to Pasiouras et al. (2008), cost efficiency is a wider concept than technical efficiency, since it refers to both technical and allocative efficiency. The definition of cost efficiency corresponds to important economic objective: cost minimization. Isik and Hassan (2002) defined cost efficiency as a measure of how far bank's cost is from the best practice bank's cost if both were to produce the same output under the same environmental conditions. It is measured as the ratio between the minimum cost at which it is possible to attain a given volume of production and the observed costs for firm. A cost efficiency score of 0.85 would mean that the bank is using 85% of its resources efficiently or alternatively wastes 15% of its costs relative to a best-practice bank.

We use the Stochastic Frontier Analysis (SFA), as developed by Aigner et al. (1977), to estimate cost efficiency frontier. The main advantage of SFA over DEA is that it allows us to distinguish between inefficiency and other stochastic shocks in the estimation of efficiency levels. In addition, by using this model, it would be easier to add control variables, such as country-level variables, in the equation of this model than in non-parametric techniques. Hence, this approach allows us to compare efficiency between country, and the efficiency of conventional and Islamic banks.

The stochastic frontier for cost is estimated using Green (2005) models that allow inefficiency term follows a distributional form. This study considers the estimation of the "true" fixed-effects (TFE) model in Greene (2005) trying to solve the incidental parameters problem affecting his maximum likelihood dummy variables estimator (MLDVE), Greens models can be estimated using maximum likelihood estimation methods. These models are referred to as "true frontier models" in that they are a straightforward extension of original frontier framework (in line with Aigner et al., 1977) to panel data. Thus, as formulated, the inefficiency term remains in the model and the fixed effect is intended only to capture the firm specific heterogeneity.

Similar to many other studies, the intermediation approach is applied in order to measure efficiency, which assumes that the main function performed by a bank is to intermediate funds between depositors and borrowers at the lowest possible cost (Gilbert and Wilson (1998); Kraft and Tirtiroglu (1998); Rezvanian and Mehdian (2002); Isik and Hassan (2002)). According to the intermediation approach, banks are producing two outputs (Loans, and other Off Balance Sheet Activities), and employing Three inputs (capital, deposits and Labor). All variables are measured in millions of US dollar.

6. Variables Selection and Hypothesis

Regarding the Price of capital Assets (PK), it noted here that many studies measured the price of capital in different ways like Olena (2005) who calculated price of capital as the depreciation of fixed assets divided by fixed assets, and D.G. McKillop (1996) who calculated it as a ratio of (real yen) non personnel expenses to the (real yen) value of movable and immovable capital. In our case, we calculate the Price of capital by other operating expenses over total assets, as (Sarsour and Dawoud, 2015). This is due to the unavailability of data on the yearly depreciation. Price of Labor (PL): Price of Labor is calculated as total salaries and staff expenses over total assets. Price of deposits (PD): Price of deposits is measures as interest expenses over total Customer deposits.

Regarding control variables, we add such control and country level variables that might affect the level of total cost in a country. First, level of Equity, Berger and Mester (1997) argue that a bank's insolvency risk depends on the level of its equity capital since it provides a cushion against portfolio losses and financial distress. Insolvency risk (non-performing loans) influences the bank's costs through the risk premium which the bank has to

pay for its borrowings. However, equity capital is more than just a cushion against insolvency. The level of a bank's equity capital also provides an alternative to deposits and other borrowed funds as a source of loanable funds. Thus, the level of a bank's equity capital may have a direct impact on the bank's other borrowing costs and therefore, the level of equity capital should be considered as an input into the bank's production process.

Second, GDP Growth and GDP per Capita, as Fries and Taci, 2004, these indicators serve as a proxy measure for the overall level of development, including the quality of state institutions and the level of skills. Costs may decrease with overall development because of corresponding improvements in the quality of institutions; It also has an impact of the demand and supply for deposits and loans. This indicator is expected to be negatively associated with total costs.

Third, the rate of inflation affects interest rate. Therefore, the higher these variables, the lower bank efficiency will be in activities such as risk management and credit screening. In a recent study on profit efficiency in the banking industry of four new European Union Member States, Koutsomanoli-Filippaki et al. (2008) show that banks in high inflation countries usually incur in lower profits.

Table 3-20Summary of variables and hypothesis predictions

Variable	Prediction	Definition	Source
	TC		
Total cost (C)	Dependent variable	Total cost includes the Interest Expenses, personnel expenses, and other operating expenses.	Bankscope, Authors' calculation
Output Quantities	+/-	Gross loans of Bank and Off-balance Sheet Items (OBS)	Bankscope
Input Prices	+/-	Price of Capital, Price of Labour and Price of Deposits	Bankscope, Authors' calculation
Control variables			
Equity	+/-	Equity Capital	Bankscope
GDP Per Capita	+	Annual GDP per capita.	(IMF) database
GDP growth	+	Annual GDP growth rate	(IMF) database
Inflation Rate	+	Annual Inflation rate	(IMF) database
Years [Year]		Year dummies	

7. Descriptive Analysis

Table 3-3 shows big variations between banks in MENA countries over the sample period 2005 – 2012. As we can see, minimum total cost ratio (0.2%), for example, is too far from the maximum of 50%. At the same time, Minimum total assets ($96.40million) are very small compared with a maximum of $100,827.2 million reflecting important differences in the size of the banks. This also true for loans ratio, as we notice the minimum value of loans is (0.4%), compared with the maximum (88%). Likewise, it happen the same if we look the price of inputs. The average price of Capital in MENA countries is (0.01), which has also a big variation between the minimum and maximum. However, we can notice that this variation between maximum and minimum values getting smaller in case of price of labor and price of deposits.

This variation of course is related with the heterogeneity between countries in MENA area. For example, Gulf Countries have a great source of funds; therefore, have a huge assets and OBS activities compared with small countries in terms of funds like Yemen or Jordan. Therefore, this suggests a variation in the effectiveness of banks working in MENA countries over time, as we will see in the next sections.

Table 3-3: Descriptive statistics of output and input variables (2005 – 2012)

Variable	Definition	Mean	Std.Dev.	Min	Max
TC to Assets	Total Cost over Total Assets	0.05	0.03	0.002	0.50
TA	Total Assets	7788.29	13730.18	96.40	100827.2
Outputs					
Loans to Assets	Gross Loans over Total Assets	0.48	0.22	0.01	0.89
OBS to Assets	Off-Balance Sheet Activities over Total Assets	0.22	0.16	0.001	0.71
Inputs					
TCD to Assets	Total Customer Deposits over Total Assets	0.61	0.21	0.01	0.87
TFA	Total Fixed Assets over Total Assets	0.02	0.02	0.00	0.16
Price of Inputs					
PK	Price of Capital (Other Operating Expenses/Total Assets)	0.01	0.02	0.00	0.35
PL	Price of Labor (Personal Expenses/ Total Assets)	0.01	0.01	0.00	0.13
PD	Price of Deposits (Interest Expenses/Customer Deposits)	0.04	0.02	0.00	0.17

Table 3-4 below represents some descriptive statistics by country for the variables used in the study. Comparing the average values across countries, we can then observe some

differences regarding total cost values, outputs, input prices and other bank-specific variables. In terms of total cost over total assets, we can observe a variation across the countries. This is related to the nature of each country in terms of income, wages, interest payment, and so on.

In terms of input prices, we can clearly observe that Sudan have on average the highest level of price of capital besides the rest of countries, which is 0.03. This is probably due to the greater of depreciation and amortization of assets over time, while the rest of countries have price of capital range from 0.01 to 0.02. In terms of price of deposits, we can observe that Iran have greater value compared with the others, which is 0.08, followed by Bahrain and Yemen 0.06, reflecting different financial conditions of countries.

We also observe that Israel and Lebanon have the highest value in terms of Customer Deposits compared with the other countries in the sample which is 0.81 and 0.80 with respect to total assets, respectively, while Bahrain and Sudan have the lowest value by 0.40, and 0.43 respectively. On the other hand, we can notice that Libya and Iraq have the lowest value of Gross loans in terms of assets by 0.19 and 0.21 respectively. Meanwhile, Oman and Tunisia have got the greatest values of the gross loans by 0.71 and 0.70 respectively.

In terms bank specific variables, we can notice the Gulf Countries have the greater profitability ratio (ROAA) compared with the rest countries. This also happens when we look the GDP per Capita as a country level variable. We can observe clearly that all Gulf Countries have a higher level compared with the rest of countries in the sample. This probably reflects the difficulties to have profitable banks in countries with high instability, like some countries witnessed in the recent years like Syria, Libya, Iraq, Tunisia, Egypt and Yemen.

Table 3-4: Mean of bank indicators by Country

	Algeria	Bahrain	Egypt	Iraq	Iran	Israel	Jordan	Kuwait	Lebanon	Libya
Input prices										
Total Cost to Total Assets	0.03	0.06	0.06	0.03	0.08	0.06	0.04	0.05	0.05	0.02
Price of Capital	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.01
Price of Labor	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Price of Deposits	0.01	0.06	0.05	0.02	0.08	0.03	0.04	0.05	0.05	0.01
Personal Expenses to TC	0.30	0.30	0.17	0.23	0.11	0.30	0.24	0.28	0.16	0.28
Interest Expenses to TC	0.31	0.48	0.68	0.40	0.71	0.41	0.53	0.47	0.71	0.31
Other Operating Expenses to TC	0.43	0.26	0.15	0.39	0.19	0.29	0.23	0.25	0.13	0.41
Inputs										
Customer Deposits to Assets	0.59	0.40	0.73	0.63	0.60	0.81	0.63	0.50	0.80	0.68
Fixed Assets to Assets	0.02	0.02	0.01	0.04	0.04	0.02	0.02	0.02	0.02	0.01
Outputs										
Gross Loans to Assets	0.45	0.40	0.45	0.21	0.63	0.64	0.50	0.40	0.28	0.19
Off Balance Sheet to Assets	0.40	0.13	0.15	0.29	0.25	0.33	0.24	0.16	0.08	0.36
Bank Specific Variables										
ROAA	1.95	2.02	1.25	3.24	1.62	0.73	1.59	2.16	0.77	0.40
Equity to Assets	0.15	0.34	0.11	0.20	0.13	0.06	0.16	0.39	0.09	0.13
Country Specific Variables										
GDP Growth	2.90	5.39	4.92	6.40	3.60	4.29	5.60	3.50	4.76	9.25
GDP per Capita	4421.26	22055.55	2248.78	3884.61	4987.07	26823.00	3693.28	36114.45	8087.71	10380.81
Inflation	4.41	2.12	10.41	16.96	17.65	2.47	3.82	4.87	4.61	5.95

Continued with Table 3-4

	Morocco	Oman	Qatar	Saudi Arabia	Sudan	Syria	Tunisia	Emirates	Yamen
Input prices									
Total Cost to Total Assets	0.06	0.04	0.03	0.03	0.06	0.04	0.06	0.04	0.07
Price of Capital	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.1	0.02
Price of Labor	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
Price of Deposits	0.04	0.03	0.03	0.02	0.04	0.03	0.04	0.04	0.06
Personal Expenses to TC	0.22	0.34	0.26	0.34	0.31	0.20	0.28	0.26	0.19
Interest Expenses to TC	0.57	0.45	0.56	0.41	0.33	0.58	0.56	0.54	0.57
Other Operating Expenses to TC	0.23	0.23	0.22	0.26	0.40	0.23	0.20	0.20	0.24
Inputs									
Customer Deposits to Assets	0.57	0.58	0.59	0.66	0.43	0.71	0.63	0.61	0.64
Fixed Assets to Assets	0.02	0.01	0.01	0.01	0.05	0.03	0.02	0.02	0.02
Outputs									
Gross Loans to Assets	0.55	0.71	0.53	0.56	0.36	0.37	0.70	0.61	0.29
Off Balance Sheet to Assets	0.17	0.22	0.32	0.21	0.34	0.24	0.24	0.32	0.31
Bank Specific Variables									
ROAA	1.90	3.75	3.73	3.61	2.62	0.19	0.99	2.52	1.04
Equity to Assets	0.13	0.29	0.31	0.26	0.19	0.11	0.17	0.22	0.10
Country Specific Variables									
GDP Growth	4.43	5.97	14.69	6.48	2.79	5.13	3.54	4.36	2.12
GDP per Capita	2653.77	18874.51	73186.55	18803.85	1405.18	2190.48	3962.23	56760.21	1109.44
Inflation	1.80	4.69	5.74	3.52	14.48	7.44	3.95	5.35	11.62

In Table 3-5, we can see the main differences between Islamic banks and Conventional Banks. For instance, the total cost in terms of assets in Islamic banks is a bit higher than conventional banks; this is consistent with price of capital and price of deposits, where Islamic Banks have a bit higher in those two input prices compared with Conventional ones. It should mention here, that Islamic Banks have alternative way of funding rather than loan like Murabaha, Mudaraba, and leasing, and so on. And also have different way of interest expenses like percentage of the profit goes to depositors if it there is a profit achieved, otherwise no. In terms of capitalization ratio, we can observe a significant difference between both kinds of banks, where equity to assets ratio in Islamic banks is 0.27 and Conventional Banks has 0.18. This means that on average Islamic banks are more capitalized than conventional Banks, and this is probably one of the reasons that make Islamic Banks are less bankruptcy compared with the conventional, especially in the recent financial crises, this result is consistent with (Srairi, 2010).

Table 3-5: The Difference between Islamic and Conventional Banks (2005-2012)

Variable	Islamic Banks	Conventional Banks
Total Cost to Total Assets	0.06	0.05
Price of Capital	0.02	0.01
Price of Labor	0.01	0.01
Price of Deposits	0.05	0.04
Personal Expenses to TC	0.25	0.26
Interest Expenses to TC	0.51	0.53
Other Operating Expenses to TC	0.26	0.23
Customer Deposits to Assets	0.52	0.63
Fixed Assets to Assets	0.03	0.02
Gross Loans to Assets	0.50	0.47
Off Balance Sheet to Assets	0.18	0.22
ROA_	1.95	1.88
Equity to Assets	0.27	0.18

8. The Model for efficiency measurement

SF panel data literature can be classified into two major groups of models. The first group treats time invariant heterogeneity as if it was inefficiency, thus not providing any mechanism to disentangle the former from the latter. This group includes, among others, (Schmidt and Sickles, 1984), Pitt and Lee, 1981), Battese and Coelli, 1988, 1992, 1995) and (Kumbhakar, 1990). In more recent papers the random effects model has been extended to include time-variant inefficiency. Cornwell, Schmidt and Sickles (1990) and Battese and Coelli (1992) are two important contributions in this regard. In particular the former paper proposes a flexible function of time with parameters varying among firms. However, in both these models the variation of efficiency with time is considered as a deterministic function that is commonly defined for all firms.

On the other hand, the second group distinguishes between the aforementioned latent components by separating the inefficiency from the effect of time invariant omitted explanatory variables that are unrelated with the production process but affect the output (Kumbhakar and Hjalmarsson, 1995; Greene, 2005a,b; Emvalomatis, 2012)

As Greene (2003), even in cases where inefficiency is due to time-invariant factors such as constant managers' capability, the resulting cost inefficiencies can vary over time. This author assumes that the management skills are one of the inputs that can interact with other time-variant input factors thus, create time-variant cost inefficiency. This result is consistent with the economic theory in that a firm's inefficiency is a dynamic phenomenon and cannot be constant. Firms constantly face new events and technologies, which they gradually learn how to deal with and apply. As the learning process continues, inefficiency with regards to the existing technologies decrease but other new events and technologies appear. Therefore the overall inefficiency of a firm depends not only on the managers' efforts but on the effect of new technologies and events on the production process. Based on this argument, the inefficiency can best be modeled as a time-variant stochastic term. On the other hand, a major part of the unobserved heterogeneity such as network and location-related factors can be considered as constant over time.

As it has been shown by Greene (2002), assuming that the inefficiency term follows a distributional form, both models with random and fixed effects can be estimated using

maximum likelihood estimation methods. These models are referred to as "true frontier models" in that they are a straightforward extension of original frontier framework (in line with Aigner et al., 1977) to panel data. He proposed numerical solutions for both models, which he respectively refers to as 'true' fixed and random effect models. This study considers the estimation of the "true" fixed-effects (TFE) model in Greene (2005) trying to solve the incidental parameters problem affecting his maximum likelihood dummy variables estimator (MLDVE). We have examined the fixed effects model applied to the stochastic frontier, as opposed to simply reinterpreting the linear regression. Thus, as formulated, the inefficiency term remains in the model and the fixed effect is intended only to capture the firm specific heterogeneity

In this part of this Chapter, we will specify the main aspects of cost frontier model. Stochastic Frontier Analysis (SFA) was developed by (Aigner et al., 1977), to estimate cost efficiency. This model as well known specify the optimal combination of inputs that lead to maximum output. Or we can say determine the maximum potential output with minimum costs. The main characteristics of this model are allowing us to treat multiple outputs, quasi-fixed inputs. However, cost function has another dimension of analyzing efficiency, which is minimizing total cost at a particular level of output. This latter aspect refers to "allocative efficiency".

A general form of the minimum cost function (also known as the cost frontier) can be written as:

$$TCi \geq TC^* = f(Q_i, W_i, \beta), \qquad i = 1,\ldots, I, \ (1)$$

where TC_i is the observed total cost of the individual bank *i*; Q_i is a vector of the outputs of bank i; Wi is an input price vector of bank i, $f(Q_i, W_i; \beta)$ is the cost frontier common to all banks representing the minimum cost of producing outputs Q_i when the banks face input prices W_i , and β is a vector of the technology parameters to be estimated. Cost efficiency (CE) is measured relative to the efficient cost frontier, which is defined as the ratio of the minimum cost to the cost actually incurred. Thus, if the cost incurred in producing a given output level turns out to be TC but that the technically efficient combination of factors of production which minimize costs for this output level is TC* then the cost efficiency of the firm will be CE = TC*/TC. This in turn implies that it would be possible to produce the same output bundle under the same conditions with a saving in costs of (1-CE). Failure to attain the cost frontier may be due to either technical or allocative inefficiency (or both). Because the

cost frontier is deterministic, such a formulation ignores measurement errors and other sources of statistical noise and all deviations from the frontier are attributed to inefficiency.

In order to estimate the cost efficiency of banks, a transcendental logarithmic (Trans-log) stochastic frontier functional form is employed in this study. The general form of the cost frontier model is

$$C_{it} = \beta x_{it} + (v_{it} + u_{it}) \ldots\ldots \qquad i = 1,\ldots,I, \;\; t = 1,\ldots T$$

Where C_{it} is total cost in logarithm form of bank i in period t; x_{it} is a matrix of outputs, price of inputs, and input quantity independent variables in logarithm form; β is an vector of unknown parameters; The random errors v_{it} are assumed to be uncorrelated across time and panel, and normally distributed with mean zero and variance σ_V. The component u_{it} are assumed to have a strictly non-negative distribution (it's often referred to as the inefficiency term) and it is provided by a truncated-normal distribution with mean μ+ and variance $\sigma\mu^2 > 0$ (Berger and DeYoung, 1997). The sum ($v_{it} + u_{it}$) reflects technical and economic inefficiencies, as well as pure random shocks in the production process that might be due to careless handling and defective or damaged output. It also reflects unfavorable external events such as bad luck, climate, and machine performance (Aigner et. al. 1977).

The technical inefficiency term (u_{ht}) is defined as follows:

$$(u_{ht}) = \exp(-\eta(t-T))\; u_h$$

Where technical inefficiency (u_{ht}) decreases, increases, or is constant over time depending on the values of η.

The parameters of stochastic frontier model are estimated by the maximum likelihood (ML) method. The stochastic cost function is defined as (Kraft and Tirtiroglu, 1998), the transcendental logarithmic functional form of stochastic cost frontier specification is as follows

$$LnC_{it} = \alpha_0 + \sum_{i=1}^{2} \alpha_i LnQ_{it} + \sum_{m=1}^{3} b_m LnP_{mt} + \frac{1}{2}\sum_{n=1}^{3}\sum_{m=1}^{3} \alpha_{nm} LnP_{mt} LnP_{nt} + \frac{1}{2}\sum_{i=1}^{2}\sum_{j=1}^{2} \beta_{ij} LnQ_{it} LnQ_{jt} +$$

$$\sum_{i=1}^{2}\sum_{m=1}^{3} \delta_{im} LnQ_{it} LnP_{mt} + \sum_{i=1}^{4} \phi_i LnZ_i + v_{it} + u_{it}$$

Where subscript i denotes the cross-sectional dimension (banks), t stands for the time dimension, LnC_{it} is the natural logarithm of total costs for a panel of N banks and time T; LnQ_{it} is the natural logarithm of bank outputs (total loans and total Off Balance Sheet); LnP_m is the natural logarithm of the mth input price (i.e. labor, capital, and loanable fund); α_i, b_m, α_{nm}, β_{ij}, and δ_{im}, ϕ_i are coefficients to be estimated. Z_i Stands for a set of control variables; Equity, GDP Growth, GDP per Capita and Inflation.

Finally, the choice of SFA (parametric approach) over DEA (non-parametric approach) is justified on the grounds that even though DEA imposes less structure on the efficiency frontier than SFA, they have the drawback of not allowing for random errors, data problems or other measurement errors. Christos et al. (2008) argued that applying DEA in transition economies is a significant disadvantage because uncertainty and measurement problems loom large. On the contrary, SFA allows for measurement error, and the generation of firm-specific efficiency estimates, which are important for bank managers in order to improve their operational efficiency.

9. EMPIRICAL RESULTS

Stochastic cost frontier approach is used to generate estimates of cost efficiencies for each bank over the years 2005-2012. The maximum likelihood function is used to estimate the cost efficiency of all banks in MENA countries using the translog function (stochastic frontier cost function).

Our results as Table 3-6 indicates a good fit and the signs of estimated coefficients are in line with the theory. We can observe clearly that price of deposits, loans; cross-output term, cross-price term and equity are significant and have a negative impact on total cost. While, price of labor, off balance sheet activities, GDP per Capita, GDP growth and Inflation are also significant and have positive impact on total cost.

Our results for inflation are in line with those of Kasman and Yildirim (2006) who highlighted that inflation increases cost and reduces profits as banks tend to compete through expanding branch networks. Furthermore, inflation increases the bad debts, and therefore, makes the banks to bear additional costs to manage these debts, which increase the inefficiency for banks.

The same happens with GDP per Capita. Maudos et al. (2002) argue that high GDP per capita is associated with highly demanded for financial product from financial system, and as results increase the profit for banks, but at the same time, make banks have less control of their expenses, which yield to increase in bank inefficiency. The result is also consistent with Berger and Mester (1997), Dietsch and Lozano-Vivas (2000), Pasiouras et al. (2009), suggested that, in a more developed economy, banks incur in higher financial and operating cost but could have higher demand for its financial products.

Table 3-6: The cost frontier function parameter estimates

Variable	Coefficient
LnLOAN	-0.091***
LnOBS	0.231***
LnPD	-0.220***
LnPL	1.639***
0.5*Ln(Loan2)	0.313***
0.5*Ln(OBS2)	0.058***
0.5*Ln(PL2)	0.371***
0.5*Ln(PD2)	0.087***
Ln(Loan)*Ln(OBS)	-0.126***
Ln(PL)*Ln(PD)	-0.148***
Ln(PL)*Ln(Loan)	0.142***
Ln(PD)*Ln(Loan)	-0.126***
Ln(PL)*Ln(OBS)	-0.184***
Ln(PD)*Ln(OBS)	0.167***
Ln(Equity)	-0.534***
Ln(GDPpercapita)	0.171***
gdpgrowth	0.002***
inflation	0.007***
Usigma(Constant)	-2.224***
Vsigma(Constant)	-32.537
sigma_u	0.328***
sigma_v	8.60
Number of obs	1612
Log likelihood function	180.836

***, **, and * indicate 1%, 5% and 10% significance levels, respectively.
Price of labor (PL); Price of deposits (PD); Off Balance Sheet Activities (OBS)

Results presented in Table 3-7 below indicate the average cost efficiency of banks in MENA countries. The overall average cost efficiency during the period 2005–2012 is around 77 %. This implies that during the period of study, the average bank in MENA countries could reduce its costs by 23%. This results is closer to results of Olson and Zoubi (2008) study who analyzed the cost and profit efficiency in MENA banks from 2000-2008, and found that average cost efficiency around 73%.

The table also displays that the average cost efficiency across years have a little variation with 70% in 2005 to 76% 2012. This is different when we look at efficiency scores across countries where the results indicate a big variation on average efficiency, which is related to many differences in terms of number of banks, input expenses, and other country level variables like GDP per capita.

We can notice the minimum values of average cost efficiency in Kuwait and Morocco by 67% and 69% respectively, which implies that those countries do not control enough their costs. At the same time, we can see clearly that Egypt, Israel, Jordan, Tunisia and Oman have ranked the highest efficiency scores among other countries by 87%, 86%, 82%, 82% and 80% respectively. Another interesting note is that on average, Gulf countries have less fluctuation in efficiency scores across years compared with the rest of countries in the sample study, which implies that Gulf countries have a great ability to control their costs across years compared with the other countries or might related to difficulties to reduce it.

We now turn to the efficiency of conventional banks as opposed to the efficiency of Islamic banks. As concerns cost efficiency, comparison of the two groups of banks shows that the conventional banks are more efficient, on average, than Islamic banks. The mean cost efficiency score is 78 % for conventional banks while it is equal at 73% for Islamic banks. The Analysis of the dispersion of efficiency levels shows insignificant differences between Islamic and conventional banks. Our findings are in line with the studies of Rosly and Abu Baker (2003) and Yudistira (2003) which find that conventional banks are more efficient than Islamic Banks. A study also performed by Kamaruddin et al. (2008) reveals that Islamic banks in Malaysia during the period 1998–2004 are twice as inefficient (cost inefficiency is equal at 28%) as typical conventional banks in the world. This inefficiency can be explained by the lack of economies of scale due to smaller size of Islamic banks. In addition, According to Olson and Zoubi (2008), the inefficiency of Islamic banks may be due to the fact that their customers are pre-disposed to Islamic products regardless of cost. According to Sarsour and

Daoud (2015), Islamic banks provide its banking services according to the Islamic law (Al-Shariah), and it adopts the principle of Musharakah (partnership in profit and loss), this imposes more risks on these banks due to the high uncertainty conditions. Furthermore, the weak legal environment, the little attention given to Islamic banks by official institutions in some countries, as well as the modernity and lack of experience of these banks weakens their performance. This suggests that the dominant source of cost inefficiency in Islamic banks is allocative (regulatory) rather than technical (managerial).

Table 3-7: Efficiency Scores by Country, Year, and by Bank Type (2005-2012)

Country	2005	Obs	2006	obs	2007	Obs	2008	obs	2009	obs	2010	obs	2011	obs	2012	obs	Mean of Eff
Algeria	0.56	8	0.61	7	0.68	7	0.72	10	0.95	7	0.84	2	0.95	3	0.88	4	0.74
Bahrain	0.66	15	0.74	15	0.71	13	0.75	19	0.71	19	0.73	21	0.80	22	0.78	19	0.73
Egypt					0.79	1	0.99	4	0.81	15	0.84	28	0.86	27	0.92	26	0.87
Iraq	0.33	2	0.99	1	0.80	2	0.68	3	0.60	3	0.78	3	0.75	5	0.83	2	0.71
Iran	0.65	6	0.66	8	0.60	7	0.88	8	0.77	9	0.85	9	0.71	3	0.73	3	0.74
Israel	0.78	10	0.80	10	0.89	10	0.93	9	0.92	8	0.86	6	0.90	8	0.89	8	0.86
Jordan	0.66	15	0.73	17	0.81	15	0.85	15	0.94	16	0.88	16	0.86	17	0.84	16	0.82
Kuwait	0.69	17	0.76	19	0.71	16	0.62	15	0.62	16	0.69	17	0.64	15	0.64	13	0.67
Lebanon	0.76	21	0.84	22	0.87	20	0.84	22	0.79	20	0.79	20	0.76	21	0.66	20	0.79
Libya	0.28	2	0.32	2	0.83	2	0.99	1			0.99	1	0.82	1	0.56	1	0.62
Morocco	0.85	6	0.68	8	0.58	9	0.78	8	0.62	8	0.75	8	0.69	8	0.69	6	0.69
Oman	0.82	6	0.76	6	0.83	10	0.80	10	0.89	10	0.80	9	0.78	10	0.75	9	0.80
Qatar	0.83	7	0.69	9	0.72	9	0.71	10	0.80	9	0.87	10	0.73	9	0.54	10	0.73
Saudi Arabia	0.71	12	0.86	12	0.79	13	0.82	13	0.79	14	0.77	14	0.73	14	0.61	13	0.76
Sudan	0.75	7	0.70	8	0.69	8	0.83	7	0.81	6	0.82	8	0.74	7	0.71	5	0.76
Syria	0.67	1	0.99	2	0.90	5	0.90	5	0.95	4	0.86	4					0.90
Tunisia	0.69	17	0.76	17	0.79	15	0.88	18	0.87	21	0.87	20	0.87	19	0.83	19	0.82
Emirates	0.75	21	0.73	23	0.71	25	0.65	23	0.73	23	0.76	24	0.77	23	0.80	22	0.74
Yamen	0.26	2	0.38	3	0.46	4	0.69	7	0.72	6	0.75	5	0.97	4	0.85	3	0.67
Bank Type																	
Conventional Banks	0.71	147	0.74	156	0.76	158	0.77	175	0.79	178	0.81	186	0.81	185	0.79	170	0.78
Islamic Banks	0.66	25	0.74	32	0.71	33	0.82	32	0.80	36	0.74	39	0.71	31	0.65	29	0.73
Overall Mean	0.70	172	0.74	188	0.75	191	0.78	207	0.79	214	0.80	225	0.79	216	0.76	199	0.77

10. Potential Determinants of Banking Efficiency

In this part, we will talk about the potential determinants of efficiency. In terms of ROAA (Isik and Hassan 2002; Pasiouras 2008; Perera et al. 2007), have reported that profitability is inversely related to cost inefficiency. Hence, banks with higher profit tend to be more efficient. On the other hand, some studies reached to mix results between ROAA and efficiency like Ataullah and Le (2006) who indicates that relationship between ROAA and efficiency could be positive or negative depending on the specification of the model; like in India case. Also Casu and Girardone (2004) reached to negative relationship between ROAA and efficiency in Italy.

In terms of size of banks, Perera et al. (2007), argue that larger banks are more cost efficient than smaller banks, because large size has ability to increase his market share, and therefore, increase the revenue with relatively less costs. However, some studies did not find any efficiency advantage related to large banks (Girardone et al. 2004; Berger and Mester 1997) or reported a negative relationship between efficiency and size (Allen and Rai, 1996; Christopoulos et al., 2002). But there is more literature that has identified some empirical evidence on the existence of economies of scale in banking. For example, Hughes et al. (2001) found for examined banks economies of scale that increase with size, once the risk-taking and capital structure are controlled for in the bank production function. Feng and Serlitis (2010) and Wheelock and Wilson (2009) also highlighted the existence of economies of scale in U.S. banks. Moreover, the study of Drake and Hall (2003) provides empirical evidence on the existence of a strong relationship between bank size and technical efficiency and scale efficiency in Japan. So, Bank size may be an important determinant of net interest margins and spreads if there are economies of scale in the banking sector. In other words, one bank may be more efficient than another as a result of the economies of scale that arise from size rather than because of better management.

Instead of introducing bank size categories (big, medium and small) as dummy variables into our modelling procedures, we use the logarithm of total assets as a proxy for bank size. The advantage of doing so is to capture the effects of scale on cost efficiency while avoiding potential misspecification by using inappropriate break points for dividing our range of banks into different size groups

Regarding the equity, well-capitalized banks are more efficient than their poorly capitalized counterparts, in terms of cost efficiency. This finding could be explained by the fact that high capital requirements may result in higher levels of equity capital reducing the probability of financial distress, which reduces costs by lowering risk premium on substitutes for other potential more costly risk management activities (Berger and Bonaccorsi di Patti, 2006; Casu and Molyneux, 2000). In addition, some studies Isik and Hassan (2003) which find that high capital requirements increase the efficiency of banks are in favor of the theory of moral hazard. On the contrary, Staikouras et al. (2008) and VanHoose (2007) report a negative relationship between capital adequacy and profit efficiency. They explain this result by the fact that banks, in light of stricter capital standards, may decide to switch loans with other less risky assets (e.g., government securities) that can reduce the profit of banks.

Regarding Inflation rate, as increase in inflation rate causes increase in costs and bad debts, this will reduce banks efficiency since banks have to incur additional costs in managing bad debts. ln addition, Kasman and Yildirim (2006) highlighted that inflation increases cost and reduces profits as banks tend to compete through expanding branch networks. However, a positive relationship is expected if banks charge higher rates in a higher inflationary environment to compensate their returns.

If we look to GDP per Capita, Maudos et al. (2002) argue that high GDP per capita is associated with highly demanded for financial product from financial system, and as results increase the profit for banks, but at the same time, makes banks have less control of their expenses, which yield to increase in bank inefficiency. Nevertheless, Grigorian and Manole (2006) argued that banks which operate in higher per capita income countries are more efficient in attracting deposits and generating stronger cash flows, and hence, contribute to higher bank efficiency level. So, higher per capita income countries have a more mature banking system that transfer to more competitive interest rates and profit margin. In this sense, efficiency is expected to be positively related to GDP per capita in this case.

In terms of the relationship between bank concentration and efficiency, there are mainly two arguments; competition-inefficiency hypothesis and competition-efficiency hypothesis. Competition-inefficiency hypothesis is supported by the empirical studies of Evanoff and Ors (2002), and Kumbhakar et al. (2001). These studies indicate that more banks competition is associated with decline in banks efficiency for several reasons: first, as mentioned by Boot and Schmeits (2005), in competitive environment, the relationship

between customers and banks are less stable and shorter. Second, in competitive environment, the consumers tend to switch to another financial institution, due to amplified asymmetric information. On the other hand, in the competition-efficiency hypothesis, the positive impact of competition on efficiency is supported by (Chen, 2007), and (Dick and Lehnert, 2010). Because competition enhances banks to specialize on certain type of loans and particular groups of borrowers (Zarutskie, 2013), likewise, induces bank managers to adjust their lending technologies.

10.1 HYPOTHESIS TO BE TESTED

The main objective of this chapter is to investigate the incidence, magnitude and determinants of banking efficiency in MENA countries during 2005–2012. To achieve this goal, the chapter will focus on the following hypothesis:

H1: Gulf Countries are more efficient compared with banks in non-Gulf countries.

H2: Bank Size has a positive impact on cost efficiency.

H3: Bank Equity has positive impact on cost efficiency.

H4: GDP Per Capita is associated positively with cost efficiency.

H5: Market Structure has significant impact on cost efficiency.

H6: Bank profitability (ROAA) has positive on cost efficiency.

H7: Inflation rate has negative impact on cost efficiency.

H8: Islamic banks have significant impact on cost efficienc

Table 3-8: Summary of variables and predictions

Variable	Prediction	Definition	Source
	Efficiency		
Log (Efficiency)	Dependent variable	Cost Efficiency of bank	Bankscope, Authors' calculation
ROAA	+	Return on Average Assets	Bankscope
Inflation	-	Inflation rate	(IMF) database)
Log (Equity)	+	Equity Capital of Bank	Bankscope
Log (Assets)	+	Total Assets of Bank	Bankscope
Log (GDP Per Capita)	+	Annual GDP per capita.	(IMF) database
Herfindhal (HHI)	+/-	Herfindhal Index	Bankscope, Authors' calculation
Dummy Gulf	+/-	Gulf Countries=1, and Non-Gulf=0	
Dummy Islamic	+/-	Islamic Banks=1, and Conventional Banks=0	
Years [Year]		Year dummies	

11. The Model

In this part, we will analyze the determinants of Cost efficiency in MENA countries banks during 2005 – 2012. For this purpose, we provide an explanatory analysis by regressing cost efficiency (dependent) against number of financial and structural variables (exogenous). GMM model was used to estimate the regression between cost efficiency and other determinants.

The difference and system GMM estimators developed by Arellano and Bond (1991); Arellano and Bover (1995) and Blundell and Bond (1998) are designed for situations with "small T, large N" panels such as ours. They deal well with independent variables that are not strictly exogenous i.e. correlated with past and possibly current realizations of the error, with fixed effects, heteroskedasticity and autocorrelation within individuals (Roodman, 2009). In difference GMM all regressors are usually transformed by differencing (also referred to as Arellano–Bond estimation). System GMM is an extension of difference GMM (also referred as the Arellano–Bover/Blundell–Bond estimator) which augments Arellano–Bond by

building a system of two equations -the original equation and the transformed equation - and making an additional assumption that first differences of instrument variables are uncorrelated with the fixed effects. System GMM was invented to tackle the weak instrument problem and allows for the introduction of more instruments and the improvement of the models' efficiency.

Our model is as follows:

$$Lneff_{it} = \alpha i_t + \beta_1 (Lneff)_{it-1} + \beta_2 ROAA_{it} + \beta_3 Lnequity_{it} + \beta_4 LnAssets_{it} + \beta_5 LnHHI_{it} +$$
$$\beta_6 LnGDPperCapita_{it} + \beta_7 Inflation_{it} + \beta_8 DummyGulf + \beta_9 DummyIslamic + \sum_{t=1}^{8} Yeras + \varepsilon_{it}$$

Where

$Lneff_{it}$ - efficiency of bank *i* in period *t* and *Ln* of $(Lneff)_{it-1}$ is its one period lag.
$ROAA_{it}$ – Return of Assets of bank *i* in period *t*
$LnHHI_{it}$ – Herfindhal index as a concentration measure (proxy of Competition)
$Lnequity_{it}$ – Equity of bank *i* in period *t*
$LnAssets_{it}$ - natural log of assets of bank *i* in period *t*, as a measure of bank size.
$Inflation_{it}$ - Inflation rate, as macroeconomics variables.
$LnGDPperCapita_{it}$ – GDP per-capita, as macroeconomics variables.
$DummyGulf$ - Dummy of Gulf Countries, if Country is Gulf takes=1, otherwise=0.
$DummyIslamic$ - Dummy for Islamic, if Bank is Islamic takes=1, otherwise=0.

11.1 The Results

First of all, in case of all countries, we can observe that most coefficients are significant and in line with our expectations. As can be seen in Table 3-9, the effect of ROAA is statistically significant and confirms the general notion that profitability is positively related to cost efficiency. Hence, banks with higher profit tend to be more efficient. Similar results are reported by several studies (Isik and Hassan 2002 for Turkish banks; Pasiouras 2008 for Greek commercial banks; Perera et al. 2007 for 111 commercial banks in South Asia).

The coefficient of log (Assets) is statistically significant and positively related with cost efficiency scores. The result means that bank size has positive impact on cost efficiency, implying that larger banks are more efficient than the smaller ones. Our findings are in line with many studies (e.g., Chu and Lim 1998 for Singapore banks; Papadopoulos 2004 for the European banking industry; Pasiouras 2008 in Greece) which concluded that the larger the total assets, the higher the efficiency.

As expected, the log (equity) has a positive and statistically significant impact on cost efficiency. Hence, the result suggests that well-capitalized banks are more efficient than their poorly capitalized counterparts, in terms of cost efficiency (Berger and Bonaccorsi di Patti, 2006; Casu and Molyneux, 2000).

Regarding Inflation rate, the coefficient is statistically significant and negatively related to cost efficiency. As increase in inflation rate causes an increase in costs, interest rates and bad debt; this will reduce banks efficiency. ln addition, Kasman and Yildirim (2006) highlighted that inflation increases cost and reduces profits as banks tend to compete through expanding branch networks.

In addition, GDP per Capita is statistically significant and negatively related to cost efficiency. This result is consistent with the lack of expenses control supported by Maudos et al. (2002), who argue that countries with high per capita income is associated with big demand for financial products, which leading to less control of their expenses. In terms of the relationship between bank competition and efficiency is not statistically significant. This also applies for dummies variables for gulf countries and Islamic Banks.

In case of Gulf Countries, we can observe that most of coefficients are significant and in line with all countries case in terms of the signs of coefficients and significance level, except GDP per capita, it is inversely related with cost efficiency like all countries case, but in case of Gulf Countries it is not significant.

If we look at Non-Gulf Countries case, we can observe that there is a little bit difference from all countries case and Gulf Countries case in terms of signs of coefficients and significance level. However, equity has a positive impact on cost efficiency and it is statistically significant like all countries case and Gulf Countries case. Moreover, an interesting difference that Herfindahl index (HHI), is statistically significant, and has a negative relationship with cost efficiency. This result supports the competition-efficiency hypothesis that states a positive impact of competition on efficiency. Because competition make banks to focus in a certain types of loans and borrowers (Zarutskie, (2013), Chen, (2007), Dick and Lehnert, (2010)), likewise, induces bank managers to adjust their lending technologies. This positive impact can also be explained by the "Quiet Life hypothesis," which states that managers with monopoly power enjoy a share of monopoly rents, they are careless in the expense management and the working effort will be reduced, which leads to a decline in efficiency.

In terms of bank type dummy, we can notice that bank type has significant influence on banks efficiency especially in case of Non-Gulf Countries. As we reached in our study that Islamic banks less efficient than commercial banks for different reasons discussed in above pages (Kamaruddin et al., (2008), (Rosly and Abu Baker, 2003) and (Yudistira, 2003).

Table 3-9: Dynamic panel-data estimation, two-step system GMM

lneff	**sysGMM**	**sysGMM**	**sysGMM**
	All Countries	**Gulf Countries**	**Non-Gulf Countries**
lneff L1.	0.442***	0.451***	0.540***
ROA_	0.007**	0.008***	-0.002
Inflation	-0.009***	-0.009*	0.004
lnEquity	0.165***	0.147**	0.058*
lnAS	0.059***	0.045**	
lnGDPpercapita	-0.074**	-0.060	-0.009
HerfindnNEW	-0.199	-0.182	-0.252*
Dummygulf	-0.062		
Islamic	-0.087	-0.015	-0.174***
_cons	0.493*	0.364	0.137
Diff AR(2)	0.618	0.585	0.526
Hansen Test	0.358	0.999	0.864
NO. of Instruments	211	172	154
NO. of Groups	239	94	145
NO. of Observations	845	400	436

***, **, and * indicate 1%, 5% and 10% significance levels, respectively

As we can see in Table 3-10, in terms of all countries, most of coefficients are significant and in line as we expect except H1, H5, and H8, related to dummy Gulf, HHI index and dummy Islamic respectively. At the same time, Gulf countries case seem very similar to all countries case in terms of significance level and the direction of coefficients except H4, that is related to GDP per capita, which seems has no significance in Gulf countries case. In the contrast, Non-Gulf countries case seems quite different from last two cases. We can see clearly that H5, which is related to HHI index, is significant in Non-Gulf countries case, which is the opposite of the other two cases. Another difference related to H6 that is related ROAA, that seems has a negative impact on cost efficiency and at the same time, it is not significant, this is also the opposite of other two cases. The same scenario happened with H7, which is related to inflation. But we can see in terms of dummy Islamic

variable H8, the direction of the coefficient is the same like other two cases, but the difference is in the significance level.

Table 3-10: Summary results of Testing Hypothesis

Hypothesis		All Countries	Gulf Countries	Non-Gulf Countries
H1	Sign	-		
	Significant	NO		
H2	Sign	+	+	
	Significant	Yes	Yes	
H3	Sign	+	+	+
	Significant	Yes	Yes	Yes
H4	Sign	-	-	-
	Significant	Yes	No	No
H5	Sign	-	-	-
	Significant	NO	NO	Yes
H6	Sign	+	+	-
	Significant	Yes	Yes	NO
H7	Sign	-	-	+
	Significant	Yes	Yes	No
H8	Sign	-	-	-
	Significant	NO	NO	Yes

Chapter 4

Market Structure, Performance, and Efficiency of the MENA Banking Sector

1. Introduction

The profitability of banks is necessary to ensure the stability of the financial system. However, sometimes banks obtain such profitability imposing high financing costs that adversely affect the competitiveness and economic development. The establishment of collusive practices, associated with the lack of competition, very dominant market positions or an overly protectionist regulation can create a comfortable environment to obtaining profitability but at the expense of a high level of inefficiency. In these cases, the financial sector may be particularly vulnerable to the entry of more efficient competitors' trough liberalization, or even competition from other new alternatives like digital operators. However, it is also possible to find highly efficient banking systems with high levels of concentration, in which case they could obtain good levels of performance and competitiveness. Knowing what are the reasons for the performance of banks is important for policy makers and other stakeholders. In this regard, various theories, the traditional SCP paradigm, the Relative Market Power hypothesis (RMP); the Efficiency hypothesis (ES) and Quit Life hypothesis (QLH), explain the relationship between performance, market structure and efficiency, and may be useful to assess whether the performance of the financial sector is obtained under competitive and efficient conditions.

Several studies have been conducted related to bank performance, market structure and efficiency, while most of these studies are referred to US and European banking sector like. In this context, Goddard et al. (2001) argues that the volume of the US literature has exceeds the volume of European studies, and therefore, many recent studies have performed to fill this gap. However, Berger and Humphrey (1997) argue that the structure of US bank industry is quite different from other countries. In the case of European studies, is more frequent to find stronger evidence for the traditional SCP paradigm, in other words, concentration affect performance (Molyneux et al., 1995).

Nevertheless, little attention has been taken into account to study these relations in MENA countries. This study aims to investigate the profit-structure relationship in Middle East and North Africa (MENA) banking markets by testing the market power and efficient-

structure hypotheses, during the period (2005-2012), attempting to investigate whether market structure and efficiency really does matter in determining bank performance in the MENA banking markets.

If the traditional SCP hypothesis or the relative market power hypothesis is found to be evident in the MENA banking markets, this would imply that antitrust or regulatory policy should be aimed at changing market structure in order to increase competition or the quality of bank performance. If the efficiency hypotheses hold then increasing concentration in banking markets should not be of concern for policymakers in the MENA banking markets. Meanwhile, if ”quiet life” hypothesis holds then, firms with more market power or in more concentrated markets would be less efficient. In this sense, Coccorese, and Pellecchia (2010) argue that such a technological progress, globalization and deregulation of banking markets might lead to huge consolidation in banking system, which theoretically leads to more concentrated industry and therefore greater market power for banks. This exploitation of market power will lead to what is called in the literature as the ‘quiet life’ hypothesis (QLH), as Berger and Hannan (1998). One possible explanation of this behavior is managers could increase some expenses, especially to preserve market power. As far as we are aware, this is one of the few studies in which market power and efficiency aspects of the MENA banking markets have been investigated.

The importance of this study comes from; firstly, as far as we are aware, there have been very few studies that investigate market structure and performance relationships in MENA banking markets. Secondly, the analysis will contribute to our general understanding of the determinants of bank performance. Thirdly, our study will assist researchers and policy makers in matters relating to potential changes in the institutional environment of the MENA banking industry, particularly the potential impact of deregulation, banks mergers and acquisitions on industry structure and performance.

The paper is structured as follows: in the next section, we discuss the theories that explain bank. Section 3 presents related studies for market structure, efficiency and bank performance. Section 4 represents the empirical analysis, by discussing the dependent and independent variables, then analyze the descriptive statistics. Section 5 explains the methodology and econometrics model, then analyze the empirical results of testing four hypotheses concerning market structure, efficiency and bank performance of banks in MENA countries, while the final section summarizes and concludes this study.

2. Related theories

The relationship between market structure and profitability takes much attention in banking literature, and there has been an intense debate over the direction of causality. In this part, we will present all the theories that explain this relationship, which are:

- The Structure – conduct performance hypothesis (SCP).
- The relative market power hypothesis (RMP).
- The efficient structure hypothesis (ES).
- The quiet life hypothesis (QL).

In the following, we will summarize these hypotheses and the related literature.

2.1 The Structure – conduct performance hypothesis (SCP).

Traditional SCP related to (Bain, 1951). According to the Structure-Conduct-Performance hypotheses, the degree of competition among firms in the market is influenced by the degree of concentration among a few relatively large firms, since a more highly concentrated markets structure is assumed to be conducive to more effective collusion. At high levels of concentration, effective monopoly exists through the recognition of mutual interdependence, and market participants are able to achieve the monopoly price-output configuration that maximizes industry profits. So SCP describes the positive relationship between concentration and performance, which gives an evidence for banks to get a monopolistic rent in concentrated markets through their ability to offer lower deposit rates and to charge higher loan rates. As (Stigler 1964) explain, SCP theory is derived from oligopolistic behavior model, which implies that collusive arrangements are less costly to maintain in concentrated markets.

Most early empirical research has focused on the SCP paradigm analyzing the relationship between concentration and performance measured by profitability. A positive correlation between concentration and profit was typically interpreted as the evidence that firms act collusively in order to achieve high profits, (Altunbaş et al., 2001). As mentioned above, the earliest work on the relationship between market structure and performance was undertaken by Bain (1951) and is viewed as the foundation of modem empirical work in the industrial organizations literature. Regarding Bain (1951), this study analyzed the impact of concentration on US manufacturing industries performance, covering the period 1936-40. He found that industries with higher concentration ratio

obtain higher profitability. Bain's findings were confirmed by numerous other studies, which at the time were interpreted as providing empirical justification for government intervention aimed at increasing competition. Bain's (1956) study extended his analyses to include the effects of both concentration and entry barriers on industry performance. In general, the early literature, therefore, supported the view that more concentrated industries earn monopoly profits. Proponents of the SCP paradigm therefore tend to view most existing markets as imperfect in terms of their competitive structure, and in need of some form of regulation in order to avoid the abuse of market power, (Wilson et al. 2001).

2.2 The relative market power hypothesis (RMP)

Other theory that has been widely used mostly in the banking industry is Relative to the Market Power Hypothesis (RMP). Similar to SCP, (RMP) predicts a positive relationship between a firm's market share and its performance. The RMP put forward by Roades (1983), focuses on the role of market share on profit and prices. As Ye, el at (2012) indicate, RMP argues that concentration situation for banks are not necessary to raise the prices, because large banks in a large market can differentiate their products and services, therefore, can charge a higher prices and obtain profit. In other word, concentration structure is not a prerequisite for large banks to obtain profit.

As Berger (1995) says, large banking can enjoy market power by many ways, like make a good distribution for its branches, which allow the customers to get an access easily, qualify their financial services, and a good advertising policy to attract the customers. All of these reasons and others make the banks to obtain the market share.

While the structure-conduct-performance hypothesis argues that more concentrated markets lead to higher loan rates and lower deposit rates because of lessened competition, the Relative-market power hypothesis argues that only large banks with some "brand identification" can influence pricing and raise profits. The difference between those two hypotheses revolves around whether market power proves generic to a market or specific to individual banks within a market (Jeon and Miller, 2005).

In this regard, Mensi and Zouari (2010) argue that the RMP hypothesis is empirically proved when concentration introduced in the explanatory equations of performance is found non-significant in contrast to market share, which should be positively and significantly

correlated with price and/or profitability. Nevertheless, it is not obvious that employing market structure in these equations produces unambiguous results. A bank with a strong position in the market may either reinforce its domination over the market or achieve a higher efficiency.

In this regard, some empirical studies test the SCP and RMP hypotheses by analyzing the profit-concentration relationship (market share). However, these studies are incapable of favoring one of the two hypotheses. The reason is that the effects of market power and efficiency might be simultaneously present in the variables describing market structure and they are neutralized at the level of the concentration coefficient (market share). These studies cannot confirm either of the SCP and RMP hypotheses without ambiguity, due to the combined effect of market power and inefficiency (Mensi and Zouari, (2010).

We can conclude that each of SCP and RMP state that market power is the main determinant of performance and profitability, but at the same time, the difference between these two hypotheses is that RMP hypothesis does not assume a highly concentrated market, while the SCP hypothesis assumes that the largest firms are able to collude with each other.

2.3 The efficient structure hypothesis (ES)

Another strand of literature, however, interprets the relationship between bank performance and concentration in terms of enhanced efficiency. The efficient structure hypothesis (ES) was made by Demsetz (1973) and later by Brozen (1982). As Demsetz (1973) explains, if the firms are enjoying higher level of efficiency, which means low costs of structure, compared with its competitors, then, it can maximize the profit by following one of these two strategies: it can maximize profit by reducing the pricing and expanding the firm size, or by maintaining the same level of prices and firm size. And if the firms adopt the first strategy, this means it will gain market share and firm efficiency will be the driving force behind the process of market concentration. In this context, Demsetz (1973) tests the efficiency hypotheses using data from the US Internal Revenue service for 95 industries. The data are classified by industry concentration and firm sizes. The profit rates of firms in the three smallest of four size classes do not rise with concentration. No association between collusion and concentration is evident in the profits data of firms in these three size classes. In the largest size class, however, profits do increase with concentration, therefore, support the efficiency hypotheses.

Smirlock et al. (1984) test the efficiency hypotheses using data on 132 US manufacturing firms covering the period 1961-69, and his findings in general, support the efficiency hypotheses. Meanwhile, Berger (1995) divides the efficient-structure theories into two hypotheses – the X-efficiency and scale efficiency hypotheses. The X-efficiency hypothesis argues that higher profit for banks are association with better management and practices to control the costs, therefore, make the banks closer to best practice. Ye et al. (2012) argue if the banks enjoying these efficiency, this will allow bank to get higher market share, and therefore, higher concentration. The second explanation is the Scale Efficiency (SE) version of the efficient structure hypotheses, where some firms can produce on a more efficient scale than others with equally good management and technology, i.e., they produce at a lower cost because of local circumstances and therefore gain higher profits. Again, these firms are assumed to have larger market shares which results in higher concentration.

In this context, Berger (1995) argue that most prior tests of the market-power theories produce suspect findings, since they do not control for the efficient-structure theories. So he tests two market-power and two efficient hypotheses simultaneously, by adding measures of X-efficiency and scale efficiency to the standard tests. His findings support only two of the four hypotheses – the relative-market-power and the X-efficiency hypotheses. His evidence does not support the structure-conduct-performance and scale-efficiency hypotheses. We can conclude, the market power hypotheses (SCP and RMP) treat market concentrating variable as an exogenous, and assert that higher concentration is associated with higher profitability for banks. Meanwhile, ES hypotheses treat bank efficiency variable as exogenous, and predict that efficiency will lead to higher market share and concentration, and therefore, higher profit for efficient banks.

2.4 The quiet life hypothesis (QLH) (Market share or concentration on efficiency)

This hypothesis was developed by (Hicks, 1935). He suggests that a bank with greater market power will be more risk-averse, and thus will be able to achieve some combination of both higher returns and lower risks compared with banks possessing less power in the market. In this concept of a quiet life, there is tendency to which firms will utilize the greater efficiency that they possess by way of expense preference behavior, to relax the strict adherence to cost minimization, and thus weaken the relationship between firm profits and structure. With this, it implies that there will be a negative relationship between efficiency

and market structure variables. Higher degrees of efficiency will be found in markets with low concentration and in firms with a smaller market share.

However, Berger and Hannan (1998), employ data from the US commercial banking industry, arguing, that this produces very homogeneous products in multiple markets with differing degrees of market concentration. They focus on commercial banking, an industry in which all firms have access to virtually the same technology and produce relatively homogeneous products in geographically limited markets with dramatically different market structures. According to their study, bank prices are virtually unregulated, and banks can and do charge different prices for their deposit and loan products in different local markets. Thus the effects of concentration on efficiency can be well isolated from confounding influences of interindustry differences in products, technologies, and external competition. The main findings of this study is that banks in more concentrated markets exhibit poorer cost efficiency than do other banks, all other things being equal. So we can conclude that quiet life hypothesis (QLH) is alternative explanation of the relationship between market structure and bank performance, especially when the positive relationship between market concentration and bank performance does not exit.

3. Literature Review

There are lots of studies that cover the relationship between market structure, performance and efficiency in US banking Industry and Europe. However, few studies cover this topic in emerging markets, and in particular, in the Middle East region and North Africa (MENA) countries. Furthermore, the results are not conclusive and they depend on the market, period or country development.

At the empirical level several papers support the SCP in different countries. In this sense, a study of Athanasoglou et al. (2006), examine the profitability behavior of South Eastern European (SEE) credit institutions over the period 1998-2002, using an unbalanced panel dataset. A key result is that the effect of concentration is positive, which provides evidence in support of the structure-conduct performance hypothesis (SCP). In contrast, a positive relationship between banking reform and profitability was not identified, whilst the picture regarding the macroeconomic determinants is mixed. In the same line, the study of Park and Weber (2006) also investigates the relationship between structure and performance in the Korean banking industry during 1992–2002. The results show that when bank efficiency is ignored, they find that market share has a significant positive impact on bank

profitability, which supports SCP hypothesis. However, when bank efficiency is explicitly controlled for, the impact of market share on profits becomes insignificant, providing evidence in favor of the efficient structure hypothesis. Furthermore, contrary to the market structure hypothesis they find that market concentration has a negative impact on bank profitability over the entire period. Another important result is when the sample period is divided between three distinct periods, further insight is obtained. During the stable banking period (1992–1996), market concentration, market power, and efficiency are significant explaining bank profitability. However, during the crisis period (1997–1999) and recovery period (2000–2002), bank efficiency stands out as the primary variable affecting bank profits. While market concentration and market share became less significant over time, the importance of the efficiency variable and its magnitude of influence increased as Korean banks went through turbulence. In this stream, a study of Matthews and Al-Muharrami (2009) from Arab GCC countries is consistent with SCP hypothesis over the period 1993-2002. The paper evidence support to a positive relationship between firms' profits and market structure, specifically, the paper supports traditional SCP rather than the RMP hypothesis. On the other hand, the empirical results do not find any support for the Hicks (1935) "Quiet Life" version of the market power hypothesis. We can conclude that GCC bank behavior was consistent with the traditional SCP hypothesis where market structure helps explain performance. In this context, Bhatti (2010) examines the relationship between market structure and performance in the banking sector using data from Pakistani commercial banks. The analysis of this paper aimed to test structure-conduct-performance (SCP) and efficient-structure (E-S) hypotheses. The author use a sample of 20 scheduled commercial banks incorporated in Pakistan to examine the above hypotheses, using the annual and pooled data for a period of 9 years from year 1996-2004. He used as measures for performance, the return on assets (ROA), return on capital (ROC) and return on equity (ROE). Beside this, he used concentration ratio (CR) to measure structure-conduct-performance (SCP) hypothesis, and market share to as a proxy variable to capture the market competition. The results reveal a positive relationship between profitability and concentration; on the other hand, there is a negative relationship between competition and profitability in the Pakistani commercial banks. So this evidence support SCP hypothesis. Another important study of Nabieu (2013) is consistent with SCP hypothesis who analyzed the commercial banks in Ghana. The author utilize market structure and a market share variable to capture the effect of Market conduct on bank performance, and Return on Assets (ROA), return on equity (ROE) to capture banks'

performance from 2007-2012. The results assert that market concentration and market share significantly determines profitability.

Regarding Relative Market Power hypothesis (RMP), there study of Ye et al. (2012) examines the five hypotheses mention above. The study comprises the 14 largest nationwide banks in China during the period of 1998–2007. The results reveal that neither the structure conduct performance (SCP) nor the efficient structure (ES) hypotheses hold in China. His evidence supports the relative market power hypothesis (RMP), that states that banks with differentiated services and products are those with higher market shares and they are able to exercise their market power to obtain higher profits. In the same line, Mirzaei et al. (2013) paper empirically investigates the effects of market structure, bank-specific characteristics, overall financial structure and macroeconomic environment on profitability and stability of 308 banks in emerging economies and 1621 banks in advanced economies during the period 1999-2008. The results show that neither RMP nor SCP hypotheses hold in emerging banks, whereas the evidence supports RMP hypothesis in advanced economy banking systems. Another interesting result is that higher interest rate spreads increase profitability and stability for both types of economies.

Regarding efficiency structure hypothesis there are also papers supporting their working at the empirical level. Goldberg and Rai (1996) have analyzed the structure-performance hypotheses for the largest banks located in 11 European countries covering the period 1988-91. The sample was also divided between banks located in countries having a high and low concentration. In addition, the paper uses a stochastic cost frontier, as proposed by (Aigner et al., 1977), to derive X-inefficiency and scale-inefficiency estimates under the assumption that the error terms are half-normal. The results do not find a positive and significant relationship between concentration and profitability for a sample of banks across 11 European countries over a four year period, 1988-91. However, the empirical results only support the X-inefficiency (ESX) version of the efficient-structure hypothesis for the banks located in low concentration countries. Similar results are achieved by (Chortareas et al., 2011). The sample of the study covers 2,500 bank observations in nine Latin American countries over 1997- 2005. They use Data Envelopment Analysis for measuring efficiency. The results reveal evidence that supports the efficient structure hypotheses in Latin American countries. The findings are particularly robust for the largest banking markets in the region, namely Brazil, Argentina and Chile. In addition, capital ratios and bank size seem to be

among the most important factors in explaining higher than normal profits for Latin American banks. The results have very important implications, because efficiency structure still have the important role of deriving banks profit, even though, significant rise in takeovers from foreign banks and the increase in market concentration for most Latin American counties.

In the particular case of quiet life hypothesis (QLH), Koetter and Vins (2008) test the hypothesis among banks. They estimate cost and profit efficiency for German savings banks using stochastic cost and profit panel frontier analysis, as well as market power (Lerner index) simultaneously from a single reduced form. They use a unique sample of all savings banks operating in Germany between 1996 and 2006. The results show firstly, that saving banks are much higher cost efficiency than profit efficiency. Secondly, Lerner index shows that savings banks indeed possess some market power. Maybe the most important result is found a slightly negative relationship between cost efficiency and the Lerner index. This supports the QLH and implies that more market power induces banks to also incur more slack in the operating dimension of their business. In the same line Tetsushi et al. (2012) proposes a new test of the efficient structure (ES) hypothesis by directly examining the relationship between firm efficiency and firm growth. Applying this test to data on large banks in Japan from 1974-2005. The results reveal that more efficient banks become larger, which is consistent with the efficient structure hypothesis. They also find that market concentration erodes banks' cost efficiency, which is consistent with the quiet-life hypothesis. This imply that banks grow more as they become more efficient, but the resulting market concentration assures a "quiet life" for banks, which makes them lose efficiency and shrink. However, another finding suggests that the economic impact of the quiet life hypothesis is less significant than that of the ES hypothesis.

Table 4-1: Articles used in the Study

Author(s)	Data	Study Period	Hypothesis Supported	Results
Athanasoglou et al. (2006)	South Eastern European (SEE) credit institutions	1998-2002	SCP	A key result is that the effect of concentration is positive, which provides evidence in support of the structure-conduct performance hypothesis (SCP)
Matthews and Al-Muharrami (2009)	52 banks of Arab GCC	1993- 2002	SCP	The paper support traditional SCP rather than the RMP hypothesis. On the other hand, the empirical results do not find support "Quiet Life".
Bhatti (2010)	20 Pakistani Commercial Banks	1996-2004	SCP	The results reveal a positive relationship between profitability and concentration, on the other hand, a negative relationship between efficient structure and profitability.
Nabieu (2013)	Commercial Banks in Gana	2007-2012	SCP	The results assert that market concentration and market share significantly determines profitability.
Ye et al. (2012)	14 largest nationalwide in China	1998–2007	RMP	The results reveal that neither the structure conduct performance (SCP) nor the efficient structure (ES) hypotheses hold in China. His evidence support the relative market power hypothesis (RMP).
Mirzaei et al. (2013)	308 banks in emerging economies and 1621 banks in advanced economies	1999-2008	RMP	greater market power leads to higher bank performance being biased toward the RMP hypothesis in advanced economies, Neither of the SCP nor RMP seems to be supported for the returns in the emerging banking sector.
Goldberg and Rai (1996)	largest banks in 11 European countries	1988-1991	ES	The results do not find a positive and significant relationship between concentration and profitability. However, the empirical results only support the X-inefficiency (ESX) version of the efficient-structure hypothesis for the banks located in low concentration countries.
Park and Weber (2006)	all Korean banks	1992-2002	ES and SCP	When bank efficiency is ignored, the evidence supports SCP hypothesis. However, when bank efficiency is explicitly controlled for, the evidence support of the efficient structure hypothesis.
Chortareas et al. (2011)	2500 Banks in Nine Latin America Countries	1997-2005	ES	The results supporting the efficient structure hypotheses in Latin American countries. The findings are particularly robust for the largest banking markets in the region.
Tetsushi et al. (2012)	Large Banks in Japan	1974-2005	ES and QLH	More efficient banks become larger, which is consistent with the efficient structure hypothesis. They also find that market concentration erodes banks' cost efficiency, which is consistent with the quiet-life hypothesis.
Koetter and Vins (2008)	a unique sample of all savings banks in Germany	1996-2006	QLH	Saving banks are much higher cost efficiency than profit efficiency. Secondly, Lerner index shows that savings banks indeed possess some market power. Maybe the most important result is found a slightly negative relationship between cost efficiency and the Lerner index. This supports the QLH.

4. Empirical Analysis

After reviewing the literature on the theories that determine the profitability of the banks, we turn to study the effect of some of these factors on the banks located in the Middle East and North Africa countries (MENA). However, Palestine has been dropped from analysis due to the absence of most of the information on banks of Palestine. It should be noted that the composition of the sample depended on the available data on Bankscope database. That is, we have taken into account all available data banks on the basis Bankscope, except the case of Palestine. In the following we will show the major indicators that we will use in our analysis, as well as, other control variables.

4.1 Sample and Variables Description

Our database covers the period 2005-2012, and it is an unbalanced panel data comprised by 201 banks in the MENA countries. Given the absence of some data banks that make up the study sample during the above period, the end result of our data collection obtained 1612 observations in our sample period. The main source of information used is based on Bankscope. It should be noted also that the composition of the sample is also dependent on the available data of Bankscope database.

4.2 Dependent variable

We have chosen the return on total assets (ROAA) as a proxy for profitability. ROAA is calculated as (Net profit/Average Asset). It shows how efficiently a company is utilizing its assets and is also useful to make comparisons among peers in the same industry. This option is common in profitability analysis (Naceur, 2003), Kosmidou, Tanna, and Pasiouras, 2005, Athanasoglou, 2008, Pasiouras and Kosmidou, 2007, Demirgüç-Kunt and Huizinga, 2010). Average assets have been used in this study, in order to capture any differences that occurred in assets during the fiscal year. Meanwhile, Golin (2013) points out, return on average assets is the key measure of profitability.

4.3 Independent variables

In the empirical analysis, we use a set of variables representing the characteristics of each of the banks to test the hypotheses that explain bank's profitability, as well as macroeconomic peculiarities of such countries features.

In this context, we investigate the impact of concentration on bank profitability to test SCP hypothesis. We use the Herfindahl index of concentration, which is the sum of the market shares squared (Beck, Demirguc-Kunt and Levine, 2006). Ye et al. (2012) asserts that the costs of collusion between leading firms are low in a highly concentrated market; therefore the leading firms have more market power to set higher prices and get better profits. According to Goldberg (1996) banks are able to extract monopolistic rents in concentrated markets by their ability to offer lower deposit rates and charge higher loan rates. This hypothesis is derived from the model of oligopolistic behavior of firms which implies that collusive arrangements are less costly to maintain in concentrated markets. Thus, we propose the following hypothesis:

H1: Banks obtain higher profitability in more concentrated markets.

We also add a variable of market share (MS), which is calculated by (Total assets of bank *i* over total assets of the industry), to test RMP hypothesis. According to Berger (1995) large banks have more ability to differentiate their products, and therefore can convince more customers to deal with these banks through branch sites, intensive advertisement and, therefore, to exercise market power and earn supernormal profits. Therefore, market share is a major determinant of profits. In this sense our second hypothesis is as follows:

H2: Banks with large market share are more profitable.

Regarding efficiency ES hypothesis consider efficiency as one of the main determinants of profitability. Demsetz (1973) and Brozen (1982), argue that efficiency is the main source of shaping the structure of the market, in particular, higher efficiency will lead to higher profit for such firm, and therefore, higher market share, this in turn will lead to higher level of concentration. Simply the viewpoint asserts a positive relationship between efficiency and profitability. Conversely, in concentrated market, banks will enjoy market power, and this will lead a loss of consumer's wellbeing due to increase prices and the reduction in the quantity supplied by banks.

H3: Bank efficiency has a significant impact on bank profitability.

H4: Bank efficiency increases the level of market concentration.

In order to test Quiet Life Hypothesis (QLH), (Hicks 1935) observed that is not necessarily for firms that have greater market share to set higher prices, and therefore, get

higher profit. He reasoned that by arguing that firm in relaxed environment may not have any motivation to improve their cost efficiency. In other word, concentrated market and higher market share may be associated with lower efficiency. This evidence is supported by Berger and Hannan (1997), who found that, banks in more concentrated market is associated with lower cost efficiency. So we can propose a hypothesis as follow

H5: bank's efficiency affects positively the market share of the bank.

We also add some bank specific variables that might affect profitability. In this sense, we seek the relationship between profitability and size. To do this, we use the logarithm of total assets as a proxy to the size of banks. Meanwhile, there are pioneering studies that highlight the advantage of size to reduce the cost of the moral problem between borrowers and savers, and claim that the larger banks are associated with more profitability (Diamond, 1984; Ramakrishan and Thakor, 1984 and Leland and Pyle, 1977). Other studies conclude that the advantage of the size of the big banks is on diversification and the fact of being "too-big-to-fail" which is a particularly important guarantee from the point of view of authorities (Demirgüç Kunt and Huizinga, 2010). This advantage in terms of profitability has been well demonstrated in times of crisis (Beltratti and Stultz, 2012). Considering the related literature, we expect that size has a positive relationship with profitability.

We analyze also the effect of capitalization through equity ratio as a percentage of total assets of each bank. The literature provides various effects of capital over return profile of banks. For example, there are theories explaining that the capital increase could harm the performance of banks and lead to a reduction in credit (Diamond and Rajan, 2001). Instead, some studies confirm that well-capitalized banks tend to have a high return on assets (Demirgüç-Kunt and Huizinga, 2010). In this sense, there are contributions that said during the current financial crisis, well-capitalized banks achieved better profitability ratios (Demirguc-Kunt et al., 2010). Thus we, also expect a positive relation with performance.

We also evaluated the relationship between growth of bank assets and the level of profitability. In this context, we underline the result of Demirgüç-Kunt and Huizinga (2010), in which, the authors argue that rapidly growing banks in terms of assets, tend to have high return on assets. According to this evidence, asset growth has a positive relationship with profitability.

We also incorporate Islamic banks dummy variable to control the result of type of banks on profitability. Therefore, in the dummy we give the value 1 when banks are Islamic and the value 0 otherwise. In this context, Hasan and Dridi (2010) argue that Factors related to Islamic banks business model helped contain the adverse impact on profitability in 2008, while weaknesses in risk management practices in some Islamic Banks led to larger decline in profitability compared to Conventional banks in 2009. On the other hand, Samad (2004) examines the financial performances of Islamic and conventional banks of Bahrain after the first Gulf War in 1991. The comparison of financial measures expressed in terms of various financial ratios indicates that there is no major difference in profitability and liquidity between Islamic banks and conventional banks. According to this discussion, we expect a negative relationship with profirability.

Regarding macroeconomic variables, we introduce three variables. First we introduce GDP growth to control the effect of fluctuations in the economic cycle and the trend of economic growth in general. In this context, Demirgüç-Kunt and Huizinga (2010) conclude that GDP growth makes banks achieve a high rate of return on assets. In this context, Athanasoglou et al. (2008) argue that in economic booms period the demand for credit and stock market transactions would be strengthened substantially. And therefore, the revenue will be larger than costs, which leads to increased profit.

The GDP per capita is expected to have an effect on numerous factors related to the supply and demand for loans and deposits. As Bashir (2003), at higher income, people tend to save more and banks would be able to mobilize more resources. Hence, they finance more investment projects and are likely to generate more profits.

Another important macroeconomic condition, which may affect both the costs and revenues of banks, is the inflation rate. As Staikouras and Wood (2003) argue that inflation might affect bank profitability directly (e.g. rise in the price of labor) or maybe indirectly (e.g. changes in interest rates and asset prices). According to Kosmidou (2008), the effect of inflation on bank performance depends on whether the inflation is anticipated or unanticipated. In the former case (i.e. anticipated inflation) the interest rates are adjusted accordingly resulting in revenues, which increase faster than costs, with a positive impact on profitability. In the latter case (i.e. unanticipated inflation) the banks may be slow in adjusting their interest rates, which results in a faster increase of bank costs than bank revenues that consequently have a negative impact on bank profitability.

Table 4-2: Variables and hypotheses considered in the study

Variable	Prediction	Definition	Source
	Profitability		
ROAA	Dependent variable	Return on Average Assets	Bankscope
Herfindhal (HHI)	+	Herfindhal Index as measure of concentration	Bankscope, Authors' calculation
Market Share (MS)	+	Total assets of bank over total assets of the industry	Bankscope, Authors' calculation
Efficiency	+	Cost efficiency of bank	Bankscope, Authors' calculation
Log (Assets)	+	Total Assets of bank	Bankscope
Equity to Assets	+/-	Equity to asset of bank	Bankscope, Authors' calculation
Growth of Assets	+	Growth of Assets of bank	Bankscope
Log (GDP Per Capita)	+/-	Annual GDP per capita.	(IMF) database
GDP growth	+	GDP growth of the economy	(IMF) database
Inflation rate	+	Annual Inflation rate of the economy	(IMF) database
Dummy Gulf	+/-	Gulf Countries=1, and Non-Gulf=0	
Dummy Islamic	+/-	Islamic Banks=1, and Conventional Banks=0	
Years [Year]		Year dummies	

5. Descriptive Statistical Analysis

After the description of the study sample at the aggregate level and focused on profitability determinants, along this section we show the statistical analysis that incorporates the variables established previously. In Table 4-3 the main descriptive statistics of these variables are collected, giving a general representation of the characteristics of the banks that make up the sample in terms of our variables. Thus, the economic profitability (ROAA) 1.9% represents a relatively large dispersion, so that the lowest value is -49.27% and the largest value is 53.09%, which represents a considerable difference in the result of the banks in the sample. In terms of bank concentration measures, we can notice that overall Herfindahl index (HHI) for all the countries is 0.13, which is considered "moderately concentrated". Another interesting indicator related to market share, we can observe that the overall market share is around 0.06, but also with much dispersed values between minimum and maximum. Meanwhile, the overall average cost efficiency during the sample period is around 77 %. This implies that during the period of study, the average bank in MENA countries could reduce its costs by 23%. This results are closer to those of Olson and Zoubi (2008) who analyzed the cost and profit efficiency in MENA banks from 2000-2008, and found that average cost efficiency was around 73%.

We have also observed that banks examined represent an acceptable level of capitalization by 20% capital ratio. It also shows that the total assets of banks granted represent a very significant growth rate of 20.5%, but also with much dispersed values. Regarding macroeconomics variables, we can clearly notice that the average GDP growth in the MENA countries is 4.87% and the inflation rate exceeds 6%. Also, the average wealth in the sample is $ 17306.59 per year, with a minimum of $ 751.42 in a country and a maximum of $ 99731.10 in another. These data show the large gap in wealth between the countries forming the sample.

Table 4-3: Descriptive statistics of the variables

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA_	2496	1.90	5.33	-49.27	53.09
Herfindhal_	2848	0.13	0.11	0.05	0.87
ms	2501	0.06	0.10	0.00	0.93
eff	1612	0.77	0.22	0.01	1.00
logassets	2377	7.73	1.65	4.57	11.52
equityAST	2318	0.20	0.20	0.01	1.00
GrowthofAssets	2383	20.50	43.14	-56.64	761.02
gdpgrowth	2814	4.87	4.02	-10.48	26.17
gdppercapita	2830	17306.59	20116.44	751.42	99731.10
inflation	2830	6.31	6.53	-4.87	53.25
dummygulf	2848	0.38	0.49	0	1
dummyIslamic	2848	0.20	0.40	0	1

For us to have a good knowledge of the behavior of selected banks and macroeconomic characteristics of the countries of our study, Table 4-4 summarizes the means of the variables in each country. In principle, it can be observed that in terms of profitability, Oman, Qatar and Saudi Arabia show a high level, compared to the rest of countries which is 3.73, 3.73 and 3.6 respectively. On other hand, Syria and Libya have the lowest level among other countries 0.19 and 0.40 respectively. However, bank concentration index displays that Syria represents the highest level of Herfinfhal index, which is 0.47, which means highly concentrated area. Instead, Tunisia has the lowest level by 0.05, which means unconcentrated area, or in other words, very competitive bank industry.

In terms of efficiency, we can observe that efficiency scores indicate a big variation between countries. This is related to many differences in terms of number of banks, input expenses, and other country level variables like GDP per capita. Kuwait and Morocco represent the minimum values of average cost efficiency by 67% and 69% respectively, which implies that those countries do not control enough their costs. At the same time, we can see clearly that Egypt, Israel, Jordan, Tunisia and Oman have ranked the highest efficiency scores among other countries by 87%, 86%, 82%, 82% and 80% respectively. Banks in Gulf countries showed higher level of capital than other banks in other countries.

In terms of the rest of macroeconomics variables, we can observe that Qatar achieved the highest level of growth compared with the rest of countries which exceed the 14% in sample period. While the other countries move from 2.12 % to 6.48 %. In terms of wealth

position, we can see that Gulf countries enjoy the higher level of GDP per capita compared with the rest of countries, this of course related to oil wealth that Gulf countries have.

Given Table 4-5 can be seen that the evolution of profitability (ROAA) of banks forming the sample has fluctuated considerably during the period studied, especially in the Gulf countries who have witnessed high volatility, such volatility is a reflection of the financial instability of banks in these countries. We can notice clearly that big fluctuations happened in case of Kuwait, the average ROAA moves from 12.40 until -4.70. The same happened with Bahrain; the profitability fluctuated from 7.33 to -3.76. The same scenario applied for Emirates, Saudi Arabia and Qatar but with less degree of volatility. It might be noted here that Gulf countries have witnessed these fluctuations in profitability starting from 2008. In other words, we can see that the financial stability of all the banks in these countries that form the exhibition has experienced generally negative performance precisely in the last years, which means they have not remained untouched by the global financial crisis.

Moreover, it should be observed also that the countries who witnessed "Arab Spring", corresponds with a huge fluctuations in political conditions starting from 2010 and 2011 have also such degree of volatility in profitability such as Tunisia, Libya, Egypt and Syria, especially in last year of sample study. Finally we can say the volatility of economic performance has been a general feature in our sample during period of study, although with different degrees.

Table 4-4: Descriptive statistics of the variables by country

	Algeria	Bahrain	Egypt	Iraq	Iran	Israel	Jordan	Kuwait	Lebanon	Libya
Variable										
ROA_	1.95	2.02	1.25	3.24	1.62	0.73	1.59	2.16	0.77	0.40
Herfindnl Index (HHI)	0.18	0.09	0.07	0.36	0.10	0.13	0.24	0.12	0.09	0.31
Market Share (MS)	0.08	0.03	0.03	0.15	0.09	0.09	0.06	0.03	0.04	0.17
Efficiency Score	0.74	0.74	0.87	0.71	0.74	0.86	0.82	0.67	0.79	0.63
Log of Assets	7.56	7.38	7.94	6.40	9.34	9.50	7.65	7.62	7.51	8.37
Equity to Assets	0.15	0.34	0.12	0.20	0.13	0.06	0.16	0.39	0.09	0.13
Growth of Total Assets	24.96	13.70	18.66	60.12	38.26	9.60	14.17	10.32	13.14	24.34
Country Specific Variables										
GDP Growth	2.90	5.39	4.92	6.40	3.60	4.29	5.60	3.50	4.76	5.27
GDP per Capita	4421.26	22055.55	2248.78	3884.61	4987.07	26823.00	3693.28	36114.45	8087.71	10380.81
Inflation Rate	4.41	2.12	10.41	16.96	17.66	2.47	5.23	4.87	4.61	5.95

	Morocco	Oman	Qatar	Saudi Arabia	Sudan	Syria	Tunisia	Emirates	Yamen
Variable									
ROA_	1.90	3.73	3.73	3.61	2.62	0.19	0.99	2.52	1.04
Herfindnl Index (HHI)	0.08	0.19	0.19	0.11	0.17	0.47	0.05	0.09	0.12
Market Share (MS)	0.07	0.09	0.09	0.06	0.06	0.18	0.04	0.04	0.15
Efficiency Score	0.69	0.80	0.73	0.76	0.77	0.90	0.82	0.74	0.67
Log of Assets	8.14	7.16	8.30	9.47	5.93	6.93	6.56	8.47	6.14
Equity to Assets	0.13	0.29	0.31	0.26	0.19	0.11	0.17	0.22	0.10
Growth of Total Assets	21.11	18.66	45.69	14.34	26.56	76.63	14.49	24.07	22.15
Country Specific Variables									
GDP Growth	4.43	5.10	14.69	6.48	2.79	5.13	3.54	4.36	2.12
GDP per Capita	2653.77	18874.51	73186.55	18803.85	1405.18	2190.48	3962.23	56760.21	1109.44
Inflation Rate	1.80	4.68	5.74	3.52	14.48	7.44	3.95	5.35	11.62

Table 4-5: Evolution of Profitability (ROAA) by Country and by Year

Country/Year	2005	2006	2007	2008	2009	2010	2011	2012
Algeria	1.48	1.02	1.58	2.23	1.90	2.48	2.33	2.41
Bahrain	7.33	5.96	7.66	2.07	-3.30	-3.76	0.78	2.07
Egypt	0.90	1.19	1.59	1.37	1.27	1.47	0.93	1.24
Iraq	2.49	1.02	4.11	4.47	3.53	2.13	3.46	4.96
Iran	1.69	1.66	1.36	1.66	1.47	1.54	1.79	2.22
Israel	0.88	0.88	1.29	0.34	0.95	0.66	0.26	0.39
Jordan	2.65	1.60	1.84	1.87	1.20	1.08	1.14	1.26
Kuwait	12.41	6.48	9.00	-4.70	-3.37	-2.78	-1.42	0.29
Lebanon	0.47	0.53	0.74	0.78	0.79	1.15	0.95	0.84
Libya	0.73	0.84	0.60	0.66	0.56	-0.30	0.02	0.35
Morocco	1.89	2.20	2.77	1.79	1.39	1.63	1.60	1.55
Oman	5.29	4.40	5.10	3.48	3.22	3.80	2.25	2.73
Qatar	4.61	4.94	5.63	4.63	1.30	4.37	2.52	2.34
Saudi Arabia	5.97	5.87	4.73	3.84	3.41	1.59	1.45	1.96
Sudan	1.97	2.34	1.79	2.57	2.59	2.71	3.11	4.23
Syria	0.19	0.02	0.76	-0.60	-0.26	0.66	1.15	0.03
Tunisia	1.03	1.00	1.06	1.36	1.66	-0.04	0.73	1.13
Emirates	5.39	4.90	4.07	0.65	1.06	1.30	0.80	1.39
Yamen	1.30	1.52	1.29	0.95	0.94	0.59	0.34	0.81

6. Methodology and Econometric Model

Panel data methodology has been widely used similar to our work. For example, Keeton (1999), Calomiris and Wilson (1998), Laeven and Levine (2007 and 2009), Demirgüç-Kunt and Huizinga (2010) and Beltratti and Stulz (2011) estimate static models of panel data fixed effects. This method allows controlling unobservable heterogeneity and avoiding thus, biased estimators. This aspect is very important in our analysis because each bank has its own credit policy, management quality and culture. Each country also has its particular situation, especially as regards the macroeconomic indicators. The static models are appropriate in the presence of strictly exogenous variables, a hypothesis that is very questionable in microeconomic studies. Therefore, if not met that assumption, the estimation results may be inconsistent. In addition dynamic models are good when the dependent variable depends on its past realizations and it also deals very well with heteroscedasticity, autocorrelation and unobserved heterogeneity. The nature or our study needs to treat all this elements and this is why we have chosen a methodology based on dynamic panel data, which has been estimated using the Generalized Method of Moments (GMM). Our methodology has been proposed by Arellano and Bond (1991) and has been used by Rauch et al. (2010).

Following Smirlock (1985) and Berger (1995), we will estimate the following model to test the hypotheses the might explain bank performance.

$$ROAA_{it} = a_0 + \beta_1 ROAA_{it-1} + \beta_2 HHI_t + \beta_3 MS_{it} + \beta_4 EFF_{it} + \beta_5 LogASSets_{it} + \beta_6 EquitytoAST_{it} + \beta_7 GrowthAST_{it} + \beta_8 GDPGrowth_t + \beta_9 GDPPerCapita_t + \beta_{10} Inflation_t + \beta_{11} DummyGulf_{it} + \beta_{12} DummyIslamic_{it} + \sum_{t=1}^{8} Year_t + \varepsilon_{it} \quad (1)$$

Where:

- $ROAA_{it}$: Profitability of a given bank *i* at time *t*.
- $ROAA_{it-1}$: Profitability obtained by each bank during the previous period.
- HHI_t: Market concentration in period *t*.
- MS_{it}: Market share of bank *i* in period *t*.
- EFF_{it}: Cost efficiency of bank *i* in period *t*.
- $LogASSets_{it}$: Log of assets of bank *i* in period *t* as proxy of bank size.
- $EquitytoAST_{it}$: Equity to assets of bank *i* in period *t*.
- $GrowthAST_{it}$: Growth of assets of bank *i* in period *t*.
- $GDPGrowth_t$: GDP growth of period *t*.

- $GDPPerCapita_t$: GDP per capita of period *t*.
- $Inflation_t$: Inflation rate of period *t*.
- $DummyGulf_{it}$: Dummy variable for gulf countries, where it take the value 1 if the country is among gulf countries and the value 0 otherwise.
- $DummyIslamic_{it}$: Dummy variable for type of banks, where it take the value 1if the bank is Islamic bank and the value 0 otherwise.
- ε_t : Represents the error term while and β are the coefficients that should be estimated.

This may be viewed as the reduced form for $ROAA_{it}$ of all four hypotheses, the traditional structure conduct- performance hypothesis(SCP), the relative-market-power hypothesis(RMP), the efficiency hypothesis (ES), and the quiet life hypothesis (QLH), (Berger, 1995).

Under the efficient-structure (ES) hypothesis, the coefficient of the appropriate (EFF) variable is positive, and the coefficients of all the other key variables are either relatively small or zero. CONC and MS, although endogenous in the ES model, may be included but should be found to have no explanatory power. Their irrelevance stems from their logical ordering in the model, since they are correlated with $ROAA_{it}$ only because they reflect the effects of EFF, which are controlled for in this equation. Similarly, under the MP hypothesis, the appropriate market structure variables, CONC or MS, have positive coefficients. For instance, if only RMP holds, CONC has zero coefficient because CONC is only spuriously related to $ROAA_{it}$ through its correlation with MS. Under MP, the EFF are appropriate exogenous variables, but are just viewed as relatively unimportant (Berger, 1995).

The above equation allows three hypotheses (SCP, RMP and ES) to be valid simultaneously. To the extent that any of the key variables have positive estimated coefficients, this may be taken as evidence of the marginal contribution of the corresponding hypothesis.

As (Berger 1995 and Park and Weber 2006) condition should be imposed to test the possible endogeneity in the above equation. As following:

$$HHI_t = a_1 + \alpha_2 EFF_{it} \quad \text{.....(2)}$$

$$MS_{it} = b_1 + b_2 EFF_{it} \quad \text{.....(3)}$$

And also:

$$EFF_{it} = c_1 + c_2 HH_t + c_3 MS_{it} + \sum c_j Z_{it} \text{.....(4)}$$

Where Z_{it} includes all the control variables in the first equation. In this sense, we can conclude, if SCP hypothesis is hold, then the concentration (HHI) coefficient should have positive effect on performance in the first equation, but at the same time, the coefficient of cost efficiency should have no significant effect on concentration in the second equation. In other word, β_2 should have greater than zero, and α_2 should not be significantly different from zero.

If the RMP hypothesis holds, then the market share (MS) coefficient should have positive effect on performance in the first equation, but at the same time, the coefficient of cost efficiency should have no significant effect on market share in the third equation. In other word, β_3 should have greater than zero, and β_2 should not be significantly different from zero.

If the ES hypothesis holds, then the efficiency (EFF) coefficient should have positive effect on performance in the first equation, but at the same time, the coefficient of cost efficiency should have significant effect on concentration and market share in the second and third equation. In other word, β_4, α_2 and b_2 should be significantly greater than zero.

Finally for quit life hypothesis (QLH), it should mention that the conditions for QLH do not exclude any of other hypotheses. QLH might hold if the coefficients of the concentration and market share in equation four have negative effect on cost efficiency. In other words, c_2 and c_3 in equation four, should be negative and significantly different from zero.

7. Empirical Results

This section focuses on the empirical evidence concerning the effects of concentration (CONC), market share (MS) and the bank efficiency variable on bank performance in the MENA banking markets. Tests will be carried out using the methodology and the variables as outlined in the previous sections of this chapter , we test for the effect of each hypothesis (traditional SCP, RMP, ES) on profitability by estimating the ROAA with regressions CONC, MS and the EFF measure. As noted by Berger (1995) this will provide more definitive results because they incorporate the reduced forms for all these hypotheses, and their marginal effect simultaneously.

We build our sample data for all the MENA countries from 2005 to 2012 and regress the performance measures return on assets (ROA) on the concentration measure (CONC), the market share (MS), efficiency (ES) and other control variables. We used STATA 12 statistical software program to estimate all the regression equations.

Table 4-6 reports the results of the generalized method of moments (GMM) of the ROAA, regressions with CONC, MS, and the EFF measure and other control variables for the pooled sample of MENA countries banks between 2005 and 2012, separated by three groups: all countries, Gulf countries and non-Gulf countries.

First of all, in terms of all countries case, we might say that many variables are statistically significant related to the bank performance. As we can observe, the coefficient of the market concentration (HHI) is highly statistically significant and negatively related to the performance. In other word, higher levels of market concentration are not associated with greater bank profitability and thus the structure-conduct-performance (SCP) hypothesis may be firmly rejected. This is consistent with the findings of Berger, 1995, and Goldberg and Rai (1996). By contrast, our evidence strongly supports efficient-structure hypothesis (ES) and relative market power hypothesis (RMP), as can we notice that the coefficients of (ES) and (MS) variables are very statistically significant and positively related to bank profitability. This indicates that banks with differentiated services and products are those with higher market share, and that they are able to exercise their market power to obtain higher profits by setting higher prices. This evidence is supported by (More and Nagy, 2003, Perera et al., 2006), and (Ye et al., 2012). But at the same time, our evidence supports in the main model the efficiency structure hypothesis (ES), which indicates that firms with higher level of

efficiency can obtain greater profits than their competitors. This result is supported by Goldberg and (Rai, 1996) and (Chortareas et al., 2011).

As regards the control variables, we can see clearly a positive and significant relationship between ROAA and bank capital (Equity to assets). This evidence suggests that the best capitalized banks tend to have a high return and this result is adjusted to that obtained in the work of (Calomiris and Mason, 2003), (Kashyap, Rajan and Stein, 2008) and (Demirguc-Kunt et al., 2010).

Likewise, macroeconomics variables, there appears to be that GDP growth has such positive relationship with bank profitability. This is due to the relationship between economic growth and financial sector development. Demand for lending increases and default rates reduce during times of cyclical upswings (Dietrich and Wanzenried, 2011). Kosmidou et al. (2005) and Demirguc-Kunt and Huizinga (1999) all find positive relationship for GDP and bank performance, whilst, GDP per capita and inflation do not seem to present any significant effect on bank profitability.

Table 4-6: Dynamic panel-data estimation, two-step system GMM

ROAA	**GMM**	**GMM**	**GMM**
	All Countries	**Gulf Countries**	**Non-Gulf Countries**
ROAA L1.	0.347***	0.194*	0.533***
Herfindnl (HHI)	-4.050***	-2.183**	0.077
Market share (MS)	5.461***	1.521*	0.220*
Efficiency	2.134***	0.531	-0.204
Equity_assets_	4.818**	7.798	3.191*
lnAS	0.151	-0.117	-0.124
GrowthTotalAssets_	0.017***	0.033*	0.005
gdpgrowth	0.030*	-0.001	0.005
lnGDPpercapita	0.127	0.350	0.091
inflation	0.024	-0.058	0.052***
dummygulf	-0.677		
Islamic	0.744	-3.000	-0.538
_cons	-3.583	-0.998	0.891
Diff AR(2)	0.352	0.439	0.189
Hansen Test	0.819	0.998	0.999
NO. of Instruments	303	231	254
NO. of Groups	275	100	165
NO. of Observations	1419	503	620

Dependent variable is ROAA. ***, **, and * indicate 1%, 5% and 10% significance.

However, we cannot formally confirm that efficiency is the determinant of the profit-structure relationship, unless the efficiency variable positively correlates with market structure measures (concentration and market share). According to the structural model of the efficient-structure hypotheses presented by Berger (1995) the profit-structure relationship is conditional on the fact that the efficient-structure (ES) coefficients must be positively correlated with the market structure measures. Specifically, bank profitability is a function of its efficiency, and efficient firms gain market share and this market share may lead to market concentration. To examine this necessary condition of the ES hypotheses, (that efficiency affects market structure), we regressed the HHI and MS measures on the efficiency measure as outlined in the reduced forms for HHI and MS in second and third equations above. The results of these models are shown in table 4-7, when HHI and MS are regressed on the EFF measure and other control variables. It is clear that the efficiency is insignificantly different from zero in terms of market share (MS) in fixed effect model. These results rule out efficient structure hypothesis (ES), but these insignificant coefficients correspond to the conditions of the RMP hypothesis. Also, the positive and statistically significant market share variable suggests that there is strong evidence to support the RMP hypothesis. Bank efficiency is apparently not driving market share, but market share is an important determinant of bank profitability. Our evidence is consistent with (More and Nagy, 2003) and (Perera et al., 2006).

Now we turn to analysis more deeply for gulf countries, to test the competing hypotheses as we did before for all countries. The results have been observed in table 4-6 shows quit similar results as in all countries case. We can see the first hypothesis related to SCP is rejected, as the coefficient of HHI is significant and negatively related to profitability, which means more concentration is not associated with more profitability as SCP suggests. On the other hand, we can notice the coefficient of market share is significant and positively related to bank profitability, which makes strongly support of RMP hypothesis, that states that banks with good differentiated products can gain a big market share and therefore more profitability. This evidence is supported by (More and Nagy, 2003), (Perera et al., 2006), and (Ye el at., 2012). Maybe one of difference here between all countries case and Gulf countries is efficient structure hypothesis (ES) does not have any support in gulf countries case which is counter to all counties case.

However, to make sure that RMP hypothesis holds in Gulf countries, efficiency should have no significant impact upon market share as (Berger, 1995). As we can see in table 4-7, the insignificant coefficient of efficiency in terms of market share (MS) corresponds to the conditions of the RMP hypothesis. Also, the positive and statistically significant market share variable suggests that there is strong evidence to support the RMP hypothesis. So efficiency is apparently not driving market share, but market share is an important determinant of bank profitability. These results are the same as we reached in all countries case. So we can conclude that RMP hypothesis holds in all countries case and also in gulf countries case.

In terms of non-Gulf countries, we can see that results are similar to other two cases (all countries and Gulf countries) that is supporting RMP hypothesis, as table 4-6 shows, the coefficient of market share has a positive impact on bank profitability, as supported by (More and Nagy, 2003), and (Perera et al., 2006). At the same time, neither SCP nor ES hold in non-Gulf countries. In terms of control variables, we can see clearly a positive and significant relationship between ROAA and bank capital (Equity to assets). This evidence suggests that the best capitalized banks tend to have a high return and this result is adjusted to that obtained in the work of (Calomiris and Mason, 2003), and (Demirguc-Kunt et al., 2010).

However, table 4-7, represents the estimation of the second and third equation, we can see clearly in non-Gulf countries case that the results are consistent with the other two cases (all countries and Gulf countries) in terms of efficiency has no significant impact upon market share (MS) as Berger (1995). Which is assert RMP hypothesis especially there is a positive and statistically significant market share variable and profitability suggests that there is strong evidence to support the RMP hypothesis.

Table 4-7: Regression Results for Second and Third Equation

	All Countries		Gulf Countries		Non-Gulf Countries	
variables	**HHI (Fixed Effect)**	**(MS) Fixed Effect**	**HHI (Fixed Effect)**	**(MS) Fixed Effect**	**HHI (Fixed Effect)**	**(MS) Fixed Effect**
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
eff	-0.019***	-0.007	-0.038	-0.011	-0.011	-0.010
Equity_assets_	-0.054***	0.009	-0.342*	-0.043	0.012	0.023
lnAS	-0.015**	0.034***	-0.100**	0.838***	-0.009	0.056***
GrowthTotalAssets_	0.000	0.000**	-0.001*	0.000*	0.000*	0.000**
Gdpgrowth	0.000	0.000	-0.010***	0.004**	0.000***	0.000
lnGDPpercapita	-0.056***	0.010	0.105	-0.795***	-0.120**	0.027*
Inflation	0.000	0.001	0.017***	0.020***	0.000	0.000
_cons	0.804***	-0.306***	-2.548**	-2.096***	1.20***	-0.584***
R2_within	0.072	0.173	0.240	0.845	0.170	0.230
corr(x_i,mu_Xb)	-0.709	-0.143	-0.405	-0.046	-0.693	-0.475
sigma_u	0.113	0.081	0.360	0.646	0.136	0.099
sigma_e	0.035	0.020	0.189	0.093	0.039	0.024
F	7.450	3.500	13.45	84.92	6.70	2.97
Rho	0.912	0.940	0.783	0.979	0.923	0.942
NO. of observations	1578	1578	557	557	888	888

Dependent variables are HHI and MS. ***, **, and * indicate 1%, 5% and 10% significance.

In this part, we are going to test "quiet life "hypothesis. First of all, we can observe according to table 4-8 that the coefficients of HHI index and market share (MS) are negative in all cases (all countries, Gulf countries and non-Gulf countries), and this is in line with "quit life "hypothesis expectations. Nevertheless, we can notice that HHI index is very significant especially in all countries case, whilst, market share (MS) coefficient is not significant in all cases. The negative relationship between HHI and efficiency related to competition-efficiency hypothesis that states a positive impact of concentration on efficiency (Zarutskie, 2013), and (Dick and Lehnert, 2010). We have reached to this result in the previous chapter when we were analyzing the determinants of efficiency. So we can conclude there is some support for "quiet life "hypothesis specifically in all countries case that suggests a lack of a relationship between market structure and bank performance. This result is consistent with (Ye et al., 2012).

Table 4-8: Estimation of "quiet life "hypothesis

Eff	**Fixed Effect**	**Fixed Effect**	**Fixed Effect**
	All Countries	**Gulf Countries**	**Non-Gulf Countries**
Herfindnl (HHI)	-0.455***	-0.398	-0.159
Market share (MS)	-0.456	-1.683	-0.404
Equity_assets_	0.649***	0.271	1.292***
lnAS	-0.070	-0.099	0.015
GrowthTotalAssets_	0.000	0.000	0.000
Gdpgrowth	-0.001	0.004	-0.002
lnGDPpercapita	-0.046	-0.168	-0.206*
Inflation	-0.002	-0.010***	-0.003
_cons	1.783**	3.496***	2.403**
R2_within	0.091	0.112	0.175
corr(x_i,mu_Xb)	-0.825	-0.897	-0.822
sigma_u	0.258	0.368	0.236
sigma_e	0.171	0.179	0.157
F	3.77	3.06	8.09
Rho	0.693	0.809	0.692
NO. of observations	1578	690	888

Dependent variable is Eff. ***, **, and * indicate 1%, 5% and 10% significance.

In terms of determinants of bank profitability, as we can see in Table 4-9, in all countries case, all coefficients are significant, whereas, H1, H2, and H3, related to HHI index Market share (MS) and efficiency, respectively. At the same time, Gulf countries case seem very similar to all countries case in terms of significance level and the direction of coefficients except H3, that is related to efficiency, which seems has no significance in Gulf countries case. In the contrast, Non-Gulf countries case seems quite different from last two cases. We can see clearly that H1, which is related to HHI index, has a positive sign and not significant, which is the opposite of the other two cases. Another difference related to H3 that is related efficiency, that seems has a negative impact on bank profitability and at the same time, it is not significant, this is also the opposite of other two cases.

Now we turn to the impact of bank efficiency on market concentration and market share, we can observe that H4, that is related to the effect of efficiency on market concentration. Efficiency has a negative impact on HHI in all cases, with significance impact in all countries case. The same scenario happened with H5, which is related to the effect of efficiency on market share (MS), but no one of these cases has a significance impact.

Table 4-9: Summary results of Testing Hypothesis

Hypothesis		All Countries	Gulf Countries	Non-Gulf Countries
H1	Sign	-	-	+
	Significant	Yes	Yes	NO
H2	Sign	+	+	+
	Significant	Yes	Yes	Yes
H3	Sign	+	+	-
	Significant	Yes	NO	NO
H4	Sign	-	-	-
	Significant	Yes	No	No
H5	Sign	-	-	-
	Significant	NO	NO	NO

USC
UNIVERSIDADE
DE SANTIAGO
DE COMPOSTELA

Chapter 5

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH OPPORTUNITIES

In response to globalization and deregulation, decision makers in MENA countries over the past decade have implemented various measures to enhance the credibility of the banking sector and improve its performance and efficiency. These measures included liberalizing interest rates, according new licenses to foreign banks, implementing progressive legal and regulatory reforms and reducing the direct government control.

Therefore, this research study seeks to investigate the effect of market structure and efficiency on bank performance, and financial stability over the period 2005-2012. To do so, this thesis explores three important topics which contribute to the study of bank efficiency, competition, profitability and financial stability. The following conclusions have been obtained after our three empirical works:

Relating the impact of competition on risk taking of banks from MENA countries.

To address this question we set three definite research objectives. First, to measure the influence of self-defined risk determining factors on bank's insolvency risk – Z score; second, to assess bank competition using Herfindhal index and H-statistic. Besides this, we use bank specific variables and country specific variables that might affect financial stability. Third, we draw inference as to the nature of the factors of banks competition and other factors on risk-taking.

A main objective of our work concerned the identification of the determinants of risk-taking in MENA countries. Specifically, it is intended to analyze how bank competition affects risk-taking. We intend to find out whether the level of bank competition can affect the risk-taking behavior of banks. Also, we try to analyze the effect of the size of banks, capital ratio, growth of loans, and growth of assets on risk-taking, in addition to checking the effect of macroeconomic factors. Specifically, we analyze the relationship between the risk-taking and of economic growth, GDP per capita and inflation. Furthermore, we investigate whether Gulf countries have higher level of competition compared with others or not.

In accomplishing our research objectives above, we have utilized data taken from the BankScope International Bank Database provided by Fitch/Bureau Van Dijk which contains

information regarding commercial banks from 2005-2012. We apply system GMM as an estimation method.

Our results show significant remarks. First of all, in terms of the whole sample, we find that Panzar-Rosse H statistic over the examined period is 0.42, which indicates that the MENA banking is in a state of monopolistic competition. Meanwhile, Herfindahl index is 0.13, that means moderately concentrated, which means that both indices point in the same direction. Second, in terms of Gulf countries, the results show that Gulf countries have higher level of competition than Non-Gulf countries, in terms of (H-statistic).

The relation between bank competition measures and financial stability, in terms of H-statistic, supports "competition fragility hypothesis" for the main model, dominated by Gulf Countries. Nevertheless, we have found that that concentration is positively correlated to competition, but is not always a measure of competition because we have found markets where the correlation can be positive or negative. This means that competition can be in concentrated or not concentrated markets. This result, in the case of positive correlation, could be explained by "Contestability" literature, where more competition could be associated with more concentration, which is supported by Bikker and Haff (2002). This relationship is symmetric in the case of Gulf countries for the average, but in the Non-Gulf is not significant.

However, when we analyze the result for the Non-Gulf countries sample we find the opposite relationship, supporting "competition stability hypothesis". At the same time, the effect is explained by H-statistic but not by Herfindahl. This could mean that the effect of the level of competition on banking stability may vary depending on the level of competition. Since in Non-Gulf countries the level of competition is less than in Gulf ones, an increase in competition could be positive in terms of financial stability. Increased competition could encourage more efficient and profitable behavior of banks. However, in the case of the Gulf countries, otherwise occur as a result of operating in a more competitive environment. This would mean that moderate levels of competition seem to be good for financial stability.

In term of bank specific variables, our results indicate that capitalization (equity/assets), has negative relationship between capitalization and financial stability in case all countries, this is supported by (Blum, 1999) and (Hellman et al., 2000).

Regarding macroeconomics variables, our results indicate that GDP growth have positive effect on financial stability in terms of all cases (main model, Gulf countries, non-Gulf countries), which is consistent with (Borio and Lowe, 2002, Festic et al., 2011), while inflation rate has negative effect on financial stability in terms of (Enough OBS, Gulf countries), which is compatible with (Baboueek and Jancar, 2005), (Uhde and Heimeshoff, 2009).

Our results have the following policy implications:

First of all, the potentially important policy implication is those policies supporting financial competition banking industry, especially in non-Gulf countries, in particular, Tunisia, Algeria and Jordan, because in these countries competition measure correlated negatively with the concentration measure, which in turn enhance financial stability. This can by lower barriers to bank entry, fewer restrictions on bank activities, greater economic freedoms and higher quality of regulations.

While competition in all countries case and Gulf countries can lead to financial fragility in a weak institutional framework, it is important to focus on improving this framework, rather than limiting competition. There are certainly ways to minimize potential trade-offs between competition and stability, such as putting in place appropriate risk management tools as well as setting up strong supervisory and regulatory frameworks.

Overall, to improve competition without undermining financial stability, policymakers ought to focus on fostering the appropriate incentive framework. These incentives will be shaped by the design of entry and exit policies and prudential regulations and supervision. In the face of a crisis, the manner in which prompt corrective action and bank resolution and restructuring arrangements are applied can help minimize potential moral hazard problems and avoid excessive risk-taking as well as minimize fiscal costs to the taxpayers. The regulatory framework also needs to strike the right balance between curbing excesses while avoiding potential anti-competitive effects. For example, better disclosure, prudent (but not excessive) capital requirements for entry as well as operation, and greater transparency in pricing are the types of actions that would improve supervision without impairing competition. In contrast, increases in regulatory costs that raise entry barriers into the financial sector make markets less contestable, depriving countries of many of the benefits of an efficient and innovative banking system.

On the other side, the monetary authorities should adopt regulations to promote GDP growth and fight inflation, because this will lead to financial stability.

Relating the determinants of bank efficiency

In this context, this study investigates the cost efficiency of the MENA banking industry for the period 2005–2012, using a stochastic frontier model with country specific variables. We use Bankscope information to form a balanced panel and estimated cost efficiency scores for a sample of 201 commercial banks. We also compare the efficiency levels of banks between country and type of bank (conventional versus Islamic banks). Finally, we use the model of Greene (2005) to estimate the determinants of efficiency.

Using a translog function with three input prices, two outputs and three country-level variables, taking all MENA banks together, the results of the analysis show that cost efficiency score is 77%. It is also interesting to note that there is a rise in the cost efficiency scores of banks in MENA region from 2005 to 2012, but the improvement in efficiency was not continuous over the sample period.

Concerning the comparative cost efficiency scores of banks in different MENA countries, the empirical findings indicate that there is a notable wide range of variation in efficiency levels. The variation in terms of cost efficiency is (19%) between countries. Geographically, Israel (86%) is the most cost efficient while Kuwaiti banks (67%) are the least cost efficient. The results also show that banks in Jordan (82%), Tunisia (82%) and Oman (80%) on average have higher scores compared with other counties. In view of these results, it appears that there is still room for improving the efficiency of banks in this region. These countries, especially Kuwait and Morocco, need to continue the reform process in order to improve cost conditions and to enhance financial sector performance.

Among other interesting results of this study, we find that conventional commercial banks in MENA countries, on average, are most cost efficient than Islamic banks in non-Gulf countries. The lower cost efficiency of Islamic banks could be explained by several reasons. First, due to smaller size assets of Islamic banks compared to conventional banks, these banks do not benefit of economies of scale and in consequence are not yet ready to compete with their conventional counterpart. Second, many studies (Archer and Abdel-Karim, 2002; Kamaruddin et al., 2008) conclude that cost of funds and labor in Islamic banks is higher

when compared with those in conventional banks. This finding can be explained by the structure of Islamic banks which tends to be more complex and by the higher remuneration package offered to retain expertise in Islamic banking. Finally, according to Kabir Hassan (2005), Islamic banks are relatively less efficient in containing cost because they operate in overall regulatory environment which are not very supportive of their operations.

Having estimated the cost efficiency levels of the different banking systems in MENA countries, it should be interesting to identify the possible sources of the difference in inefficiency between banks. The results indicate that bank size measured by total assets has a positive effect on cost efficiency. This suggests that consolidation of smaller banks in the region would contribute to greater cost efficiency in banking, and also financial stability, but at the same time, this action should be by controlling concentration.

In addition, the study findings also show that banks with higher level of equity and return on average assets (ROAA) tend to be more efficient. The results which are consistent with several studies (Pasiouras, 2008; Perera et al., 2007) mean that well-capitalized and highly profitable banks are less costly. Turning to the country level variables like, inflation and GDP per capita, the regression analysis indicates that this variable is inversely related to cost efficiency. This implies that banks with lower inflation and GDP per capita exhibit higher level of efficiency, this result is consistent with Maudos et al. (2002), who argue that countries with high per capita income is associated with big demand for financial products, which leading to less control of their expenses. Meanwhile, inflation rate causes an increase in costs, interest rates and bad debt; this will reduce banks efficiency. In addition, Kasman and Yildirim (2006) highlighted that inflation increases cost and reduces profits as banks tend to compete through expanding branch networks.

Our results have the following policy implications:

Banking policies should promote towards increasing the profitability, because as we see more bank profits is associated with more efficiency. Furthermore, monetary authorities and policy makers should adopt policies that might increase the size of banks controlling by concentration, because according to our analysis, this is associated with more efficiency and stability.

Also monetary authorities should adopt policies that lower the level of concentration, especially in non-Gulf countries, because this will increase the cost of efficiency.

Additionally, banks in MENA countries should innovate in products and modes of finance by introducing new innovative technology. Also MENA banks have to better control their costs, to enhance their policies concerning the managing and supervising of various banking risks, and to improve asset quality control, because this will lead to more efficient banks.

Finally, as suggested by many studies (Archer and Abdel-Karim, 2002; Kabir Hassan, 2005), Islamic banking in non-Gulf countries has to undertake several actions to improve their efficiency and compete with conventional counterparts. Indeed, Islamic banks should try to expand activities in line with those of contemporary financial markets and develop innovative products and modes of finance which conform with shari'ah law (Islamic rules). It is also necessary for Islamic banks to increase their size through merger among Islamic financial institutions in order to achieve unrealized economies of scale. Further, to decrease their costs, Islamic banks should make their services open to a wider clientele (i.e., not necessarily Muslims) and improve their banking system through the use of new technology.

Relating the relationship between market structure, efficiency and performance

In this study, four competing hypotheses are examined in terms of bank profitability in MENA countries from 2005-2012, which are: 1) Structure Conduct Performance (SCP), Relative Market Power (RMP), Efficiency Structure (ES) and Quit Life hypothesis (QLH). We have dividing our analysis into three parts, which are: all countries case, Gulf countries case and Non-Gulf countries case. Following Berger (1995) we distinguish among the four hypotheses the two market power (MP) hypotheses (traditional SCP, and RMP) and the efficient structure hypothesis (ES) by incorporating into our performance models direct measures of efficiency. This provides more definitive results because the model specification can incorporate the reduced forms for all four hypotheses, and tests of the four hypotheses were performed by regressing measures of concentration, market share, and efficiency against profitability measure (ROA).

The empirical findings suggest that market power and efficiency are two main drivers of bank performance. At the same time, neither structure-conduct-performance (SCP) nor the efficient structure (ES) hypotheses hold in MENA countries in all cases analyzed. In this sense, although efficiency is significant explaining performance, is not responsible of market

concentration as (ES) hypothesis proposes. By the other hand, the relationship between market structure and bank profitability is negative and contrary to the SCP hypothesis. This result is consistent with our findings, that banks in more concentrated markets are less efficient, supporting Quiet life hypothesis (QLH) for MENA countries. This is also supportive of the negative effect of concentration on financial stability. The strongest support is for the relative market power (RMP) hypothesis in all cases analyzed (All countries, Gulf countries and Non-Gulf countries) that suggests that firms with higher market share are able to exercise their market power to obtain higher profits by setting higher margins. This conclusion is consistent with findings by (More and Nagy, 2003), (Mora et al., 2005) and (Perera et al., 2006).

The X-efficiency and market share have positive effects on performance, allowing entities to provide a competitive but profitable service. However, we have observed that there are still highly concentrated markets where banks are obtaining profitability but at the expense of a high level of inefficiency, adversely affecting the competitiveness of the banking system. This situation may be related to countries with highly protected financial systems with legal entry barriers or where political instability reduces the entry of competitors. In this sense, it seems appropriate to make policies that reduce this degree of concentration, favoring the entry of new traditional and digital operators and improve the level of efficiency through technological improvement. Moreover, while mergers and acquisitions can be a strategy to increase market share, efficiency and profitability of the banking sector, does not seem the most suitable for those more concentrated markets and between the biggest banks, as these operations entail increase concentration and perpetuate inefficiency and risk taking. Finally, policy makers should be aware of practices which tend to fix prices of credits-related products and which eventually harm consumers' wellbeing.

Difficulties and limitations in the development of this study and future research possibilities:

In the development of this research we have encountered some difficulties, which could partially explain the limited relevance of some variables in the estimated models, which relate mainly to the unavailability of information. Although we made a major effort to obtain a large sample of operant in the MENA countries surveyed entities, our results were limited by the availability of some necessary data in annual company reports and data base Bankscope.

In particular, this issue was especially critical in the definition of bank competition, as we would have liked to have more comprehensive information on the all measures of bank competition. Therefore, in future research, we propose improving the information available, which would provide more precise information on the evolution of competition required evidence.

In particular, the future route of research could study the impact of bank competition on risk taking in MENA countries, by using different measures of bank completion. Another line could be also interesting, by evaluating efficiency of MENA bank using Data Envelopment Analysis (DEA), and compare their results with Stochastic Frontier Analysis (SFA). Moreover, the effect of corporate governance on bank efficiency and stability could be another interesting topic.

Finally, it would be interesting to compare the findings of this thesis with future research which analyze banks from other emerging markets such as Latin American countries, and South Asian countries.

References

Ahmad, F., & Bashir, T. (2013). Explanatory Power of Macroeconomic Variables as Determinants of Non-Performing Loans: Evidence form Pakistan. World Applied Sciences Journal, 22(2), 243-255.

Ahmad, T. (2000). The Efficiency of The Banking System in Jordan (Doctoral dissertation, PhD Thesis, Colorado State University, Fort Collins, Colorado, US).

Aigner, D., Lovell, C. K., & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. journal of Econometrics, 6(1), 21-37.

Allen, F., & Gale, D. (2004). Competition and financial stability. Journal of Money, Credit and Banking, 453-480.

Allen, J., & Engert, W. (2007). Efficiency and competition in Canadian banking. Bank of Canada Review, 2007(Summer), 33-45.

Allen, L., & Rai, A. (1996). Operational efficiency in banking: An international comparison. Journal of Banking & Finance, 20(4), 655-672.

Al-Muharrami, S., & Matthews, K. (2009). Market power versus efficient-structure in Arab GCC banking. Applied Financial Economics, 19(18), 1487-1496.

Al-Tamimi, H., & Hussein, A. (2008). The use of data envelopment analysis in banking institutions: evidence from the UAE commercial banks. Available at SSRN 499184.

Altunbaş, Y., Gardener, E. P., Molyneux, P., & Moore, B. (2001). Efficiency in European banking. European Economic Review, 45(10), 1931-1955.

Altunbas, Y., Manganelli, S., & Marques-Ibanez, D. (2011). Bank Risk During Financial Crisis. Do Business Model Matter? Working Paper Series N 1394.

Andersen, P., & Petersen, N. C. (1993). A procedure for ranking efficient units in data envelopment analysis. Management science, 39(10), 1261-1264.

Archer, S., & Karim, R. A. A. (2002). Islamic finance: innovation and growth. Euromoney books and AAOIFI.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. The review of economic studies, 58(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. Journal of econometrics, 68(1), 29-51.

Ariff, M., & Luc, C. (2008). Cost and profit efficiency of Chinese banks: A non-parametric analysis. China Economic Review, 19(2), 260-273.

Ariss, R. T. (2010). On the implications of market power in banking: Evidence from developing countries. Journal of Banking & Finance, 34(4), 765-775.

Ataullah, A., & Le, H. (2006). Economic reforms and bank efficiency in developing countries: the case of the Indian banking industry. Applied Financial Economics, 16(9), 653-663.

Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. Journal of international financial Markets, Institutions and Money, 18(2), 121-136.

Athanasoglou, P. P., Delis, M. D., & Staikouras, C. K. (2006). Determinants of bank profitability in the South Eastern European region. Bank of Greece.

Azhar Rosly, S., & Afandi Abu Bakar, M. (2003). Performance of Islamic and mainstream banks in Malaysia. International Journal of Social Economics, 30(12), 1249-1265.

Babouèek, I. and M. Janèar, (2005). Effects of Macroeconomic Shock to the Quality of the Aggregate Loan Portfolio. Czech National Bank, Working Paper Series, No., 1: 1-62.

Baele, L., De Jonghe, O., & Vander Vennet, R. (2007). Does the stock market value bank diversification?. Journal of Banking & Finance, 31(7), 1999-2023.

Bain, J. S. (1951). Relation of profit rate to industry concentration: American manufacturing, 1936-1940. The Quarterly Journal of Economics, 293-324.

Bain, J. S. (1956). Barriers to new competition, their character and consequences in manufacturing industries (No. HB771 B23).

Barros, C. P., & Garcia-del-Barrio, P. (2011). Productivity drivers and market dynamics in the Spanish first division football league. Journal of Productivity Analysis, 35(1), 5-13.

Basel Committee. (2010). Group of Governors and Heads of supervision announces higher global minimum capital standards.

Bashir, A. H. M. (2003). Determinants of profitability in Islamic banks: Some evidence from the Middle East. Islamic economic studies, 11(1), 31-57.

Battese, G. E., & Coelli, T. J. (1988). Prediction of firm-level technical efficiencies with a generalized frontier production function and panel data. Journal of econometrics, 38(3), 387-399.

Battese, G. E., & Coelli, T. J. (1992). Frontier production functions, technical efficiency and panel data: with application to paddy farmers in India (pp. 149-165). Springer Netherlands.

Battese, G. E., & Coelli, T. J. (1995). A model for technical inefficiency effects in a stochastic frontier production function for panel data. Empirical economics, 20(2), 325-332.

Bdour, J. I., & Al-khoury, A. F. (2008). Predicting change in bank efficiency in Jordan: a data envelopment analysis. Journal of accounting & organizational change, 4(2), 162-181.

Beck, T. (2008). Bank competition and financial stability: friends or foes?. World Bank Policy Research Working Paper Series, Vol.

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2006). Bank concentration, competition, and crises: First results. Journal of Banking & Finance, 30(5), 1581-1603.

Belotti, F., & Ilardi, G. (2014). Consistent inference in fixed-effects stochastic frontier models. Working paper (November 7 R&R Version).

Beltratti, A., & Stulz, R. M. (2012). The credit crisis around the globe: Why did some banks perform better?. Journal of Financial Economics, 105(1), 1-17.

Berger, A. N., & Bouwman, C. H. (2009). Bank capital, survival, and performance around financial crises. Documento de trabajo, Wharton Financial Institutions Center. Disponible en: http://fic. wharton. upenn. edu/fic/papers/09/0924. pdf.

Berger, A. N. (1993). "Distribution-free" estimates of efficiency in the US banking industry and tests of the standard distributional assumptions. Journal of Productivity Analysis, 4(3), 261-292.

Berger, A. N. (1995). The profit-structure relationship in banking--tests of market-power and efficient-structure hypotheses. Journal of Money, Credit and Banking, 404-431.

Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises?. Journal of Financial Economics, 109(1), 146-176.

Berger, A. N., & Di Patti, E. B. (2006). Capital structure and firm performance: A new approach to testing agency theory and an application to the banking industry. Journal of Banking & Finance, 30(4), 1065-1102.

Berger, A. N., & Hannan, T. H. (1998). The efficiency cost of market power in the banking industry: A test of the "quiet life" and related hypotheses. Review of Economics and Statistics, 80(3), 454-465.

Berger, A. N., & Humphrey, D. B. (1991). The dominance of inefficiencies over scale and product mix economies in banking. Journal of Monetary Economics, 28(1), 117-148.

Berger, A. N., & Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. European journal of operational research, 98(2), 175-212.

Berger, A. N., & Mester, L. J. (1997). Inside the black box: What explains differences in the efficiencies of financial institutions?. Journal of Banking & Finance, 21(7), 895-947.

Bhatti, G. A., & Hussain, H. (2010). Evidence on structure conduct performance hypothesis in Pakistani commercial banks. International Journal of Business and Management, 5(9), 174.

Bikker, J. A., & Haaf, K. (2002). Competition, concentration and their relationship: An empirical analysis of the banking industry. Journal of Banking & Finance, 26(11), 2191-2214.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. Journal of econometrics, 87(1), 115-143.

Bonin, J. P., Hasan, I., & Wachtel, P. (2005). Bank performance, efficiency and ownership in transition countries. Journal of Banking & Finance, 29(1), 31-53.

Boone, J. (2000). Competition. Discussion papers, Center.

Boot, A., & Schmeits, A. (2006). The competitive challenge in banking. Advances in Corporate Finance and Asset Pricing, 133-160.

Borio, C. E., & Lowe, P. W. (2002). Asset prices, financial and monetary stability: exploring the nexus.

Bos, J. W., & Schmiedel, H. (2007). Is there a single frontier in a single European banking market?. Journal of Banking & Finance, 31(7), 2081-2102.

Boyd, J. H., & De Nicolo, G. (2005). The theory of bank risk taking and competition revisited. The Journal of Finance, 60(3), 1329-1343.

Boyd, J. H., Nicolo, G., & Jalal, A. M. (2006). Bank Risk-Taking and Competition Revisited: New Theory and New Evidence. IMF Working Paper WP/06/97.

Boyd, J. H., & Runkle, D. E. (1993). Size and performance of banking firms: Testing the predictions of theory. Journal of monetary economics, 31(1), 47-67.

Brealey, R., Leland, H. E., & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. The journal of Finance, 32(2), 371-387.

Bretschger, L., Kappel, V., & Werner, T. (2012). Market concentration and the likelihood of financial crises. Journal of Banking & Finance, 36(12), 3336-3345.

Brozen, Y., & Bittlingmayer, G. (1982). Concentration, mergers, and public policy. Free Press.

Calormiris, C. W., & Wilson, B. (1998). Bank Capital and portfolio management: The 1930's capital crunch and scramble to shed risk (No. w6649). National Bureau of Economic Research.

Calomiris, C. W., & Mason, J. R. (2003). Consequences of bank distress during the Great Depression. The American Economic Review, 93(3), 937-947.

Calormiris, C. W., & Wilson, B. (1998). Bank Capital and portfolio management: The 1930's capital crunch and scramble to shed risk (No. w6649). National Bureau of Economic Research.

Casu, B., & Girardone, C. (2004). Financial conglomeration: efficiency, productivity and strategic drive. Applied Financial Economics, 14(10), 687-696.

Casu, B., & Girardone, C. (2009). Competition issues in European banking. Journal of Financial Regulation and Compliance, 17(2), 119-133.

Casu, B., & Molyneux, P. (2003). A comparative study of efficiency in European banking. Applied Economics, 35(17), 1865-1876.

Caves, D. W., Christensen, L. R., & Diewert, W. E. (1982). The economic theory of index numbers and the measurement of input, output, and productivity. Econometrica: Journal of the Econometric Society, 1393-1414.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. European journal of operational research, 2(6), 429-444.

Charnes, A., Cooper, W. W., Golany, B., Seiford, L., & Stutz, J. (1985). Foundations of data envelopment analysis for Pareto-Koopmans efficient empirical production functions. Journal of econometrics, 30(1), 91-107.

Charnes, A., Cooper, W. W., Huang, Z. M., & Sun, D. B. (1990). Polyhedral cone-ratio DEA models with an illustrative application to large commercial banks. Journal of econometrics, 46(1), 73-91.

Charnes, A., Cooper, W. W., Seiford, L., & Stutz, J. (1982). A multiplicative model for efficiency analysis. Socio-Economic Planning Sciences, 16(5), 223-224.

Chen, G., K.A. Kim, J.R. Nofsinger and O.M. Rui (2007), Trading performance, disposition effect, overconfidence, representativeness bias, and experience of emerging market investors, Journal of Behavioral Decision Making 20(4), 425-451.

Cherchye, L., Kuosmanen, T., & Post, T. (2000). What is the economic meaning of FDH? A reply to Thrall. Journal of Productivity Analysis, 13(3), 263-267.

Chortareas, G. E., Garza-Garcia, J. G., & Girardone, C. (2011). Banking sector performance in Latin America: Market power versus efficiency. Review of Development Economics, 15(2), 307-325.

Christopoulos, D. K., Lolos, S. E., & Tsionas, E. G. (2002). Efficiency of the Greek banking system in view of the EMU: a heteroscedastic stochastic frontier approach. Journal of Policy Modeling, 24(9), 813-829.

Christos S., Emmanuel M. and Anastasia K-F., (2008), "Cost efficiency of the banking industry in the South Eastern European region" Journal of International Financial Markets, Institutions and Money. Volume 18, Issue 5, pp 483-497.

Chu, S. F., & Lim, G. H. (1998). Share performance and profit efficiency of banks in an oligopolistic market: evidence from Singapore. Journal of Multinational Financial Management, 8(2), 155-168.

Cihák, M. M., Wolfe, S., & Schaeck, K. (2006). Are more competitive banking systems more stable? (No. 6-143). International Monetary Fund.

Claessens, S., & Laeven, L. (2004). What drives bank competition? Some international evidence. Journal of Money, Credit and Banking, 563-583.

Claessens, S., & Laeven, L. (2005). Financial dependence, banking sector competition, and economic growth. Journal of the European Economic Association, 3(1), 179-207.

Coccorese, P., & Pellecchia, A. (2010). Testing the 'quiet life'hypothesis in the Italian banking industry. Economic Notes, 39(3), 173-202.

Coelli, T.J. (1995). "Estimators and Hypothesis Tests for a Stochastic Frontier Function: A Monte Carlo Analysis", Journal of Productivity Analysis, vol. 6, no. 3, pp. 247-268.

Cordella, T., & Yeyati, E. L. (2002). Financial opening, deposit insurance, and risk in a model of banking competition. European Economic Review, 46(3), 471-485.

Cornwell, C., Schmidt, P., & Sickles, R. C. (1990). Production frontiers with cross-sectional and time-series variation in efficiency levels. Journal of econometrics, 46(1), 185-200.

Coval, J. & Thakor, A., (2005). Financial Intermediation as a Beliefs-Bridge between Optimists and Pessimists. Journal of Financial Economics, 75: 535–69.

Darrat, A. F., Topuz, C., & Yousef, T. (2002, January). Assessing cost and technical efficiency of banks in Kuwait. In Unpublished paper. The ERF 8th Annual Conference, January, Cairo.

Demirgüç-Kunt, A., & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence. The World Bank Economic Review, 13(2), 379-408.

Demirgüç-Kunt, A., & Huizinga, H. (2010). Bank activity and funding strategies: The impact on risk and returns. Journal of Financial Economics, 98(3), 626-650.

Demirgüç-Kunt, A., Detragiache, E., & Merrouche, O. (2010). Bank capital: lessons from the financial crisis. IMF Working Papers, 1-35.

Demsetz, H. (1973). Industry structure, market rivalry, and public policy. The Journal of Law & Economics, 16(1), 1-9.

Deprins, A., L. Simar and H. Tulkens (1984), Measuring labor efficiency in post offices, In M. Marchand, P. Pestieau and H. Tulkens (eds.), The performance of public enterprises: concepts and measurement, Elsevier, Amsterdam, chapter 10, 243-268.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring. The Review of Economic Studies, 51(3), 393-414.

Diamond, D. W., & Rajan, R. G. (2001). Banks and liquidity. The American Economic Review, 91(2), 422-425.

Diamond, D. W., & Rajan, R. G. (2001, June). Banks, short-term debt and financial crises: theory, policy implications and applications. In Carnegie-Rochester Conference Series on Public Policy (Vol. 54, No. 1, pp. 37-71). North-Holland.

Dick, A. A., & Lehnert, A. (2010). Personal bankruptcy and credit market competition. The Journal of Finance, 65(2), 655-686.

Dick, A. A. (2006). Nationwide Branching and Its Impact on Market Structure, Quality, and Bank Performance*. The Journal of Business, 79(2), 567-592.

Dietrich, A., & Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. Journal of International Financial Markets, Institutions and Money, 21(3), 307-327.

Dietsch, M., & Lozano-Vivas, A. (2000). How the environment determines banking efficiency: A comparison between French and Spanish industries. Journal of Banking & Finance, 24(6), 985-1004.

Dong, Y. (2010). Cost efficiency in the Chinese banking sector: a comparison of parametric and non-parametric methodologies (Doctoral dissertation, © Yizhe Dong).

Drake, L. and M.J.B. Hall, (2003). Efficiency in japanese banking: An empirical analysis. Journal of Banking and Finance, 27: 891–917.

Dridi, J., & Hasan, M. (2010). Have Islamic banks been impacted differently than conventional banks during the recent global crisis. International Monetary Fund. Working Paper, 10, 201.

Emvalomatis, G. (2012). Adjustment and unobserved heterogeneity in dynamic stochastic frontier models. Journal of Productivity Analysis, 37(1), 7-16.

Evanoff, D. D., & Ors, E. (2002). Local market consolidation and bank productive efficiency.

Farrell, M. J. (1957). The measurement of productive efficiency. Journal of the Royal Statistical Society. Series A (General), 253-290.

Farsi, M., Filippini, M., & Greene, W. (2006). APPLICATION OF PANEL DATA MODELS IN BENCHMARKING ANALYSIS OF THE ELECTRICITY DISTRIBUTION SECTOR*. Annals of Public and cooperative Economics, 77(3), 271-290.

Feng, G. and A. Serlitis, (2010). Efficiency, technical change and returns to scale in large u.S. Banks: Panel data evidence from an output distance function satisfying theoretical regularity'. Journal of Banking and Finance, 34: 127-138.

Festić, M., Kavkler, A., & Repina, S. (2011). The macroeconomic sources of systemic risk in the banking sectors of five new EU member states. Journal of Banking & Finance, 35(2), 310-322.

Fiordelisi, F. (2004). The Profit-Structure Relationship Accounting for Technical and Allocative Efficiency: An application to the Italian Factoring Industry. Bangor Business School Staff Publication and Working Papers.

Fries, S., & Taci, A. (2005). Cost efficiency of banks in transition: Evidence from 289 banks in 15 post-communist countries. Journal of Banking & Finance, 29(1), 55-81.

Fu, X. M., Lin, Y. R., & Molyneux, P. (2014). Bank competition and financial stability in Asia Pacific. Journal of Banking & Finance, 38, 64-77.

Furlong, F. & Keeley, M., (1989). Bank capital regulation and risk taking: A note. Journal of Banking and Finance, Volume 13, Issue 6, December 1989, Pages 883–891.

Gambacorta, L., & Mistrulli, P. E. (2004). Does bank capital affect lending behavior?. Journal of Financial intermediation, 13(4), 436-457.

Garcia Marco, T., & Roblez Fernandez, D. (2008). Risk Taking Behaviour and Ownership in the Banking Industry: The Spanish Evidence. Journal of Economics and Business , 332-354.

Gilbert, R. A., & Wilson, P. W. (1998). Effects of deregulation on the productivity of Korean banks. Journal of Economics and Business, 50(2), 133-155.

Girardone, C., Molyneux, P., & Gardener, E. P. (2004). Analysing the determinants of bank efficiency: the case of Italian banks. Applied Economics, 36(3), 215-227.

Goddard, J. A., Molyneux, P., & Wilson, J. O. (2001). European banking: efficiency, technology and growth. Wiley.

Goldberg, L. G., & Rai, A. (1996). The structure-performance relationship for European banking. Journal of Banking & Finance, 20(4), 745-771.

Golin, J., & Delhaise, P. (2013). The bank credit analysis handbook: a guide for analysts, bankers and investors. John Wiley & Sons.

Greene, W. (2005). Fixed and random effects in stochastic frontier models. Journal of productivity analysis, 23(1), 7-32.

Greene, W. (2005). Reconsidering heterogeneity in panel data estimators of the stochastic frontier model. Journal of Econometrics, 126(2), 269-303.

Grigorian, D. A., & Manole, V. (2006). Determinants of commercial bank performance in transition: an application of data envelopment analysis. Comparative Economic Studies, 48(3), 497-522.

Guillén, J., Rengifo, E. W., & Ozsoz, E. (2014). Relative power and efficiency as a main determinant of banks' profitability in Latin America. Borsa Istanbul Review, 14(2), 119-125.

Hart, O., & Zingales, L. (2011). A new capital regulation for large financial institutions. American Law and Economics Review, ahr001.

Hellmann, T. F., Murdock K., Stiglitz J. (2000), "Liberalization, Moral Hazard in Banking and Prudential Regulation: Are Capital Requirements Enough?", American Economic Review, 90, 147-165.

Hicks, J. R. (1935). Annual survey of economic theory: the theory of monopoly. Econometrica: Journal of the Econometric Society, 1-20.

Hughes, J.P., L.J. Mester and C.G. Moon, (2001). Are scale economies in banking elusive or illusive? Evidence obtained by incorporating capital structure and risk- taking into models of bank production. Journal of Banking and Finance, 25: 2169-2208.

Isik, I., & Hassan, M. K. (2002). Technical, scale and allocative efficiencies of Turkish banking industry. Journal of Banking & Finance, 26(4), 719-766.

Isik, I., & Hassan, M. K. (2003). Efficiency, ownership and market structure, corporate control and governance in the Turkish banking industry. Journal of business finance & accounting, 30(9-10), 1363-1421.

Jeon, Y., & Miller, S. M. (2005). Bank performance: Market power or efficient structure?.

Jimenez, G. & Lopez, J.A., (2007). How Does Competition Impact Bank Risk-Taking? Federal Reserve Bank of San Francisco Working Paper, No. 2007-23.

Kabir Hassan M (2005) The cost, profit and X-efficiency of Islamic banks, working paper. In: Proceeding of the Economic Research Forum 12th annual conference. Cairo, Egypt.

Kamaruddin, B. H., Safab, M. S., & Mohd, R. (2008). Assessing production efficiency of Islamic banks and conventional bank Islamic windows in Malaysia. International Journal of Business and Management, 1(1), 31.

Karim, M. Z. A. (2001). Comparative bank efficiency across select ASEAN countries. ASEAN Economic Bulletin, 289-304.

Kashyap, A. K., Rajan, R., & Stein, J. C. (2008). Rethinking capital regulation. publisher not identified.

Kasman, A and Yildirim, C. (2006) Cost and profit efficiencies in transition banking: the case of new EU Members. Applied Economics, 38, pp. 1079-1090.

Keeley, M. C., & Furlong, F. T. (1990). A reexamination of mean-variance analysis of bank capital regulation. Journal of Banking & Finance, 14(1), 69-84.

Keeley, M. C. (1990). Deposit insurance, risk, and market power in banking. The American Economic Review, 1183-1200.

Keeton, W. R. (1999). Does faster loan growth lead to higher loan losses?. Economic Review-Federal Reserve Bank Of Kansas City, 84(2), 57.

Kim, D., & Santomero, A. M. (1988). Risk in banking and capital regulation. The Journal of Finance, 43(5), 1219-1233.

Koehn, M. & Santomero, A., (1980). Regulation of Bank Capital and Portfolio Risk. Journal of Finance, 35: 1235-1250.

Koetter, M., & Vins, O. (2008). The quiet life hypothesis in banking: Evidence from German savings banks (No. 190). Working paper series//Johann-Wolfgang-Goethe-Universität Frankfurt am Main, Fachbereich Wirtschaftswissenschaften Finance & accounting.

Köhler, M. (2012). Which banks are more risky? The impact of loan growth and business model on bank risk-taking. Deutsche Bundesbank Discussion Paper , No 33.

Kosmidou, K. (2008). The determinants of banks' profits in Greece during the period of EU financial integration. Managerial Finance, 34(3), 146-159.

Kosmidou, K., Tanna, S., & Pasiouras, F. (2005, June). Determinants of profitability of domestic UK commercial banks: panel evidence from the period 1995-2002. In Money Macro and Finance (MMF) Research Group Conference (Vol. 45, pp. 1-27).

Koutsomanoli-Filippaki, A., Mamatzakis, E., & Staikouras, C. (2009). Structural reforms and banking efficiency in the new EU States. Journal of policy Modeling, 31(1), 17-21.

Kraft, E., & Tırtıroğlu, D. (1998). Bank efficiency in Croatia: A stochastic-frontier analysis. Journal of comparative economics, 26(2), 282-300.

Kumbhakar, S. C., & Hjalmarsson, L. (1995). Labour-use efficiency in Swedish social insurance offices. Journal of Applied Econometrics, 10(1), 33-47.

Kumbhakar, S. C., Lozano-Vivas, A., Lovell, C. K., & Hasan, I. (2001). The effects of deregulation on the performance of financial institutions: the case of Spanish savings banks. Journal of Money, Credit and Banking, 101-120.

Laeven, L., & Claessens, S. (2003). What drives bank competition? Some international evidence. Some International Evidence (August 6, 2003). World Bank Policy Research Working Paper, (3113).

Laeven, L., & Levine, R. (2007). Is there a diversification discount in financial conglomerates?. Journal of Financial Economics, 85(2), 331-367.

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. Journal of Financial Economics, 93(2), 259-275.

Laker J (1999), Monitoring Financial System Stability, Reserve Bank of Australia Bulletin, October, pp 113.

Leibenstein, H. (1975). Aspects of the X-Efficiency Theory of the Firm. The Bell Journal of Economics, 580-606.

Limam, I. (2001). Measuring technical efficiency of Kuwait banks. Arab Planning Institute-Kuwait, Information Center.

Liu, H., Molyneux, P., & Nguyen, L. (2012). Competition and risk in South East Asian Commercial Banking. Applied Economics , 3627-3644.

Malmquist, S. (1953). Index numbers and indifference surfaces. Trabajos de Estadistica y de Investigacion Operativa, 4(2), 209-242.

Martinez-Miera, D., & Repullo, R. (2010). Does competition reduce the risk of bank failure? Review of Financial Studies, 23(10), 3638-3664.

Matsuyama, K., (2007). Credit Traps and Credit Cycles. American Economic Review, 97, No. 1, pp. 503-516.

Maudos, J., Pastor, J. M., Perez, F., & Quesada, J. (2002). Cost and profit efficiency in European banks. Journal of International Financial Markets, Institutions and Money, 12(1), 33-58.

McKillop, D. G., Glass, J. C., & Morikawa, Y. (1996). The composite cost function and efficiency in giant Japanese banks. Journal of Banking & Finance, 20(10), 1651-1671.

Mensi, S. and A. Zouari (2010), Efficient structure vs market power: Theories and empirical evidence, International Journal of Economics and Finance 2(4), 151-166.

Mester, L. J. (1993). Efficiency in the savings and loan industry. Journal of Banking & Finance, 17(2), 267-286.

Mester, L. J. (1996). A study of bank efficiency taking into account risk-preferences. Journal of Banking & Finance, 20(6), 1025-1045.

Mirzaei, A., Moore, T., & Liu, G. (2013). Does market structure matter on banks' profitability and stability? Emerging vs. advanced economies. Journal of Banking & Finance, 37(8), 2920-2937.

Molyneux, P., & Forbes, W. (1995). Market structure and performance in European banking. Applied Economics, 27(2), 155-159.

Molyneux, P., Lloyd-Williams, D. M., & Thornton, J. (1994). Competitive conditions in European banking. Journal of banking & finance, 18(3), 445-459.

Mora R, Villarreal E, Benitez M (2005) Profitability, concentration and efficiency in the Mexican Banking Industry, Conference Paper, October 2005, 10th LACEA, Paris, France

Móré, C., & Nagy, M. (2003). Relationship between market structure and bank performance: empirical evidence for central and eastern Europe (No. 2003/12). Magyar Nemzeti Bank (Central Bank of Hungary).

Mostafa, M. (2007). Modeling the efficiency of GCC banks: a data envelopment analysis approach. International Journal of Productivity and Performance Management, 56(7), 623-643.

Nabieu, G. A. (2013). The structure, conduct and performance of commercial banks in Ghana. European Journal of Business and Innovation Research, 1(4), 34-47.

Naceur, S. B. (2003). The determinants of the Tunisian banking industry profitability: Panel evidence. Universite Libre de Tunis working papers.

Nickell, S. (1981). Biases in dynamic models with fixed effects. Econometrica: Journal of the Econometric Society, 1417-1426.

De Nicolò, G., & Loukoianova, E. (2007). Bank ownership, market structure and risk. IMF working papers, 1-44.

Northcott, C. A. (2004). Competition in banking: A review of the literature (pp. 2004-24). Working Paper: Bank of Canada.

Ogura, Y. (2006). Learning from a rival bank and lending boom. Journal of Financial Intermediation, 15(4), 535-555.

Olena, H., (2005), "Efficiency of the Polish banking industry: foreign versus domestic banks", European University Viadrina.

Olesen, J.A., Schmidt, P. & and Waldman, D.M. (1980), "A Monte Carlo Study of Estimators of Stochastic Frontier Production Function", Journal of Econometrics, vol. 13, no. 1, pp. 67-82.

Olson, D., & Zoubi, T. A. (2008). Using accounting ratios to distinguish between Islamic and conventional banks in the GCC region. The International Journal of Accounting, 43(1), 45-65.

Otero, L. & Ezcurra, M., (2012). Analysis of the Impact of Mortgage Securitization in Financial Banking System Stability Spanish. Financial Studies. Journal of Accounting and Taxation: Comments, case studies, ISSN 1138-9540, No. 356, 2012, pp. 111-144.

Ozemhoka, A. M., & Oni, A. A. (2014). MACROECONOMIC INDICATORS AND COMMERCIAL BANKS'RISK ASSETS CREATION IN NIGERIA. European Scientific Journal, 10(13).

Panzar,J.C. and J.N. Rosse. (1987). "Testing For Monopoly Equilibrium" The Journal for Industrial Economics 35(4): 443-56.

Papadopoulos, S. (2004). Market structure, performance and efficiency in European banking. International Journal of commerce and Management, 14(1), 79-100.

Park, K. H., & Weber, W. L. (2006). Profitability of Korean banks: Test of market structure versus efficient structure. Journal of Economics and Business, 58(3), 222-239.

Pasiouras, F. (2008). Estimating the technical and scale efficiency of Greek commercial banks: the impact of credit risk, off-balance sheet activities, and international operations. Research in International Business and Finance, 22(3), 301-318.

Pasiouras, F., & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. Research in International Business and Finance, 21(2), 222-237.

Pasiouras, F., Tanna, S., & Zopounidis, C. (2009). The impact of banking regulations on banks' cost and profit efficiency: Cross-country evidence. International Review of Financial Analysis, 18(5), 294-302.

Perera, S., Skully, M., & Wickramanayake, J. (2006). Competition and structure of South Asian banking: a revenue behaviour approach. Applied Financial Economics, 16(11), 789-801.

Perera, S., Skully, M., & Wickramanayake, J. (2007). Cost Efficiency in South Asian Banking: The Impact of Bank Size, State Ownership and Stock Exchange Listings*. International Review of Finance, 7(1-2), 35-60.

Pérez, F., & Quesada, J. (1994). Efficiency and banking strategies in Spain. In The Competitiveness of Financial Institutions and Centres in Europe (pp. 135-149). Springer Netherlands.

Pitt, M. M., & Lee, L. F. (1981). The measurement and sources of technical inefficiency in the Indonesian weaving industry. Journal of development economics, 9(1), 43-64.

Poghosyan, T., & Čihak, M. (2011). Determinants of bank distress in Europe: Evidence from a new data set. Journal of Financial Services Research, 40(3), 163-184.

Ramakrishnan, R. T., & Thakor, A. V. (1984). Information reliability and a theory of financial intermediation. The Review of Economic Studies, 51(3), 415-432.

Rauch, C., Steffen, S., Hackethal, A., & Tyrell, M. (2010). Determinants of bank liquidity creation. Available at SSRN 1343595.

Rezvanian, R., & Mehdian, S. (2002). An examination of cost structure and production performance of commercial banks in Singapore. Journal of Banking & Finance, 26(1), 79-98.

Rhoades, S. A. (1983). Concentration of world banking and the role of US banks among the 100 largest, 1956–1980. Journal of Banking & Finance, 7(3), 427-437.

Roodman, D. (2009). A note on the theme of too many instruments*. Oxford Bulletin of Economics and statistics, 71(1), 135-158.

Said, D. (2012). Efficiency in Islamic banking during a financial crisis-an empirical analysis of forty-seven banks. Journal of Applied Finance & Banking, 2(3), 163-197.

Said, D. (2013). Evaluating the Overall Technical Efficiency of Islamic Banks Operating in the MENA Region During the Financial Crisis. International Journal of Economics and Financial Issues, 3(2), 426-434.

Said, D. (2013). Risks and efficiency in the Islamic banking systems: the case of selected Islamic banks in Mena region. International Journal of Economics and Financial Issues, 3(1).

Salas, V., & Saurina, J. (2003). Deregulation, market power and risk behaviour in Spanish banks. European Economic Review, 47(6), 1061-1075.

Samad, A. (2004). Performance of Interest-free Islamic banks vis-à-vis Interest-based Conventional Banks of Bahrain. International Journal of Economics, Management and Accounting, 12(2).

Sarsour, S., & Daoud, Y. (2015). The Efficiency of the Banking System in Occupied Palestinian Territory (OPT) 2000–2009. Review of Middle East Economics and Finance, 11(1), 55-77.

Schmidt, P. & Sickles, R.C. (1984), "Production Frontiers and Panel Data", Journal of Business & Economic Statistics, vol. 2, no. 4, pp. 367-374.

Sharmaa S., Rainab D. & Singhc S. (2012) Measurement of Technical Efficiency and Its Sources: An Experience of Indian Banking Sector ،Int. Journal of Economics and Management 6(1), P: 35 – 57.

Shepherd, W. G. (1986). Tobin's q and the Structure-performance Relationship: Comment. The American Economic Review, 76(5), 1205-1210.

Simar, L., & Wilson, P. W. (2007). Estimation and inference in two-stage, semi-parametric models of production processes. Journal of econometrics, 136(1), 31-64.

Sinkey, J. & Greenawalt, M., (1991). Loan-Loss Experience and Risk-Taking Behavior at Large Commercial Banks. Journal of Financial Services Research, 5, 43-59.

Smirlock, M. (1985). Evidence on the (non) relationship between concentration and profitability in banking. Journal of Money, Credit and Banking, 69-83.

Smirlock, M., & Yawitz, J. (1985). Asset returns, discount rate changes, and market efficiency. The Journal of Finance, 40(4), 1141-1158.

Smirlock, M., Gilligan, T., & Marshall, W. (1984). Tobin's q and the Structure-Performance Relationship. The American Economic Review, 74(5), 1051-1060.

Srairi, S. A. (2010). Cost and profit efficiency of conventional and Islamic banks in GCC countries. Journal of Productivity Analysis, 34(1), 45-62.

Staikouras, C., & Wood, G. (2003, June). The determinants of bank profitability in Europe. In European Applied Business Research Conference, Venice (Vol. 913).

Staikouras, C., Mamatzakis, E., & Koutsomanoli-Filippaki, A. (2008). Cost efficiency of the banking industry in the South Eastern European region. Journal of International Financial Markets, Institutions and Money, 18(5), 483-497.

Stigler, G. J. (1964). A theory of oligopoly. The Journal of Political Economy, 44-61.

Stiroh, K. (2004). Diversification in Banking: Is Non-interest Income the Answer? Journal of Money, Credit and Banking 36 , 853-882.

Tabak, B. M., Fazio, D. M., & Cajueiro, D. O. (2012). The relationship between banking market competition and risk-taking: Do size and capitalization matter?. Journal of Banking & Finance, 36(12), 3366-3381.

Tetsushi, H. O. M. M. A., Yoshiro, T. S. U. T. S. U. I., & Hirofumi, U. C. H. I. D. A. (2012). Firm Growth and Efficiency in the Banking Industry: A new test of the efficient structure hypothesis (No. 12060).

Thompson, R. G., Langemeier, L. N., Lee, C. T., Lee, E., & Thrall, R. M. (1990). The role of multiplier bounds in efficiency analysis with application to Kansas farming. Journal of econometrics, 46(1), 93-108.

Thrall, R. M. (1999). What is the Economic Meaning of FDH?. Journal of Productivity Analysis, 11(3), 243-250.

Turk Ariss, R. (2008). Financial liberalization and bank efficiency: evidence from post-war Lebanon. Applied Financial Economics, 18(11), 931-946.

Turk-Ariss, R. (2010). On the implications of market power in banking: Evidence from developing countries. Journal of Banking & Finance 34(4), 765–775.

VanHoose, D. (2007). Theories of bank behavior under capital regulation. Journal of Banking & Finance, 31(12), 3680-3697.

Vickers, J. (1995). Concepts of Competition. Oxford Economic Papers 47(1), 1–23.

Von Thadden, E., (2004). Bank Capital Adequacy Regulation under the New Basel Accord. Journal of Financial Intermediation, 13: 90–95.

Weill, L. (2003). Banking efficiency in transition economies. Economics of transition, 11(3), 569-592.

Wheelock, D. C., & Wilson, P. W. (2000). Why do banks disappear? The determinants of US bank failures and acquisitions. Review of Economics and Statistics, 82(1), 127-138.

Wheelock, D.C. and P.W. Wilson, (2009). Are U.S. Banks too large", working paper n. 2009-054b. Federal reserve bank of st. Louis, Research Department
Wooldridge, J. (2012). Introductory econometrics: A modern approach. Cengage Learning.

Yao, S., & Jiang, C. (2010). Banking reform and efficiency in China: 1995-2008. Available at SSRN 1601230.

Ye, Q., Xu, Z., & Fang, D. (2012). Market structure, performance, and efficiency of the Chinese banking sector. Economic Change and Restructuring, 45(4), 337-358.

Yudistira, D. (2003). Efficiency in Islamic banking: An empirical analysis of 18 banks. Economics working paper archive at WUSTL.

Zarutskie, R. (2013). Competition, financial innovation and commercial bank loan portfolios. Journal of Financial Intermediation, 22(3), 373-396.

Zouari, A. (2010). Efficient structure versus market power: theories and empirical evidence. International journal of Economics and Finance, 2(4), 151.

Appendix A

List of Middle East North Africa (MENA) Countries Banks

Algeria

1. Banque Extérieure d'Algérie
2. Banque Nationale d'Algérie
3. Crédit Populaire d'Algérie
4. Banque de l'Agriculture et du Developpement Rural
5. Banque de Développement Local
6. BNP Paribas El Djazaïr
7. Société Générale Algérie
8. Albaraka of Algeria-Banque Al Baraka d'Algerie
9. Natixis Algerie
10. Gulf Bank Algeria
11. Arab Banking Corporation - Algeria
12. Housing Bank for Trade and Finance - Algeria
13. Trust Bank Algeria

Bahrain

14. Ahli United Bank BSC
15. Arab Banking Corporation BSC
16. Gulf International Bank BSC
17. BBK BSC
18. National Bank of Bahrain
19. BMI Bank BSC
20. Future Bank BSC
21. Bahrain Commercial Facilities Company BSC
22. Ithmaar Bank BSC
23. Investcorp Bank BSC
24. United Gulf Bank (BSC) EC
25. BMB Investment Bank-Bahrain Middle East Bank BSC
26. Albaraka Banking Group BSC
27. Kuwait Finance House
28. Arcapita Bank BSC
29. Al-Salam Bank-Bahrain BSC
30. Bahrain Islamic Bank BSC
31. Khaleeji Commercial Bank
32. First energy bank
33. ABC Islamic Bank (E.C)
34. Gulf Finance House BSC
35. Bank Alkhair BSC
36. Seera Investment Bank BSC
37. Venture Capital Bank BSC (c)-VCBank
38. International Investment Bank BSC-IIB
39. Global Banking Corporation BSC
40. Investors Bank BSC
41. Citi Islamic Investment Bank
42. Arab Financial Services Company - AFS
43. TAIB Bank BSC
44. Real Estate Finance Company BSC (C)-REEF
45. Bahrain Mumtalakat Holding Company

46. Bahrain Development Bank BSC

47. Liquidity Management Center BSC

48. Bahrain Financing Company BSC

Egypt

49. EFG-Hermes Holding Company

50. National Bank of Egypt

51. Banque Misr SAE

52. Commercial International Bank (Egypt) S.A.E.

53. Arab African International Bank

54. Banque du Caire SAE

55. HSBC Bank Egypt S A E

56. Bank of Alexandria

57. Credit Agricole Egypt

58. Société Arabe Internationale de Banque

59. Bank Audi SAE

60. Al Watany Bank of Egypt

61. Barclays Bank - Egypt SAE

62. Suez Canal Bank

63. Emirates National Bank of Dubai SAE

64. United Bank (The)

65. Ahli United Bank (Egypt) SAE

66. Abu Dhabi Islamic Bank

67. BLOM Bank Egypt SAE

68. Egyptian Gulf Bank

69. Arab Banking Corporation - Egypt

70. Union National Bank - Egypt SAE

71. QNB Al Ahli

72. Arab Investment Bank-Federal Arab Bank for Development and Investment

73. Faisal Islamic Bank of Egypt

74. Al Baraka Bank Egypt SAE

75. African Export-Import Bank - Afreximbank

76. Export Development Bank of Egypt

77. Housing and Development Bank

78. MISR Iran Development Bank

Iraq

79. Warka Bank for Investment and Finance

80. Bank of Baghdad

81. North Bank

82. Gulf Commercial Bank

83. Iraqi Middle East Investment Bank

84. Dijlah & Furat Bank for Development and Investment Joint Stock Company

85. Kurdistan International Bank for Investment and Development

86. Trade Bank of Iraq

Iran

87. Bank Mellat

88. Bank Melli Iran

89. Bank Maskan

90. Bank Tejarat

91. Bank Saderat Iran

92. Bank Sepah

93. Parsian Bank

94. Bank Pasargad

95. Bank Keshavarzi-Agricultural Bank of Iran

96. Eghtesad Novin Bank PJSC-EN Bank

97. Saman Bank

98. Bank Refah

99. Bank of Industry and Mine

100. Export Development Bank of Iran

101. Karafarin Bank

Israel

102. Bank Hapoalim BM

103. Bank Leumi Le Israel BM

104. IDB Holding Corporation Ltd

105. Bank of Jerusalem

106. Bank Otsar Hahayal Ltd

107. First International Bank of Israel

108. Israel Discount Bank LTD

109. Mercantile Discount Bank Ltd

110. Mizrahi Tefahot Bank Ltd

111. UBank Ltd

112. Union Bank of Israel Ltd

113. Israel Credit Cards Ltd-Cal

Jordan

114. Arab Bank Plc

115. Arab Banking Corporation (Jordan)

116. Bank of Jordan Plc

117. Cairo Amman Bank

118. Capital Bank of Jordan

119. Arab Bank Group (Combined)

120. Housing Bank for Trade & Finance (The)

121. Jordan Ahli Bank Plc

122. Jordan Commercial Bank

123. Jordan Kuwait Bank

124. Société générale de Banque-Jordanie

125. Arab Jordan Investment Bank

126. Bank al Etihad

127. Invest Bank

128. Islamic International Arab Bank

129. Jordan Dubai Islamic Bank

130. Jordan Islamic Bank

131. National Microfinance Bank Company

Kuwait

132. National Bank of Kuwait SAK

133. Gulf Bank KSC (The)

134. Commercial Bank of Kuwait SAK (The)

135. Al Ahli Bank of Kuwait (KSC)

136. Ahli United Bank KSC

137. Burgan Bank SAK

138. Al Massaleh Real Estate Co.Kuwait

139. KIPCO Asset Management Co

140. Kuwait Projects Company Holding KSC

141. Gulf Investment Corporation

142. Kuwait Investment Company (SAK)

143. National Investments Company

144. Noor Financial Investment Company

145. Securities Group Company KSC

146. Kuwait Financial Center SAK-Markaz

147. Arzan Financial Group for Financing and Investment KSE

148. Global Investment House

149. Kuwait Finance & Investment Company K

150. Gulf Investment House KSC

151. Kuwait & Middle East Financial Investment Company

152. Boubyan Bank KSC

153. Kuwait International Bank

154. A'Ayan Leasing & Investment Company

155. First Investment Company KSCC

156. International Investor Company, KSC

157. Rasameel Structured Finance Company KSC

158. Commercial Facilities Company

159. Oman Exchange Company Ltd

160. Al Mulla International Exchange Company WLL

161. Kuwait Fund for Arab Economic Development

162. Industrial Bank of Kuwait KSC

163. Kuwait Finance House

Lebanon

164. Bank Audi SAL

165. BLOM Bank s.a.l

166. Byblos Bank SAL

167. Fransabank sal

168. Bank of Beirut SAL

169. Bankmed, sal

170. Banque Libano-Francaise

171. Crédit Libanais SAL

172. B.L.C Bank SAL

173. BBAC sal

174. Société Générale de Banque au Liban - SGBL

175. Lebanon & Gulf Bank SAL

176. IBL Bank sal

177. Audi Saradar Private Bank SAL

178. Banque BEMO Sal

179. MEAB SAL

180. Lebanese Swiss Bank SAL (The)

181. Fenicia Bank SAL

182. Al-Mawarid Bank SAL

183. Banque Misr Liban

184. Société Nouvelle de la Banque de Syrie et du Liban

185. Ahli International Bank SAL

186. Banque de l'Industrie et du Travail SAL

187. Jammal Trust Bank SAL

188. Syrian Lebanese Commercial Bank SAL

189. Near East Commercial Bank SAL

190. Banque Pharaon & Chiha SAL

Libya

191. Libyan Foreign Bank

192. Sahara Bank

193. Wahda Bank

194. National Commercial Bank SAL

195. Bank of Commerce & Development

196. Libyan Qatari Bank

197. Banque Sahélo-Saharienne pour l'Investissement et le Commerce

198. Jumhouria Bank

Morocco

199. Groupe Banques Populaires

200. Attijariwafa Bank

201. Attijariwafa Bank (Combined)

202. Banque Centrale Populaire

203. Banque Marocaine Du Commerce Exterieur-BMCE Bank

204. Banque Marocaine pour le Commerce et l'Industrie BMCI

205. Chaabi International Bank Offshore

206. Crédit Agricole du Maroc

207. Crédit du Maroc

208. Crédit Populaire du Maroc

209. Société Générale Marocaine de Banques

210. CDG Capital

211. Association Al Amana Pour la Promotion des Microentreprises

212. Fondation Attawfiq Micro-Finance

213. Fondation Zakoura Micro-Credit

214. Fondation Banque Populaire

215. Crédit Immobilier et Hotelier

216. Caisse de Depot et de Gestion

217. Fonds d'Equipement Communal

218. EQDOM-Societe d'Equipement Domestique et Menager

219. Société de Financement d'achats à Crédit - SOFAC Crédit

Oman

220. Bank Muscat SAOG

221. National Bank of Oman (SAOG)

222. Bank Dhofar SAOG

223. HSBC Bank Oman

224. Bank Sohar SAOG

225. Oman Arab Bank SAOG

226. Oman International Development and Investment Co.

227. Dhofar International Development & Investment Holding Company

228. Muscat Finance Company Limited SAOG

229. Oman Housing Bank (SAOC)

230. Oman Development Bank SAOC

231. United Finance Company

Qatar

232. Qatar National Bank

233. Commercial Bank of Qatar (The) QSC

234. Doha Bank

235. Al Khalij Commercial Bank

236. International Bank of Qatar QSC

237. Ahli Bank QSC

238. Barwa Bank

239. Qatar First Investment Bank

240. The First Investor

241. Qatar Islamic Bank SAQ

242. Qatar International Islamic Bank

243. Masraf Al Rayan (QSC)

244. First Finance Company (QSC)

245. Qatar Development Bank QSCC

Saudi Arabia

246. National Commercial Bank (The)

247. Riyad Bank

248. Samba Financial Group

249. Saudi British Bank (The)

250. Banque Saudi Fransi

251. Arab National Bank

252. Saudi Investment Bank (The)

253. Saudi Hollandi Bank

254. Bank Al-Jazira

255. Arab Petroleum Investments Corporation - APICORP

256. Arab Investment Company SAA (The)

257. Al Rajhi Bank

258. Islamic Development Bank

259. Alinma Bank

260. Bank AlBilad

261. Islamic Corporation for the Development of the Private Sector-Société Islamique pour le Développement du Secteur Privé"

262. Al Amoudi Exchange Company LLC

Sudan

263. Omdurman National Bank

264. Sudanese French Bank (The)

265. Farmers Commercial Bank

266. Elnilein Bank

267. Blue Nile Mashreq Bank Ltd

268. Byblos Bank Africa Ltd

269. Saudi Sudanese Bank

270. Savings & Social Development Bank

271. Sudanese Egyptian Bank

272. Al Jazeera Sudanese Jordanian Bank

273. Faisal Islamic Bank (Sudan)

274. Bank of Khartoum

275. Tadamon Islamic Bank

276. Al Salam Bank

277. Islamic Co-operative Development Bank

278. Industrial Development Bank

279. United Capital Bank

280. Al Baraka Bank Sudan

281. Sudanese Islamic Bank

282. Export Development Bank

Syria

283. Commercial Bank of Syria

284. Real Estate Bank

285. International Bank for Trade and Finance SA

286. Banque Bemo Saudi Fransi SA

287. Arab Bank Syria SA

288. Bank Audi Syria

289. Fransabank-Syria SA

290. Byblos Bank Syria SA

291. Cham Islamic Bank SA

Tunisia

292. Banque Internationale Arabe de Tunisie - BIAT

293. Banque Nationale Agricole

294. Société Tunisienne de Banque

295. Amen Bank

296. Banque de l'Habitat

297. Attijari Bank

298. Arab Tunisian Bank

299. Banque de Tunisie

300. Union Internationale de Banques

301. Union Bancaire pour le Commerce et l'Industrie SA UBCI

302. North Africa International Bank - NAIB

303. Arab Banking Corporation - Tunisie

304. Banque Tunisienne de Solidarité

305. Banque Franco-Tunisienne

306. Banque de Tunisie et des Emirats SA

307. Tunis International Bank

308. Qatar National Bank Tunisia

309. Albaraka Bank Tunisia

310. Tunisian - Kuwaiti Development Bank-Banque Tuniso - Koweitienne de Développement BTKD"

311. STUSID Bank

312. Caisse de prêts et de soutien des collectivités locales-CPSCL

313. Tunisie Leasing

314. Arab Tunisian Lease

315. Attijari Leasing

316. Compagnie Internationale de Leasing

317. El Wifack Leasing SA

318. Arab International Lease

319. Modern Leasing

320. Tunisie Factoring

321. Unifactor-Union de Factoring

Emirates

322. Emirates NBD PJSC

323. National Bank of Abu Dhabi

324. First Gulf Bank

325. Abu Dhabi Commercial Bank

326. Mashreqbank PSC

327. Union National Bank

328. Commercial Bank of Dubai P

329. National Bank of Ras Al-Khaimah (PSC)

330. Bank of Sharjah

331. National Bank of Fujairah

332. United Arab Bank PJSC

333. Commercial Bank International PSC

334. Arab Bank for Investment & Foreign Trade-Al Masraf

335. National Bank of Umm Al-Qaiwain

336. Invest Bank PSC

337. Abu Dhabi Investment Company

338. Emirates Investment Bank PJSC

339. Finance House PJSC

340. SHUAA Capital psc

341. Dubai Islamic Bank PJSC

342. Abu Dhabi Islamic Bank - Public Joint Stock Co

343. Sharjah Islamic Bank

344. Amlak Finance PJSC

345. Tamweel PJSC

346. Waha Capital PJSC

347. Emirates Islamic Bank PJSC

Yamen

348. International Bank of Yemen YSC

349. National Bank of Yemen

350. Yemen Kuwait Bank for Trade and Investment

351. Yemen Commercial Bank

352. Tadhamon International Islamic Bank

353. Saba Islamic Bank

354. Shamil Bank of Yemen & Bahrain

355. Yemen Bank for Reconstruction and Development

356. Cooperative & Agricultural Credit Bank