دراسات اقتصادية

السلسلة العلمية لجمعية الاقتصاد السعودية

المجلد الرابع عشر

العدد (27)

جمادى الأولى (1442هـ) ***يناير (2021م)***

قواعد النشر

هـذه الدوريــة العلميــة نصــف ســنوية محكمــة تعنــى بالشــئون الاقتصادية تصدر عن جمعية الاقتصاد السعودية بجامعة الملك سعود، وهي تهدف إلى إتاحة الفرصة للباحثين لنشر نتائج أبحاثهم. تنظر هيئة التحرير – من خلال هيئات التحرير الفرعية – في نشر مواد في علم الاقتصاد وفروعه. تقدم البحوث الأصلية، التي لم تنشر أو ترسل للنشر في محلات أخرى، بالإنجليزية أو بالعربية، وفي حالة القبول يجب إلا تنشر المادة في أي دورية أخرى دون إذن كتابي من رئيس هيئة التحرير.

تصنف المواد التي تقبلها المجلة للنشر إلى الأنواع الآتية:

(1) بحث: ويشتمل على عمل المؤلف في مجال تخصصه، ويجب أن يحتوى على إضافة للمعرفة في مجاله وأن يكون في حدود (25) صفحة.

(2) مقالة استعراضية: وتشتمل على عرض نقدي لبحوث سبق أجراؤها في مجال علم الاقتصاد وفروعه أو أجريت في خلال فترة زمنية محددة وإلا تتجاوز (5) صفحات.

(3) المنبر (منتدى): خطابات إلى المحرر، ملاحظات وردود.

(4) نقد الكتب.

تعليمات عامة

(1) تقديم المواد: يقدم الأصل مطبوعا – ومعه نسختين – على مسافتين وعلى وجه واحد من ورق مقاس A4 (21 × 29.7 سم)، ويجب أن ترقم

الصفحات ترقيما متسلسلا بما في ذلك الجداول والأشكال. وتقدم الجداول والصور واللوحات وقائمة المراجع على صفحات مستقلة مع تحديد أماكن ظهورها في المتن.

(2) الملخصات: يرفق ملخصان بالعربية والإنجليزية للبحوث والمقالات الاستعراضية على إلا يزيد عدد كلمات كل منهما على (200) كلمة.

(3) الجداول والمواد التوضيحية: يجب أن تكون الجداول والرسومات واللوحات مناسبة لمساحة الصف في صفحة المجلة (5ر12 x 18سم)، ويتم إعداد الأشكال بالحبر الصيني الأسود على ورق كلك، ولا تقبل صور الأشكال عوضا عن الأصول . كما يجب أن تكون الخطوط واضحة ومحددة ومنتظمة في كثافة الحبر ويتناسب سمكها مع حجم الرسم، ويراعى أن تكون الصور الظلية الملونة أو غير الملونه – مطبوعة على ورق لماع.

(4) الاختصارات: يجب استخدام اختصارات عناوين الدوريات العلمية كما هو وارد في The World List of Scientific Periodicals. تستخدم الاختصارات المقننة دوليا بدلا من كتابة الكلمات مثل: سم، مم، م، كم، مل، كجم، ق، %، ... الخ.

(5) المراجع: بصفة عامة يشار إلى المراجع بداخل المتن بالأرقام حسب أولوية ذكرها. تقدم المراجع جميعها تحت عنوان المراجع في نهاية المادة بالطريقة المتبعة في أسلوب (MLA):

أ – يشار إلى الدوريات في المتن بأرقام داخل أقواس مربعة على مستوى السطر. أما في قائمة

المراجع فيبدأ المرجع بذكر رقمه داخل قوسين مربعين فاسم عائلة المؤلف ثم الأسماء الأولى أو اختصاراتها فعنوان البحث (بين علامتي تنصيص) فاسم الدورية (تحت خط) فرقم المجلد، فرقم العدد، فسنة النشر (بين قوسين) ثم أرقام الصفحات.

مثال:

رزق، إبراهيم أحمد، (مصادر الاتصال المعرفي الزراعي لزراع منطقة القصيم بالمملكة العربية السعودية) مجلة كلية الزراعة، جامعة الملك سعود، م 9، ع 2 (1987م)، 63-77.

ب – يشار إلى الكتب في المتن داخل قوسين مربعين مع ذكر الصفحات، مثال [8، ص16]. أما في قائمة المراجع فيكتب رقم المرجع داخل قوسين مربعين متبوعا باسم المؤلف ثم الأسماء الأولى أو اختصاراتها فعنوان الكتاب (تحته خط) فمكان النشر ثم الناشر فسنة النشر.

مثال:

الخالدي، محمود عبد الحميد، قواعد نظام الحكم في الاسلام الكويت: دار البحوث العلمية، 1980م.

عندما ترد في المتن إشارة إلى مرجع سبق ذكره يستخدم رقم المرجع السابق ذكره (نفسه) مع ذكر أرقام الصفحات المعنية بين قوسين مربعين

على مستوى السطر. يجب مراعاة عدم استخدام الاختصارات مثل: المرجع نفسه، المرجع السابق، ... الخ.

(6) الحواشي: تستخدم لتزويد القارئ بمعلومات توضيحية. ويشار إلى التعليق في المتن بأرقام مرتفعة عن السطر بدون أقواس. وترقم التعليقات متسلسلة داخل المتن ويمكن الإشارة إلى مرجع داخل الحاشية – في حالة الضرورة – عن طريق استخدام رقم المرجع بين قوسين بنفس طريقة استخدامها في المتن. تقدم التعليقات على صفحات مستقلة علما بأنها ستطبع أسفل الصفحات المعنية ويفصلها عن المتن خط.

(7) تعبر المواد المقدمة للنشر عن آراء ونتائج مؤلفيها فقط.

(8) المستلات: يمنح المؤلف عشرة (10) مستلة مجانية من بحثه.

(9) المراسلات: توجه جميع المراسلات إلى:

رئيس تحرير السلسلة العلمية لجمعية الاقتصاد السعودية
ص. ب 71115 الرياض 11587
المملكة العربية السعودية
هاتف 0114674141 فاكس 0114674142

(10) عدد مرات الصدور: نصف سنوية.

المحتويات

أولاً: البحوث والدراسات

ثانياً: مقالات

أولاً: البحوث والدراسات

هل يؤثر تراجع معدلات النمو النقدي على استقرار دالة الطلب على النقود في اقتصاد السعودي؟

نيزار حسناوي حراثي*

الملخص

يهدف البحث الى دراسة العلاقة بين الطلب على النقود في المدى الطويل والنمو النقدي في المملكة العربية السعودية. ويأخذ البحث بالاعتبار التغير الهيكلي لسنة 2015 والذي أثر سلبا على معدلات النمو المالي في الاقتصاد السعودي. ويكشف البحث استنادا على اختبارات الاستقرار عدم وجود تغير هيكلي نتيجة للتراجع الأخير للنمو النقدي مما يدل على استقرار دالة الطلب على النقود. بالإضافة إلى ذلك، أظهرت النتائج أن الطلب على النقد لم يؤدي إلى انخفاضا في السيولة. وتوصي الدراسة بانه يمكن تحقيق استقرار الاقتصاد الكلي من خلال اعتبار عرض النقود أداة فعالة للتعديل على المدى الطويل.

* قسم الاقتصاد، كلية إدارة الأعمال، جامعة الملك سعود، ص.ب 71115 الرياض 11587 المملكة العربية السعودية، بريدي الكتروني: nharrathi@ksu.edu.sa.

التغيرات الهيكلية والعلاقة بين أسعار الأسهم والنفط في المملكة العربية السعودية

وحيد عبد الرحمن بانافع*

الملخص

يهدف هذا البحث لدراسة العلاقة بين أسعار الأسهم وأسعار النفط باستخدام بيانات ربعية تبدأ من الربع الأول لعام 1985 الى الربع الرابع لعام 2018. ونظراً لاعتماد الاقتصاد السعودي على النفط، فان تحليل العلاقة بين أسعار الأسهم والنفط اعتمد على طرق قياسية تأخذ بعين الاعتبار التغيرات الهيكلية. واظهرت النتائج انه ليس هناك علاقة طويلة الاجل بين أسعار الأسهم، أسعار النفط، وسعر الصرف إلا بعد اخذ بعين الاعتبار أثر أكثر من تغير هيكلي واحد في التحليل. كما أشارت النتائج إلى وجود أثر ايجابي وذو دلاله إحصائية لأسعار النفط وسعر الصرف على أسعار الأسهم في الاجل الطويل والقصير، ولكن كان تأثيرهما على أسعار الأسهم أكبر– في الحجم– في الاجل الطويل. أيضاً، كان تأثير التغير الهيكلي الذي حدث في الربع الأول من عام 2003 ايجابي وذو دلالة إحصائية على أسعار الأسهم في الاجل الطويل والقصير، ولكن تأثيره أكبر –في الحجم– في الاجل الطويل. كما كان تأثير التغير الهيكلي الذي حدث في الربع الأول من عام 2008 على أسعار الأسهم سلبي في الاجل الطويل والقصير، ولكن كان ذو دلاله إحصائية فقط في الاجل الطويل. فهذه النتائج قد تساعد المتعاملون في سوق الأسهم السعودي على تقليص نسبة عدم التأكد عند اتخاذ قراراتهم الاستثمارية.

* قسم الاقتصاد والميزانية، معهد الإدارة العامة، الرياض 11141 المملكة العربية السعودية، بريد الكتروني: banafeaw@ipa.edu.sa

ثانياً: مقالات

تطور القطاع المالي والنمو الاقتصادي: من يقود الآخر؟

Financial Sector Development and Economic Growth: Who Leads the Other?

د. عبد الله بن محمد المالكي*

Abdullah Mohammed S. Al-Malki

مقدمة:

حظي موضوع العلاقة بين تطور أسواق المال، أو نمو وتطور القطاع المالي بشكل عام والنمو الاقتصادي بدراسات وأبحاث عديدة أجريت بهدف التحقق من وجود هذه العلاقة وأيهما يؤثر في (أو يسبب) الآخر، وعلى الرغم من اختلاف وجهات النظر تجاه هذه العلاقة إلا أن معظم والأبحاث والدراسات التطبيقية توصلت إلى وجود علاقة بين القطاعين الحقيقي والمالي وأن الاختلاف القائم يركز على اتجاه هذه العلاقة، بمعنى آخر هل تتجه العلاقة من القطاع المالي إلى النمو الاقتصادي أم العكس أم أن العلاقة تبادلية بين القطاعين، ولم يدعم وجهة النظر التي تشكك أو تنفي وجود هذه العلاقة سوى دراسات قليلة جدا، وبالتالي فإن هناك شبه إجماع على وجود علاقة بين تطور القطاع المالي والتنمية الاقتصادية أو النمو الاقتصادي في أي اقتصاد قائم.

* قسم الاقتصاد – كلية إدارة الأعمال – جامعة الملك سعود، E.mail. amalmalki@ksu.edu.sa

ويمكن إيجاز وجهات النظر المختلفة في الآتي:

وجهة النظر الأولى: ترى أن تطور القطاع المالي يقود إلى النمو الاقتصادي وتعود هذه النظرة إلى دراسة Bagehot (1873) أواخر القرن التاسع عشر، ودراسة Schumpeter (1911) في أوائل القرن العشرين، وقد أطلق البعض عليها نظرة شومبيتر، كما حظيت هذه النظرة لاحقا بتأييد واضح نظرياً وتطبيقياً على يد الكثير من الاقتصاديين والباحثين، على سبيل المثال لا الحصر: Gurley and Shaw (1955)، Goldsmith (1969) ، Mackinnon (1973)، Shaw (1973)، King and Levine (1993) وغيرهم.

أما وجهة النظر الثانية فقد بدأت مع الاقتصادية الانجليزية Robinson عام (1952) والتي بينت أن النمو الاقتصادي هو الذي يقود التطور في القطاع المالي وتم تأييد هذه النظرة من قبل كل من Kuzintes (1955) و Friedman and Schwartz عام (1963). في العام (1988) شكّك Lucas في مدى أهمية القطاع المالي للنمو الاقتصادي وذكر في عبارته الشهير أن الاقتصاديين بالغوا في إعطاء القطاع المالي أهمية بالنسبة للنمو الاقتصادي أكثر من اللازم. وهنالك بعض الآراء القريبة من رأي لوكاس مثل Ram (1999) و(1989) Stern و(1996) Thornton . وهناك من زاد على ذلك بالقول أن تأثير التمويل على النمو الاقتصادي ذو علاقة سالبة مثل Van Wijnbergen (1983) و Buffie (1984) .

أما وجهة النظر الرابعة فتعود إلى Patrick عام 1966 والمعروفة بالعلاقة التبادلية أو السببية والمعروفة ايضاً بظاهرتي العرض القائد والطلب التابع. وقد تم تأييد هذه النظرة بدراسات رائدة مثل دراسة Demetriades and Hussein (1996) و Luintel and Khan (1999) وغيرها.

ويمكن إيجاز ما تم عرضه سابقا في أن معظم الدراسات التطبيقية تؤيد نظرة شومبيتر أو فرضيات باتريك وهناك بعض الدراسات التي تؤيد نظرة جوان روبنسون أما فرضية لوكاس فلم تحظى إلا بعدد قليل جداً من الدراسات المؤيدة وبذلك يمكننا القول أن

للتمويل أو بمعنى آخر لتطور القطاع المالي دور واضح وهام في عملية التنمية الاقتصادية والنمو الاقتصادي في الدول النامية والمتقدمة على السواء كما أن النمو الاقتصادي بدوره يؤثر في القطاع المالي. لذلك نجد أن موضوع العلاقة بين تطور القطاع المالي والقطاع الحقيقي لم يحسم بعد ولا يزال محل اهتمام الاقتصاديين والباحثين في الدول المتقدمة والدول الصاعدة والنامية على السواء.[1]

المتغيرات والأساليب والنماذج المستخدمة في القياس:

يعتبر متغير عرض النقود الواسع M2 كنسبة من إجمالي الناتج المحلي الإجمالي من أشهر المتغيرات لقياس تطور القطاع المالي ومن المتغيرات التي استخدمت على نطاق واسع أيضا متغير الائتمان المصرفي الممنوح للقطاع الخاص كنسبة من إجمالي الناتج المحلي الإجمالي. إضافة إلى ذلك استخدم العديد من الاقتصاديين والباحثين متغيرات أخرى مثل نسبة أصول البنوك التجارية إلى إجمالي أصول البنوك التجارية والبنك المركزي، وإجمالي نسبة الودائع البنكية إلى الناتج المحلي الإجمالي. وهناك من استخدم متغيرات من سوق الأسهم إضافة إلى متغيرات القطاع البنكي مثل نسبة القيمة السوقية للأسهم إلى الناتج المحلي الإجمالي أو معدل دوران الأسهم أو قيمة الأسهم المتداولة أو عدد الشركات المدرجة في السوق أو مؤشر السوق ونحوها. وبالنسبة للنمو الاقتصادي فإن أكثر المتغيرات استخداما هو متغير إجمالي الناتج المحلي الفردي الحقيقي أو معدل نمو الناتج المحلي الإجمالي.

[1] Economists disagree sharply about the role of financial sector in economic growth", Levine (2004, p. 1).
Economists have not reached a consensus with regard to the direction of causality between these two variables", Ang (2008, p. 537).

من جانب آخر يمكن تقسيم الطرق والأساليب التي استخدمت في القياس إلى ثلاثة أنواع رئيسة هي:

دراسات اعتمدت على البيانات المقطعية وعلى طريقة المربعات الصغرى العادية، ودراسات اعتمدت على بيانات السلاسل الزمنية وعلى طريقة اختبارات خصائص تلك البيانات مثل جذور الوحدة والتكامل المشترك واختبارات السببية وتصحيح الخطأ. ودراسات اعتمدت على البيانات المقطعية والسلاسل الزمنية معاً (البيانات المجمعة) وعلى الطريقة المعممة Generalized Method of Moments (GMM). ويعد نموذجي متجه تصحيح الخطأ، والانحدار الذاتي الموزع المبني على اختبارات الحدود ARDL والمطور من قبل Pesaran et al. (2001) وكذلك النموذج غير الخطي للانحدار الذاتي الموزع المبني على اختبارات الحدود (NARDL) المطور من قبل Shin, Yu, & Creen Wood Nimmo (2014) من أحدث الأساليب القياسية نسبياً لدراسة السلاسل الزمنية.

أسواق المال العربية:

لا شك أن القطاع المالي في الدول العربية تطور بشكل ملحوظ خلال العقود الثلاثة الماضية نتيجة للإصلاحات الاقتصادية والمالية التي تبنتها بعض الدول مثل مصر والأردن وبعض دول الخليج العربي مثل السعودية والكويت والإمارات العربية المتحدة وغيرها. إلا أن الوضع يختلف بشكل كبير عند مقارنتها بالدول المتقدمة والصاعدة، فالدول المتقدمة وخاصة في القطاع المالي وصلت إلى مراحل متقدمة في هذا المجال سواء فيما يتعلق بالقطاع المصرفي أو سوق الأوراق المالية (الأسهم والسندات) أو المشتقات المالية أو حتى فيما يتعلق بالقطاع العقاري وقطاع التأمين وغيرها. في حين لا تزال مثل هذه القطاعات في مراحلها الأولى في معظم الدول العربية ناهيك على أن هناك دول لا تزال تفتقر إلى وجود أسواق للأسهم وهذه في حد ذاتها مفارقة عجيبة توضح اتساع الهوة بين هذه الدول والدول الصاعدة مثل بعض دول شرق

آسيا ناهيك عن الدول المتقدمة. ورغم الأزمة المالية الخانقة التي حصلت في عام 2008 في أمريكا وانتقلت إلى أوربا وألقت بضلالها على كل الأسواق الدولية إلا إن ذلك لا يقلل من تطور القطاع المالي في تلك الدول سواء كان ذلك فيما يتعلق بالقطاع البنكي أو الأسواق المالية أو القطاع العقاري أو قطاع التأمين.

ولكي يتسم الطرح بالموضوعية فإن البعض لا يجدون في اتساع هذه الفجوة بين الدول النامية أو الأسواق الناشئة والدول المتقدمة غرابة ويبررون ذلك بالعمر الزمني الطويل لمثل هذه الأسواق والتي اكتسبت من خلاله الكثير من الخبرات والتجارب التي أدت فيما بعد إلى تطورها ووصوله إلى هذا المستوى من الكفاءة ، إذا فطرحهم يرتكز على أن الدول المتقدمة سبقتنا بمئات السنين فعلى سبيل المثال فقد تجاوز عمر بورصة لندن الثلاثمائة عام في حين لم يتجاوز عمر بعض الأسواق المالية في بعض الدول العربية بضعة سنين ناهيك عن أن بعضها تفتقر إلي السوق المالية إلى هذا اليوم كما أسلفنا. إلا أنه وفي المقابل فأن بعض الدول العربية التي وجدت بها البورصات منذ فترة ليست بالقصيرة مثل البورصة المصرية لا تزال لا ترقى إلى مستوى الأسواق الصاعدة فحسب فما بالك بالأسواق المتقدمة.

الاقتصاد السعودي:

في بداية القرن العشرين كان الاقتصاد في الجزيرة العربية اقتصاد بدائي وبسيط واستمر كذلك مع البدايات الأولى لتكوين الدولة السعودية الحديثة، فكان يقوم على الزراعة والرعي، والحياة الاقتصادية والاجتماعية بشكل عام كانت بسيطة. ويعتبر اكتشاف النفط في سنة 1938 م نقطة تحول كبيرة في تاريخ الاقتصاد السعودي فقد تحول من اقتصاد مغلق وبسيط في بداية تأسيس المملكة العربية السعودية إلى اقتصاد حر مفتوح ومتطور، فهو يعتبر واحد من أسرع الاقتصاديات نموا في العالم. ليس ذلك فحسب بل انعكست آثار ذلك الاكتشاف الكبير إلى تحول آخر في جميع أوجه الحياة في المملكة العربية السعودية وبشكل خاص في المجال الاجتماعي فقد تحول المجتمع

تدريجياً من مجتمع بسيط كانت تغلب عليه حياة البادية والريف إلى مجتمع متمدن في فترة ليست بالطويلة.[2]

ما بعد النفط:

يقوم الاقتصاد السعودي على مبدأ الاقتصاد الحر المفتوح وبنظام سعر صرف ثابت مرتبط بالدولار. يرى ويلسون وآخرون أن الاقتصاد السعودي هو اقتصاد حر في كثير من الجوانب من خلال مجتمع مغلق[3].

ويعتبر الاقتصاد السعودي من أكبر الاقتصاديات في الشرق الأوسط وشمال إفريقيا (MENA) والأكبر على مستوى دول الخليج العربي. فعلي سبيل المثال فاق إجمالي الناتج المحلي 2625 بليون ريال سعودي في عام 2020 بالأسعار الجارية 2531 بليون ريال سعودي بالأسعار الحقيقة في نفس العام بأسعار 2010. وكما هو معلوم فإن الاقتصاد السعودي اقتصاد ريعي في المقام الأول يعتمد بشكل كبير على إيرادات النفط على اعتبار أن المملكة العربية السعودية اكبر مصدر للنفط الخام في العالم، إذ تبلغ نسبة الصادرات النفطية إلى إجمالي الصادرات 90–95% تسهم بمعدل يتراوح بين 35–40% من إجمالي الناتج المحلي ونتيجة لذلك تعتبر إيرادات النفط المصدر الرئيس للدخل المحلي السعودي، إضافة إلى ذلك تمتلك المملكة احتياطي نفطي ضخم يقدر 261 مليار برميل وهو ما يعادل ربع المخزون النفطي العالمي. وتتراوح نسبة

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[2] وقد عبر رامون كناورهيز عن تلك الفترة بالتالي:

In 1940 the wheel was not in general use in most areas of the nation. Saudi Arabia had a pastoral economy based on the raising of goats, sheep and camels. The majority of the urban population lived in small villages built of mud brick and earned a living from subsistence agriculture. The nomads drove their herds of animals across the desert in search of forage, carrying their meager belongings on camel back from grazing area to grazing" ; Knauerhase (1978, p. 57).

[3] Saudi Arabia used to be regarded as an open economy through in many respects a closed society". Wilson et. al. (2004, P. 2).

لم يعد الحال كذلك مع تبني الدولة عدة برامج لعل أبرزها برنامج الابتعاث الخارجي الذي انطلق في عام 2005م ورؤية المملكة 2030 التي تبنتها المملكة منذ أبريل 2016.

إيرادات النفط الداخلة في تكوين النفقات الحكومية بين 56–66 في العقود الثلاثة الأخيرة مقارنة بمعدل 94% في عام 1979م بسبب ارتفاع مكونات الإنفاق الحكومي من المصادر الأخرى غير النفط ولتذبذب أسعارا لنفط في بعض الفترات كما حدث في فترة الثمانينيات.

ومما لا شك فيه أن ارتفاع عائدات النفط في السبعينيات وبداية الثمانينيات أسهمت بشكل كبير في توسع وازدهار الاقتصاد السعودي والقطاع المالي خلال فترة قصيرة. كما يرى البعض أن خطط التنمية في المملكة تعتبر من الخطط الطموحة التي تميزت بها المملكة العربية السعودية والتي نقلتها إلى مصاف القوى الاقتصادية على المستوى الدولي.

ولا يمكن أيضا تجاهل دور القطاع الخاص في التنمية الاقتصادية في المملكة خاصة في الفترة الأخيرة، وقد استشعرت الدولة أهمية دور القطاع الخاص في المشاركة في العملية التنموية منذ وقت طويل وقد ظهر ذلك جليا في استراتيجيات وأهداف الخطط التنموية المختلفة وفي الدعم السخي للقطاعات الاقتصادية المختلفة من صناعية وزراعية وحرفية وخدمية والمتمثلة في صناديق الإقراض التنموية والتسهيلات والدعم ونحوه، وأخيرا في تحول ملكية بعض الشركات من الملكية العامة إلى الخاصة مثل الاتصالات والبريد ونحوه.

وتعد رؤية المملكة العربية السعودية 2030 رؤية طموحة تهدف إلى تنويع مصادر الدخل القومي ورفع نسبة الصادرات غير النفطية إلى 50% على الأقل من إجمالي الناتج المحلي غير النفطي، وزيادة الإيرادات الحكومية غير النفطية إلى تريليون ريال سنوياً، والوصول بمساهمة القطاع الخاص إلى 65% من إجمالي الناتج المحلي الإجمالي.

القطاع المالي:

تعتبر الأسواق والمؤسسات المالية من المكونات الأساسية لأي اقتصاد متطور، يعرف Rybezynoki (1986) النظام المالي لأي دولة بمجموعة من المؤسسات والترتيبات التي من شأنها نقل المدخرات من مُولديّها (المدخرين) إلى من يقوم باستخدامها لإغراض الاستثمار أو الاستهلاك.

وعلى الرغم من اختلاف التصنيفات للأسواق المالية تبعا للغرض من ذلك التصنيف إلا انه يمكن تصنيفها إلى مجموعتين حسب تاريخ استحقاق الأوراق المالية المتداولة في السوق. وهما: سوق النقد وسوق رأس المال. ويعتبر سوق النقد سوق مالي قصير الأجل (سنة أو اقل) مثل اذونات الخزانة والأوراق التجارية، أما سوق رأس المال فهو سوق طويل الأجل (سنة أو أكثر) مثل السندات التي تستحق بعد عام والأسهم والرهونات العقارية.

تطور القطاع المالي في المملكة العربية السعودية:

في الفترة التي سبقت اكتشاف النفط في الجزيرة العربية (المملكة العربية السعودية فيما بعد (منذ 1932) لم يكن هناك أي وجود لأي نوع من البنوك بشكلها الحالي، بل تواجد العديد من الصيارفة كنتيجة طبيعية لتزايد توافد الحجيج إلى مكة والمدينة في بداية القرن الماضي، ويعتبر فرع البنك الهولندي هو أول بنك أجنبي تواجد في المملكة (في كل من الدمام والخبر) وذلك عام 1926م. إضافة إلى ذلك لم يكن للمملكة عملة مستقلة بذاتها بل كانت تعتمد على العملات الأجنبية في التعامل النقدي. لم يكن أيضا هناك بنك مركزي أو أي مؤسسة مالية عامة أو خاصة تطلع بهذا الدور. بشكل عام يمكن وصف النظام المالي والبنكي في الجزيرة العربية (المملكة العربية السعودية فيما بعد، 1932) في الفترة التي سبقت عام 1952 م بأنه بدائي وبسيط كما أسلفنا.

تعتبر سنة 1952م (1372 هجرية) الانطلاقة الأولى لتطور القطاع المالي في المملكة العربية السعودية، ففي ذلك العام تم إنشاء مؤسسة النقد العربي السعودي (البنك المركزي السعودي حالياً) باعتباره البنك المركزي للمملكة والذي أوكلت إليها بعض الوظائف التي من أهمها تطوير القطاعين البنكي والنقدي للدولة، وسك العملة، والمراقبة والإشراف على البنوك التجارية، هذا بالإضافة إلى كونها بنك الدولة.

يصف عابدين وشوك (1984) النظام المالي في المملكة بأنه تطور من عدة مصادر فهو في المقام الأول عبارة عن تزاوج نخبوي بين المؤسسات الغربية والإسلامية. يتكون القطاع المالي في المملكة العربية السعودية – والذي تتولى وزارة المالية الإشراف عليه– بشكل أساسي من القطاع النقدي والقطاع البنكي والصيارفة (الذين تم دمجهم مؤخرا في بنك تجاري واحد) وسوق المال (سوق الأسهم) وصناديق الإقراض التنموية، ومصلحة معاشات التقاعد، والمؤسسة العامة للتأمينات الاجتماعية وصندوق الاستثمارات العامة وسوق التأمين وسوق العقار وسوق السندات (الصكوك) وغيرها. علما أن معظم الدراسات والأبحاث تناولت القطاع البنكي وسوق الأسهم أما بالنسبة للثلاثة الأسواق الأخيرة فلم تخضع للبحث والدراسة حاليا لعدة أسباب من أهمها عدم اكتمال هذه الأسواق بشكل رسمي آو لعدم عدم توافر البيانات بالكمية والكيفية المناسبة لأغراض الدراسة العملية. لذلك اقتصرت معظم الدراسات التي تناولت القطاع المالي في المملكة العربية السعودية على متغيرات تمثل كل من القطاع المصرفي وسوق الأسهم أو أي منهما، كما أن معظم الدراسات التي تناولت القطاع المالي في المملكة ركزت بشكل أو بآخر على القطاع المصرفي أو على دراسة كفاءة سوق الأسهم السعودي في حين نجد أن الدراسات التي تناولت القطاع المالي بشكل عام أو صناديق الإقراض المتخصصة أو سوق العقار أو التأمين بالتحليل والقياس لا تزال محدودة ونادرة وبحاجة للمزيد من البحث والتحليل والقياس. فعلى سبيل المثال لا توجد هناك دراسات علمية تطبيقية تناولت بالتحليل والقياس الأسباب التي كانت وراء المشكلات المزمنة التي يعاني منها السوق السعودي

مثل توجه المستثمرين إلى المضاربات بشكل كبير على حساب الاستثمار، صغر حجم السوق، ومخاطر السوق، وافتقاره للشفافية، حوكمة الشركات وافتقاره لبعض مقومات الأسواق المالية في الدول الصاعدة والمتقدمة مثل البورصات والوسطاء الماليين والمشتقات والمستقبليات (Futures) والابتكارات المالية الأخرى مثل الخيارات وحقوق الأفضلية ونحوه ذلك (أي لماذا تأخر سوق المال في المملكة عن اللحاق بركب الأسواق المالية الصاعدة طوال الفترة الماضية)، كما لا توجد دراسات تناولت الأسباب التي أدت إلى حدوث التصحيحات التي مر بها سوق الأسهم السعودي في السنوات العشر الماضية على سبيل المثال.

ومن خلال استعراض الدراسات السابقة التي تمكّنا من الإطلاع عليها والمتعلقة بسوق المال والقطاع المالي في المملكة اتضح وبشكل عام أهمية هذا القطاع في التنمية الاقتصادية والنمو الاقتصادي، أما فيما يتعلق بالدراسات التي تناولت كفاءة السوق السعودي للأسهم فقد توصلت في معظمها وبشكل عام إلى أن السوق السعودي يتصف بالسوق ذو الكفاءة الضعيفة. وأخيراً أظهرت الدراسات التي تناولت العلاقة السببية بين القطاع المالي والقطاع الحقيقي نتائج تؤيد جميع الفرضيات الأربع السابقة: العلاقة التبادلية بين القطاعين، العلاقة باتجاه واحد من القطاع المالي إلى القطاع الحقيقي (فرضية العرض القائد)، العلاقة باتجاه واحد من القطاع الحقيقي إلى القطاع المالي (فرضية الطلب التابع)، في حين لم تظهر الفرضية الأخيرة (عدم وجود علاقة بين القطاعين) سوى في دراسة واحدة. وبهذه النتيجة الأخيرة يتضح لنا مدى استمرار الجدل حول علاقة تطور القطاع المالي بالقطاع الحقيقي، وعدم حسم هذه العلاقة إلى يومنا هذا.

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long and short-run, which is consistent with the expectations. The impact is large in magnitude in the long-run compared to the short-run. In addition, the results indicate that there is a positive impact of the structural break 2003Q1 on stock prices in both the long and short-run, but its effect is big in size in the long-run. Moreover, the estimated structural break 2008Q1 affects stock prices negatively and statistically significant only in the long-run.

These findings should be of interest to stock market participants when making their decisions about investing in the market. In fact, knowing the impact of oil prices and exchange rates on the Saudi stock market may decrease the level of uncertainty about the market. In addition, these results may help policymakers in Saudi Arabia to formulate their policies in a way that does not hurt their economy.

Modelling the relationship between stock and oil prices is an important issue for future research, especially for economies dependent on natural resources or politically unstable ; therefore, this relationship might be investigated in such economies using econometric techniques that take into account more than one-time unknown structural break, since these economies are more likely to face multiple structural breaks that may affect the stability of the cointegrating relationship between the variables.

Moreover, the estimated structural breaks 2003Q1 and 2008Q1 have different impacts on Saudi stock market. The structural break 2003Q1 affects stock prices positively in the long and short-run, since it reflects the start of new phase of oil price increases. But its impact is large in magnitude in the long-run. In fact, TASI index increased from 2518.08 point in 2002 to 4437.58 point in 2003. The impact of the estimated structural break 2008Q1 is negative on the stock prices in both the long and short-run, but statistically significant only in the long-run. During the year 2007, TASI index was 11038.66 point and dropped dramatically to 4802.99 point in 2008, which could be related to global financial crisis.

7.Conclusion:

This paper aims to empirically investigate the relationship between stock prices and oil prices in Saudi Arabia using quarterly data from 1985Q1 to 2018Q4. Since the economy of Saudi Arabia depends heavily on oil, econometric techniques that take into account structural breaks are applied, namely those of Zivot and Andrews (1992), Perron (1997), Gregory and Hansen (1996), and Bai and Perron (1998). The results indicate that there is only evidence of cointegrating relationships between stock and oil prices after considering endogenous structural breaks in the analysis. The multivariate model is used instead of the bivariate model, by adding the nominal exchange rate as a determinant variable to analyze the relationship between stock and oil prices.

The results indicate that there is a positive and statistically significant impact of oil prices and exchange rates on stock prices in the

cointegrating relationship between the variables could not be found unless two structural breaks are taken into consideration (2003Q1 & 2008Q1). In such, this paper takes into account endogenous structural breaks in the analysis, rather than exogenous structural breaks, since the effect of structural breaks may not occur instantly and need some time to get its full impact.

The unit root and cointegration tests that take into consideration only one unknown structural break may not be suitable for countries with low economic diversification such Saudi Arabia. In fact, most of the estimated structural breaks from both unit root and cointegration tests are related to oil shocks. Consequently, using Bai & Perron to estimate multiple structural breaks might be the appropriate technique to use when analyzing the relationship between stock and oil prices.

The results indicate that there is a positive effect of oil prices and exchange rates on stock prices in both the long and short-run; however, the effect is large in magnitude only in the long-run. The results are consistent with the expectation. Saudi Arabia is one of the largest oil exporting countries, and the increase of oil prices would increase the disposable income and consumption thus the firms' profit and the expected cash flows would increase. Since Saudi Riyal is pegged to US dollar, an appreciation of the US dollar against Chinese yuan, may benefit the economy of Saudi Arabia by decreasing the cost of its inputs. Thus, the firms in Saudi Arabia can import more inputs at low cost. As a result, the domestic stock prices are affected positively by exchange rates.

Table (8): Results of the short-run

	coefficients	F stat (p-value)	T stat (p-value)
Δlop_{t-i}	0.076 ***	11.67 (0.00)	
$\Delta lnex_{t-i}$	0.09 **	2.42 (0.02)	
ε_{t-1}	-0.103 ***		-4.293 (0.00)***
DM03Q1	0.128 ***		3.986(0.00)***
DM08Q1	-0.014		-0.695 (0.48)
Adj. R^2	0.71		
Breusch-Godfrey (B-G)		1.471 (0.117)	
Harvey		0.677 (0.77)	
Ramsey Reset		1.22 (0.29)	

6. Results Discussion:

When modeling the relationship between stock and oil prices, the analysis should not depend on bivariate models to avoid the problem of misspecification. Narayan and Narayan (2010) indicate that using bivariate models instead of multivariate models may lead to an omitted variable problem. Therefore, this paper followed Narayan and Narayan's multivariate model by adding another determinant variable, namely nominal exchange rates.

Moreover, the economy of Saudi Arabia is oil-based, which means that the economy might be unstable due to structural breaks that may be caused by oil shocks. Therefore, the cointegrating relationship between stock and oil prices may be affected by these structural breaks and need to be considered in the specification (1). It is obvious from Figure (1) that there might be more than one structural break, which may affect the stability of the model (1). The results point out that the

exchange rates, the sum of the coefficients of each variable are obtained and examined by using F test to check whether they are statistically significant.

The results are reported in Table (8) and show that the short-run effects of oil prices and exchange rates are positive and statistically significant at 1% and 5%, respectively. However, the effects are small in magnitude compared to the long-run. In addition, the effects of both structural breaks are consistent with the long-run analysis; however, the structural break 2008Q1 is not statistically significant comparing with the long-run.

The coefficient of speed of adjustment on the residuals term with one lag (ε_{t-1}) is negative and statistically significant at the 1% level, which is consistent with the expectation. The coefficient is 0.103, which is considered to be low. This means that only 10.3% of the adjustment to the long-run equilibrium occurs on the following quarter of the shock.

The diagnostic tests are applied, and the results are reported in Table (8). The result of the Breusch-Godfrey serial correlation LM test (henceforth B-G) reveals that the null hypothesis of no serial correlation is accepted, since the value of Breusch-Godfrey is 1.471 and the p-value is 0.117. In addition, the result of Harvey test indicates that there is no heteroskedasticity, since the value of the F test is 0.677 and the p-value is 0.77, which means that the null hypothesis of homoscedasticity is accepted. Also, the result of the Ramsey reset test reveals that there is no misspecification problem in the model, since the value of the F test is 1.22 and the p-value is 0.29.

lop	0.264**	2.52 (0.013)
lnex	0.367*	1.679 (0.095)
constant	5.251***	9.719 (0.00)
DM03Q1	1.074***	6.945 (0.00)
DM08Q1	-0.69***	-4.034(0.00)

*,**, *** denote significance levels at 10%, 5% and 1%, respectively.

5.3.2 Short-Run:

Since there is evidence of a long-run cointegrating relationship between stock prices, oil prices, and exchange rates, the error correction model (henceforth ECM) is applied to estimate the short-run oil price and exchange rate impacts on stock prices. To consider the effect of structural breaks on stock prices in the short run, we allow both breaks 2003Q1 and 2008Q1 to take the form $DM03Q1_t = \Delta\, DM03Q1$ and $DM08Q1_t = \Delta\, DM08Q1$ in the ECM with zero lag, and can be written as follows:

$$\Delta lsp_t = \alpha + \sum_{i=1}^{p1} \beta_{1i} \Delta lsp_{t-i} + \sum_{i=0}^{p2} \beta_{2i} \Delta lop_{t-i} + \sum_{i=0}^{p3} \beta_{3i} \Delta lnex_{t-i} + \delta_1 \Delta DM03Q1_t + \delta_2 \Delta DM08Q1_t + \varphi \varepsilon_{t-1} + \varepsilon_t \quad (12)$$

where β_{2i} and β_{3i} indicate the short-run oil price and exchange rate effects; $\delta_1\ and\ \delta_2$ represent the effect of structural breaks 2003Q1 and 2008Q1 in the short-run, respectively; φ is the speed of adjustment, which represents recovery speed from short- run disequilibrium to the long-run equilibrium convergence; and ε_{t-1} is residuals with one lagged that was obtained from the long-run relation (model 1), and is expected to be negative and statistically significant. AIC is used to choose the lag length. To get the short-run impact of oil prices and

2008Q3 are added as fixed regressors to equation (1). The estimation results of the FMOLS and CCR are reported in Table (7). The FMOLS and CCR estimates of the oil prices elasticity (γ_1) are about 0.258, and 0.264 respectively, and statistically significant at the 5% level. This means that there is a statistically significant positive impact of oil prices on stock prices, which is consistent with the expectation. Consequently, for every one percent increase in oil prices, the stock prices increase by about 0.26.

The results of FMOLS and CCR indicate that the exchange rate elasticity is about 0.376 and 0.367 respectively, and statistically significant at the 10% level. This means that there is a positive impact of exchange rate on stock prices. The results point out that a 1% increase of exchange rate of US dollar increase stock prices by less than 1%. Also, the impact of the estimated structural break, which occurred in 2003Q1, is positive on stock prices snice this break may refer to the new era of oil price increases (2003 to June 2014). However, the case is different with the structural break, which occurred in 2008Q1. The impact of 2008Q1 is negative on stock prices since this break may related to Global financial crisis (2007-2008).

Table (7): Results of the long-run elasticities

FMOLS	coefficients	T stat (p-value)
lop	0.258 **	2.158 (0.03)
lnex	0.376*	1.70 (0.090)
constant	5.255***	9.210 (0.00)
DM03Q1	1.085 ***	6.682 (0.00)
DM08Q1	-0.694***	-4.032(0.00)
CCR	coefficients	T stat (p-value)

analysis may lead to misleading results. For instance, when testing the long-run relationship between the variables in Saudi Arabia using Gregory and Hansen's test, we could not reject the null of no cointegration in all the models for Z_α and Z_t statistics. However, when the ARDL-Bound cointegration test was utilized with two structural breaks estimated endogenously by Bai and Perron, the results provide evidence of a cointegrating relationship between the variables.

Table (6): Results of ARDL - Bound test with two endogenous structural breaks

Number of independent variables (K)	F stat	Lower bound I(0)	Upper bound I(1)	Null hypothesis: no long run relationship : $\gamma_1 = \gamma_2 = \gamma_3 = 0$
2	4.490	3.1	3.87	Reject the null

Lower and upper bounds are reported at a 5% significance level. ** denotes rejection of the null hypothesis at a 5% significance level.

5.3 Long and Short Run:

5.3.1 Long Run Elasticities:

Since the structural breaks do not take the form $DM03Q1_t = DM03Q1_{t-1}$ in equation (11) of ARDL-Bound cointegration test, the long-run oil prices and nominal exchange rates elasticities are estimated by Fully Modified Least Squares (FMOLS), and Canonical Cointegrating Regression (CCR)[3]. To take into consideration structural breaks on the regression, two dummy variables for the year 2003Q1 and

[3] From equation (11), the long run oil prices and nominal exchange rates elasticities can be estimated by ECM-ARDL respectively as follows: γ_2/γ_1, and γ_3/γ_1. However, the long-run impact of structural breaks cannot appear in the long run estimation since we consider them as fixed regressors in the ECM-ARDL.

$$\Delta lsp_t = \alpha + \gamma_1 lsp_{t-1} + \gamma_2 lop_{t-1} + \gamma_3 lnex_{t-1} + \sum_{i=1}^{p1} \beta_{1i} \Delta lsp_{t-i} + \sum_{i=0}^{p2} \beta_{2i} \Delta lop_{t-i} + \sum_{i=0}^{p3} \beta_{3i} \Delta lnex_{t-i} + \delta_1 DM03Q1_t + \delta_2 DM08Q1_t + \varepsilon_t \quad (11)$$

where $DM03Q1_t$ denotes the dummy variable corresponding to the year 2003 in quarter Q1, and $DM08Q1_t$ denotes to a dummy variable corresponding to the year 2008 in Q1. The dummy variables are defined as DM03Q1 = 0 for $t < \tau$ and DM03Q1 = 1 for $t \geq \tau$. Similarly, DM08Q1 = 0 for $t < \tau$ and DM08Q1 = 1 for $t \geq \tau$. In order to take into account the impact of structural breaks in the cointegrating relationship, we added the two dummy variables to model (11) as fixed regressors with zero lag. For instance, the two dummy variables do not take the form $DM03Q1_t = DM03Q1_{t-1}$ in model (11); However, we consider them as fixed regressors ($DM03Q1_t, DM08Q1_t$) with zero lag.

The results of the ARDL-Bound cointegration test after considering two structural breaks are reported in Table (6). The results provide evidence of a long-run relationship between the variables. Two conclusions can be derived from these results: First, these results demonstrate that neglecting the effect of structural breaks in the analysis of a cointegration relationship may provide a distorted conclusion, and that was obvious when the ARDL-Bound cointegration test (model 6) was applied without considering the structural breaks. Second, in analyzing the relationship between economic variables, whether at the macroeconomic or microeconomic level in countries with a less diversified economy such as Saudi Arabia, it is important to consider more than one unknown structural break; otherwise, the

rates (op, sp, nex), structural breaks need to be taken into account in the specification (model [1]).

The date of the structural breaks that occurred in 2003Q1 is consistent with the one obtained by Gregory and Hansen's test in all three models (GH1, GH2, GH3). The structural break, which occurred in1991Q1, may refer to the final effect of the Second Gulf War. Moreover, the structural break that occurred in 2008Q1 might be related to the 2007-2008 global financial crisis.

Tables (5): Results of Bai and Perron test

The null hypothesis:	Test stat	Critical values at 5%	Break date	
no breakpoints vs. m breakpoints	Sup $F_T(1)$ = 247.256**	13.98	1991Q1	Reject H_0
	Sup $F_T(2)$ = 54.634**	15.72	2003Q3	
no breakpoints vs. 1 ≤ m ≤ U	UDmax = 247.26 **	14.23	2003Q1	Reject H_0
	WDmax = 247.26**	15.59	2008Q1	
m breakpoints vs. m + 1 breakpoint	Sequential Sup F_T (2 | 1) = 54.63 **	15.72	2003Q1 2008Q1	Reject H_0

** refers significance level at 5%.

The second step is to re-investigate the cointegrating relationship between the variables (op, sp, nex) after considering the two endogenous structural breaks, which were obtained from the Bai and Perron test, in the specification. Two dummy variables are added to the model (6) of ARDL-Bound cointegration test as fixed regressors, and the new form of model (6) can be written as follows:

$$y_t = x'_t \alpha_j + \varepsilon_t \quad (10)$$

where y_t is the dependent variable sp for j= 1, … , m+1, where m is the number of breaks. x'_t is the vectors of covariates (1, op, nex), and α_j refers to vectors of coefficients. In order to obtain the least squares estimate α_j for each number of break partition (T_1, ….,T_m), the sum of squared residuals is minimized (Choi and Jung, 2009). Bai and Perron suggest three methods to determine the number of structural breaks as follows:

1. sup $F_T(m)$, which tests the null H_0, in which there are no breakpoints against the alternative H_1, where there are m breakpoints.
2. UD_{max} and WD_{max} , where UDmax refers to double maximum statistics and WDmax indicates weights double maximum statistics. The null hypothesis under this method is that H_0: no breakpoints against the alternative H_1: $1 \leq m \leq U$ where U refers to the upper bound of the breakpoints' number.
3. Sequential sup $F_T(m+1 \mid m)$, which tests the null hypothesis H_0: m breakpoints against the alternative H_1: m + 1breakpoint.

The estimation results of structural breaks by Bai and Perron (1998) are reported in Table (5). All the three tests of Bai and Perron provide evidence of multiple structural breakpoints at the 5% significance level. The results of these tests indicate that there are significant structural breaks that occurred in 1991Q1, 2003Q1-3, and 2008Q1 that affected the stability of model (1); therefore, when testing the long-run relationship between oil prices, stock prices, and exchange

2014, a boom cycle is revealed due to an increase of oil prices. In fact, 2002Q4 could represent the end period of oil price decreases, and 2003Q2-3 show a new phase of oil price increases.

Table (4): Results of Gregory and Hansen's test

Model	ADF*	Break date	$Z^*\alpha$	Break date	Z^*t	Break date	Null Hypothesis: No cointegration
GH1	-5.142 (2)**	2002Q4	-36.175	2003Q2	-4.395	2003Q2	Only reject the null for ADF
GH2	-3.714 (4)	2002Q4	-34.603	2003Q2	-4.275	2003Q2	Don't reject
GH3	-5.150 (2)	2002Q4	-37.928	2003Q3	-4.543	2003Q3	Don't reject

The critical values are reported in Gregory and Hansen (1996). The number of lags is chosen based on AIC, and the number between parentheses are lag length.

4.2.3 Cointegration Test Results with Two-unknown Structural Breaks:

From the results of Gregory and Hansen, it is clear that there might be more than one structural break that affects the cointegration relation between the variables (sp, op, nex). Consequently, our analysis is extended by investigating the long-run relationship between the variables using a cointegration test with two unknown structural breaks. This can be done in two steps: The first step is to take advantage of Bai and Perron (1998) method and estimate two unknown structural breaks. The second step is to add these two endogenous structural breaks to the ARDL-Bound cointegration test as fixed regressors. The form equation of Bai and Perron (1998) method can be written as follows:

where β_1 shows the intercept before the shift, and β_2 shows the change in the intercept when the shift occurs. Also, γ_1 is the cointegrating slope coefficients before the regime shift while γ_2 is the change in the cointegrating slope coefficients when the regime shift occurs. $DM_{t\tau}$ = 0 for t < τ and $DM_{t\tau}$ = 1 for t ≥ τ, where τ denotes the time when structural change occurs, and t = 1, ……,n.

Gregory and Hansen's test is a joint test, is comprised of three test statistics, and can be written as follows: $ADF^* = inf_{\tau \epsilon T}\, ADF\ (\tau)$, $Z^*\alpha = inf_{\tau \epsilon T}\, Z_\alpha\ (\tau)$, $Z^*t = inf_{\tau \epsilon T}\, Z_t\ (\tau)$. This test examines the smallest values of all the three statistics, ADF^* , $Z^*\alpha$, and Z^*t, because these small values of the test statistics provide evidence against the null hypothesis of no cointegration.

Table (4) represents the results of Gregory and Hansen's cointegration test of the three models. The results of Z_α and Z_t indicate that there is no evidence of a long-run relationship between oil prices, stock prices, and nominal exchange rates in all the models GH1, GH2, and GH3. Therefore, the null hypothesis of no cointegration is not rejected at a 5% significance level. However, the results of ADF* after considering one-time unknown structural break, which occurred in 2002Q4, reveal that there is a long-run relationship between the oil prices, stock prices, and nominal exchange rates only in the level shift model (GH1).

The date of the structural breaks that occurred in 2002Q4 and 2003Q2-3 correspond to important events that affect the economy of Saudi Arabia. During the period from 1985 to 2002, there was a decrease of oil prices, which reveals a deficit cycle; and from 2003 to

Table (3): Results of ARDL-Bound test

Number of independent variables (K)	F stat	Lower bound I(0)	Upper bound I(1)	Null hypothesis: No long run relationship : $\gamma_1 = \gamma_2 = \gamma_3 = 0$
2	1.444	3.1	3.87	Don't reject

The lower and upper bounds are reported at a 5% significance level.

4.2.2 Cointegration Test Results with One-unknown Structural Break:

The cointegration relationship between stock prices, oil prices, and exchange rates could be affected by structural breaks. Thus, the Gregory and Hansen (1996) test (henceforth, GH) with one unknown structural break is performed. Gregory and Hansen point out that the standard ADF test, which does not consider a one-time regime shift in the cointegration analysis, might lead to a misleading conclusion about the long-run relationship between variables. Therefore, the three models with one-time unknown structural break of GH are applied, and they have the following form:

Level shift (henceforth, GH1):

$$y_t = \beta_1 + \beta_2 DM_{t\tau} + \gamma_{1\tau} x_{2t} + \varepsilon_t \quad (7)$$

Level shift with trend (henceforth, GH2):

$$y_t = \beta_1 + \beta_2 DM_{t\tau} + \alpha t + \gamma_{1\tau} x_{2t} + \varepsilon_t \quad (8)$$

Regime shift (henceforth, GH3):

$$y_t = \beta_1 + \beta_2 DM_{t\tau} + \gamma_{1\tau} x_{2t} + \gamma_{2\tau} x_{2t} DM_{t\tau} + \varepsilon_t \quad (9)$$

4.2 Cointegration Test Results:

4.2.1 Autoregressive Distributed Lag (ARDL) Bound Cointegration Test:

In this section, the long-run relationship between oil and stock prices is investigated by using the ARDL-Bound test, proposed by Pesaran et al. (2001). The rationale of using this method is that the result of unit root tests with structural breaks indicate that the existence of structural breaks is not that important for oil and stock series, or there might be more than one significant structural break that may affect the stationarity of the series. Meanwhile, the conventional unit root tests are biased toward accepting the false null hypothesis when there is both trend and structural break in the data. Therefore, we take advantage of this test since it does not require pre-determining the order of integration of the variables. Also, it is still valid to test the long-run relationship between the variables, even though the variables are not from the same order of integration (I(0), I(1)).

The ARDL - Bound test model can be written as follows:

$$\Delta lsp_t = \alpha + \gamma_1 lsp_{t-1} + \gamma_2 lop_{t-1} + \gamma_3 lnex_{t-1} + \sum_{i=1}^{p1} \beta_{1i} \Delta lsp_{t-i} + \sum_{i=0}^{p2} \beta_{2i} \Delta lop_{t-i} + \sum_{i=0}^{p3} \beta_{3i} \Delta lnex_{t-i} + \varepsilon_t \qquad (6)$$

where p refers to optimal lag length, and Table (3) shows the results of the ARDL- Bound cointegration test. The results provide evidence of no long-run relationship between stock prices, oil prices, and exchange rates since the value of F statistics is less than the lower-bound value.

Table 1: Results of unit root tests without structural breaks

Variables	ADF t stat in levels	P-value at 5%	H_0: there is a unit root in a series	ADF t stat in first differences	P-value at 5%	H_0: there is a unit root in a series
sp	-1.094 (4)	0.926	Don't reject	-4.161 (4)***	0.007	Reject
op	-2.544 (4)	0.307	Don't reject	-5.487 (4)***	0.000	Reject
nex	-1.910 (4)	0.644	Don't reject	-3.682 (4) **	0.027	Reject
Variables	KPSS LM-stat in levels	Critical value at 5%	H_0: there is *no* unit root in a series	KPSS t stat in first differences	Critical value at 5%	H_0: there is *no* unit root in a series
sp	0.138 (9)**	0.146	Don't reject	0.053 (8)**	0.146	Don't reject
op	0.184 (9)	0.146	Reject	0.121 (5)**	0.146	Don't reject
nex	0.328 (9)**	0.146	Don't reject	0.145 (0)**	0.146	Don't reject

** denotes the significance level at 5%, while the number in parentheses is lag length.

Table 2: Results of unit root tests with a structural break

Variables	ZA t stat in levels	t stat at 5% critical value	H_0: there is a unit root with a structural break in both the intercept and slope	Breakpoint Date
sp	-3.880 (4)	-5.08	Don't reject	2003 Q2
op	-3.317 (4)	-5.08	Don't reject	2004 Q2
nex	-7.531 (4)**	-5.08	Reject	1993 Q2
Variables	Perron t stat in levels	t stat at 5% critical value	H_0: there is a unit root with a structural break in both the intercept and slope	Breakpoint Date
sp	-3.861 (4)	-5.59	Don't reject	2003 Q1
op	-3.331 (4)	-5.59	Don't reject	2004 Q2
nex	-7.541 (4)**	-5.59	Reject	1993Q1

The numbers between parentheses are lag length that is chosen by AIC.

Similar to the ZA unit root test, Perron (1997) examines a unit root with one unknown structural break, and uses three models (shift in intercept, shift in slope, and shift in both), but this test differs from the ZA test by including one time break dummy variable (DTB is one if t = time break + 1). The model with shift in intercept and slope can be written as follows:

$$y_t = \emptyset + \delta y_{t-1} + \alpha t + \beta DM_t + \gamma_1 DT_t + \gamma_2 DTB_t \sum_{j=1}^{k} \varphi_i \Delta y_{t-j} + \varepsilon_t \quad (5)$$

The results of ZA (1992) and Perron (1997) are presented in Table 2. All the results indicate that the null hypothesis of a unit root with a structural break in the intercept and slope is accepted for all data series at a 5% significance level except nominal exchange rates, meaning that the variables (sp, op) are not stationary in levels. For nominal exchange rates, we could reject the null after considering a significant structural break, which occurred in 1993Q1-2. During the year 1993 two measures adopted by the Chinese government. First, in March 1993, the government allowed Chinese residents to take 6,000 renminbi abroad. Therefore, some banks started handling the conversion renminbi in Hong Kong. Second, the former administrative measures to control the foreign exchange market were changed to Foreign Exchange Stabilization Fund (Jianping, 1998).

In order to determine the lag length, Akaike Information Criterion (AIC) are performed; but for KPSS test, truncation lags are chosen based on the Newey-West method. Table (1) represents the results of unit root tests without taking into account structural breaks. From the results of ADF, we are unable to reject the null hypothesis of a unit root in level data. However, when the first difference is taken from all the variables, the null hypothesis is rejected at a 5% level, which means that all the variables are stationary and integrated of order one I (1). However, the results of KPSS indicate that stock prices and nominal exchange rates are stationary in level, which means that the null hypothesis of no unit root in level series for both variables is accepted at 5% significant levels.

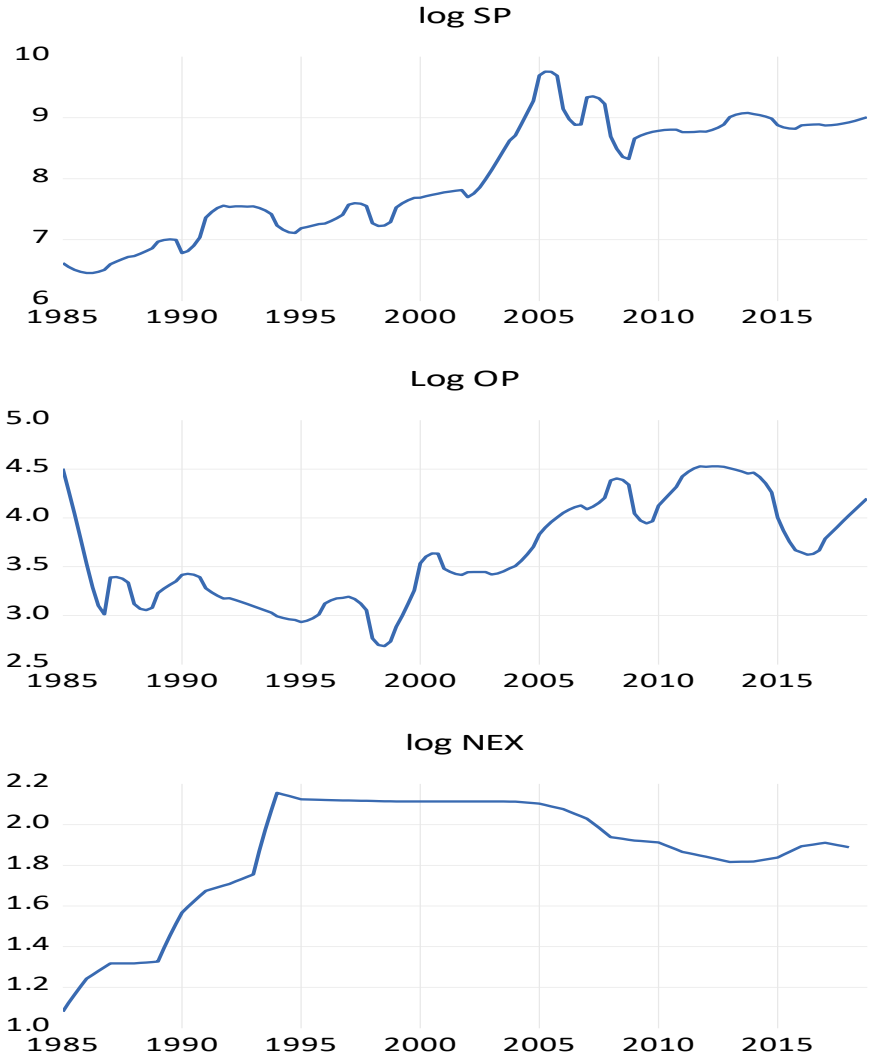
The ZA (1992) utilizes three models to examine a unit root with one unknown structural break, shift in intercept, shift in slope, and shift in both intercept and slope. If the model with shift in intercept and slope was applied while structural break occurs in the model with intercept shift or slope shift, the power loss would be minimal (Banafea, 2014). Thus, the model with shift in intercept and slope is utilized as follows:

$$y_t = \emptyset + \delta y_{t-1} + \alpha t + \beta DM_t + \gamma DT_t + \sum_{j=1}^{k} \varphi_i \, \Delta y_{t-j} + \varepsilon_t \qquad (4)$$

where DM and DT indicate a mean and trend shift, respectively. Δ refers to the first difference; $DM_t = 1$ and $DT_t = t - Tbreak$ if $t > Tbreak$. Tbreak refers the time where the breakpoint occurred; ε_t is error term, which assumes white noise.

structural breaks in our analysis. Also, Figure (1) shows that all the variables, stock prices, oil prices, and nominal exchange rates show a trend. Therefore, the tests of unit root are applied with intercept and trend.

Figure (1): The log-level data of the variables



considered high compared to other countries. In fact, the imports from China increased from 81.8 billion riyals in 2018 to 105.6 billion in 2019, and the exports from Saudi Arabia to China raised from 146.7 billion riyals in 2018 to 179.7 billion in 2019. All the prior data are obtained from SAMA.

The empirical analysis consists of three steps. The first includes testing the stationarity of the series using unit root tests with one unknown structural break to determine the order of integration. The second involves the cointegration relationship between variables being examined using techniques with two unknown structural breaks. Finally, the long- and short-run impact of oil prices and nominal exchange rates on stock prices will be estimated.

4. Approach and Empirical Results:

4.1 Unit Root Test Results:

In this section, two unit root tests are preformed, namely Augmented Dickey- Fuller (1979) (henceforth, ADF) and Kwiatkowski et al. (1992) (henceforth KPSS). Neither test takes into consideration the effect of structural breaks. The null hypothesis under ADF is that there is a unit root, but under KPSS, the null is that there is no unit root. Since structural breaks may affect the properties of the series, two unit root tests, which take into account one unknown structural break, are applied, namely Zivot and Andrews (1992) (henceforth ZA) and Perron (1997). The ZA and Perron tests have the same null hypothesis: There is a unit root with a structural break in the intercept and slope.

The plot of the log-level data in Figure (1) indicates that structural breaks might be important. Thus, it is important to consider

Haung et al. (1996) and Narayan and Narayan (2010) indicate that oil prices may affect stock prices through expected inflation and real interest rate. For importing countries, an increase of oil prices would put downward pressure on a country's exchange rate and upward pressure on the domestic inflation rate. As a result, when expected inflation increases, the discount rate will increase, which affects stock prices negatively.

The impact of exchange rates on stock prices may differ from an import- dominant country to an export-dominant country. For the export-dominant country, an increase of its exchange rate may lead to a decrease in the competitiveness of its exports; therefore, its exports would decrease. As a result, the domestic stock prices would be affected negatively. On the other hand, for an import-dominant country, an appreciation of its exchange rate may lead to a decrease in the cost of its inputs. As a result, the domestic stock prices may be affected positively (Narayan & Narayan, 2010).

Quarterly data is used from 1985Q1 to 2018Q4[1]. The Tadawul All-Share Index (TASI) is used as a proxy for stock prices; the OPEC basket with base year 2005 is used as a proxy for oil prices; and the Chinese Yuan is chosen as the exchange rate against US dollar[2], because the volume of trade exchange China and Saudi Arabia is

[1] High-frequency data, such as daily and weekly data, or low-frequency data such as annual data may not help when we analyze the relationship between oil and stock prices, since oil shocks may not appear clearly in such data. Consequently, the data is transformed from annual frequency to quarterly frequency using Denton-Cholette's method, proposed by Dagum (2006).

[2] Since Saudi riyal is pegged to US dollar, and oil exports are paid by dollar, we use Yuan against US dollar as a proxy for nominal exchange rates.

error term. The theoretical relationship between oil and stock prices can be expressed as follows. Oil prices can impact stock prices through the stock valuation channel. The relationship between stock prices and returns can be presented as follows:

$$R = \left(\frac{lnsp_t}{lnsp_{t-1}}\right) \quad (2)$$

where R is the stock returns, and economic theory indicates that the discounted future cash flows are reflected by the current stock prices as shown in the following equation

$$lnsp_t = \sum_{n=t+1}^{n} \left(\frac{E(C_n)}{1-E(r^n)}\right) \quad (3)$$

where C_n is the cash flow at time n, r is the discount rate, and E(.) is the expectation operator. Equations 2 and 3 indicate that the stock returns can be affected by factors that can impact the expected cash flows and the discount rate (Degiannakis et al., 2018).

Oil prices can affect stock prices (returns) through demand and supply channels. From the supply side, oil prices may affect the disposable income and consumption of exporting countries positively. Therefore, an increase of oil prices may lead to an increase in the disposable income, and this would increase the consumption thus the firms' profit and the expected cash flows would increase. On the demand side, changes of oil prices may affect stock prices negatively through the production cost. Therefore, an increase of oil price may increase the cost of the firms and reduces their profit thus the cash flows would decrease.

spillover effects, there is a unidirectional effect from oil to some sectors for returns. However, for the volatility patterns, there is bidirectional effect.

Akoum et al. (2012) examine the co-movements of stock markets and crude oil returns in the GCC countries and two non-oil markets, namely Egypt and Jordon, from January 16, 2002 to May 31, 2011 using the Wavelet Coherency method. The results indicate that there is no strong link between stock market and oil returns in the short term for all the countries, but there is evidence that stock and oil returns co-move in the long term.

Our review of the literature highlights the fact that there is a lack of consensus about the relationship between oil and stock prices. The contradictory results of the studies could be due to the econometric techniques applied, different frequency of the data used, and the type of structural breaks (endogenous vs. exogenous) includes in the analysis, the different types of data (aggregate vs. disaggregate) used, and the different models. This study attempts to fill a gap in the literature by examining the relationship between oil and stock prices in Saudi Arabia with consideration of endogenous structural breaks.

3. Methodology and Data:

To express the relationship between oil prices and stock prices, this paper makes use of the model proposed by Narayan and Narayan (2010). The model can be written as follows:

$$lnsp_t = \gamma_0 + \gamma_1 lnop_t + \gamma_2 lner_t + \varepsilon_t \qquad (1)$$

where $lnsp$ is the natural log of stock prices, $lnop$ is the natural log of oil prices, and $lner$ is the natural log of nominal exchange rate, ε is the

volatility except bank and insurance sectors during the 10th, 25th, and 75th quantiles. Also the results of Quantile regression analysis for wavelet nonlinear denoising with a soft thresholding series reveal that only aggregate market index, transport and telecommunication sectors are not sensitive of oil price volatility during the 75th and 90th quantiles.

Degiannakis et al. (2018) survey the literature on the relationship between oil price and stock market, and found that most of the research focuses on the effect of oil markets on stock markets. They also revealed that results vary between the studies due to several factors: The type of data used, specifically whether it is aggregate or disaggregate data of stock indices; whether the country is net oil exporting or net oil importing; and whether the change in oil price is symmetric or asymmetric.

Using quarterly data covering the period 1994Q4-2015Q2 for eight countries, including Saudi Arabia, Simohammed et al. (2016) utilize Panel-ARDL and SVAR techniques to examine the impact of oil prices on stock prices. The results indicate that there is both a short- and long-term relationship between oil and stock prices; also, the results point out that there is a positive impact of oil prices on stock prices in Saudi Arabia.

Jouini (2013) investigates the relationship between world oil price and stock markets in Saudi Arabia using the VAR-GARCH process and weekly data from January 10, 2007 to September 28, 2011. The results conclude that there is evidence of both volatility and return transmission between stock sector markets and oil price. For the

impact of oil price slump during 2014-2016 period, the data are divided into the pre-oil price slump and slump period.

In the pre-slump period, the results of the GCC countries reveal that there are asymmetric long run impacts of oil price fluctuations on the aggregate market index except for Saudi Arabia and Qatar. However, in the slump period, there is evidence of asymmetrical long run impacts in all GCC countries. The results of the short run indicate asymmetrical impacts of oil prices on the aggregate index in the period of pre-slump in all GCC countries except for UAE. During the slump period, the findings show asymmetrical impacts of oil prices on the aggregate index in all GCC countries.

deJesus et al. (2020) investigate the dynamic relationship between oil and stock prices in the long run using daily data from March 13, 2001 to August 25, 2017 for selected oil exporting and importing countries including Saudi Arabia. To consider structural breaks in the analysis, the approach which is proposed by Rafailidis and Katrakilidis (2014) are applied. For oil exporting countries, the results indicate that there is a positive relationship between oil and stock prices in the long run. The results of oil importing countries depend on whether they are developed or emerging economies. There is a positive relationship in the case of emerging economies while a negative relationship in developed economies.

Using monthly data from 2006 to 2017, Hamdi et al. (2019) examine the relationship between oil price volatility and the stock sectoral returns in the GCC countries by using quantile regression analysis. The results indicate that all sectors are interdependent of oil

Cevik et al. (2021) examine the dynamic relationship between crude oil and stock returns in Saudi Arabia using weekly data from 2001 to 2018, and time-varying causality in the mean and variance tests. To take into consideration any leverage impacts in the volatility of stock returns, an APARCH process was utilized. They find that crude oil prices have significant impacts on stock returns. Their empirical results showed that there is a bidirectional causality relationship between oil prices and stock returns. Also, there are presence of risk spillovers between oil prices and stock returns.

Jiang and Yoon (2020) utilize two types of wavelet method to study the dynamic co-movement between oil and stock markets in six countries including Saudi Arabia using weekly data from 13 January, 2006 to 29 December, 2019. The main findings indicate that there are feedback relationships between the price movement of oil and stock markets in all six countries. The results of the wavelet coherence analysis reveal that the pairs of oil and stock returns in oil exporting countries have high co-movement during the period from 2007 to 2017, and the returns of oil prices affect the stock returns of Saudi Arabia, Russia, and Canada during that period. Also, stock returns in oil exporting countries are more influenced by oil prices compared with oil importing countries.

Siddiqui et al. (2020) analyze an asymmetric impact of the oil prices on stock prices in GCC countries and other largest oil importing countries. The Nonlinear ARDL approach was applied using weekly data from the period 14 July, 2008 to 29 August 2016. To capture the

Secondly, most of the previous work examine the impact of exogenous structural breaks on the relationship between oil and stock prices in Saudi Arabia, and little attention has been paid to endogenous structural breaks. Also, most of studies used daily and weekly data, and this frequency may affect the cointegration relationship between variables since the structural breaks, which may be caused by oil shocks, may not appear clearly in such frequency. In fact, the stability of the model is an important issue when examining the relationship between variables; therefore, choosing the daily or weekly data when analyzing the relationship between oil and stock prices could lead to misleading results.

Lastly, oil shocks may cause structural breaks, and the effect of these breaks may not occur instantly. Consequently, we use econometric techniques, namely those posed by Gregory and Hansen (1996) and Bai and Perron (1998), to take into account endogenous structural breaks.

The reminder of this paper is organized as follows: Section 2 reviews related literature. Section 3 presents methodology and data. Section 4 presents empirical results. Section 5 discusses results. Section 6 concludes the paper.

2. Literature Review:

A large body of academic literature is devoted to empirically investigate the link between oil and stock prices (returns) in both oil exporting and importing countries. This section provides a brief review of recent studies on the relationship between oil and stock prices (returns) in Saudi Arabia.

including Saudi Arabia (Cevik et al.,2021; Jiang and Yoon, 2020; Siddiqui et al.,2020; deJesus et al.,2020; Hamdi et al.,2019; Degiannakis et al., 2018).

From the literature, it is obvious that there is no consensus about the relationship between stock prices (returns) and oil prices in Saudi Arabia. In fact, most of the studies evaluate the relationship between oil and stock prices in Saudi Arabia during unstable periods such as the 2007-2008 global financial crisis, the oil shock, which occurred in June 2014, the 2003-2011 Iraqi war, and the collapsed of Saudi stock market in 2006. All these events likely created structural breaks, and the final effects of these events may not appear instantly but need some time. Consequently, this paper aims to re-examine the relationship between oil and stock prices in Saudi Arabia using econometric methods, namely Gregory and Hansen (1996), Bai and Perron (1998), which include endogenous structural breaks in the relationship between oil and stock prices.

What distinguishes this paper from the previous work on Saudi Arabia is that this paper utilizes two econometric techniques to test the long-run relationship between oil and stock prices, with consideration of multiple endogenous structural breaks. The economy of Saudi Arabia is less diversified since it depends heavily on natural resources such as oil and natural gas. Therefore, changes in oil or gas prices may create structural breaks. Neglecting taking into account structural breaks in the analysis of the relationship between oil and stock prices may lead to distorted results.

Structural Changes and the Relationship Between Stock and Oil Prices in Saudi Arabia

1. Introduction:

Many studies on the literature have focused on the link between oil price shocks and various macroeconomic variables. Hamilton (1983), a pioneer study, found that there is a negative impact of oil price fluctuations on economic output in the U.S. This study motivated many researchers to further investigate the effect of oil price shocks on various economic conditions, such as economic growth, interest rates, inflation, etc. (Mork, 1989; Hooker, 1996; Kilian, 2008). Therefore, the link between economic conditions and corporate cash flows and interest rates may affect the stock price markets.

Jones and Kaul (1996) wrote a pioneer study that shed light on the effect of oil price fluctuations on the stock markets by examining the impact of oil price fluctuations on stock markets in the US, Canada, UK, and Japan using the standard present value model. The results indicate that there is a significant and negative impact of oil price fluctuations on stock market returns through its impact on cash flows for all four countries. Following Jones and Kaul, several studies have investigated the relationship between oil price changes and stock prices (returns). More recently, there is an abundance of studies that investigate the link between oil and stock prices using various econometric techniques in both oil exporting and importing countries

Structural Changes and the Relationship Between Stock and Oil Prices in Saudi Arabia

Waheed A. Banafea*

Abstract

The purpose of this paper is to investigate empirically the relationship between the stock and oil prices using quarterly data from 1985Q1 to 2018Q4. Since the economy of Saudi Arabia is an oil-based one, econometric techniques that take into consideration structural breaks are utilized. The results indicate that the long-run relationship between stock prices, oil prices, and exchange rates could not be found until two endogenous structural breaks are taken into consideration in the analysis. The findings show that there is a positive and statistically significant impact of oil prices and exchange rates on stock prices in both the long and short-run; however, the impact is big in size only in the long-run. Also, the impact of the structural break, which occurred in 2003Q1, on stock prices is positive and significant in both long and short-run. The structural break, which occurred in 2008Q1, affects stock prices negatively and significant in the long-run. The impact of both structural breaks is large in magnitude only in the long-run. These results may help market participants to make their decisions under a low level of uncertainty in Saudi Arabia.

* Department of Economic & Budget, Institute of Public Administration, Riyadh 11141, Saudi Arabia. Email: banafeaw@ipa.edu.sa

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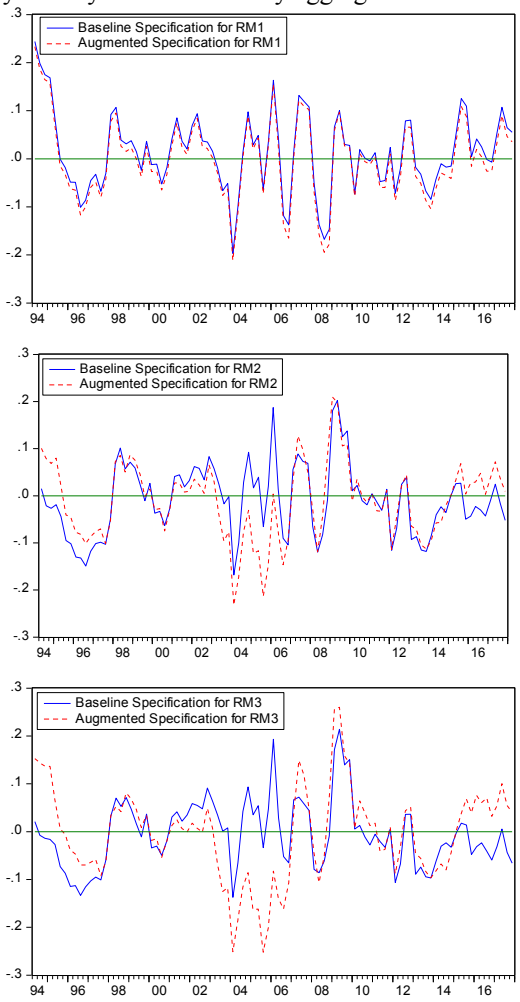
stability of the key macroeconomic aggregates. The findings can also provide important policy implications for the other GCC countries given their common economic and institutional features with Saudi Arabia. It is also found that the recent money decreases do not lead to noticeable liquidity lack and, thus, to inflation declines.

The present framework can be adapted to other research issues as well. For example, an analysis of the long-run money demand function for the Middle Eastern and North African (MENA) countries can be interesting to check for consensual results. The application of panel methods to investigate the cointegrating relationships in the framework of the money demand function may be attractive given the economic and political similarities in the sub-regions of MENA region.

6. Conclusion:

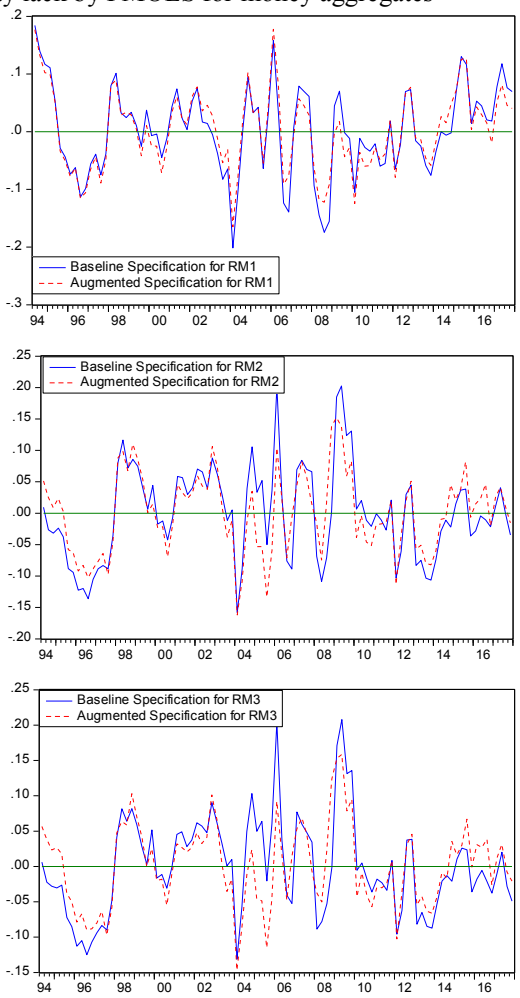
The study focuses on the estimation and stability properties of the long-run money demand function for the Saudi economy over 1994–2017 using efficient estimation methods of cointegrating relationships and tests for cointegration breakdown that are well suited in case of a break date at the end of the sample. This aims to check whether the recent declining money growth rates exhibit a structural change in the long-run money demand function, which has implications on the monetary policy to follow by policymakers in order to achieve macroeconomic stability. Findings reveal long–run relationships between demand for money and the considered forcing variables. Another interesting result is that the constraint that income elasticity of demand for money is unity is not rejected for all money aggregates, which does not support the scale economies in money management. The estimate results are aligned with the underlying theory of demand for money, as the responses of money demand to changes in real income, interest rate, inflation, and equity market variables are correctly signed, pointing to economically intuitive conclusions. Additionally, it is found that although money aggregates induce break dates in their time-varying patterns, the long-run money demand equation is stable during the estimation period, as the money declines recorded from 2015 do not exhibit a structural change irrespective of whether equity market influences are taken into account. This result formally highlights a robust stability of the long-run money demand function for the Saudi economy, which can help authorities make proper decisions to achieve

Figure 4. Liquidity lack by FIML for money aggregates



cannot be attributed to the equity market falls recorded at the end of the sample (Figure 2), and tells us about the robustness of the findings, as shown above.

Figure 3. Liquidity lack by FMOLS for money aggregates



5. Liquidity Lack:

The final issue in our analysis involves determining whether the recent persistently money declines lead to liquidity lack in Saudi Arabia and, thus, to inflation reductions. Toward this end, for the above two long-run money specifications, we consider the FMOLS and FIML estimates to measure the liquidity lack by means of the equilibrium errors, that is, the difference between the observed money and the fitted money that is derived from the estimated long-run money demand function. The measures estimated from the baseline and augmented specifications for each money aggregate are displayed in Figure 3 for FMOLS and Figure 4 for FIML. It turns out that there is no indication of noteworthy liquidity lack since 2015Q3 for narrow money and 2015Q4 for broad money irrespective of whether equity market variables are incorporated into the money demand specification for both estimation methods. This finding may reflect the no cointegration breakdown of the long-run money demand function after these dates (Tables 7 and 12), and imply that the recent declining money growth rates do not generate liquidity problems and, thus, inflation reductions for the Saudi economy, which can be seen in the consumer price index (Figure 1) that tends to increase at the end of the sample. Additionally, the liquidity lack measure that includes the effects of equity market variables generally produces results that are similar to the results produced by the measure that neglects these effects for each money aggregate. This suggests that the recent persistently money declines

Table 12. Cointegration breakdown test results

RM1	FMOLS	FIML
Pa	0.053 (0.605)	0.031 (0.865)
Pb	0.050 (0.605)	0.044 (0.757)
Pc	0.033 (0.632)	0.026 (0.878)
Ra	1.398 (0.434)	0.629 (0.757)
Rb	1.297 (0.461)	1.220 (0.622)
Rc	0.571 (0.421)	0.438 (0.622)
RM2	FMOLS	FIML
Pa	0.014 (0.949)	0.033 (0.855)
Pb	0.008 (0.999)	0.036 (0.855)
Pc	0.006 (0.999)	0.021 (0.829)
Ra	0.333 (0.744)	1.027 (0.737)
Rb	0.129 (0.936)	1.111 (0.724)
Rc	0.058 (0.936)	0.612 (0.579)
RM3	FMOLS	FIML
Pa	0.010 (0.962)	0.042 (0.776)
Pb	0.006 (0.999)	0.064 (0.592)
Pc	0.005 (0.999)	0.045 (0.513)
Ra	0.143 (0.885)	1.228 (0.632)
Rb	0.022 (0.999)	1.983 (0.526)
Rc	0.019 (0.987)	1.334 (0.368)

Notes: The tests are applied to the FMOLS and FIML procedures. For the Phillips-Hansen FMOLS estimation method, a Parzen kernel with automatic plug-in band-width parameter selection is used to calculate the nonparametric correction; and for the Johansen FIML estimation method, an optimal lag length of two picked by the Schwarz information criterion is used for the three money-based level VAR systems. P-values are calculated based on a parametric subsampling method (Andrews and Kim, 2006). Simulated p-values are reported in parentheses.

policy analysis.[17] The implication of such a finding is that it would have been natural for SAMA to opt for money supply as a well suited tool for monetary policy decisions.

In other empirical studies, Rao and Kumar (2009) provide evidence of a stable narrow money demand function for Asian countries during 1970–2005, implying that central banks should consider money supply in framing a monetary policy. Kumar et al. (2013) show a stable money specification for Nigeria using the narrow measure over 1960–2008, although there is a regime-shift in the money demand relationship for 1986. They also outline that the use of money supply may be considered a monetary policy instrument. El-Shazly (2016) examines the stability of money demand function for Egypt and the implications for the implementation of monetary policy. He finds evidence of regime-shifts in the money demand function, and that the short-term interest rate is the main policy instrument. More recently, Kjosevski and Petkovski (2017) reveal that the money demand function for seven Southeast European economies is relatively stable from 2005 to 2014.

[17] A similar result is found by Hamori and Hamori (2008) who reveal that the money demand function for 11 European Union (EU) economies is stable over 1999-2006 as per the money aggregate M3, suggesting that such an aggregate is suitable for the European Central Bank's formulation of the monetary policy.

cointegrating relationship between demand for money and the explanatory factors are stable over time against the alternative hypothesis of structural instability at one unknown break date. The results (not presented to preserve space) reveal instability of the long-run money demand function during the estimation period for all money aggregates, with a break date being occurred around 2013, thus implying that demand for money and the related determinants are cointegrated with an unstable relationship. This finding underlines that either the long-run money demand function is really unstable or the structural stability null hypothesis is erroneously rejected, as the $SupF$ test is not typically suitable to the situation of a break date at the end of the sample. Therefore, given the well-established stability of the money demand function for the Saudi economy over different study periods (Darrat, 1984; and Bahmani, 2008), it seems that the application of well suited tests for long-run stability that are designed for the case of a break date over a relatively short time period at the end of the sample leads to pertinent conclusions, giving support to policymakers to make a judicious monetary policy in order to achieve macroeconomic stability.

As a comparison between the empirical findings of narrow and broad money in terms of compliance with the underlying theory of demand for money and structural stability, we retain the results of the augmented specification with second broad money estimated by FIML. Indeed, in addition to guaranteeing the stability of the long-run money demand function over the study period, this specification provides correctly signed coefficients. Accordingly, these estimation results can be dependably employed by Saudi authorities to design an adequate

Like the baseline specification, we consider the cointegration breakdown tests of Andrews and Kim (2006) to gain more evidence on structural stability of the long-run money demand function. The results displayed in Table 12 indicate that for all money aggregates, the persistently money falls do not induce a strucrural break for the augmented specification, thus suggesting stability of the long-run money demand function over the estimation period by all of the tests applied to FMOLS and FIML, although there are break dates located in the money aggregates (Table 3). Like the estimation issue, taking into account the equity market influences does not affect structural stability of the long-run money demand function. Hence, demand for money, real income, interest rate, inflation, and stock market variables are cointegrated with a stable relationship, implying that the recent persistently money declines do not lead to stability problems of the long-run money demand fucntion. This finding gives support to the views put forward by Darrat (1984) and Bahmani (2008) that money demand function is stable even though it was during previous study periods (1962–1981 and 1971–2004), thus pointing to strong evidence of stability for money demand in Saudi Arabia.

The stability of the long-run money demand function (baseline and augmented specifications) is also analyzed by the *SupF* test, developed by Hansen (2002), that is adapted for cointegrated regression models, making use of the Phillips-Hansen FMOLS estimation method. The test allows testing the null hypothesis that the coefficients of the

Table 11. Estimates of the long–run money demand function

RM1	FMOLS	FIML
Constant	-3.381*** (0.963)	-5.360*** (1.005)
RGDP	0.948*** (0.045)	1.051*** (0.071)
Interest rate	-0.100*** (0.019)	-0.120*** (0.024)
Inflation rate	-4.888*** (1.884)	-10.273*** (2.262)
Share price	0.073 (0.045)	-0.020 (0.076)
Volatility	-4.254** (1.836)	0.684 (2.977)
RM2	FMOLS	FIML
Constant	-0.930 (0.817)	-0.995 (0.911)
RGDP	0.834*** (0.038)	0.845*** (0.061)
Interest rate	-0.042*** (0.016)	-0.064*** (0.021)
Inflation rate	-1.116 (1.598)	-5.883*** (1.989)
Share price	0.182*** (0.038)	0.153** (0.067)
Volatility	-5.323*** (1.557)	-1.065 (2.699)
RM3	FMOLS	FIML
Constant	1.969** (0.772)	2.519*** (0.841)
RGDP	0.734*** (0.036)	0.717*** (0.064)
Interest rate	-0.052*** (0.015)	-0.086*** (0.022)
Inflation rate	0.573 (1.510)	-6.886*** (2.101)
Share price	0.172*** (0.036)	0.155** (0.070)
Volatility	-4.335*** (1.471)	1.924 (2.844)

Notes: For the Phillips-Hansen FMOLS estimation method, a Parzen kernel with automatic plug-in bandwidth parameter selection is used to calculate the nonparametric correction; and for the Johansen FIML estimation method, an optimal lag length of two picked by the Schwarz information criterion is used for the three money-based level VAR systems. Standard errors are displayed in parentheses. *** and ** denote significance at the 1% and 5% levels.

Table 10. Perron-Rodríguez test results

MSB statistic				**Z_rho statistic**		
Dep. variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
RM1	0.140	0.159	0.140	-33.570	-25.52	-33.510
RGDP	0.105**	0.106*	0.105**	-54.480***	-51.14**	-54.410***
Interest rate	0.173	0.164	0.173	-16.920	-20.520	-16.910
Inflation rate	0.240	0.146	0.240	-12.980	-26.050	-12.930
Share price	0.125	0.118	0.125	-42.810**	-47.810**	-42.790**
Volatility	0.123	0.118	0.123	-43.380**	-48.210**	-43.360**
Dep. variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
RM2	0.130	0.132	0.130	-36.330*	-30.420	-36.330*
RGDP	0.131	0.132	0.131	-35.050*	-34.700	-35.050*
Interest rate	0.190	0.170	0.190	-13.500	-18.830	-13.500
Inflation rate	0.169	0.166	0.169	-20.250	-18.720	-20.240
Share price	0.119*	0.118	0.119	-46.590**	-47.620**	-46.580**
Volatility	0.117*	0.117	0.117*	-47.890**	-49.560**	-47.890**
Dep. variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
RM3	0.134	0.137	0.134	-33.720	-27.940	-33.720
RGDP	0.134	0.137	0.134	-32.960	-31.830	-32.960
Interest rate	0.185	0.163	0.185	-14.590	-20.950	-14.590
Inflation rate	0.203	0.158	0.203	-14.790	-20.730	-14.780
Share price	0.121	0.120	0.121	-44.420**	-46.170**	-44.410**
Volatility	0.118*	0.117	0.119	-46.090**	-49.320**	-46.080**

Notes: Model 1: constant and non-trending data; Model 2: constant and time trend (with or without trending data); and Model 3: constant with trending data (deterministic cointegration). ***, ** and * denote cointegration at the 1%, 5% and 10% levels, respectively.

The share price has a predictability power only for broad money aggregates regardless of the estimation method, with similar impact. The significant impact of stock price on demand for money (significant wealth effect) implies that financial assets are considered alternatives to holding money.[15] This result can be attributed to reforms established in equity markets of the GCC region in the mid–2000s. Long-run demand for money is negatively and significantly linked to equity market volatility regardless of the money aggregate using FMOLS procedure. Volatility coefficient estimated by FIML is positive but not significant for narrow and second borad money aggregates.[16] Stock market coefficients estimated by FIML are correctly signed for the second broad money aggregate, although volatility coefficient is not statistically significant, which is aligned with the findings of Friedman (1988).

[15] In similar studies, Caruso (2001) finds a significant wealth effect for a set of 25 economies, and Kontolemis (2002) shows evidence of significant responses of demand for money to changes in stock prices in the euro area.

[16] European Central Bank (2003) reveals that increased uncertainty in stock prices leads to opt for safe and liquid assets rather than equities.

Table 9. Johansen test results

		Trace Statistic		**Max-Eigen Statistic**	
RM1	**Null hypothesis**	Model 1	Model 2	Model 1	Model 2
	None	118.015***	98.677**	43.453**	40.406**
	At most 1	74.562*	58.271	26.031	24.669
	At most 2	48.531	33.602	24.201	13.678
	At most 3	24.330	19.925	11.697	10.852
	At most 4	12.633	9.073	9.214	7.327
	At most 5	3.419	1.746	3.419	1.746
RM2	**Null hypothesis**	Model 1	Model 2	Model 1	Model 2
	None	132.174***	107.660***	52.327***	44.526**
	At most 1	79.846**	63.134	29.193	21.250
	At most 2	50.653*	41.884	20.834	17.027
	At most 3	29.819	24.857	16.567	13.011
	At most 4	13.251	11.846	10.069	9.817
	At most 5	3.182	2.030	3.182	2.030
RM3	**Null hypothesis**	Model 1	Model 2	Model 1	Model 2
	None	142.962***	119.305***	61.426***	53.099***
	At most 1	81.536**	66.206*	29.555	23.219
	At most 2	51.982*	42.987	21.513	18.561
	At most 3	30.469	24.426	17.345	12.792
	At most 4	13.124	11.634	9.870	9.448
	At most 5	3.254	2.1862	3.254	2.186

Notes: Model 1: restricted constant and no deterministic trend; and Model 2: linear deterministic trend. The optimal lag length picked by the Schwarz information criterion is two for the three money-based level VAR systems. ***, ** and * denote rejection of the null hypothesis at the 1%, 5% and 10% levels, respectively.

Regarding the long-run effects, the estimation results provided in Table 11 indicate that the coefficients of real GDP, interest rate, and inflation behave similarly to those of the baseline specification in terms of sign and significance across estimation methods, with the exception of inflation that becomes significant for broad money using the FIML estimation procedure.[14] As to magnitude, the income and interest rate elasticities are in the estimation range obtained for the baseline specification. However, for inflation, the differences in the estimated coefficients are relatively mediocre for each money aggregate across estimation methods. Overall, controlling for stock market variables in the long-run money demand function does not generally alter the responses of demand for money to the fluctuations in real GDP, interest rate, and inflation.

[14] In a similar context and using annual data from 1971 to 2004, Bahmani (2008) finds that inflation negatively and significantly affects demand for money measured by the second real money aggregate for Saudi Arabia, thus suggesting that inflation can be used as a proxy for cost of holding money.

From the unit root test results presented in Table 8, share price and equity market volatility are $I(1)$,[13] suggesting that we can analyze cointegration properties of the augmented specification of the money demand function. The test results displayed in Tables 9 and 10 reveal that demand for money, real GDP, interest rate, inflation, and stock market variables exhibit cointegrating relationships at the conventional significance levels irrespective of the included money aggregate, thus supporting the augmented specification of the long-run money demand function for the Saudi economy.

Table 8. Unit root test results

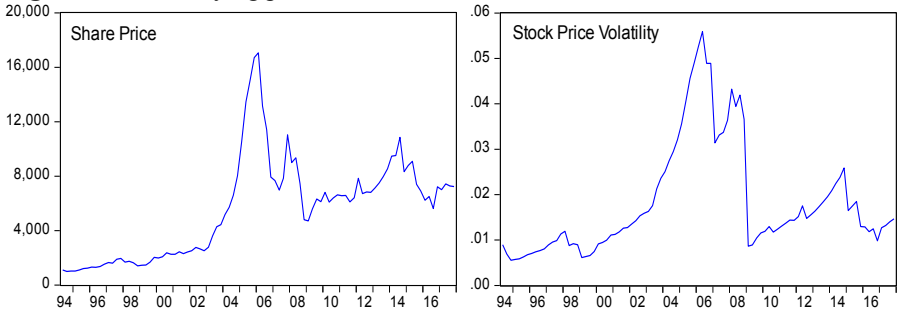
	PP		**ERS**		**NP**	
	Intercept	Trend	Intercept	Trend	Level breaks	Level and slope breaks
Share price	-1.482	-1.529	35.968	16.200	-0.682	-2.110
	-7.850***	-7.919***	0.908***	2.337***	-9.324***	-8.984***
Volatility	-1.914	-1.838	4.960	13.442	-0.367	-1.478
	-8.692***	-8.654***	0.581***	2.012***	-16.820***	-16.080***

Notes: Top value: level series; and Bottom value: First-differences. The null hypothesis of unit root is tested by all tests. For PP and ERS tests, we estimate two regressions with only an intercept as well as with an intercept and time trend, and the Bandwidth is selected by the Newey-West method using Bartlett kernel. For NP test, we estimate two regressions with only level changes as well as with level and slope changes by accounting for two endogenous structural breaks, and the procedure of Hall (1994) is used to select the optimal lag length. *** denotes stationarity at the 1% level.

[13] The stock market variables experience two break dates located at 2006Q3 and 2008Q3. The second break coincides with the September 2008 fall of Lehman Brothers, reflecting the substantial declines in equity price (Figure 2).

this vein, Carstensen (2006) outlines that augmenting the euro area money demand function with stock market variables affects stability of the specification.[11] Regarding the expected coefficient signs, Friedman (1988) argues that share price and equity market volatility are assumed to have positive wealth and risk-avoidance effects, respectively.[12] This implies that when stock price and financial uncertainty rise, investors generally invest in safe and liquid assets more than in equities; however, the situation would be reversed once equities and financial uncertainty diminish.

Figure 2. Time-varying patterns of stock market variables



[11] In a similar context, Bahmani-Oskooee and Baek (2017) reveal that the inclusion of output and monetary uncertainty measures leads to stability of the money demand function in Korea.

[12] There is evidence of positive dependence of money aggregates with stock market variables, as correlation coefficients are close to 0.6 for share price and to 0.15 for equity market volatility.

4. Robustness Check:

To give support to the above estimate results in order to check for their robustness, we control for the effects of share price and equity returns volatility on demand for money. Toward this end, for each money aggregate, we augment the specification given by Eq. (1) with share price and volatility as follows:

$$RM_t = a_0 + a_1 RGDP_t + a_2 Interest_t + a_3 Inf_t + a_4 Stock_t + a_5 Vol_t + v_t \quad (2)$$

where $Stock_t$ denotes share price, and Vol_t denotes stock returns volatility.[10] This study is the first to examine equity market influences in the framework of long-run money demand function for the Saudi economy. Theoretically, these variables are assumed to reflect investor expectations as regards holding money or stocks. In this context, investors can revise their expectations progressively over time as new information arrives. The inclusion of equity market variables in the long-run money demand function is motivated by the fact that, like money aggregates, there is evidence of decreases in the share price and stock market volatility over the same short time period at the end of the sample (Figure 2). Accordingly, these synchronized declines in money demand and stock market variables may be indicative of a potential relationship between them. Additionally, it is important to examine whether taking into account the equity market effects can be useful in affecting structural stability of the long-run money demand function. In

[10] We estimate the stock market volatility from the univariate GJR–GARCH model developed by Glosten et al. (1993). The model allows for asymmetry in volatility to highlight the effects of negative and positive shocks of equal magnitude on equity market volatility.

Table 7. Cointegration breakdown test results

RM1	FMOLS	FIML
Pa	0.088 (0.250)	0.033 (0.703)
Pb	0.071 (0.461)	0.039 (0.581)
Pc	0.050 (0.500)	0.030 (0.676)
Ra	3.054 (0.053)	0.715 (0.432)
Rb	2.388 (0.118)	1.008 (0.297)
Rc	1.510 (0.066)	0.573 (0.297)
RM2	FMOLS	FIML
Pa	0.007 (0.999)	0.031 (0.868)
Pb	0.007 (0.999)	0.014 (0.999)
Pc	0.006 (0.999)	0.007 (0.999)
Ra	0.051 (0.987)	0.752 (0.579)
Rb	0.035 (0.987)	0.234 (0.776)
Rc	0.013 (0.999)	0.055 (0.961)
RM3	FMOLS	FIML
Pa	0.008 (0.999)	0.064 (0.605)
Pb	0.011 (0.987)	0.027 (0.908)
Pc	0.007 (0.999)	0.013 (0.999)
Ra	0.136 (0.910)	1.971 (0.474)
Rb	0.235 (0.821)	0.769 (0.645)
Rc	0.117 (0.885)	0.285 (0.658)

Notes: The tests are applied to the FMOLS and FIML procedures. For the Phillips-Hansen FMOLS estimation method, a Parzen kernel with automatic plug-in band-width parameter selection is used to calculate the nonparametric correction; and for the Johansen FIML estimation method, an optimal lag length of two picked by the Schwarz information criterion is used for the three money-based level VAR systems. P-values are calculated based on a parametric subsampling method (Andrews and Kim, 2006). Simulated p-values are reported in parentheses.

persistently money declines do not induce a break date for the baseline specification as all tests do not reject the null hypothesis, thus suggesting that demand for money, real income, interest rate, and inflation are cointegrated with a stable relationship over the study period regardless of the estimation method. For narrow money, stability of the long-run money demand function is not rejected except for the Ra and Rc tests applied to FMOLS procedure at the 10% significance level.

show evidence of declines from 2015Q3 for narrow money and from 2015Q4 for broad money (Figure 1), and to allow valid inference, the stability of the long-run money demand function is analyzed by tests developed for the case of a break date occurring at the end of the sample (2015 for the current study). In this vein, we apply tests for cointegration breakdown proposed by Andrews and Kim (2006) who outline that the breakdown of the long-run relationship at a relatively short time period at the end of the sample might be due to a change in the cointegrating vector or in the disturbances from being stationary to being I(1). The study implements six cointegration breakdown tests (Pa, Pb, Pc, Ra, Rb, and Rc) that show in general good size and power properties for a wide range of cases (Andrews and Kim, 2006). The tests are applied to the FMOLS and FIML procedures that are employed to estimate efficiently the cointegrating vectors. The *p*-values of the tests are calculated based on a parametric subsampling method. The test setup evaluated in this study consists of testing a break date at the start of the persistently money declines in 2015Q3 for narrow money and in 2015Q4 for broad money. Under these conditions, the cointegration breakdown tests allow testing the null hypothesis of cointegration prevailing from 1994Q2 to 2017Q4 against the alternative hypothesis of cointegration breakdown during the postbreak time period, namely 2015Q3-2017Q4 for narrow money and 2015Q4-2017Q4 for broad money. In other words, under the null, the relationship between the variables is stable over both subsamples; however, under the alternative, cointegration breaks down in the second subsample. The test results displayed in Table 7 clearly reveal that for broad money, the

Table 6. Estimates of the long–run money demand function

RM1	FMOLS	FIML
Constant	-3.634*** (0.782)	-4.872*** (0.895)
RGDP	0.979*** (0.029)	1.026*** (0.035)
Interest rate	-0.130*** (0.016)	-0.120*** (0.018)
Inflation rate	-6.480*** (1.871)	-9.776*** (2.178)
RM2	FMOLS	FIML
Constant	-3.758*** (0.828)	-4.198*** (0.952)
RGDP	0.996*** (0.031)	1.013*** (0.036)
Interest rate	-0.058*** (0.017)	-0.051*** (0.019)
Inflation rate	-1.646 (1.983)	-2.934 (2.249)
RM3	FMOLS	FIML
Constant	-0.865 (0.845)	-1.464 (0.987)
RGDP	0.893*** (0.032)	0.916*** (0.036)
Interest rate	-0.062*** (0.017)	-0.053*** (0.019)
Inflation rate	0.870 (2.024)	-0.761 (2.285)

Notes: For the Phillips-Hansen FMOLS estimation method, a Parzen kernel with automatic plug-in bandwidth parameter selection is used to calculate the nonparametric correction; and for the Johansen FIML estimation method, an optimal lag length of two picked by the Schwarz information criterion is used for the three money-based level VAR systems. Standard errors are displayed in parentheses. *** denotes statistical significance at the 1% level.

3.4. Stability Analysis:

It is by now well-established that the only empirical studies to have examined the stability of money demand function for the Saudi economy is Darrat (1984) and Bahmani (2008) who outline that the money demand function is stable for the samples 1962–1981 and 1971-2004, respectively. As documented above in the introduction, the stability tests used in these empirical studies suffer from regression problems. As demand for money, real income, interest rate, and inflation are clearly cointegrating (Tables 4 and 5), as money aggregates

across different sample periods and methodologies may be considered as a first sign of long-run stability of the money demand function for the Saudi economy.

Interest rate exerts a negative and relatively weak impact on demand for money regardless of the estimation method, with money demand sensitivities being smaller (around half) for broad money than narrow money, pointing out the noticeable predictive ability of interest rate for narrow money compared to broad money. The finding of small responses of demand for money to changes in interest rate is in line with most empirical works that underline the diminishing effect of interest rate on money demand in developing countries. This may be due to the lack of development in financial markets where the interest rate is determined, and to social and religious considerations of the Saudis.

The inflation semi-elasticity is very high in absolute terms for narrow money compared to broad money. The extent of this predictability impact is greater in terms of magnitude than that of interest rate, suggesting that inflation is the dominant explanatory factor of demand for money based on the narrow measure. Additionally, the fact that the inflation semi-elasticity exceeds one implies that demand for money varies at a faster rate than inflation, suggesting that domestic macroeconomic developments greatly affect money holdings. For broad money, inflation does not have the power to influence demand for money over the study period.

3.3. Long-Run Effects:

We now estimate the long-run money demand function using the Fully Modified Ordinary Least Squares (FMOLS) procedure of Phillips and Hansen (1990) in order to draw economically intuitive conclusions from the sensitivity of demand for money to changes in the related determinants. As a cross-check, it is quite straightforward to assess the long-run effects using another efficient estimation method of the cointegrating relationship, such as the Full Information Maximum Likelihood (FIML) of Johansen (1988, 1991). The estimate results presented in Table 6 comply with the underlying theory of demand for money irrespective of the money aggregate included in the specification for all estimation methods, except of inflation for the second broad money using FMOLS. They reveal that demand for money responds positively to the fluctuations in real GDP to almost the same extent for the three money aggregates across estimation methods. In this context, a rise of 1% in real GDP leads to an increase of 0.979% (1.026%) in narrow money, 0.996% (1.013%) in the first broad money, and 0.893% (0.916%) in the second broad money for the FMOLS (FIML) method. The constraint that the long–run income elasticity of money demand is unity is not rejected for the three money aggregates across estimation methods.[9] The long–run elasticity for narrow money is similar to that obtained by Darrat (1984) who finds that such elasticity is equal to 1.112 during 1962–1981. The fact that the income elasticity is similar

[9] Rao and Kumar (2011) examine the US narrow money demand function from 1960 to 2008, and outline that the hypothesis that income elasticity is unity is not rejected during the sub–periods separated by the structural break located at 1998.

Table 5. Perron-Rodríguez test results

MSB statistic				**Z_rho statistic**		
Dep. variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
RM1	0.109***	0.166	0.108***	-47.620***	-22.620	-48.490***
RGDP	0.105***	0.098***	0.104***	-52.360***	-56.950***	-53.330***
Interest rate	0.189	0.188	0.188	-14.070	-14.910	-14.240
Inflation rate	0.206	0.146	0.204	-15.090	-25.440	-15.470
Dep. variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
RM2	0.108***	0.134	0.108***	-48.730***	-27.860	-48.700***
RGDP	0.102***	0.102***	0.102***	-53.530***	-53.500***	-53.540***
Interest rate	0.236	0.221	0.236	-8.791	-10.670	-8.801
Inflation rate	0.233	0.168	0.232	-11.240	-18.160	-11.370
Dep. variable	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
RM3	0.138*	0.143	0.138*	-30.810**	-23.570	-30.810**
RGDP	0.136*	0.138	0.136*	31.610**	-30.970*	-31.610**
Interest rate	0.229	0.218	0.228	-9.617	-11.050	-9.630
Inflation rate	0.227	0.163	0.226	-11.860	-19.130	-12.00

Notes: Model 1: constant and non-trending data; Model 2: constant and time trend (with or without trending data); and Model 3: constant with trending data (deterministic cointegration). ***, ** and * denote cointegration at the 1%, 5% and 10% levels, respectively.

Overall, demand for money, real income, interest rate, and inflation co–move over the long–run irrespective of the included money aggregate, which gives support to the baseline specification of the long-run money demand function. Tang (2003) outlines that cointegration can be interpreted as a sign of stable nexus between variables over the study period. In our context, stability of the long-run money demand function will be assessed later using suitable structural change tests.

Table 4. Johansen test results

		Trace Statistic		**Max-Eigen Statistic**	
RM1	**Null hypothesis**	Model 1	Model 2	Model 1	Model 2
	None	78.548***	59.573***	42.533***	40.005***
	At most 1	36.015**	19.568	24.256**	12.735
	At most 2	11.758	6.834	6.747	6.744
	At most 3	5.012	0.090	5.012	0.090
RM2	**Null hypothesis**	Model 1	Model 2	Model 1	Model 2
	None	76.946***	53.666**	35.108***	32.551**
	At most 1	41.838***	21.115	25.018**	14.085
	At most 2	16.820	7.030	10.426	6.404
	At most 3	6.394	0.626	6.394	0.626
RM3	**Null hypothesis**	Model 1	Model 2	Model 1	Model 2
	None	73.071***	50.009**	28.472*	28.407**
	At most 1	44.599***	21.602	25.088**	14.240
	At most 2	19.511*	7.362	13.140	6.376
	At most 3	6.371	0.986	6.371	0.986

Notes: Model 1: restricted constant and no deterministic trend; and Model 2: linear deterministic trend. The optimal lag length picked by the Schwarz information criterion is two for the three money-based level VAR systems. ***, ** and * denote rejection of the null hypothesis at the 1%, 5% and 10% levels, respectively.

between the variables, we conduct the Perron and Rodríguez (2016) cointegration procedure that is based on a single-equation static regression.[7] In this vein, for each money aggregate, we consider four linear regressions in which a given variable is considered as dependent and the remaining variables are considered as independent. A model with a constant and non-trending data, a model with constant and time trend (with or without trending data), and a model with a constant only in the regression with trending data (deterministic cointegration) are estimated. The findings reported in Table 5 comply with those of the Johansen's procedure, as the variables are clearly cointegrating for all money aggregates across test equations. Indeed, the variables experience two long-run relationships for the first and third test equations, and one cointegrating relationship between the variables for the second test specification at the conventional significance levels.[8]

[7] We consider two statistics, MSB and Z rho, which allow us to test the null hypothesis of no cointegration between variables.

[8] The exception is the third money aggregate where there is no evidence of cointegration for the second test equation by the MSB statistic.

Figure 3. Break dates for variables in levels

	Level breaks		**Level and slope breaks**	
Variables	Date 1	Date 2	Date 1	Date 2
RM1	1999Q3	2004Q3	1999Q3	2004Q3
RM2	2002Q3	2004Q3	2002Q3	2004Q3
RM3	1999Q3	2004Q3	1999Q3	2009Q4
RGDP	2003Q4	2006Q1	2003Q4	2006Q1
Interest rate	2009Q3	2010Q2	2004Q1	2009Q3
Inflation rate	2007Q1	2008Q1	2007Q1	2008Q1

Note: The trimming factor is set at 0.2.

The *I*(1) property of the variables supports recourse to the Johansen (1988) approach to analyze the cointegration properties of the money demand function. The approach is applied to the VEC representation of a linear VAR model consisting of all variables for each money aggregate. A model with a restricted constant and no deterministic trend, and a model with a linear deterministic trend are estimated. For both test equations, the lag order is optimally picked by the Schwarz information criterion and is two for the three money-based level VAR systems, guaranteeing non-autocorrelated residuals. The trace and maximum eigenvalue test results are depicted in Table 4. The variables exhibit two cointegrating relationships for the first test equation at the conventional significance levels regardless of the money aggregate;[6] however, for the second test specification, there is evidence of one long-run relationship between the variables for the three money-based VAR systems. To confirm the presence of long-run relationships

[6] The exception is the second broad money where there is evidence of three cointegrating relationships.

Table 2. Unit root test results

	PP		**ERS**		**NP**	
Variables	Intercept	Trend	Intercept	Trend	Level breaks	Level and slope breaks
RM1	0.002	-2.191	507.035	38.794	-0.083	0.335
	-8.482***	-8.442***	0.544***	1.919***	-9.167***	-9.182***
RM2	-0.734	-0.777	874.841	31.277	-0.798	-0.222
	-8.381***	-8.378***	0.732***	2.369***	-8.814***	-9.078***
RM3	-0.678	-0.809	609.128	33.495	-0.244	-1.376
	-8.313***	-8.298***	0.773***	2.414***	-9.714***	-9.992***
RGDP	-0.444	-2.581	227.022	9.375	-3.343	-4.473
	-8.882***	-8.815***	1.055***	3.817***	-9.913***	-9.849***
Interest rate	-1.485	-1.666	13.418	12.862	-1.631	-0.232
	-5.824***	-5.819***	0.779***	2.811***	-6.339***	-7.314***
Inflation rate	-1.964	-2.644	5.823	18.721	-2.935	-4.445
	-9.564***	-9.571***	0.517***	1.923***	-16.360***	-9.748***

Notes: Top value: level series; and Bottom value: First-differences. The null hypothesis of unit root is tested by all tests. For PP and ERS tests, we estimate two regressions with only an intercept as well as with an intercept and time trend, and the Bandwidth is selected by the Newey-West method using Bartlett kernel. For NP test, we estimate two regressions with only level changes as well as with level and slope changes by accounting for two endogenous structural breaks, and the procedure of Hall (1994) is used to select the optimal lag length. *** denotes stationarity at the 1% level.

3.2. Unit root and Cointegration Analysis:

To conduct the cointegration analysis, we must first ensure that all variables are *I*(1). Toward this end, we employ the PP (Phillips and Perron, 1988), ERS (Elliott et al., 1996), and NP (Narayan and Popp, 2010) tests.[5] The NP test is particularly well suited in presence of regime-shifts in the variables, as conventional tests without breaks are not powerful in this situation. It accounts for two unknown break dates in the level and in the level and slope of trending variables. The test results reported in Table 2 reveal that all variables are *I*(1) for all test equations, as they are non–stationary in levels and stationary in first-differences. The detection of break dates in the level variables when opting for the NP test (Table 3) suggests that domestic and international crises and shocks alter these variables, and outlines the necessity of examining the stability of the money demand function.

[5] All tests allow for the testing of non–stationarity under the null hypothesis.

Table 1 provides the empirical unconditional correlations between demand for money and the related determinants. The results show positive dependence between money aggregates and real income and inflation, with real GDP being the most correlated with money aggregates, suggesting that economic activity is strongly linked to the creation of money. However, money aggregates are highly and negatively linked to interest rate. An interesting result is that correlations between money aggregates and the related determinants are largely similar for the broad measures, which can be explained by the close definition of such measures. The correlation calculations provide an initial assessment of the linkages between demand for money and the considered determinants, but do not precisely determine the causal relationships between them. To this effect, a reliable econometric analysis is needed to achieve our objectives.

Table 1. Empirical unconditional correlations

	RM1	RM2	RM3
RGDP	0.979^{***}	0.990^{***}	0.988^{***}
Interest rate	-0.770^{***}	-0.766^{***}	-0.775^{***}
Inflation rate	0.404^{***}	0.488^{***}	0.510^{***}

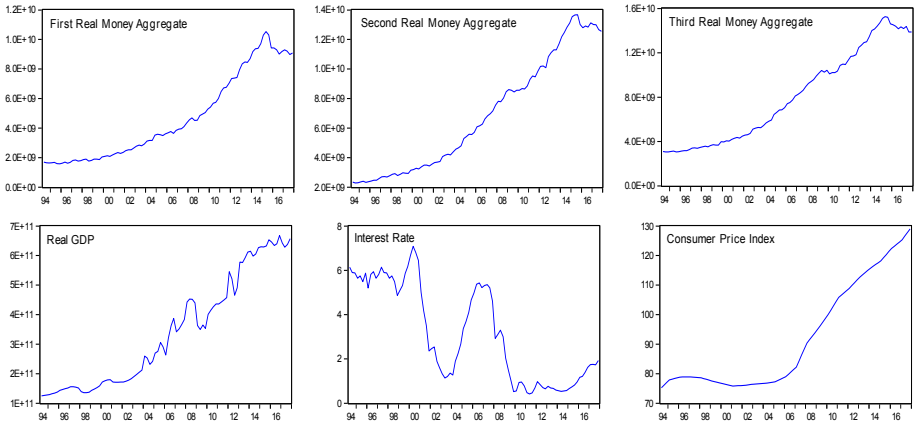
Note: *** denotes statistical significance at the 1% level.

thus providing more relevant information that lead to accurate results. Overall, the sample period is sufficiently long to study the long–run linkages between demand for money and the related determinants based on cointegration approaches.

3.1. Descriptive Analysis of Data:

The graphs of the series plotted in Figure 1 reveal that money aggregates behave similarly throughout the study period, and record decreases from 2015Q3 for narrow money and from 2015Q4 for broad money, which may be explained by the strong falls in oil price from mid-2014. These persistently money declines over a relatively short time period at the end of the sample might lead to an unstable money demand function when using unsuitable stability tests, which could mislead policymakers about the monetary policy that allows achieving macroeconomic stability. The graphs also provide preliminary insights into an eventual cointegrating relationship between demand for money and the other variables, which will be discussed later in the study.

Figure 1. Time-varying patterns of level variables



demand and determinants during 1987–2009 using cointegration techniques and reveals a cointegrating relationship among the variables.

It is clear that the sample periods considered in the literature related to Saudi Arabia neglect recent international crises and events that might influence the sensitivity of demand for money to the fluctuations of the related determinants. Our study then revisits the issue from 1994 to 2017 in an attempt to account for these shocks and examine their effects on estimation and stability of the money demand function for the Saudi economy.

3. Empirical Analysis:

To explore the empirical evidence on the above baseline specification of the long-run money demand function, we proceed as follows. First, we present a descriptive analysis of data to apprehend the relationship between demand for money and the related determinants. Second, unit root and cointegration tests are used to reveal a long-run money demand function. Third, the long-run money demand function is estimated to determine the sensitivity of demand for money to changes in the considered determinants. Finally, structural stability tests are conducted to establish a stable long-run money demand function whose usefulness for policy analysis mainly pertains to its structural stability.

The analysis is based on quarterly data from 1994Q2 to 2017Q4 (yielding 95 observations)[4] that are collected from the SAMA database. The use of quarterly data allows us to exhibit a large time dimension,

[4] The time frame was chosen according to the available data.

All the variables, except for inflation and interest, are converted into natural logarithm[3] so that the associated coefficients are interpreted as elasticities that measure the responses of demand for money to changes in the corresponding determinants. Regarding coefficient signs, the underlying theory stipulates that demand for money is expected to respond positively to the fluctuations in real GDP and negatively to the changes in interest rate and inflation. All macroeconomic aggregates included in the long-run money demand function are assumed to be integrated of order one, $I(1)$, and cointegrated for stability purposes.

Little attention has been paid to the analysis of money demand function in the economic literature for Saudi Arabia. Indeed, Darrat (1984) estimates the money demand function for Saudi Arabia using quarterly data during 1962–1981 and shows that the considered determinants have predictability power over money demand. Alkswani and Al–Towaijari (1999) study the determinants of money demand in Saudi Arabia during 1977–1997 using cointegration techniques, and conclude in favor of a long–run relationship between demand for money and the considered determinants. Bahmani (2008) reveals cointegration between demand for money and the related determinants from 1971 to 2004 based on the bounds-testing approach. Abdulkheir (2013) investigates the long–run relationship between Saudi's money

[3] Miyao (2002) argues that considering the interest rate in log form allows us to obtain more stable elasticity compared to semi-elasticity determined without log transformation, thus providing reliable results.

conduct a robustness check for the estimation and stability results by controlling for stock market variables. Section 5 examines the effects of the recent persistently money decreases on liquidity. Section 6 provides concluding comments.

2. Long–Run Money Demand Function:

The literature embodies a lot of empirical studies on estimating the money demand function and testing its stability over time. Regarding the specification issue, researchers generally model the demand for money as a function of the level of transactions in an economy (income) and the cost of holding money (interest rate). In this study, we consider the following baseline specification:

$$RM_t = a_0 + a_1 RGDP_t + a_2 Interest_t + a_3 Inf_t + v_t \qquad (1)$$

where RM_t is real monetary aggregate,[1] $RGDP_t$ is real GDP (level of transactions in the economy), $Interest_t$ is foreign nominal interest rate (cost of holding money),[2] Inf_t is inflation rate that is computed as the first logarithmic difference of the consumer price index, and v_t is the disequilibrium.

[1] In this study, we consider three money aggregates measured in real terms (RM1, RM2, and RM3) as the nominal aggregates deflated by the consumer price index.

[2] Typical choices of the money cost measure include inter alia the government bond rate (Golinelli and Pastorello, 2002), the spread between the long- and short-term rates (Muller and Hahn, 2001), and the spread between the short-term interest rate and the own rate of money (Carstensen, 2006). In this study, we estimated other specifications with different money cost measures, and found that the foreign nominal interest rate is a suitable choice in terms of sign, significance, and magnitude.

applying the roboust estimation technique is is to draw reliable conclusions for the policymakers to achieve macroeconomic stability through appropriate monetary policies.

Results reveal that demand for money and the related determinants exhibit cointegrating relationships, and that the constraint that the long–run income elasticity is unity is not rejected for all money aggregates. The underlying theory of demand for money is justified, provided the reactions of money demand to the fluctuations of the related determinants are correctly signed, thus leading to economically intuitive conclusions. Further, the recent money declines do not pose any exceptional threat to stability of the long-run money demand function over the study period, although there are structural changes in the money aggregates. The implication is that SAMA formulates stabilization policies by opting for money supply as a well suited tool for monetary policy decisions. We also find evidence that the recent declining money growth rates in the Saudi economy do not reflect noteworthy liquidity lack and, thus, inflation falls. Given the economic and institutional linkages of the other GCC economies with Saudi Arabia, the results will also be helpful for these countries in establishing judicious monetary policies in order to achieve macroeconomic stability.

The remainder of the paper is structured as follows. Section 2 introduces the long-run money demand specification. Section 3 discusses the estimation and stability results for the long-run money demand function, and presents policy implications. In Section 4, we

and the appropriate monetary policy in Saudi economy. To gain more evidence on monetary stability and particularly to take into account of recent money fall, , we extend the dataset for the period from 1994 to 2017. Additionally, we conduct a comprehensive analysis by applying appropriate structural stability tests. This tests provide valid inference required for pertinent policy implications by considering a break date within the sample periods.

Third, unlike prior studies on Saudi Arabia, this study is unique as it considers an alternative money demand function augmented with share price and equity market volatility where demand for money is related to real income, interest rate, and inflation. The stock market variables are relevant to consider because of the with the trend of financial liberalization and reformation in the stock markets of the Gulf Cooperation Council (GCC) region in the mid–2000s. This trend stimulated economic activities through the participation of international investors in GCC markets. Since Saudi Arabia is a major oil exporter in the world and has a key role in the region, oil price fluctuation has significant impacts on its stock prices and economic activities. In this connection, there can be a causal relationship of gradual fall in both demand for money and stock market price from 2015. In this paper, we examine the effects of equity market developments on money growth in order to provide new insights on the topic and fill in certain gaps in the related literature.

Fourth, we conduct an empirical study by applying roboust estimation and testing procedures as compared to the other studies focusing on traditional methods in Saudi Arabia. The main goal behind

on single money aggregate determinant. Unlike these studies, the present paper adds three determinants of money demand function into the literature. The incentive is that development of consumption and investment in Saudi Arabia encourages the extensive use of narrow and broad money, and the Saudi Arabian Monetary Agency (SAMA) has the ability to control narrow and broad aggregates. We examine whether the estimation and stability results change and to what extent across narrow and broad money.

Second, Darrat (1984) and Bahmani (2008) are the only few who examine the structural stability of money demand for Saudi Arabia, but during 1962–1981 and 1971–2004, respectively, using traditional testing procedures, the Chow (1960) test and the CUSUM (cumulative sum) and CUSUMSQ (cumulative sum squared) tests (Brown et al.,1975), that suffer from regression problems. Indeed, the critical values of the Chow test are valid only for stationary relationships, questioning the reliability of the findings and conclusions in confirming cointegration between demand for money and the related determinants. The CUSUM and CUSUMSQ tests may wrongly reject the stability of demand for money, as they are not typically suitable to the situation of a structural change through out the sample. This leads to fallacious conclusions to the monetary policymakers to achieve macroeconomic stability. This limited evidence on the stability issue along with many international shocks that have occurred during the last three decades, and particularly the recent fall of money growth rates necessiates to revisit the money demand function by examining the structural stability

Do Recent Declining Money Growth Rates Affect the Stability of Money Demand for the Saudi Economy?

1. Introduction :

The money demand function plays a key role and provides useful information in making appropriate monetary policies to predict fluctuations in macroeconomic aggregates. Thus, establishing a relationship between demand for money and related determinants is appearing crucial to the monetary authorities for designing suitable macroeconomic stabilization policies. In this context, many studies investigate the money demand function both in advanced and developing economies. Some of these studies focus on the structural stability of the money demand function over time, but their findings are quite ambiguous without providing specific direction to initiate proper monetary policy. In addressing this issue, , this study revisits the linkages between demand for money and its' determinants and stability of money demand function in Saudi Arabia. It applies a cointegrating framework by considering the occurrence of a break date when the money declines recorded from 2015 in the Saudi economy.

The motivation of conducting this study on the stability of money demand function for Saudi economy is direced by four reasons. First, there is limited evidence on the issue, as only Darrat (1984), Alkswani and Al-Towaijari (1999), Bahmani (2008), and Abdulkheir (2013) deal with the estimation of the money demand function based

Do Recent Declining Money Growth Rates Affect the Stability of Money Demand for the Saudi Economy?

Nizar Harrathi*

Abstract

This paper examines the relationship between long-run money demand function and money growth rates in Saudi Arabia. It considers structural break in 2015 which created negative effect on money growth rates in Saudi economy. By applying stability tests, the paper reveals that the recent money falls do not exhibit a break, leading to stability of demand for money, although there are break dates in money aggregates. In addition, money declines do not lead to noteworthy liquidity lack. Policymakers can achieve macroeconomic stability by considering money supply as an effective tool for long-run adjustment.

Key-words: Money Demand; Cointegration; Breakdown; Long-run Stability; Saudi Arabia

JEL Classification: C22; E41; E52

* Department of Economics, College of Business Administration, King Saud University, P.O. Box 71115, Riyadh 11587, Saudi Arabia. E-mail: nharrathi@ksu.edu.sa.

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