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№ 1, 2017

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# Current Stern Issues Fussing Financial Markets

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**Abstract.** Purpose – The purpose of this paper is to evaluate the current ability and prospects of the financial economy to respond to the newest challenges of the world economy with the special orientation to the emerging markets.

Design/methodology/approach – The paper revisits the crisis as it is moving from an acute to a chronic phase. Meaning no new recession is thinkable top priority today is the euro zone crisis and China change.

Findings – The euro zone is afflicted by three ills: a banking crisis, a sovereign-debt crisis and a growth crisis. Dealing with one often makes the others worse. Whatever the issue it is not simplifying but aggravating the behavior of the financial markets participants, viz. institutional investors. In case of China which economic role is expanding and plummeting simultaneously the expectations are even more controversial. Research Limitations/Implications – The author's ability to decipher what went wrong in the financial economy could not translate fully into how to fix them. It easier to point out the flaws in a system than to correct them. Practical Implications – Some additional snags protrude out of the fact that main economic players have no trust in Chinese statistics.

Originality/value – The paper talks broadly about a more balanced economy and adds insight into the present and the future of international financial markets.

**Keywords:** Eurozone; Chinese growth; financial market; hedge funds.

## Ажиотаж на финансовых рынках из-за краткосрочных проблем

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**Аннотация.** Целью данной статьи является оценка актуальных возможностей и перспектив финансового сектора ответить на вызовы новой мировой экономики с особым учетом развивающихся рынков. Автор статьи заново рассматривает кризис в его переходе от острой фазы к хронической. Особое внимание уделено кризису Еврозоны и изменениям в Китае. Что касается Еврозоны, то здесь наблюдаются три «болезни»: банковский кризис, кризис суверенных долгов и кризис экономического роста. Попытки «лечить» один из недугов приводят к ухудшению состояния остальных. Тем более что решение вопросов не только не помогает, но даже ухудшает поведение участников финансовых рынков, а именно институциональных инвесторов. Относительно Китая, экономическая роль растет и падает одновременно, вопрос становится еще более сложным. В статье отражен взгляд автора на более сбалансированную экономику, а также на текущее состояние и будущее международных финансовых рынков.

**Ключевые слова:** Еврозона; экономический рост Китая; финансовый рынок; хедж-фонды.

## INTRODUCTION

Among the minor debates like when the crisis began, viz. was it 2006, when America's housing market peaked; 2007, when money-market liquidity froze; or 2008, when Lehman Brothers collapsed the contemporary financial world is pondering about several quite serious issues.

The crisis has highlighted specific areas of difficulty. Among them are problems with judging the sophistication of a client. Then real and potential costs are devastating. Property is the world's biggest asset class. It took 25 years for American stocks to regain their 1929 highs and Japanese stocks have never made it back to their peak. British households' property wealth, in today's prices, is around £500 billion (\$785 billion) short of its peak; American households have lost a whopping \$9.2 trillion. Measured by real GDP per person a third of the 184 countries the IMF collects data for are poorer than they were in 2007. These 61 countries have each lost at least five years.

It becomes clear that the crisis is, in effect, moving from an acute to a chronic phase. Of 34 advanced economies, 28 had lower GDP per head in 2011 than they did in 2007. Japan's household-saving rate has fallen from 14% of disposable income in the early 1990s to only 2% in the past couple of years. Its net debt-to-GDP ratio—more than 130% in 2011—is second only to that of Greece. There is no easy settlement to this. Cut the deficit too aggressively, in other words, and the negative impact on growth and the rise in the cost of debt service from higher spreads could result in a higher, not lower, debt-to-GDP ratio. Decreasing debt is a marathon, not a sprint (Blanchard, 2012).

There is a big difference between the business cycle, which typically lasts five to eight years, and a long-term (long wave) debt cycle, which can last 50–70 years. A business cycle usually ends in a recession, because the central bank raises the interest rate, reducing borrowing and demand. The debt cycle ends in deleveraging because there is a shortage of capable providers of capital and/or a shortage of capable recipients of capital (borrowers and sellers of equity) that cannot be rectified by the central bank changing the cost of money. An ordinary recession can be ended by the central bank lowering the interest rate again. A deleveraging is much harder to end. It usually requires some combination of debt restructurings and write-offs,

austerity, wealth transfers from rich to poor and money-printing (Taber, 2012).

In this study, I use comprehensive analysis of the newest trends to investigate the relative ability of different market participants and specific country events to influence potential growth in the financial industry. I take the performance as reflected in Europe, USA, and Asian countries. I also investigate, which types of adjustments of the international financial markets, would improve wobbling world economy.

Previous empirical research provides contradictory and sometimes ambiguous evidence on the value relevance of the actual state of affairs disclosures promulgated in different countries. Thus, present study using comprehensive analysis of the financial market data shed more lights on the issue.

In this research, I am going to investigate the current position of the financial economy with the distinct accent on the activity of the main market makers countries and companies included.

The top priority of the study is the euro zone crisis.

## PREVIOUS RESEARCH

The Great recession 2007–09 was excessively researched by economists and academics, many famous ones including. D. Acemoglu (2009) looks into the structural lessons of the crises. Akerlof, G. and Shiller, R. (2009) discover psychology drives in its nature. Brunnermeier, M. (2009) tried to decipher the credit crunch. As a relevant and very popular became a relatively old research by H. Minsky (1977). The recession was scrutinized from different points of economic view by Ohanian (2010). Reinhart, C. and Rogoff, K. (2009) published a kind of bestseller akin to manifesto simply saying that this time it was different.

Nikolson (2008) recognized that financial crisis which initiated in United States has become global phenomenon. This crisis apart from affecting the developed economies has distressed the economy of such a country like Russia as well; in May 2008, Russian stock market was fallen by 50% and the Russian central bank had to buy ruble in massive amount to prevent the severe falling against US Dollar and Euro (Erkkilä, 2008).

About the cause of current crisis Bartlett (2008) said that crisis was started with the downfall of US sub-prime mortgage industry, the intensity of this

collapse was significant. He further stated that it is “The largest financial loss in history”, as compared to Japan’s banking crisis in 1990 about \$780 billion, losses stemming from the Asian crisis of 1997–98 approximately \$420 billion and the \$380 billion savings and loan crisis of U.S itself in 1986–95.

Imaz (2008) charged U.S subprime mortgage industry to be the major reason of current global financial crisis, he also stated that the total losses estimated initially up to \$300 to \$600 billion are now considered to be around \$1 trillion.

While enlightening the factors that why this US sub-prime mortgage crisis turn into global banking crisis, Khatiwada and McGirr (2008) stated “Many of these sub-prime mortgages actually never made it on the balance sheets of the lending institutions that originated them”; and they were made attractive to foreign banks by high investment grading, “when sub-prime borrowers failed to repay their mortgages, the originating institution needed to finance the foreclosure with their own money, bringing the asset back on its balance sheet. This left many banks in a financially unfeasible situation, in a rather short, out of hand timeframe”.

However Hyun-Soo (2008) argues that it was the “Trust Crisis” which caused this global predicament. DeBoer (2008) believes that it was series of events that caused the crisis; it begins with the collapse of currencies in East Asia in 1997 and became edgy due to the financial crisis of Russia in 1998. Next, in USA was the “dot-com” stock collapse in 2001, and the final stroke was again in USA, when after a swift decline in housing prices and “rapid contraction in credit, it fell into recession.

Rasmus (2008) has the same thoughts; he, while discussing the reasons of economic recession of U.S said “The ‘real’ ailments afflicting the US economy for more than a quarter-century now include sharply rising income inequality, a decades-long real pay freeze for 91 million non-supervisory workers, the accelerating collapse of the US postwar retirement and healthcare systems, the export of the US economy’s manufacturing base, the near-demise of its labor unions, the lack of full time permanent employment for 40 per cent of the workforce, the diversion of massive amounts of tax revenues to offshore shelters, the growing ineffectiveness of traditional monetary and fiscal policy, and the progressive decline of the US dollar in international markets.”

## EUROZONE HITCHES AND FUTURE

The euro zone is afflicted by three ills: a banking crisis, a sovereign-debt crisis and a growth crisis. Dealing with one often makes the others worse.

A big problem is that the euro zone is only partly integrated. Its members have given up economic tools, such as currency devaluation and monetary policy, yet lack “federal” instruments to cope with shocks. So redressing the imbalances must come through “internal devaluation”: bringing down real wages and prices relative to competitors.

The deeper roots of the euro-zone crisis lie with the loss of competitiveness in the region’s trouble spots.

Although the euro might still survive in the core countries like Germany and the Netherlands, the prospect of a stronger euro shorn of its weakest links would take years to materialise.

Important problems stand out. One is the scale of European public spending. If America is a defence superpower, spending almost as much on defence as the rest of the world combined, Europe is a “lifestyle superpower”, spending more than the rest of the world put together on social protection. Ageing will add to the burden. Europeans can still choose to work shorter days and take longer holidays than Americans, but they can no longer afford to retire early.

The Germans know what they do not want: no transfer union, no Eurobonds and no transformation of the European Central Bank into a lender of last resort.

The Spanish illness might harm the euro zone’s convalescence. Portugal and Ireland are in recession, and may need second bail-outs; Greece will probably require a third rescue (and the restructuring of official debt). 20% of the productivity slowdown in Spanish manufacturing between could be pinned 1992 and 2005 on temporary work (Doladoy et al., 2012).

Even if almost all of Greece’s private creditors agreed to write off half of what they are owed, its debt would still be about 120% of GDP by 2020. More likely, participation in any write-off would be lower than that, leaving debt above 145% of GDP in 2020. That implies new debt restructurings would be needed. And since Greece’s economic news has been worse than expected of late, even these numbers are optimistic. The European

Central Bank (ECB) is now thought to be Greece's biggest bondholder.

Far from stable is the economic situation in France. Public debt stands at 90% of GDP and rising. Public spending, at 56% of GDP, gobbles up a bigger chunk of output than in any other euro-zone country — more even than in Sweden. France now has the euro zone's largest current-account deficit in nominal terms.

Between the third quarter of 2009 and the same period 2011, the euro's share of central-bank reserves fell from 27.9% to 25.7% and the dollar's proportion nudged up slightly from 61.5% to 61.7%. It is probable that the European Central Bank will eventually be forced to adopt quantitative easing (QE) as the only way of helping the region out of its debt crisis (the provision of three-year liquidity to the banks is a step along that road).

It is hard to be sure whether quantitative easing in Europe would be bullish or bearish for the currency. The conventional assumption is that creating more currency is bad for its value: QE in America is generally agreed to have been negative for the dollar. But if QE is perceived to stabilise the European economy, it could end up being positive for the euro, at least in the short term.

One can fix the value of money internally, via a gold standard, or externally, via a fixed exchange rate. The point is that, neither fixing nor floating the currency is a panacea; countries still need to keep themselves competitive.

Back in 2008 the monetary base of the euro zone (in effect notes and coins plus reserves held at the region's central banks) was around 10% of GDP; the equivalent figures for the Federal Reserve and the Bank of England were in the 4–6% range. Now the monetary base in all three places is between 16% and 18% of GDP.

A crisis for some is an opportunity for others. The decline in short-term rates is not surprising, given the excess liquidity washing around the euro-zone banking system: banks have almost €500 billion on overnight deposit with the ECB earning interest of 0.25%.

## FINANCIAL INDUSTRY AND THE MARKET

Finance is a very specific and an industry out of the ordinary.

For example, in a global ranking of firms assigned patents in America in 2011 the first financial

firm in the list was American Express — only in joint 259th place (Hardman, 2012).

Finance is at its most dangerous when it is perceived to be safe. Securitisation is an important source of credit to the real economy. Scale is what makes finance worrying. When products or techniques become systemic, everyone has a stake in ensuring that they are well managed.

Financial industry literally seizes the world economy. Take for instance LIBOR that was developed in the 1980s to simplify the pricing of interest-rate derivatives and syndicated loans. Accurate benchmarks are vital if risk is to be correctly priced. Contracts worth around \$360 trillion, five times global GDP, are based on LIBOR.

LIBOR rates are needed, every day, for 15 different borrowing maturities in ten different currencies. But hard data on banks' borrowing costs are not available every day, and this is the root of the LIBOR problem. Suspicions that something was wrong with LIBOR were aroused in 2008 when financial risks began to pick up but the benchmark, which ought to have ticked upwards too, did not move. That same year a group of American academics circulated a paper showing that banks' individual estimates of their borrowing costs were surprisingly close, given their different levels of risk.

Studies have shown that institutions that are seen as too big to fail pay lower prices for funding (although post-crisis efforts to ensure that institutions can be resolved in case of failure are meant to remove that subsidy).

Generally financial landscape is full of oddities. Quite possible is the prospect of America being paid interest by its creditors when its national debt is rocketing. The Treasury recently disclosed it is exploring how to let investors enter negative yields when bidding at debt auctions. Clearly, demand for American government debt is driven by much more than a hunger for returns. Financial-market participants use Treasury bonds and bills as collateral to secure lending, for instance. And for risk-averse investors such as foreign central banks, money-market funds and retirees, America's debt is uniquely suited to storing savings without much due diligence. In short, its government debt is a lot like money. That is analogous to the dollar's role as reserve currency, which obliges America to issue debt securities in which foreigners can invest those dollars.

Politicians seem to have three main beefs with the financial sector. The first is that bankers earn too much. The second is that banks take reckless risks and then need rescuing by governments. And the third complaint is that investors in financial markets have undue influence over an economy through their ability to affect bond yields and equity prices.

Rather a big issue affecting financial market potentials with big social component embraces the bankers pay.

Pay at the top grew by over 300% between 1998 and 2010. At the same time, the median British worker's real wage has been pretty stagnant. These trends mean the ratio of executive to average pay at FTSE100 firms jumped from 47 to 120 times in 12 years. Bosses' pay has gone up not because corporate governance is failing but because of globalization. Getting and keeping a good boss matters more to a firm's owners than how much he or she is paid; and they invest internationally, so they know how much good bosses need to be paid. This looks more like a market rate than a market failure.

The pay of bank bosses correlated well with returns on equity, but not with returns on assets — in other words, managers prospered by gearing up bank balance-sheets. That is now harder to pull off.

Mistrust of mainstream finance is all the rage. But lean economic times also make get-rich-quick schemes more tempting, and desperation breeds gullibility. As investors in Bernie Madoff's funds found out to their cost, frauds are more prone to exposure in a weak economy — when it becomes clear who has been swimming naked. The FBI is currently probing 1,000 cases of investment fraud, more than double the number in 2008. Meanwhile America's Securities and Exchange Commission filed more than twice as many Ponzi cases in 2010 as in 2008.

Though figures are notoriously hard to come by, the amount of fraud based on stolen card numbers in the United States is around \$14 billion a year (Light of Bytes, 2012).

With the rest of the developed world having embraced more secure "smart cards" (or at least in the process of doing so), America remains the only major country that still relies on antiquated payment cards that encode their sensitive data in a magnetic stripe on the back. In security terms, that is about as safe as writing your account details on a post-card and sending it through the mail.

Stolen credit-cards details are sold in bulk, ranging in price from ten cents to nearly a dollar per item. To date, more than 1.3 billion EMV cards have been issued globally, and some 21m point-of-sale terminals can now accept them. This represents nearly one out of two payment cards in use globally, and three out of four terminals on merchants premises around the world.

Tax evasion costs governments \$3.1 trillion annually. Switzerland's banks house around \$2.1 trillion, or 27%, of offshore wealth (Werdiger, 2011).

In some cases fraud spreading looks as a systemic one. Korea's Fair Trade Commission (FTC) detected over 3,500 cases of price-fixing in 2010, but only 66 led to fines.

I am far of blaming the role of financial innovations. The good society requires an effective financial sector, and the way to extend the good life to more people is not to shrink the sector nor restrain financial innovation but instead to release it.

Nevertheless it is easy to find some glaring negative events because of those innovations.

So, on February 3rd 2010, at 1.26.28 pm, an automated trading system operated by a high-frequency trader (HFT) called Infinium Capital Management malfunctioned. Over the next three seconds it entered 6,767 individual orders to buy light sweet crude oil futures on the New York Mercantile Exchange (NYMEX), which is run by the Chicago Mercantile Exchange (CME). Enough of those orders were filled to send the market jolting upwards.

But the fact that they happen at all feeds the perception that today's equity markets have turned into something more akin to science fiction than a device for the efficient allocation of capital. HFTs do not have clients but operate with their own capital. Now the complaints are about the milliseconds HFTs gain over ordinary investors by putting their servers right next to the exchanges' data centres; then they were about the monopolistic privileges of the specialists and the advantages of being on the floor. Meanwhile the industry itself pushes inexorably forward. That certainly entails greater speed: the industry used to think in terms of milliseconds (it takes you 300–400 of these to blink) but is now fast moving to microseconds, or millionths of a second. It also means smarter algorithms.

People have gone from trading in open-outcry pits to trading via screens to programming algorithms. The next stage could be self-learning systems, in which sentient algorithms mine the capital

markets, spotting correlations that are too complex for humans to see and suggesting trading ideas as a result. Humans will still be needed to validate these ideas, he says reassuringly. Innovation is often triggered by a client coming to a bank with a specific headache. Software has a nasty habit of developing bugs.

The Chicago Mercantile Exchange, which launches over 400 new derivatives products a year, outlines a three-stage process for innovation: investigation, creation and validation.

It is a tradition among investors to assert that equities are the best asset for the long run. Buy a diversified portfolio, be patient and rewards will come. Holding cash or government bonds may offer safety in the short term but leaves the investor at risk from inflation over longer periods.

Such beliefs sit oddly with the performance of the Tokyo stockmarket, which peaked at the end of 1989 and is still 75% below its high. Over the 30 years ending in 2010, a “long run” by any standards, American equities beat government bonds by less than a percentage point a year. The data for 19 countries from 1900 to 2011 shows that the equity risk premium relative to Treasury bills (short-term government debt) ranged from just over two-and-a-half percentage points a year in Denmark to six-and-a-half points in Australia. In the period 1900–2011, the average world dividend yield was 4.1%; real dividend growth was just 0.8%; and the rerating of the market added 0.4%. Gold was the only asset that had a positive correlation with inflation.

Countries are specific in their attitude to the financial sphere. So unlike those in charge of public pension funds elsewhere, the Canadians prefer to run their portfolios internally and invest directly. They put more of their money into buy-outs, infrastructure and property, believing that these produce higher returns than publicly traded stocks and bonds. They are in some ways like depoliticized sovereign-wealth funds — a new brand of financial institution. Running assets internally costs a tenth of what it would if they were outsourced. Canadian pension funds have ensured their pay is competitive with Bay Street, Toronto’s version of Wall Street.

A mixture of social and financial returns is central to a burgeoning asset class known as “impact investing”. In simple terms, finance lacks an “off” button. Most stock market bulls build their case

on the trailing price-earnings ratio for the S&P 500, which stands at 16.

The capital market that is commonly thought to be the most developed in the world is in a mess. An average of 165 companies with less than \$50m in inflation-adjusted annual sales went public in America each year between 1980 and 2000. In 2001–2011 the average fell by more than 80%.

Qualitative and quantitative changes have marked 2011 in other segments of the financial market. The insurance industry paid out some \$110 billion for natural disasters last year. Their economic costs were \$378 billion last year, breaking the previous record of \$262 billion in 2005 (in constant 2011 dollars). Whether the economic toll of disasters is rising faster than global GDP is unclear, since a wealthier world naturally has more wealth at risk. Development by its nature also aggravates risks.

The mountain of over-the-counter (OTC) derivatives products, whose notional amounts outstanding, reckoned at around \$700 trillion in June 2011, easily dwarf the \$83 trillion of derivatives on exchanges. The notional amount of outstanding over-the-counter (OTC) derivatives declined to \$648 trillion at the end of last year, after reaching a high of \$707 trillion in June 2011.

Interest-rate contracts, which make up the majority of OTC derivatives traded, decreased by 9% to \$504 trillion; credit-default swaps dropped by 12%; and other derivatives, including commodities and equity-linked contracts, fell by 9%—despite Australia and Spain reporting to the Bank for International Settlements for the first time in December 2011. However, gross market values, which measure the cost of replacing all existing contracts, increased by 40%, to \$27.3 trillion, the biggest increase since the second half of 2008.

For less calamitous changes in the weather, derivatives are a better option. According to the Weather Risk Management Association, an industry body, the value of trades in the year to March 2011 totalled \$11.8 billion, nearly 20% up on the previous year, though far below the peak reached before the financial crisis took the steam out of the business. In 2005–06 the value of contracts had hit \$45 billion.

Weather derivatives had an inauspicious start: the first trade was done by Enron in 1997.

Mining and oil companies account for some 30% of the value of London's stockmarket, about twice the global weighting.

But just as the client base is shifting eastward, so is incorporation. A new big trend is the rise of the "mid-shore" financial centre, which incorporates elements of onshore and offshore. Two big examples are Hong Kong and Singapore. Both have offshore traits (low tax, secrecy) but also have strong legal systems and plenty of double-taxation treaties. This has helped Singapore, in particular, gain business that has fled the Channel Islands and other European jurisdictions.

The average year-on-year growth rate for cross-border bank credit to non-banks during the 2000–07 period was a sizzling 15.2%, compared with 6.7% for total bank credit. Since then cross-border credit has fizzled and looks likely to fall further.

European lenders were in the vanguard during the era of internationalization, and around a third of their assets are outside their home markets. In March 2012 the Reserve Bank of Australia revealed that the departure of European lenders, in particular French banks, had left an A\$34 billion (\$35 billion) funding gap in the syndicated-loan market for local companies. A big lesson of the crisis is that banks which are global in life are national in death. Bankruptcies of Lehman Brothers and MF Global showed regulators how assets could easily get trapped in foreign jurisdictions, leaving a bigger bill for taxpayers back home. Now a third revolution is under way. Manufacturing is going digital. Offshore production is increasingly moving back to rich countries not because Chinese wages are rising, but because companies now want to be closer to their customers so that they can respond more quickly to changes in demand. And they cling to a romantic belief that manufacturing is superior to services, let alone finance.

Financial industry was at birth of a very interesting sector of the world economy known as offshore business incorporation.

Up to 2m companies are set up in America each year. Britain creates some 300,000. These are the total numbers. At the same time around 250,000 are set up in offshore locations.

The British Virgin Islands (BVI) alone registered 59,000 new firms in 2010. It had 457,000 active companies as of last September — more than 16 companies for every one of its 28,000 people.

Firms may use them during mergers, to park assets during complicated transactions, or to fend off lawsuits in countries with predatory governments or corrupt courts. They can usefully protect trade secrets or safeguard directors from kidnappers or busybodies. Takeovers are usually lucrative for shareholders of the target firm: in America between 1990 and 2008, they have received a median premium of 35%.

They offer flexibility for entrepreneurs needing to move quickly. Many companies started out as a shell. Delaware's Division of Corporations registered 133,297 new corporate vehicles 2011.

Offshore formation agents seethe at this: they have tightened their standards under pressure from big countries that do not practice what they preach and (worse still) are now stealing their business.

Great financial influence on the world economy is contributed by remittances to poor countries. Since 1996 remittances to poor countries have been worth more than all overseas-development aid, and for most of the past decade more than private debt and portfolio equity inflows. In 2011 remittances to poor countries totaled \$372 billion, according to the World Bank (total remittances, including to the rich world, came to \$501 billion). That is not far off the total amount of foreign direct investment that flowed to poor countries. Given that cash is ferried home stuffed into socks as well as by wire transfer, the real total could be 50% higher.

Remittances are not just big, but growing — they have nearly quadrupled since the turn of the millennium — and resilient. In 2009, when economies around the world crashed, remittances to poor countries fell by a modest 5%, and by 2010 had bounced back to record levels. By contrast, foreign direct investment in poor countries fell by a third during the crisis, and portfolio inflows fell by more than half. In 1970 46% of recorded remittances were reckoned to originate in America. By 2010 America's share was just 17%. One big new player is the Gulf, which has sucked in migrant workers since the oil boom. Saudi Arabia is now the world's biggest sender of remittances after America, posting \$27 billion in 2010, mostly to the families of South Asians and Africans who toil on its building sites and clean its homes. More than half of all remittances to South Asia come from the Gulf; worldwide, the region sends almost as many remittances to poor countries as Western Europe does.

Expensive oil has made Russia a big destination for immigrants, too. In 2000 it was only the 17th-biggest remitter in the world — indeed, it was a net receiver. But by 2010 it was the fourth-largest sender, dispatching nearly \$19 billion, mostly to Central Asia. Remittances from Russia are worth more than a fifth of Tajikistan's economy. Stricter border controls keep migrants in as well as out, and the remittances flowing.

Despite world economic turmoil, global inflows of foreign direct investment (FDI) rose by 17% in 2011 to \$1.5 trillion (SUNS, 2012).

Most buy-out firms now prefer the fluffy title of “alternative asset manager”. There are 827 buy-out firms globally (Pensionprism, 2012). Private-equity buy-outs tend to increase productivity — by around 2%, on average (Lee, 2012).

Dynamic changes occur to hedge funds. Running a hedge fund today is three times as much work for a third of the fun, says one. But many are motivated by economics. Hedge funds typically get paid a 2% management fee on assets to cover expenses and a 20% performance fee on the returns they achieve for investors. Most funds do not earn performance fees unless they outperform their peak level or “high-water mark”. At the end of 2011, 67% of hedge funds were below their high-water marks and 13% have not earned a performance fee since 2007 or earlier. 18% of hedge funds are more than 20% below their high-water marks (Durden, 2012).

Last year alone, Bridgewater Pure Alpha fund earned its investors \$13.8 billion, taking its total gains since it opened in 1975 to \$35.8 billion, more than any other hedge fund ever, including the previous record-holder, George Soros's Quantum Endowment Fund.

Around a third of all hedge funds own Apple's shares, including big names like SAC Capital and Greenlight. Some have made very big bets. Citadel's \$5.1 billion stake in Apple (as of December 31<sup>st</sup> 2011) accounted for around 12% of its equity portfolio. Many hedge funds that have done well in the past year owe much to this single position.

Apple is larger than the American retail sector combined. It accounts for 4.5% of the S&P 500 and 1.1% of the global equity market.

## CHINA DWINDLING AND EXPANDING ROLE

China foreign-exchange reserves fell in the fourth quarter 2011 for the first time since the height of

the Asian financial crisis in 1998. The drop was small, from \$3.2 trillion to \$3.18 trillion, but also a little mysterious. China still exports more than it imports, and attracts more foreign direct investment than it undertakes. These two sources of foreign exchange must, then, have been offset by an unidentified drain. Last year about \$185 billion might have passed from mainland China through the VIP rooms of Macau's casinos.

Each iPad sold in America adds \$275, the total production cost, to America's trade deficit with China, yet the value of the actual work performed in China accounts for only \$10. China's small contribution to total costs suggests that a Yuan appreciation would have little impact on its exports. A 20% rise in the Yuan would add less than 1% to the import price of an iPad.

But is China's currency still undervalued by the Senate's own definition? There are three IMF's methods to identify offending exchange rates. Referring to one IMF calculation the Yuan was undervalued by 23%. That estimate, made in September 2011, was based on the exchange rate required to bring the country's notorious current-account surplus into line with the “norm” for a country like China. The IMF has not said officially what that norm should be, but one study suggests it is about 2.9% of GDP.

The corollary of a cheap currency is a large current-account surplus. It is therefore notable that China's surplus narrowed to only 2.5% in the fourth quarter of 2011. It was the smallest surplus (relative to the size of China's economy) since 2002. Even in absolute terms, the \$201 billion surplus was the smallest since 2005.

China's labour force is not, however, growing as quickly as it was. From 1991 to 2000, it swelled by 8.7m a year.

So China is not about to hollow out. But if it is to keep growing fast, it must become more innovative. At present Chinese innovation is a mixed bag. China was once a dazzling innovator: think of printing, paper, gunpowder and the compass.

China can seem invincible. In 2010 it overtook America in terms of manufactured output, energy use and car sales. Shanghai reported fertility of just 0.6 in 2010—probably the lowest level anywhere in the world. In 1980 China's median (the age at which half the population is younger, half older) was 22. That is characteristic of a young developing country. It is now 34.5, more like a rich country

and not very different from America's, which is 37. China set up a national pensions fund in 2000, but only about 365m people have a formal pension. And the system is in crisis. The country's unfunded pension liability is roughly 150% of GDP. AT ITS peak, of over 10% of GDP in 2007, China's current-account surplus offered firm proof that the Yuan was undervalued. The evidence is much less conclusive now. China's currency is 30% stronger in real trade-weighted terms than in 2005, when its peg to the dollar was scrapped. China's surplus with America rose to a record \$202 billion, more than accounting for its total surplus (China ran a deficit with the rest of the world).

Between 2000 and 2010 China increased its consumption of oil more than any other country, by 4.3m b/d, a 90% jump. It now gets through more than 10% of the world's oil. More surprising is the country that increased its consumption by the second-largest increment: Saudi Arabia, which upped its oil-guzzling by 1.2m b/d. At some 2.8m b/d, it is now the world's sixth-largest consumer, getting through more than a quarter of its 10m b/d output. Air-conditioning units soak up half of all power generated at peak consumption periods (Savrieno, 2012).

Officials also almost tripled the amount of foreign investment allowed in China's capital markets, to \$80 billion.

Emerging markets is a useful term precisely because it is imprecise. Coined for the convenience of investors looking for somewhere exciting to put their money, it covers a bewildering range of economies with little in common, except that they are not too rich, not too poor and not too closed to foreign capital. It is hard to say whether the shared success of emerging economies can continue.

Although the emerging markets have less room for easing now than they did in 2008, when they collectively ran a small surplus on their budgets, their average budget deficit last year was only 2% of GDP, against 8% in the G7 economies. And their general-government debt amounts on average to only 36% of GDP, compared with 119% of GDP in the rich world.

The ten largest economies in Asia now spend roughly \$400 billion a year on research and development (R&D)—as much as America, and well ahead of Europe's \$300 billion.

GDP per person measured at purchasing-power parity, which adjusts for differences in the cost of living in each country shows that Japan was

overtaken by Singapore in 1993, by Hong Kong in 1997 and by Taiwan in 2010.

Previous colonial development has greatly influenced the economy of some of now emerging markets. Two countries which share a common language trade 42% more with each other than two otherwise identical countries that lack that bond. Two countries that once shared imperial ties trade a startling 188% more. Imperial ties affect trade patterns more than membership of a common currency (which boosts trade by only 114%). The ex-colonies' traffic with Britain with their traffic with the rest of the world shows that trade flows were 13% higher than you would expect, capital flows were 24% higher and the flows of people and information were a startling 93% higher.

## STATE CAPITALISM

The defining battle of the 21<sup>st</sup> century will be not between capitalism and socialism but between different versions of capitalism. The rise of state capitalism in the East may encourage a trade war as liberal countries attack subsidies and state-capitalist countries retaliate. It introduces commercial criteria into political decisions and political decisions into commercial ones. And it removes an essential layer of scrutiny from central government.

The red tape in America is no laughing matter. The problem is not the rules that are self-evidently absurd. It is the ones that sound reasonable on their own but impose a huge burden collectively.

It costs companies an average of 95 man-days a year just to deal with trade bureaucracies. It takes longer and is more expensive to ship goods between two Middle Eastern ports than to send them from the Middle East to America. Such market fragmentation, the authors argue, is the consequence of the region's centralized, state-led economic policies.

When firms had to decide whether to do something in America or elsewhere, America lost two times out of three. About €350 billion of EU contracts are open to foreign bidders, twice as much as in America and 13 times as much as in Japan.

The Fed has "outperformed" the rest of America's financial industry put together for four years running. That might be a triumph in a state-controlled economy. In America, it is another cause for concern. 2011 already written off as a disaster.

Generally state companies show no signs of relinquishing the commanding heights, whether

in major industries (the world's ten biggest oil-and-gas firms, measured by reserves, are all state-owned) or major markets (state-backed companies account for 80% of the value of China's stock market and 62% of Russia's). And it has been given an extra boost by the 2007–08 financial crises: in 2009 some 85% of China's \$1.4 trillion in bank loans went to state companies.

In Russia, for example, the state has retained golden shares in 181 firms. In all, the world's sovereign-wealth funds control about \$4.8 trillion in assets, a figure that is likely to rise to \$10 trillion by the end of this decade.

Since 2000 the cumulative surpluses of oil exporters have come to over \$4 trillion, twice as much as that of China.

One reason why this enormous stash has received much less attention than China's is that only a fraction of it has gone into official reserves. Most of it is in opaque government investment funds (Arezki and Hasanov, 2009).

The Bank of England is now a market mammoth, owning over 30% of the £940 billion (\$1.5 trillion) pool of outstanding government bonds.

According to Bank of America Merrill Lynch, there were some \$11 trillion-worth of government bonds in issue at the end of 2001; by the end of 2011, that figure had risen to more than \$31 trillion. The reason was that central banks were pretty indifferent to low yields, being content to park their reserves in the relative safety and liquidity of Treasury bonds as a way to manage their currencies' level versus the dollar.

In Britain, data from the Debt Management Office show that banks and building societies owned just £26 billion-worth of gilts in the last quarter of 2008; by the end of 2011 they owned £131 billion, or around 10% of the total.

It is ensuring that the sovereign can borrow cheaply. But it is not enough. The simplest wheezes push spending into the future. Classic forms of deferred spending that do not show up on balance-sheets until later include pension promises and public-private partnerships, where governments pay companies for infrastructure after construction is done. America met a 1987 deficit target by simply delaying military pay and Medicare payments. Greece's debt figure shot up by 7.8% of GDP in 2010 when Eurostat, the EU's statistical agency, reclassified bus, railway and other public companies in the government ac-

counts. Accounting measures should follow the movement of economic value, not cash, so that delaying pay packets until next year (or retirement) has no effect.

Government spending is in some cases in obvious excess. At 40% of GDP, public spending is already high for such a middle-income country like Russia. Mr Putin has made extravagant pre-election promises, adding up to as much as \$160 billion to the budget, which will push this ratio even higher. His promises include large pay and pension increases for the armed forces, teachers and doctors. In 2012 alone he has pushed through a 33% rise in defence, security and police spending.

The result is huge economies of scale: the cost per container on an Asia-to-Europe trip has fallen from around \$1,000 to below \$300.

Singapore accounts for 4% of the world's total spending on arms imports. Its defence spending per head beats every country bar America, Israel and Kuwait. This year \$9.7 billion, or 24% of the national budget, will go on defence.

American defence spending (which, as a share of GDP, is about three times the European NATO average.

Very impressive is America's Strategic Petroleum Reserve. The SPR holds 700m barrels of the black stuff in vast underground caverns strung along the Gulf of Mexico.

Higher temperatures make butane and other cheap and popular petrol additives evaporate, causing smog, so air-quality regulations prevent their usage during the summer. Americans may protest loudly, but their economic behavior indicates a remarkable indifference to the price of oil. If gas prices truly damage the quality of lives, Americans have done a remarkable job of hiding it.

We are living now in a world of general peculiar inflation affecting all the sides of economic, cultural and social life. So, airlines have been issuing so many miles (for spending on the ground as well as in the air) that the total stock is worth more than all the dollar notes and coins in circulation. In Britain the proportion of A-level students given "A" grades has risen from 9% to 27% over the past 25 years. Yet other tests find that children are no cleverer than they were. A study by Durham University concluded that an A grade today is the equivalent of a C in the 1980s. In American universities almost 45% of graduates now get the top grade, compared

with 15% in 1960. Grade inflation makes students feel better about them, but because the highest grade is fixed, it also causes grade compression, which distorts relative prices. This is unfair to the brightest, whose grades are devalued against those of average students. It also makes it harder for employers to identify the best applicants. Job-title inflation, which has recently accelerated because a fancier-sounding title is cheaper than a pay rise. Inflation of all kinds devalues everything it infects. It obscures information and so distorts behaviour. It is true inflation is similar to toothpaste: easy to squeeze out of the tube, almost impossible to put back in.

### SUMMARY AND CONCLUDING REMARKS

The Results of the study do not show that current economic and financial developments are the marks of a sustainable recovery. Moreover, it indicates on a real probability of a double dip recession. The same results prevailed at total sample of separate country situation with the feeble ex-

clusion of the USA. The same is relevant to quite a few financial and industrial groups. In addition, the result of the analysis does not show the superiority of positive towards negative trends and developments for firm performance, based on stock market price.

The results show that in state companies China being a priority the current tendencies are far from perfect despite assertive rhetoric of certain government officials even in the developed part of the world.

In companies, active in the financial industry, I found no evidence of comprehensive change of their strategy towards more prudent one. This will not obviously reduce the international financial markets volatility.

I propose further study of the issue in another research with the same methodology applied in this research, except that, first, the estimation of the best models that fit the data to be done, and second, using the best competing models to investigate the potential threats to the world economy and financial industry, in particular.

### REFERENCES

1. Acemoglu, D. (2009). 'The Crisis of 2008: Structural Lessons for and from Economics.' MIT, January 6, 2009. Available at: <http://economics.mit.edu/files/3703>.
2. Akerlof, G. and Shiller, R. (2009). *Animal Spirits: How Human Psychology Drives the Economy and why it Matters for Global Capitalism*. Princeton University Press.
3. Arezki, R. and Hasanov, F. (2009). 'Global imbalances and petrodollars.' IMF Working Paper, WP/09/89, April 2009. Available at: <https://www.imf.org/external/pubs/ft/wp/2009/wp0989.pdf>.
4. Bartlett, D. (2008). 'Fallout of the Global Financial Crisis.' RSM International Association, April 2008. Available at: [http://moodle.adaptland.it/pluginfile.php/7939/mod\\_resource/content/0/bartlett\\_fallout\\_global\\_financial\\_crisis\\_2008.pdf](http://moodle.adaptland.it/pluginfile.php/7939/mod_resource/content/0/bartlett_fallout_global_financial_crisis_2008.pdf).
5. Blanchard, O. (2012). 'Driving the Global Economy with the Brakes On.' Posted on January 24, 2012 by IMFdirect. Available at: <https://blog-imfdirect.imf.org/2012/01/24/driving-the-global-economy-with-the-brakes-on>.
6. Brunnermeier, M. (2009). 'Deciphering the Liquidity and Credit Crunch 2007–2008.' *Journal of Economic Perspectives*, Volume 23, no 1, Winter 2009, pp. 77–100. Available at: [https://www.princeton.edu/~markus/research/papers/liquidity\\_credit\\_crunch.pdf](https://www.princeton.edu/~markus/research/papers/liquidity_credit_crunch.pdf).
7. DeBoer, R.D. (2008). 'Understanding the Financial Crisis: Origin and Impact.' Available at: <https://www.juniorachievement.org/documents/20009/36541/UnderstandingFinancialCrisis.pdf/694118d6-45c1-4442-8f62-50922bc38a16>.
8. Deleveraging — How Do We Get Out of This? TABER Asset Management, 03.07.2012. Available at: <http://www.taberasset.com>.
9. Doladoy, S., Juan, J., Stucchi, O. (2012). 'Does dual employment protection affect TFP? Evidence from Spanish manufacturing,' May 30, 2012. Available at: [http://www.iza.org/conference\\_files/ESSLE\\_2012/dolado\\_j91.pdf](http://www.iza.org/conference_files/ESSLE_2012/dolado_j91.pdf)
10. Durden, T. (2012). Only Two Thirds of All Hedge Funds are under their High Water Mark. Zero Hedge. Available at: <http://www.zerohedge.com/news/over-two-thirds-all-hedge-funds-are-under-their-high-water-mark>
11. Erkkilä, M. (2008). 'Impact of financial crisis on the Russian economy.' Focus/Opinion Expert view 4/2008, 19.09.2008. Available at: <http://www.suomenpankki.fi/pdf/166166.pdf>.

12. Third World Network. (2012). 'Global FDI flows rose by 17% last year.' TWN Info Service on Finance and Development, 31 January 2012. Available at: <http://www.twn.my/title2/finance/2012/finance120103.htm>.
13. Hardman, B. (2012). 'From vanilla to rocky road. The Darwinian evolution of exchange-traded funds.' *The Economist*, From the print edition February 25th 2012. Available at: <http://www.economist.com/node/21547989>.
14. Hyun-Soo, P. (2008). 'Future Direction of the Global Financial Crisis.'
15. Khatiwada, S., McGirr, E. (2008). 'Financial Crisis: a review of some of the consequences, policy actions and recent trends.' International Institute for Labour Studies.
16. Krieger, S. (2012). 'Secret's, Secret's Are No Fun; US and others crack down on Swiss Bank Secrecy.' *Euroculture*, Posted on September 27, 2012 by Stephen Krieger. Available at: <http://eurokulture.missouri.edu/secrets-secrets-are-no-fun-us-and-others-crack-down-on-swiss-bank-secrecy>.
17. Romney, Lee J. (2012). 'Happy that Obamacare is Upheld.' Dayonbay, June 27, 2012. Available at: <http://www.dayonbay.org/romney-happy-that-obamacare-is-upheld/>
18. Triana, Michel. (2012). 'Light of Bytes. Credit Card Security: Outfoxing the fraudsters.' Available at: <http://michel triana.com>.
19. Yilmaz, K. (2008). 'Global Financial Crisis and the Volatility Spillovers across Stock Markets.' Koc University, Istanbul.
20. Minsky, H. (1977). 'A Theory of Systemic Fragility,' in E. Altman und A. Sametz (Hg.), 'Financial Crises, Institutions and Markets in a Fragile Environment,' New York.
21. Nicholson, R., et al. (2008). 'Impact of the Financial Crisis on Technology Spending in the Utility Industry.' *Energy Insights*, IDC Company. Available at: [http://cdn.idc.com/downloads/EI\\_Utility\\_Spending\\_Update.pdf](http://cdn.idc.com/downloads/EI_Utility_Spending_Update.pdf)
22. Ohanian, Lee E. (2010). 'The Economic Crisis from a Neoclassical Perspective.' *Journal of Economic Perspectives*, 24(4): 45–66.
23. Rasmus, J. (2008). 'The Deepening Global Financial Crisis: From Minsky to Marx and Beyond.' *Journal of Socialist Theory*, 36:1, 5–29.
24. Reinhart, C. and Rogoff, K. (2009). *This Time is Different: Eight Centuries of Financial Folly*. Princeton University Press.
25. Savrieno, A. (2012). 'The Hidden Value in Electric Vehicle Infrastructure.' *Seeking Alpha*, June 27, 2012 <http://seekingalpha.com/article/686561-the-hidden-value-in-electric-vehicle-infrastructure>.
26. The Shrinking Private Equity World? *Pensionprism*, January 26, 2012. Available at: <http://testleoblog.wordpress.com/author/testleoblog/page/11/>
27. Werdiger, J. (2011). 'Tax Evasion Costs Governments \$3.1 Trillion Annually.' *New York Times*, November 28, 2011.

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# A Tentative Behavioral Approach to Real Income Targeting

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**Abstract.** This is a paper based on cognitive psychology's view of "curvilinear" optimism-pessimism and hence, with a flavor of behavioral macroeconomics. The substructure of a real overlapping-generations business cycle model is assumed to be underlined by the long-term character of the rational expectations of the big socioeconomic elite. This model is combined with the general-public's view of the economy, which is assumed to be an extrapolation of the changing psychology of the community about the banking system. An exogenous shock will be propagated through this mass psychology. Policy-wise, the public sector is assumed away and the only purpose of the monetary authority is to secure the efficiency of intergenerational income distribution in a business environment with zero steady-state profit. Within this context, monetary policy is found to be in the spirit of the Old Chicago quantity theory from the viewpoint that it should be subject to a full-employment-wage standard in a gold-standard fashion. It is a countercyclical policy and not a version of the modern revival of inflation targeting, which is of the sort held responsible for the 1929 Crash.

**Keywords:** mood; bank rating; economic activity; monetary expansion; Old Chicago quantity theory; full-employment-wage standard.

## Предварительный поведенческий подход к таргетированию реальных доходов

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**Аннотация.** В основу данного исследования положен тезис когнитивной психологии о криволинейности настроений оптимизма и пессимизма в контексте поведенческой макроэкономики. Предполагается, что реальная субструктура модели перекрывающихся поколений экономического цикла обусловлена долговременным характером рациональных ожиданий больших социально-экономических элит. Далее модель соединяется с обобщенным взглядом широких масс населения на экономику, что, как предполагается, позволяет экстраполировать меняющуюся психологию населения относительно банковской системы. Именно экзогенный шок будет распространяться путем влияния на массовую психологию. При этом авторы абстрагируются от наличия какого-либо рационально управляемого публичного сектора, а единственной целью монетарной власти является обеспечение эффективности распределения доходов между когортами населения с постоянным нулевым результатом для предпринимательской среды. В этом смысле монетарная политика ведется в духе старой Чикагской количественной школы, т.е. опирается на принцип равновесия «полная занятость – заработная плата» в духе эры золотого стандарта. Это антициклическая политика, а не современное воскрешение таргетирования инфляции, что явилось одной из причин краха 1929 г.

**Ключевые слова:** настроение; банковский рейтинг; экономическая активность; монетарная экспансия; старая чикагская количественная теория; принцип равновесия «полная занятость – заработная плата».

## 1. INTRODUCTION

One thing that has slipped the attention of the economics profession is that the mixed-economy Old, pre-1950, Chicago School and Keynesian theories and policy prescriptions were sort of “general-public economics” as opposed to post-1980 neo-liberalism (the new classical economics of monetarism plus supply side economics plus rational expectations), which has been kind of the “elite economics” of large market players. Figure 1, adapted from Piketty and Saez (2014), is quite instructive as to the dramatic consequences this shift of agent emphasis had on socioeconomic order (see e.g. Söllner 2014). What Old Chicago and Keynesians had in mind was moderate socioeconomic inequality and market power, which when either desideratum was disturbed, the state should intervene to restore order. The free market economy is there to promote the common interest, the welfare of the many, and not the private interest of the strong and well-to-do: “Henry Simons had preached a form of laissez-faire in his famous 1934 pamphlet *A Positive Program for Laissez Faire*, but what a form!... almost as harmonious with socialism as with private-enterprise capitalism” (Stigler 1988, p. 149). This weak rather than strong Pareto efficiency view of the socioeconomic being is one reason having prevented mixed-economy macroeconomics from developing a thorough microeconomic background; thorough, from the viewpoint of encompassing utility and profit maximization beyond the general equilibrium mechanics acknowledged by neoclassical synthesis.

To have such a comprehensive background, rational expectations on the part of the agents have to be postulated to be compatible with the standard neoclassical utility and profit maximization. Indeed, some elite can form such expectations and act accordingly by employing the appropriate personnel, which for neo-liberalism is enough invoking on the leading role of these elite. But, the most the majority of the citizenry can afford to develop to minimize animal spirits is casual or bounded rational ones, which is what Keynesians acknowledge, while no expectations concept the short-lived star of Old Chicago had the time to elaborate. Of course, one might argue that allowing new-neoclassical synthesis the presence of rational expectations, this theory does have sound micro-foundation; but critics say that this new synthesis is far from reality, much more so from Keynesian theorizing (see e.g. Landmann 2014). At the other end, post-Keynesian economics dismisses even general equilibrium workings having thus placed itself outside mainstream economics (see e.g. Harcourt 2006).

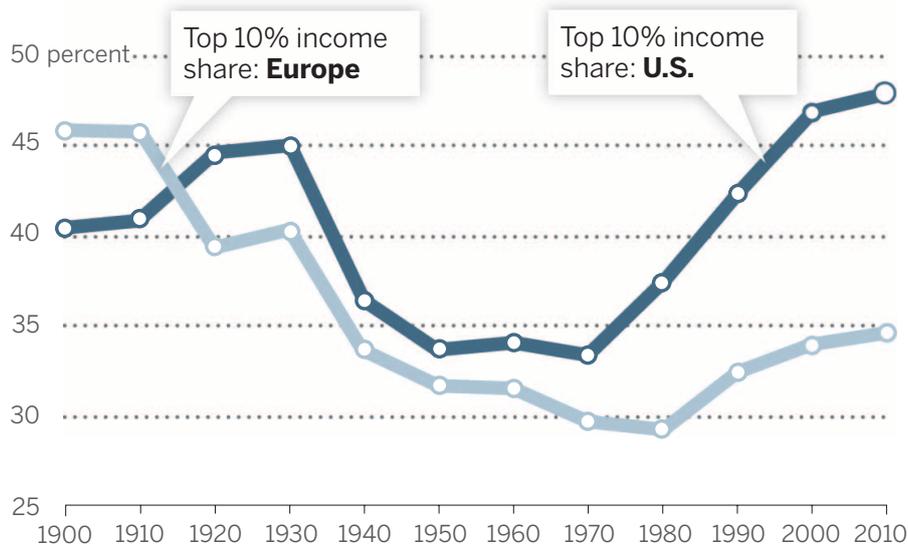


Figure 1. The Evolution of the Top 10% Pre-tax Income Share in the U.S. and Europe between 1900 and 2010

Note. The share of total income accruing to top decile income holders was higher in Europe than in the United States from 1900 to 1910; it was substantially higher in the United States than in Europe from 2000 to 2010. The series report decennial averages (1900 = 1900 to 1909, etc.) constructed using income tax returns and national accounts. See T. Piketty, *Capital in the Twenty-first Century*. Harvard Univ. Press, Cambridge, MA, 2014, chapter 9, Fig. 9.8. Series available online at [piketty.pse.ens.fr/capital21c](http://piketty.pse.ens.fr/capital21c).

Source: Piketty and Saez (2014, p. 838).

According to this paper, either the new classical economics of neo-liberalism or the new-neoclassical synthesis should be complemented with a variable describing the general-public's mood about the state of the free market system. Large market players do exist and they do act based ideally on rational expectations; the order of magnitude of largeness is immaterial because the standard of comparison is the socioeconomic status of the majority of the people. And, they do lead the engine of the economy so that rational expectations can be safely assumed throughout a model description of it. But, this model has to account somehow for the mood, for the psychology of the general public as well, which immediately reminds one of Keynes' animal spirits, because their origin is the discipline of psychology of his times (see e.g. Safire 2009). This is not to say that incorporating the psychological element in a macroeconomic discussion makes it Keynesian as, for instance, may be realized through Geiger's (2016) work.

Nevertheless, such a discussion does obtain some Keynesian flavor to the extent the psychological element is founded on psychology; a so to speak, behavioral-economics viewpoint of the Keynesian approach (see e.g. Driscoll and Holden 2014). For example, modern cognitive psychology does rationalize the basic for economics psychological element, namely optimism-pessimism (see e.g. Croom and Bono 2015), and hence, the mood of the public might be captured through some concept related to these findings. But, in economics, optimism-pessimism has been related to the concept of expectation as, for instance, expectations are shaped by the news (Avdjiev 2016), rationally or casually (Beaudry et al. 2012 and 2014). So, the expectations approach would be compatible with the psychological one only if the new information shapes casual only expectations, bad or good *a la* Croom and Bono (2015) rather than only good as the "mood swings" view postulates (Schmitt-Grohe and Uribe 2012).

This, exactly, viewpoint of the general-public mood is adopted herein in connection with an elementary real business cycle model, without of course purporting to claim that new classical economics would become subsequently a variant of Keynesian economics, but they would do obtain some Keynesian flavor behaviorally, while the new-neoclassical synthesis would certainly become "more Keynesian" in character. Thus, the next section works out a bank-health rating index by the general public, an index tied to an economy-wise index, with both of them being

defined psychologically rather than based on some expectations notion. The idea is that what the general public sees to rate first banks and then the economy, are its pocket and employment status. First, the banks, because in an overlapping-generations general-equilibrium model, the worker's current income is found to depend directly on how much the employer had borrowed from the bank in the previous period; borrowing of which the worker is aware. It is a relationship which determines current consumption demand and current bank rating, and can propagate would-be instability.

This is more or less the novelty of the present paper from the viewpoint of modeling; one, in line with cognitive psychology and hence, with behavioral macroeconomics. Contrary to the behavioral macro-model of De Grauwe and Macchiarelli (2015), optimism-pessimism is not self-fulfilling, does not come out of the use of a "best" forecasting rule among many such rules, and is not associated with the concept of animal spirits on the part of investors. It is associated with the consumer-laborer and not without recourse to the discipline of psychology. Also, herein, there are no heterogeneous expectations, some rational and some "parsimonious forecasting models that are, in equilibrium, optimal within a restricted class" (Branch and McGough 2011, p. 395). The model *per se* captures the rationality of businessmen expectations, which in turn is compromised with consumer-labor psychology, analytically rather than by incorporating explicitly a second class of agents. We want to see here how the policy conclusions of standard new classical macroeconomics are qualified when the psychology of the general public is acknowledged, and not when the model population is divided into two socioeconomic classes.

Policy-wise in Section 3, the public sector is assumed away and the only purpose of the monetary authority is to secure the efficiency of intergenerational income distribution in a business environment with zero steady-state profit. Within this context, our money creation conclusion is in the spirit of Old Chicago School about money creation as the primary tool against recession. Money supply should be adjusted to the imperatives of wage stability at its full employment level just as under a gold standard. Following (Bordo et al. 2004), using such a wage index or in general, an index of input prices as a nominal anchor is expected to render monetary expansion endogenous, serving exclusively the imperatives of labor-money convertibility. In effect, monetary expansion emerges to be a panacea against any disturbance of the intergenerational income distribution implied by general-equilibrium, *ceteris paribus*. Although the particular content of Old Chicago thinking postulated here, becomes clear as the paper proceeds, the concluding Section 4 expands further on it and on the nature of the policy implication of the following elementary real business cycle model.

## 2. AN OVERLAPPING GENERATIONS MODEL AND THE BANK

Suppose that individuals live for two time periods so that at time  $t$  the economy consists of a contemporary young generation and one old generation, young at time  $t-1$ . Individuals are alike regardless generation, the overall population does not change, and so it may be assumed that there is always in the economy one typical young and one typical old persons.

### *The Consumer and Bank Deposits*

One young at time  $t$  individual works to earn income,  $W_t$ , for current consumption,  $Q_t^y$ , and to consume when old,  $Q_{t+1}^o$ , based on its savings,  $S_t$ , having first deposited them with a bank,  $S_t \equiv D_t$  to benefit also from the interest rate  $r_{D,t}$ . The time superscript is used presumably as a generation index. That is, the typical young at  $t$  and old at  $t+1$  individual is representative of the  $t$ th generation and is called upon to maximize utility,  $U$ , of the following form:

$$U(Q_t^y, Q_{t+1}^o) = \ln(Q_t^y) + \ln(Q_{t+1}^o) \quad (1)$$

subject to the constraints:

$$W_t = Q_t' + S_t \equiv Q_t' + D_t.$$

And

$$Q_{t+1}' = (1 + r_{D,t})S_t \equiv (1 + r_{D,t})D_t$$

with regard to  $Q_t'$ ,  $Q_{t+1}'$ , and  $S_t \equiv D_t$ . According to (1): (i) Intertemporal risk aversion measuring how risks at different times interact is zero; (ii) Consumption at one date does not affect the utility realized from consumption at other dates; (iii) There is complete neutrality over the timing of the resolution of risk. That is, the utility function contemplated is quite simple, but suffices for the purposes of this paper.

Now, inserting the constraints into the objective function, the following optimization problem obtains:

$$\max_{S_t=D_t} \left[ \ln(W_t - S_t) + \ln(1 + r_{D,t})S_t \right]$$

with the first-order condition:

$$\frac{1}{W_t - S_t} = \frac{1}{S_t}$$

and hence,

$$S_t = \frac{W_t}{2} = D_t \quad (2)$$

regardless the value of the deposit interest rate  $r_{D,t}$ , since under logarithmic preferences, wealth and substitution effects cancel. To introduce the bank-health rating index by the typical individual just described, the following connection with bank activities is postulated.

### **The Bank**

Suppose that there is a single bank free from any required reserves regulation. Instead, define a bank-health rating index,  $h \in (0,1)$ , related directly to the ratio of loans,  $L$ , to deposits,  $D$ :  $l \equiv L/D$ , through

$$h = \sqrt{l/2} \Rightarrow l = 2h^2, \quad (3)$$

and tied to an economy-wise confidence index as reflected through the cash-drain ratio,  $c \equiv C/D \in (0,1)$ , as follows: When  $h=0$ , the bank-health rate by the public is nil and hence, cash drain is full:  $c=1$ ; when  $h=1$ , the rating is perfect, the cash held is nil, and  $c=0$ :

$$c = 1 - h^2. \quad (4)$$

Expression (3) is just a conventional way of capturing a trend according to which bank rating increases with  $l$  but in a decreasing fashion as credit over-expands. Yet, according to (4), this over-expansion does not take away the confidence to the performance of the economy. The healthiness of the financial system is tied to the confidence about the economy, and (4) reflects the fact that this confidence is restored with difficulty after a recession, but it is strengthened rapidly once the public realizes that credit expanding steadily. Both of the contemplated indexes reflect psychological trends as documented, for example, by Croom and Bono (2015); trends that

as the next subsection shows, influence eventually consumer behavior in its role as an income earner.

To describe  $h$  better, let  $M$  be the money stock:

$$M = C + D = (1+c)D \quad (5)$$

and  $B$  stand for the monetary base:

$$B = C + L$$

so that:

$$\frac{M}{B} = \frac{C+D}{C+L} = \frac{\frac{C}{D}+1}{\frac{C}{D}+\frac{L}{D}} = \frac{1+c}{c+l} \equiv m \quad (6)$$

or, from (3) and (4):

$$m = \frac{2-h^2}{1+h^2}. \quad (6')$$

That is, the money multiplier is completely determined by the public's rating of the banking system. Now, from (5) and (6):

$$(1+c)D = \frac{1+c}{c+l}B \Rightarrow D = \frac{1}{c+l}B,$$

which when inserted in  $L = lD$  gives that:

$$L = \frac{l}{c+l}B,$$

compared from (3) and (4) to  $D$  as follows:

$$D = \frac{1}{1+h^2}B < L = \frac{2h^2}{1+h^2}B \quad \text{iff} \quad h > \frac{1}{\sqrt{2}} \Leftrightarrow l > 1.$$

So,  $h = 1/\sqrt{2}$  might be taken to be the critical value of  $p$  above which we have "over-rating" of the bank as a lending institution. Letting  $r_{L,t}$  be the lending rate, below  $h = 1/\sqrt{2}$ , the public sees  $r_{L,t} < r_{D,t}$ , wanting the bank to attract more borrowing to get rid of excess reserves; the bank operates at a loss. At  $h = 1/2$ , the "glass is halfway full". Any further losses beyond those associated with the midpoint prompt pessimism about the bank at an increasing rate towards  $h = 0$ . At the other end, if  $h < 1/2$ , and losses are declining, pessimism is alleviated and turns to optimism once  $h > 1/2$  and until  $h = 1/\sqrt{2}$  when the two interest rates become equal and the bank breaks even. Beyond  $h = 1/\sqrt{2}$ , lending ceases to be backed by deposits,  $r_{L,t} > r_{D,t}$  to ration it, the bank becomes profitable and this causes its over-rating.

### **The Firm and Bank Borrowing**

To complete the description of index  $h$ , the firm from the borrowing side has to be examined as well. There is one only but zero-profit firm, producing its output in a constant returns Cobb-Douglas fashion, based fully on the previous borrowing from the bank,  $L_{t-1}$ , and on labor,  $N_t$ ,

supplied by the consumer-laborer always at  $N = 1$ . Its profit maximization problem is consequently:

$$\max_{N_t, L_{t-1}} \left( N_t^a L_{t-1}^{1-a} - W_t N_t - r_{L,t} L_{t-1} \right)$$

with first-order conditions:

$$W_t = a N_t^{a-1} L_{t-1}^{1-a} \quad (7)$$

And

$$r_{L,t} = (1-a) N_t^a L_{t-1}^{-a} \quad (8)$$

or, under full employment in the labor market:

$$W_t = a L_{t-1}^{1-a} \quad (7')$$

and:

$$r_{L,t} = (1-a) L_{t-1}^{-a} \quad (8')$$

where presumably  $a \in [0,1]$ . Indeed, if the firm is financed wholly by the bank, part of the loan is used to pay wages according to the parameter  $a$ . Combining (7') with (2), obtains that:

$$S_t = \frac{a L_{t-1}^{1-a}}{2} = D_t \quad (9)$$

which when inserted in (3) gives that:

$$h = \sqrt{L_t / D_t} / 2 = \sqrt{L_t / a L_{t-1}^{1-a}} \quad (3')$$

These two last expressions plus the one regarding goods-market equilibrium:

$$Q_t + Q_t^{t-1} + D_t = L_{t-1}^{1-a}$$

—all three expressions holding under full employment conditions— describe completely the full-employment general-equilibrium benchmark case of discussion under which  $h = 1/\sqrt{2}$ . Equating this value of  $h$  with (3'), one obtains that at steady state where  $L$  does not change:

$$\bar{L} = \left( \frac{a}{2} \right)^{1/a},$$

which, since at steady state  $L_t = D_t$  too, i.e.  $\bar{D} = \bar{L}$ , gives along with (9) and (2) that:

$$\bar{W} = 2 \left( \frac{a}{2} \right)^{1/a}.$$

Also,  $r_L = r_D$ , but the consumer-laborer does not care about the interest rates anyway, because the preferences are logarithmic. To complete the description of the bank rating index in connection with this optimum state of affairs,  $h = 1/\sqrt{2}$ , the consumer-laborer, without having to worry about job security, is primarily concerned with its pocket, and being aware that the wage comes out of previous lending, compares current to last period's lending to rate the bank in the way described by (3') just to make sure that the current optimal state of the economy will not change.

### 3. ECONOMIC ACTIVITY AND POLICYMAKING

Letting  $t-1$  be the last time there was steady state, with  $L_{t-1} = D_{t-1}$  and full employment,  $N=1$ , the following types of disturbances may be identified: First, suppose that  $h_t > 1/\sqrt{2}$  and  $L_t > \bar{L} = \bar{D} = D_t$ , since  $D$  cannot become greater than  $\bar{D}$ . In this case,  $W$  will increase above  $\bar{W}$ ; an increase that may be only nominal to restore goods-market equilibrium at a higher price level. To illustrate the accompanying increase in  $M$ , let  $\bar{M} = 1$  and since,

$$L = \frac{2h^2}{1+h^2} B = \frac{2mh^2}{1+h^2} M = \frac{2h^2(2-h^2)}{(1+h^2)^2} M \Rightarrow \bar{L} = \frac{56}{25} \bar{M} = \frac{56}{25},$$

an increased  $h$  to  $h_t = 3/4 > 1/\sqrt{2}$ , gives  $L_t = 414(M)/625$ , which when equated to  $\bar{L} = 56/25$ , results in  $M \cong 3.38$ . This is how much  $M$  must increase to give a nominal  $L_t$  equal to  $\bar{L}$ . Should  $M$  be reduced below to  $\bar{M} = 1$  to fight inflation? The answer is clearly negative as it may be seen by multiplying the fraction  $414/625$  with some decimal number: The reduction will be recessionary; stagflation might set in. The expansion of money supply in conjunction perhaps with a policy aiming at decreasing in nominal terms the discrepancy  $r_L - r_D > 0$ , and even restoring the equality between the two rates, serve as means that would finally remove excess demands and supplies associated with  $h_t > 1/\sqrt{2}$ .

The mentality of such monetary policy appears to be similar to Bernanke's (1999) "constrained discretion" of "inflation-targeting" and near to nominal income targeting (Bradley and Jansen 1989) or nominal GDP targeting (Sumner 2014). But, here, it is the fears of excess demand in the labor market that lead to inflationary money creation to keep real wage at  $\bar{W}$ . The primary policy concern is full employment at general equilibrium and price stability comes up only as a by-product of the consequent policy action. And, practically, if the pressures for  $W > \bar{W}$  reflect also over-investment prompting fears for recessionary future liquidations *a la* Hayek, the medium- and long-term policy target may not be price stability even as a by-product but anti-recessionary money creation in the Old Chicago way of *monetalis supera fiscus*.

"Hayek liquidations" may be characterized by Keynesian deficient demand too, if there are "many socially desirable trades between individuals remaining unexploited when the economy inherits too many capital goods" (Beaudry et al. 2014, Abstract). In this case, the mentality underlying monetary expansion is much like that underlying gold convertibility as would be the case under inflation-targeting or the same, k% rule (see e.g. Flandreau 2007), with the difference here that gold is replaced not by a k% rule but by some full employment index like  $N=1$  or rather  $W = \bar{W}$ . That the deliberate increase of  $M$  to prompt wage-push inflation, to neutralize in turn an otherwise permanent labor market disequilibrium and maintain full employment as well as the monetary policy response in case of broader "Hayek-Keynes dynamics" are quantity theory in character, the Old Chicago version of it *a la* Douglas who is strongly influenced by under-consumption theories (see e.g. Laidler 1998). We have to see how the monetary authority reacts when  $h_t < 1/\sqrt{2}$  too, to assess if this actually is the mentality characterizing the monetary authority, since the "philosophy" behind its reactions must be one.

More precisely, the second case is when  $h_t < 1/\sqrt{2}$ , but full employment cannot be continued through a lower  $W$  and deflation, because a deflation would not restore the equilibrium in the goods

market at a lower price level. A deflation would be recessionary if not accompanied by a policy of increasing  $M$  above  $\bar{M} = 1$ : Letting  $h_t = 2/3 < 1/\sqrt{2}$ , one obtains that  $L_t = 112(M)/169$  and again, that  $M \cong 3.38$  if of course, one wants  $L_t = \bar{L}$ . This increase in  $M$  is the only way to render temporary the reduction of  $L$  and avoid a deepening recession. Moreover, steady state is restored at the original price level. Without increased  $M$ , there can still be equilibrium in the goods market, though a temporary underemployment one:

$$Q_t^t + Q_t^{t-1} + D_t = N_t^a \bar{L}^{1-a}$$

with  $N < 1$ , since (9) is bound to propagate the shock that led to  $h_t < 1/\sqrt{2}$ . That is, the spirit of anti-recessionary monetary policy here is (Old) Chicagoan in the sense that if we allowed for the presence of a government and its budget, the policy would involve a budget deficit financed by money creation as the implementation of monetary rather than fiscal policy (see e.g. Tavlas 1997, 2015). So, the overall mentality characterizing the intervention of the monetary authority, the one that should be taken to apply to the case of  $h_t > 1/\sqrt{2}$  as well, is that money matters not as a companion of fiscal policy, but from the standpoint of the quantity theory (Wray 2011). And, of course, it is not the modern monetarist perspective of this theory of the k% rule in the place of gold standard, but the Old Chicago version of monetary policy that does not deny the usefulness of budget deficits in a recession. In any case, above or below steady state, the focus is always full-employment general equilibrium and hence, consistent policy-wise with a “real-wage-standard” rather than k% rule in the place of gold standard.

Now, to see how in general (9) operates, we have to look at the derivatives of consumption,  $Q_t = Q_t^t + Q_t^{t-1}$  and investment,  $I_t = D_t - D_{t-1} + L_{t-1}$  with respect to  $h$  given that the relationship for the goods-market equilibrium is in general:

$$Q_t^t + Q_t^{t-1} + D_t = N_t^a L_{t-1}^{1-a} + (D_{t-1} - L_{t-1}).$$

So, rearranging terms:

$$\underbrace{Q_t^t + Q_t^{t-1}}_{Q_t} + \underbrace{(D_t - D_{t-1} + L_{t-1})}_{I_t} = \underbrace{N_t^a L_{t-1}^{1-a}}_{Y_t} \tag{10}$$

We do know from Barro (1997) that in the real world, total investment is much more volatile than total consumption, and if our model is plausible, a similar result should be obtained below as well. In any case, one obtains readily from (10) that:

$$\begin{aligned} Q_t = Y_t - I_t &= N_t^a L_{t-1}^{1-a} - (D_t - D_{t-1} + L_{t-1}) = \\ &= N_t^a L_{t-1}^{1-a} - \left( \frac{1}{2} a L_{t-1}^{1-a} - D_{t-1} + L_{t-1} \right) = \\ &= \left( N_t^a - \frac{1}{2} a \right) \left[ \frac{2h_{t-1}^2 (2 - h_{t-1}^2)}{(1 + h_{t-1}^2)^2} \right]^{1-a} + \frac{(2 - h_{t-1}^2)(1 - 2h_{t-1}^2)}{(1 + h_{t-1}^2)^2} \end{aligned}$$

and hence, that:

$$I_t = Y_t - Q_t = \frac{1}{2} a \left[ \frac{2h_{t-1}^2 (2 - h_{t-1}^2)}{(1 + h_{t-1}^2)^2} \right]^{1-a} - \frac{(2 - h_{t-1}^2)(1 - 2h_{t-1}^2)}{(1 + h_{t-1}^2)^2}$$

It follows that:

$$\frac{\partial Q_t}{\partial h_{t-1}} = \frac{\left(N_t^a - \frac{1}{2}a\right)(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} - \frac{18h_{t-1}(1-h_{t-1}^2)}{(1+h_{t-1}^2)^3} \quad (11)$$

and:

$$\frac{\partial I_t}{\partial h_{t-1}} = \frac{\frac{1}{2}a(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} + \frac{18h_{t-1}(1-h_{t-1}^2)}{(1+h_{t-1}^2)^3}. \quad (12)$$

This last derivative will be positive only if  $1-2h_{t-1}^2 > 0 \Rightarrow h_{t-1} < 1/\sqrt{2}$ . That is, investment responds positively to improved confidence to the economy and improved bank rating during a recovery and up to  $h=1/\sqrt{2}$ . And, entering a recession from  $h=1/\sqrt{2}$ , investment contracts alongside the increasing mistrust to the economy and the worsening bank rating. Similar will be the trends in consumption if beyond  $h_{t-1} < 1/\sqrt{2}$  in (11), we have in addition:

$$\begin{aligned} & \frac{\left(N_t^a - \frac{1}{2}a\right)(1-a)2^{2-a}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} > \frac{18(1-h_{t-1}^2)}{(1+h_{t-1}^2)^3} \Rightarrow \\ \Rightarrow & \frac{N_t^a(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} > \frac{1}{2} \left[ \frac{a(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} + \frac{36(1-h_{t-1}^2)}{(1+h_{t-1}^2)^3} \right] \end{aligned} \quad (13)$$

and  $N_t^a > a/2$ . Of course, it would not be plausible to assume anything else about  $N_t$ , because with  $a=0.8$  it would involve  $N_t < 0.318$  and with  $a=0.7$  we would have  $N_t < 0.223$ , i.e. a complete collapse in the labor market and of the economy in either case given that these are the values of  $a$  that are empirically relevant (see e.g. Felipe and Adams 2005).

But, in so far as (13) is concerned, note that it would be plausible only under an unchanged marginal propensity to consume (MPC), since if this propensity is say 0.8 and income increases by 1 monetary unit, one cannot have that 0.75 such units are consumed and 0.25 deposited with a bank because it would mean that (11) is negative. And, if the MPC does not change because of consumption inertia as behavioral macroeconomics acknowledges (see e.g. Driscoll and Holden 2014), we should also have that:

$$\frac{\partial Q_t}{\partial h_{t-1}} = \frac{\partial I_t}{\partial h_{t-1}} \Rightarrow \frac{N_t^a(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} = \Phi,$$

which in conjunction with (13) gives that:

$$\Phi = \frac{N_t^a(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} > \frac{1}{2}\Phi,$$

where  $\Phi$  is the bracketed term on the right of (13) :

$$\Phi = \frac{a(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} + \frac{36h_{t-1}(1-h_{t-1}^2)}{(1+h_{t-1}^2)^3}$$

This is a theoretical possibility, indeed, but not endorsed by Barro’s findings, which simply attest to the plausibility of the example just mentioned after perhaps some initial consumption inertia. A positive (12) but negative (11) would mean that the marginal propensity to consume declines during a recovery, i.e. people tend to save and deposit proportionately more than before, and increases during a recession, i.e. people tend to live more for the day when things go from bad to worse. And, if given  $h_{t-1} < 1/\sqrt{2}$ , (11) is negative, (13) becomes:

$$\frac{N_t^a(1-a)2^{2-a}h_{t-1}(1-2h_{t-1}^2)}{h_{t-1}^{2a}(1+h_{t-1}^2)^{3-2a}(2-h_{t-1}^2)^a} < \frac{1}{2}\Phi$$

and since,  $\Phi/2 < \Phi$ , it follows that:  $|\partial Q_t / \partial h_{t-1}| < \partial I_t / \partial h_{t-1}$ .

In sum, this inequality is what makes the expansion of money supply powerful during a recession when  $h_{t-1} < 1/\sqrt{2}$  though accommodative should be the character of this policy under inflation when  $h_{t-1} > 1/\sqrt{2}$  in the Old Chicago policy way and not in the modern monetarist fashion which would stick to some k% rule in a recession, risking the same catastrophic consequences that the adherence to gold standard had in the Great Depression (see e.g. White 2007). One last point needs to be made to see how these policy conclusions differ from the non-quantity theory interventionist policy prescriptions. Consider Figure 2 which illustrates the optimal response of  $M \equiv f(x)$  to  $x \equiv h \neq 1/\sqrt{2}$  as it derives from the relationship:

$$\frac{2h^2(2-h^2)}{(1+h^2)^2} M = \frac{56}{25}$$

above. The starting point is  $h = 1/\sqrt{2}$  and  $M$  increases either to the left or to the right of this point, at an increasing rate as recession or inflation worsens. And, when the starting point is the extreme left or right of the diagram, recession and inflation, respectively, it depicts the rate of change of the increase in  $M$ , decreasing rate in an any case once instability has been checked

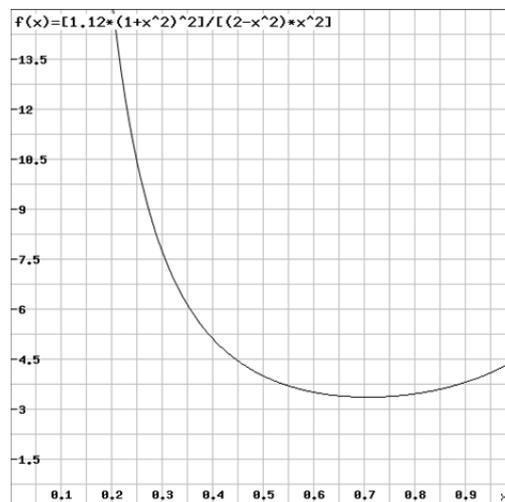


Figure 2. Optimal response of  $M$  to  $x \equiv h \neq 1/\sqrt{2} \cong 0.7071068$

and the economy is moving towards  $h = 1/\sqrt{2}$ . On the contrary, the non-quantity theory interventionist practice is equivalent to viewing the Figure upside down, seeing it from its top to the bottom, in which case it shows increasing  $M$  at a decreasing rate as steady state is approached from a recovery, and decreasing  $M$  at an increasing rate under worsening inflation as a reflection of fiscal expansion and contraction, respectively.

Interest rate policy lowering the lending rate in a recession does not matter within the context of this paper, because  $r_L < r_D$ , anyway, with their difference being increasing if  $M$  does not increase. Moreover, lowering under such circumstances  $r_L$  endangers fostering liquidity trap conditions or in modern terms, substitution of bank credit by monetary expansion at the zero lower bound as, for example, Orłowski (2015) has shown to be the case with quantitative easing. But, a policy of restoring the equality of the two rates nominally when the economy operates above the steady state and  $r_L > r_D$ , might be used in conjunction with the expansion of money supply to restore general equilibrium at a higher price level. Of course, these are policy prescriptions under the presumption of “other things being equal” (*ceteris paribus*) as, for instance, is manifested through the neglect of the public sector and imperfect competition. The monetary authority exists only to insulate the efficiency of intergenerational transfers from variations in  $h$ ; its interventions are justifiable on these only grounds. The absence of public expenditure and monopoly power from our model might be not one but two reasons why it predicts mild only inflation and on the other hand, deep depressions as possible consequences of a disturbance in the rating of the banks by the general public. Indeed, in so far as inflation is concerned, there is no market-power to prompt profit-push inflation and there is no government to “confiscate, secretly and unobserved, an important part of the wealth of their citizens” (Keynes 1919, p. 235).

#### 4. CONCLUDING REMARKS

It is clear that allowing for a Keynesian-like general public in a real business cycle model takes us away from the neo-liberal policy recommendations of modern monetarism and new classical macroeconomics, but does not draw us near any other form of modern macroeconomic policy wisdom. It leads us, instead to the non-Keynesian view of money supply policy as one adhering to some full-employment wage index monitored perhaps by some unemployment rate as well *a la* adherence to gold-standard convertibility as the invisible hand of monetary policy. What we really appear to have managed herein, is to offer a tentative behavioral approach to Old Chicago School macroeconomics. It is one that denies the usefulness of some k% rule because this rule will be catastrophic once recession starts taking its toll. This idleness is what the Fed chose to follow in the 1920s doing exactly what modern monetarism would propose: stick to k%. The Old Chicago is practical; it is as interventionist as Keynesianism is if it fears recession (see e.g. Rockoff 2015). And, what to really its full employment focus comes down is an overall rule of “a wage standard” in the place of k%, which is the modern version of the gold standard.

Hayek (1932, 1933) and Robbins (1934) were right when stating that the asset price bubble that burst in 1929 was the result of the pursuit of price stability by the Fed in the 1920s that swelled up credit expansion. And, all those like White (2007) who does not have illusions about the truth of this old thesis and cautions about what exactly the monetary authority should be targeting, are correct as well. As a matter of fact, he does propose a rule targeting an index of input prices (wages and/or raw material prices) as we do herein, but from the viewpoint of nominal income or GDP targeting. Real income targeting may be obtained once the behavioral element of working-class mood is acknowledged. Otherwise, either the so-called Classical Dichotomy holds, and... “money plays an important role even in Real Business Cycle theory — sort of like the dog that doesn’t bark in a detective novel — becoming so irrelevant that one wonders why the representative agent who is optimizing her consumption through time bothers with it” (Wray 2011, p.2). Or, money is non-neutral and “in the absence of money... the rates of interest would only reach equilibrium when there is full employment” (Keynes 1964, p. 235); that is, money is the ultimate cause of unemployment... Seen Keynes as a heretic as campaigned by

neo-liberalism (see e.g. Boettke and Newman 2016), one way to stick to orthodoxy and yet find a role for money is the Goodhart (2008) way of allowing for default.

But, such approaches just miss the point that once money is assigned a role other than *luBRICSant* and monetary policy becomes sensible as a policy instrument, money becomes in essence *Chartalist*, and the question then is “for whom” to conduct monetary policy, whom the policy will benefit more. So, to have an active monetary policy in the realm of orthodoxy, something behavioral is needed addressing the “for whom”; and, this is always of political importance as well. In this paper, we saw that the introduction of a behavioral element alone is analytically powerful enough to give an answer to the question “for whom”: For the general public first, and then only for the elite, was the answer, a clear-cut one in the name of Old Chicago macro-monetary economics under Tavlas’ (1997, 2015) interpretation of this school of thought. If Rockoff (2015) is right about Simons, the *Chartalist* character of prewar Chicago quantity theory originates in his definition of money as one including near-moneys, the nearness being a matter of opinion by the asset holder. This “explains how Simons drew Keynesian policy conclusions from the quantity theory. For Simons, it mattered little whether the government issued currency, Treasury bills, Treasury notes, or even Treasury bonds. All were money, or close substitutes for it; ...and thus all had an expansionary impact... The identity between monetarism, as Simons conceived it, and Keynesian economics meant that the labels could be used interchangeably” (Rockoff 2015, p. 17).

Or, according to Minsky (1996, p. 364), “I accept Henry Simons’s view that the aim of economic policy is not narrowly economic. The aim of policy is to assure that the economic prerequisites for sustaining the civil and civilized standards of an open liberal society exist. If... extremes of income distribution, and social inequality attenuate the economic underpinnings of democracy, then the market behavior that creates these conditions should be constrained. If it is necessary to give up a bit of market efficiency, or a bit of aggregate income, in order to contain democracy-threatening uncertainty, then so be it. In particular, there is need to supplement private incomes with socially provided incomes so that civility and civic responsibility are promoted.” The point of prewar Chicago that our discussion here chose to stress is the *Chartalist* character of money in the pursuit of full employment through a rule rather than discretion. A monetary rule is made to avoid *Chartalism*, but the one derived here does favor the general public, and it is *Chartalist* from this point of view: As *Chartalist* as Keynes, because “[a] virulent critic of Keynes, Simons nevertheless revealed a striking similarity in premise and analysis, which, in our judgment, affords a common bond not only for Professors Keynes and Simons but also all fiscalists and monetarists” (Sennholz 1971).

The focus is full employment as a presumption of the quantity theory, and if Simons had in mind a rule for price stabilization, the target of this rule was full employment. Statements like: “Other than the rule or target — price-level stabilization instead of full employment — the monetary and fiscal powers given to the government under the Chicago plan were not much different than those proposed by the Keynesians” (Ebeling 1998) should be evaluated accordingly. Both Simons and Keynes are concerned with the institutional rather than theoretical premises of capitalism (Aschheim and Tavlas 1984), and the rule of real income targeting advanced earlier, appears to bridge this “rule vs. target” difference between the two approaches. And of course, in so far as labor unions are concerned: “Monopoly power must be abused. It has no use save abuse” (Simons 1948, p. 129). The labor market should be free, because, for an index to be workable, it “has to be highly sensitive; otherwise, the administrative authority would be compelled to postpone its actions unduly after significant disturbances or... obliged to use discretion in anticipating changes” (Simons 1936, p. 13).

## REFERENCES

1. Aschheim, Joseph and George S. Tavlas. (1984). The Monetary Thought-Ideology Nexus: Simons versus Keynes, *Banca Nazionale del Lavoro*, 37, pp. 177–196.

2. Avdjiev, Stefan. (2016). News Driven Business Cycles and Data on Asset Prices in Estimated DSGE Models, *Review of Economic Dynamics*, 20 (2), pp. 181–197.
3. Barro, Robert. (1997). *Macroeconomics*, 5th Edition, Cambridge MA: MIT Press.
4. Beaudry, Paul, Deokwoo Nam and Jian Wang. (2012 and 2014). Do Mood Swings Drive Business Cycles and is it Rational? Available at: [http://www.economics.ubc.ca/files/2013/05/pdf\\_paper\\_paul-beaudry-moodswings-business.pdf](http://www.economics.ubc.ca/files/2013/05/pdf_paper_paul-beaudry-moodswings-business.pdf) and [http://jianwang.weebly.com/uploads/1/4/6/3/14639846/bnw\\_00\\_beaudrynamwang.pdp](http://jianwang.weebly.com/uploads/1/4/6/3/14639846/bnw_00_beaudrynamwang.pdp).
5. Beaudry, Paul, Dana Galizia and Franck Portier. (2014). Reconciling Hayek's and Keynes Views of Recessions, NBER Working Paper 20101. Available at: <http://www.nber.org/papers/w20101>.
6. Bernanke, Ben S., Thomas Laubach, Frederic S. Mishkin and Adam S. Posen. (1999). *Inflation Targeting: Lessons from the International Experience*, Princeton NJ: Princeton University Press.
7. Bordo, Michael D., John Landon Lane and Angela Redish. (2004). Good versus Bad Deflation: Lessons from the Gold Standard Era, NBER Working Paper 10329. Available at: <http://www.nber.org/papers/w10329>.
8. Boettke, Peter and Patrick Newman. (2016). The Consequences of Keynes. Available at: <http://ssrn.com/abstract=2803980> or <http://dx.doi.org/10.2139/ssrn.2803980>.
9. Bradley, Michael D. and Dennis Jansen, W. (1989). The Optimality of Nominal Income Targeting When Wages Are Indexed to Price, *Southern Economic Journal*, 56 (1), pp. 13–23.
10. Branch, William A. and Bruce McGough. (2011). Business Cycle Amplification with Heterogeneous Expectations, *Economic Theory*, 47, pp. 395–421.
11. Croom, Randall and Joyce Bono, E. (2015). Great Expectations-Really! The Curvilinear Relationship between Optimism and Performance, *Academy of Management Proceedings*, 1, 17210.
12. De Grauwe, Paul and Corrado Macchiarelli. (2015). Animal Spirits and Credit Cycles, *Journal of Economic Dynamics & Control*, 159, pp. 95–117.
13. Driscoll, John C. and Steinar Holden. (2014). Behavioral Economics and Macroeconomic Models, *Journal of Macroeconomics*, 41, pp. 133–147.
14. Ebeling, Richard M. (1998). Monetary Central planning and the State, Part 23: Henry Simons and the 'Chicago Plan' for Monetary Reform, *The Future of Freedom Foundation*, November 1. Available at: <http://fff.org/explore-freedom/article/monetary-central-planning-state-part-23-henry-simons-chicago-plan-monetary-reform>.
15. Felipe, Jesus and F. Gerard Adams. (2005). 'A Theory of Production.' The Estimation of the Cobb-Douglas Function: A Retrospective View, *Eastern Economic Journal*, 31 (3), pp. 427–445.
16. Flandreau, Marc. (2007). Pillars of Globalization: A History of Monetary Policy Targets, 1797–1997, CEPR Discussion Paper 6252. Available at: [www.cepr.org/pubs/dps/DP6252.asp](http://www.cepr.org/pubs/dps/DP6252.asp).
17. Geiger, Neils. (2016). 'Psychological' Elements in Business Cycle Theories: Old Approaches and New Insights, *European Journal of the History of Economic Thought*, 23 (3), pp. 478–507.
18. Goodhart, Charles A. E. (2008). Money and Default. In Mathew Forstater and L. Randall Wray (eds.), *Keynes for the Twenty-First Century: The continuing relevance of the General Theory*, New York: Palgrave Macmillan.
19. Harcourt, Geoff C. ed. (2006). *The Structure of Post Keynesian Economics: The Core Contributions of the Pioneers*, Cambridge: Cambridge University Press.
20. Hayek, Friedrich A. ([1932] 1999). The Fate of the Gold Standard, reprinted in S. Kresge (ed.) *The Collected Works of F.A. Hayek. Good Money, Part I: The New World*, pp. 153–68. Chicago: University of Chicago Press.
21. Hayek, Friedrich A. (1933). *Monetary Theory and the Trade Cycle*, trans. by N. Kaldor and H.M. Croome, London: Jonathan Cape.
22. Keynes, John Maynard. (1919). *The Economic Consequences of the Peace*, London: Macmillan.
23. Keynes, John Maynard. (1964). *The General Theory of Employment, Interest, and Money*, New York and London: Harcourt Brace Jovanovich.
24. Laidler, David. (1998). More on Hawtrey, Harvard and Chicago, *Journal of Economic Studies*, 25 (1), pp. 4–16.

25. Landmann, Oliver. (2014). Short-Run Macro After the Crisis: The End of the 'New' Neoclassical Synthesis?, University of Freiburg Discussion Paper 27. Available at: [http://www.vwl.uni-freiburg.de/iwipol/discussion\\_papers/DP27\\_Landmann\\_Short\\_Run\\_Macro.pdf](http://www.vwl.uni-freiburg.de/iwipol/discussion_papers/DP27_Landmann_Short_Run_Macro.pdf).
26. Minsky, Hyman P. (1996). Uncertainty and the Institutional Structure of Capitalist Economies, *Journal of Economic Issues*, 30 (2), pp. 357–368.
27. Orłowski, Lucjan T. (2015). Monetary Expansion and Bank Credit: A Lack of Spark, *Journal of Policy Modeling*, 37 (3), pp. 510–520.
28. Piketty, Thomas and Emmanuel Saez. (2014). Inequality in the Long Run, *Science*, 344(6186), pp. 838–843.
29. Robbins, Lionel. (1934). *The Great Depression*, London: Macmillan.
30. Rockoff, Hugh. (2015). Henry Simons and the Quantity Theory of Money, Becker Friedman Institute. Available at: <https://bfi.uchicago.edu/sites/default/files/research/SIMONS6.pdf>.
31. Safire, William. (2009). Animal Spirits, *The New York Times*, 10 March 2009. Available at: [http://www.nytimes.com/2009/03/15/magazine/15wwln-safire-t.html?\\_r=0](http://www.nytimes.com/2009/03/15/magazine/15wwln-safire-t.html?_r=0).
32. Schmitt-Grohe, Stephanie and Martin Uribe. (2012). What's News in Business Cycles, *Econometrica*, 80 (6), pp. 2733–2764.
33. Sennholz, Hans F. (1971). Chicago Monetary Tradition in the Light of Austrian Theory, in *Toward Liberty: Essays in Honor of Ludwig von Mises on the Occasion of his 90th Birthday*, vol. 2, ed. F. A. Hayek, Henry Hazlitt, Leonrad R. Read, Gustavo Velasco and F. A. Harper, Menlo Park: Institute for Humane Studies. Available at: <http://oll.libertyfund.org/pages/sennholz-the-chicago-monetary-tradition>.
34. Simons, Henry C. (1936). Rules versus Authorities in Monetary Policy, *Journal of Political Economy*, 44 (1), pp. 1–30.
35. Simons, Henry C. (1948). *Economic Policy for a Free Society*, Chicago: University of Chicago Press.
36. Söllner, Albrecht. (2014). Globalization, Greed, and Exploitation. How to Break the Baleful Path?, *Journal of Business Economics*, 84 (9), pp. 1211–1235.
37. Stigler, George. (1988). *Memoirs of an Unregulated Economist*, Chicago: University of Chicago Press.
38. Sumner, Scott B. (2014). Nominal GDP Targeting: A Simple Rule to Improve Fed Performance, *Cato Journal*, 34 (2), pp. 315–338.
39. Tavlas, George S. (1997). Chicago, Harvard, and the Doctrinal Foundations of Monetary Economics, *Journal of Political Economy*, 105, pp. 153–177.
40. Tavlas, George S. (2015). In old Chicago: Simons, Friedman, and the Development of Monetary-policy Rules, *Journal of Money, Credit, and Banking*, 47 (1) (02), pp. 99–121.
41. White, Lawrence H. (2007). What Type of Inflation Target?, *Cato Journal*, 27 (2), pp. 283–288.
42. Wray, L. Randall. (2011). Keynes after 75 Years: Rethinking Money as a Public Monopoly, *Levy Economics Institute Working Paper 658*. Available at: [http://www.levyinstitute.org/pubs/wp\\_658.pdf](http://www.levyinstitute.org/pubs/wp_658.pdf).

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# Price Movements in Futures and Spot Markets: Evidence from the S&P CNX Nifty Index

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**Abstract.** This paper is examined the price discovery and causality between spot and futures markets. Then, it forecasts spot prices using in NIFTY futures markets. Vector Error Correction Model (VECM), Impulse Response Function analysis and Variance Decomposition analysis are used to examine the price discovery process between spot and futures prices. This paper compares the forecast ability of futures prices on spot prices using Auto Regressive Integrated Moving Average (ARIMA) and VEC model. The results find that there exists a bi-directional causality between Nifty spot and futures markets and the spot markets disseminate new information stronger than futures prices. The forecast performance of VEC model is better than ARIMA model on post-sample periods. Because, VEC model incorporates the importance of taking into account the long-run relationship between the futures and the spot prices in forecasting future spot prices.

**Keywords:** price discovery; causality; forecasting; India.

## Движение цен на спотовых и фьючерсных рынках: подтверждение индексами S&P CNX NIFTY

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**Аннотация.** В работе рассмотрены детерминация цен и причинно-следственные связи между спотовыми и фьючерсными рынками. На этой основе спрогнозированы спотовые цены, используемые на фьючерсных рынках NIFTY. С целью проверки процесса детерминации цен на спотовых и фьючерсных рынках использованы *Vector Error Correction Model* (VECM – векторная модель коррекции ошибок), анализ *Impulse Response Function* (импульсная переходная функция) и анализ *Variance Decomposition* (декомпозиция дисперсии). Проверена также прогностическая способность двух моделей *Auto Regressive Integrated Moving Average* (интегрированная модель авторегрессии – скользящего среднего) и *VECM* для оценки связи в детерминации спотовых и фьючерсных цен. В результате автор отметил взаимную (прямую и обратную) связь между спотовыми и фьючерсными ценами на рынках NIFTY.

**Ключевые слова:** детерминация цен; причинность; прогнозирование; Индия.

## 1. INTRODUCTION

Price discovery process in the futures markets helps to achieve the market efficiency in the stock markets and also the futures markets minimising risk through hedging. In this paper, the price linkage between Indian stock index futures and its underlying index is examined. Price discovery functions depend on whether new information is reflected first in the futures markets or cash markets. In this process, both markets achieve a unique and common unobservable price, which is the efficient price. In perfect efficient markets, profitable arbitrage should not exist, as price adjusts simultaneously and fully to incoming information. And, new information disseminating into the market should be immediately reflected in cash and futures prices by triggering trading activity in one or all of the markets simultaneously. Therefore, nobody can make any profit in the long run.

The issue of price discovery process between cash and futures markets has been discussed and debated extensively in the literature. Studies such as Kawaller (1987), Harris (1989), Stoll and Whaley (1990), Chan (1992), Teppo and Vessa (1995), Arshanpalli and Doukesh (1997), Alphones (2000), Lafuente (2002), Tenmozhi (2002), Kavussanos and Nomikos (2003), So and Tse (2004), Bhatia (2007), Theissen, E. (2011) supported that the futures markets play an important role in the price discovery process by transferring new information faster than the cash market. Because futures markets are different from cash markets in terms of lower cost of transaction, capital required and other aspects. Chan and Kaloyi (1991), Tang, et al (1992), Turkington and Walse (1999), Zou and Pinfold (2001) and Raju and Karande (2003) showed that the bi-directional causality exists between both markets and price discovery takes place in both futures and cash market. Wahab and Lashgari (1993) and Mukherjee and Mishra (2006) showed that spot markets disseminate price information to futures markets. Wahab and Lashgari (1993) observed that though there is a lower transaction costs in the futures market but the spot market is more responsive to shocks in the futures market than to shocks in its own. Abhyankar (1995) found in his study that futures lead cash by an hour

on average. More interestingly, he showed that lower transaction costs in the London cash market after the Big Bang have dampened the lead of futures, whereas short sale restrictions in the cash market have increased this lead. Mukherjee and Mishra (2006) observed the role of the futures market in the matter of price discovery tends to weaken and sometime disappear after the release of major firm-specific announcements.

Besides, this paper also examines whether the existence of a causal relationship between spot and futures prices can lead to more accurate predictions of future spot prices. Ghosh (1993), Wahab & Lashgari (1993), Tse (1995), Teppo et al (1995), Brooks, et al (2001) and Kavussanos and Nomikos (2003) observed the prices of financial futures contracts can be interpreted as forecasts of the spot rates, which will be applied at the final delivery date of that contracts. Futures prices play an essential role as a predictor of spot prices, because both the markets are interrelated. They also showed that the error correction model (ECM) performs better than other forecasting models like random walk, auto regressive integrated moving average (ARIMA) and vector auto regression (VAR) model. The present paper examined the price discovery process between spot and futures markets and it also examined the forecasting performances of futures market to forecast the spot prices using the latest available data in National Stock Exchange (NSE), India.

After the brief introduction and identifying the objective of the paper in the section one, the rest of the chapter is structured as follows. Section two explains the methodology and data information. Section three offers empirical results and discussions of price discovery process between the two markets and it is also evaluates the forecast performance of the estimated model. Finally, section five presents the conclusion of the paper.

## 2. METHODOLOGY AND DATA

Johansen's (1988) Vector Error Correction Model (VECM) was employed to examine the causal relationship between spot and futures prices. The following steps are followed to estimate Johansen's Vector Error Correction Model (VECM).

Step 1: Augmented Dickey-Fuller (ADF), Dickey-Fuller Generalised Least Square (DF-GLS) and Phillips-Perron (PP) tests are conducted to examine the stationary of the data series.

Step 2: If the series are integrated in an identical order, then Johansen Multivariate Maximum likelihood cointegration test is used to investigate the long-run relationship between spot and futures prices and it is presented below.

$$\Delta X_t = \sum_{i=1}^{p-1} \Gamma_i X_{t-i} + \Pi X_{t-1} + \varepsilon_t; \tag{1}$$

$$\varepsilon_t = \begin{pmatrix} \varepsilon_{S,t} \\ \varepsilon_{F,t} \end{pmatrix} \approx N(0, \Sigma).$$

Where  $X_t = (S_t F_t)'$  is the vector of spot and futures prices, each being I (1) such that the first differenced series are I (0);  $\Delta$  denotes the first difference operator;  $\Gamma_i$  and  $\Pi$  are  $2 \times 2$  coefficient matrices measuring the short-and long-run adjustment of the system to change in  $X_{t-1}$  and  $\varepsilon_t$  is  $2 \times 1$  vector of white noise error terms.

Step 3: The test results are quite sensitive to the lag length. Hence, the lag length P is selected on the basis of multivariate generalizations of Akaike's information criteria (AIC) and Schwarz's criteria (SC).

Step 4: The likelihood ratio tests are employed to identify the co-integration between the two series. The first statistic  $\lambda_{\text{trace}}$  tests whether the number of cointegrating vectors is zero or one.

In general, if r cointegrating vector is correct. The following test statistics can be constructed as:

$$\lambda_{\text{Trace}}(r) = -T \sum_{i=r+1}^n \ln(1 - \hat{\lambda}_i). \tag{2}$$

Where, n is the number of separate series to be examined, T is the number of usable observations and  $(\hat{\lambda}_i)$  are the estimated eigen values (also called characteristic roots) obtained from the  $(i+1) \times (i+1)$  'cointegrating matrix.'

The test statistic  $(\lambda_{\text{trace}})$  tests whether the number of distinct cointegrating vectors is less than or equal to r. Johansen and Juselius

(1990) provide the critical values of these statistics. The rank of  $\Pi$  may be tested using the  $\lambda_{\text{trace}}$ . If rank  $(\Pi) = 1$ , then there is single cointegrating vector and  $\Pi$  can be factored as  $\Pi = \alpha\beta'$ , where  $\alpha$  and  $\beta'$  are  $2 \times 1$  vectors. Using this factorisation  $\beta'$  represents the vector of cointegrating parameters and  $\alpha$  is the vector of error correction coefficients measuring the speed of convergence to the long-run steady state.

Step 5: If spot and futures prices are cointegrated, then causality must exist at least in one direction (Granger, 1986). To test the causality, the following vector error correction model (VECM) is estimated by using ordinary least square (OLS) in each equation.

$$\Delta S_t = a_{S,0} + \sum_{i=1}^{p-1} a_{S,i} \Delta S_{t-i} + \sum_{i=1}^{p-1} b_{S,i} \Delta F_{t-i} + \alpha_S Z_{t-1} + \varepsilon_{S,t} \tag{3}$$

$$\Delta F_t = a_{F,0} + \sum_{i=1}^{p-1} a_{F,i} \Delta S_{t-i} + \sum_{i=1}^{p-1} b_{F,i} \Delta F_{t-i} + \alpha_F Z_{t-1} + \varepsilon_{F,t} \tag{4}$$

where  $a_{S,0}$ ,  $a_{F,0}$  are intercept terms;  $a_{S,i}$ ,  $b_{S,i}$ ,  $a_{F,i}$ ,  $b_{F,i}$  are the short-run coefficients and  $Z_{t-1} = \beta' X_{t-1}$  is the error correction term from equation (1).

In terms of the vector error correction model (VECM) of equation (3) & (4),  $F_t$  Granger Causes  $S_t$  if some of the  $b_{S,i}$  coefficients,  $i = 1, 2, \dots, p-1$  are not zero and  $\alpha_S$ , the error correction coefficient in the equation for spot prices, is significant at conventional levels. Similarly,  $S_t$  Granger causes  $F_t$  if some of the  $a_{F,i}$  coefficients,  $i = 1, 2, \dots, p-1$  are not zero and  $\alpha_F$  is significant at the conventional levels. These hypotheses can be tested by using either t-tests or F-tests on the joint significance of the lagged estimated coefficients. If both  $S_t$  and  $F_t$  Granger cause each other, then there is a feedback relationship between the two markets. Therefore, the error correction coefficients,  $\alpha_S$  and  $\alpha_F$  serve two purposes. They are (i) to identify the direction of causality between spot and futures prices and (ii) to measure the speed with which deviations from the long-run relationship are corrected by changes in the spot and futures prices.

The vector error correction model (VECM) equation (3) & (4) provides a framework for

valid inference in the presence of I (1) variable. Moreover, the Johansen (1988) procedure provides more efficient estimates of the cointegrating relationship than the Engel and Granger (1987) estimator (Gonzalo, 1994). Also, Johansen (1988) tests are shown to be fairly robust to presence of non-normality (Cheung and Lai, 1993) and heteroscedasticity disturbances (Lee and Tse, 1996).

## THE FORECASTING MODELS

The prices of financial futures contracts can be interpreted as forecasts of the spot rates, which will be applied at the final delivery date of that contract. This study compares the forecasting ability of futures prices on spot prices with two major forecasting techniques namely auto regressive integrated moving average (ARIMA) and vector error correction (VEC) model.

### Cointegration and vector error correction model

Johansen's cointegration and vector error correction model are explained in the first sub-section of this section. The forecasting of the vector error correction model (VECM) for the spot and futures prices can be expressed as

$$\Delta S_t = a_{S,0} + \sum_{i=1}^{p-1} a_{S,i} \Delta S_{t-i} + \sum_{i=1}^{p-1} b_{S,i} \Delta F_{t-i} + \alpha_S Z_{t-1} + \varepsilon_{S,t}. \quad (5)$$

### An ARIMA model

In order to form a benchmark for comparison to the vector error correction (VECM) models previously, an auto regressive integrated moving average (ARIMA) model is estimated (with  $S_t$  as the dependent variable since prediction of the spot series is the modeling motivation). An ARIMA ( $p, d, q$ ) model is a univariate time series modeling technique, where  $p$  denotes the number of autoregressive terms,  $d$  the number of integrated order and  $q$  the number of moving average terms which is based on Box-Jenkins methodology (Box-Jenkins, 1970). The ARIMA model is expressed as

$$S_t = \alpha_{S,0} + \sum_{i=1}^{p-1} \alpha_{S,i} S_{t-i} + \sum_{i=1}^{q-1} \beta_{S,i} v_{t-i} + v_{S,t}. \quad (6)$$

Again the Akaike's information criteria (AIC) and Schwarz's criteria (SC) is utilized for selecting lags of the model.

Then, the constructed models or techniques are examined on the basis of whether each significantly "outperforms" the forecasting ability of the futures price. Performance of the model is measured by the validity of its estimate on the basis of its forecasting power tests such as: root mean square error (RMSE), mean absolute error (MAE), mean absolute percentage error (MAPE) and Theil's inequality coefficient (U-statistic).

All the required data information for the study has been collected from the National Stock Exchange (NSE), India website. The main data set for the study consists of the daily closing values of the S&P CNX Nifty index futures and spot Nifty index, which are considered from June 12, 2000 to January 28, 2016 for near month futures contracts and it consists 3892 observations. In-sample analysis is carried out for the period June 12, 2000 to November 30, 2015 with 3851 observations and remaining observations (41) from December 1, 2015 to January 28, 2016 are considered to evaluate the out-of-sample forecasting performance of the model. The study has taken  $S_t$  and  $F_t$  as natural logged spot and futures prices respectively. The near month futures have been analysed as they are mostly heavily traded.

## 3. RESULTS AND DISCUSSIONS

The stationary of the spot and futures prices series are tested using the augmented Dickey Fuller (ADF) tests, Dickey-Fuller test statistic using a generalized least squares (DF-GLS) and Phillips Perron (PP) tests. The optimal lag numbers of each series are tested by using the Akaike's Information Criteria (AIC) and Schwarz Criteria (SC). According to Akaike's Information Criteria (AIC) and Schwarz Criteria (SC), four lags for the DF and PP tests and maximum 8 lags for the DF-GLS test have been selected for both Nifty spot and futures

Table 1. Unit Root Tests

Constraint	ADF		DF-GLS		PP	
	Levels	Difference	Levels	Difference	Levels	Difference
	ln(spot price)					
Intercept	-0.692	-30.822*	0.827	-13.322*	-0.692	-57.710*
Intercept and trend	-2.097	-30.818*	-1.684	-17.438	-2.085	-57.702*
	ln(futures price)					
Intercept	-0.704	-31.047*	0.783	-9.148*	-0.698	-60.558*
Intercept and trend	-2.148	-31.043*	-1.703	-14.403*	-2.148	-60.550*

Note: \* denotes 1% level of significance.

Table 2. Johansen tests for cointegration

Maximum rank	Parms	LL	Eigenvalue	Trace statistic	5% critical value
0	14	28249.63	–	194.8009	15.41
1	17	28346.79	0.04875	0.4827*	3.76
2	18	28347.03	0.00012		

Note: \* denotes 1% level of significance.

Table 3. Selection-order criteria

lag	LL	LR	FPE	AIC	HQIC	SBIC
0	11583.20		8.90E-06	-5.96	-5.96	-5.95
1	28146.60	33.127	1.80E-09	-14.48	-14.47	-14.47
2	28311.00	328.90	1.60E-09	-14.56	-14.55	-14.54
3	28339.10	56.16	1.60E-09	-14.57	-14.56*	-14.54
4	28347	15.89*	1.60E-09*	-14.57*	-14.56	-14.55*

prices series. In the table 1, the results reject the presence of a unit root in both series because the test statistic is significant at 1% level. The findings concluded that both spot and futures prices are non-stationary at levels and stationary at first difference. In the table 2, Johansen's cointegration test is performed for Nifty Index spot and Nifty futures prices. The test finds that one cointegration relationship

exists between spot and futures markets and there is long relation between them. Thus Johansen tests for cointegration justify the use of a vector error correction model (VECM) for showing short run dynamics.

To assess the optimal lag length, Stata var-soc command is used with a maximum lag length of four. In the table 3, most of criteria support a lag of length four. Therefore four

Table 4. Tests for Vector Error Correction Model

Variables	$\Delta S_t$	Std. Err.	$\Delta F_t$	Std. Err.
$a_i$ $i=s,f$	0.0002*	0.0003	-0.0001	0.0003
$\Delta S_{t-1}$	-0.0020	0.1019	0.2325**	0.1070
$\Delta S_{t-2}$	-0.1043	0.1010	0.0196	0.1060
$\Delta S_{t-3}$	-0.1410	0.0921	-0.0888	0.0966
$\Delta F_{t-1}$	0.0833	0.0979	-0.1737***	0.1027
$\Delta F_{t-2}$	0.0557	0.0974	-0.0589	0.1023
$\Delta F_{t-3}$	0.1485***	0.0888	0.1012	0.0932
$Z_{t-1}$	0.1645*	0.0642	0.3279*	0.0674

Note: \*, \*\* and \*\*\* denotes 1%, 5% and 10% level of significance respectively.

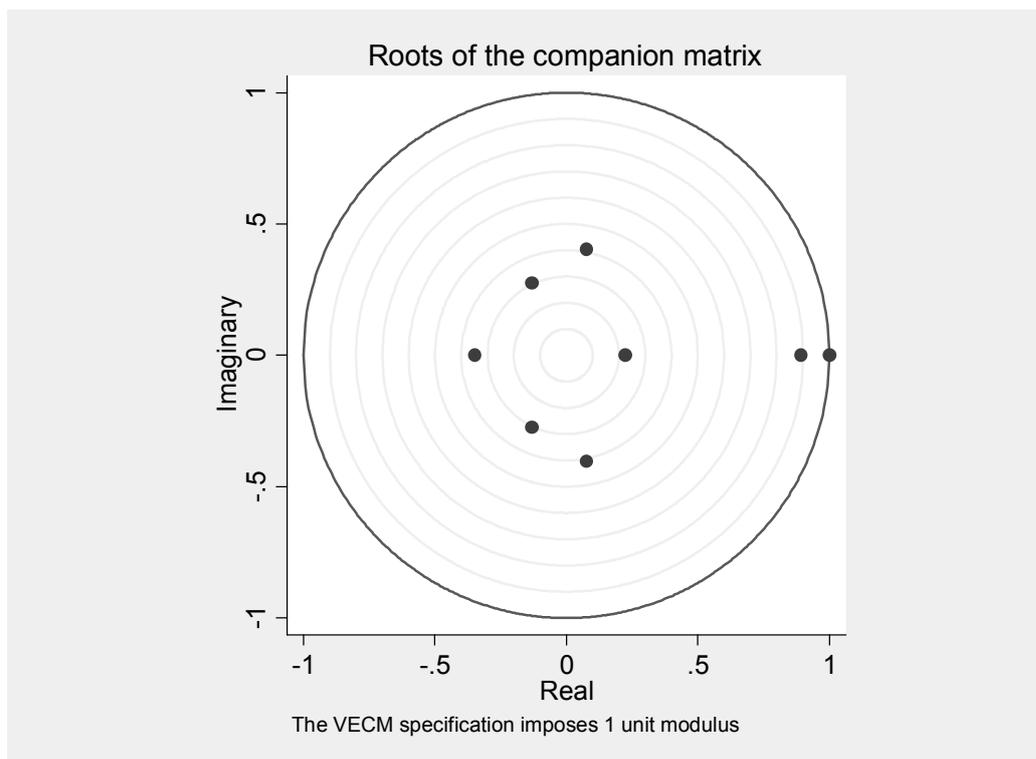


Figure 1. Graphs for the stability condition

lags have taken to test the vector error correction model (VECM).

In the table 4, the VECM estimation results have shown that both spot and futures price series are adjusting to the previous period's deviation from long-run equilibrium. But the futures price series have a greater speed of adjustment to the previous period's deviation from than the spot price series. Because

it is noticed that  $\alpha_f$  is 0.3279 which is greater than  $\alpha_s$  (0.1645). This finding is suggested that the delivery date of each contract the futures price has to adjust itself to the prevailing spot price. The results find that there is causality from spot to futures at the first lag periods i.e., spot market leads the futures market and the significance level is 5 percent. And, the futures market leads the spot markets at

Table 5. Comparison of out-of-sample forecasts of the spot index (1<sup>st</sup> Dec, 2015 to 28<sup>th</sup> Jan 2016)

Forecast performance	VECM	ARIMA
RMSE	0.00004	0.00115
MAE	0.00194	0.03818
MAPE	0.00022	0.00428
U-stat	0.0005	0.0027

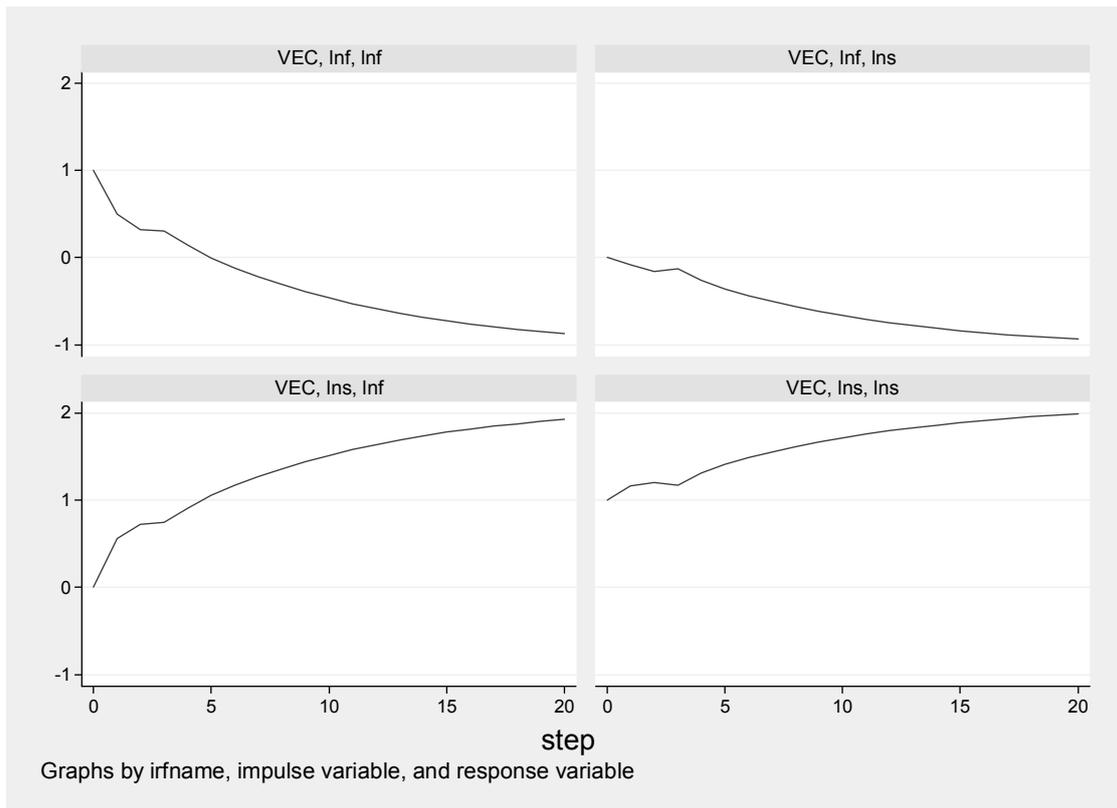


Figure 2. Impulse response functions

the third lag periods and the significance level is 10 percent. Here, the results also show that there is bi-directional causality between spot and futures markets. Thus, the price discovery process takes place in both spot and futures market. The findings from the different results concluded that the price lead of spot market is stronger than futures market.

To assess the validity of VECM, stability of the model is tested. The varstable command examines the dynamic stability of the system. In the figure 1, none of the eigen values is even close to one. The test concludes that the system is stable.

Further, impulse response functions and variance decomposition of the VECM are used

to get a more detailed insight on the causal relationship between spot and futures prices. The diagonal panels in Figure 2 show the effects of shocks to each change of market price on future values of its own change. In case of futures prices, the shock is reflecting increased initial periods and then it is declined. Spot price is increasing of its own shocks. The off-diagonal panels (bottom-left and top-right) show the effects of a growth shock in one market price on the path of growth in the other. In the bottom-left panel, it shows that a one-standard-deviation shock in change of spot prices raises the change of the futures prices and the impact of spot prices on futures prices is very high. In the top-right panel, it

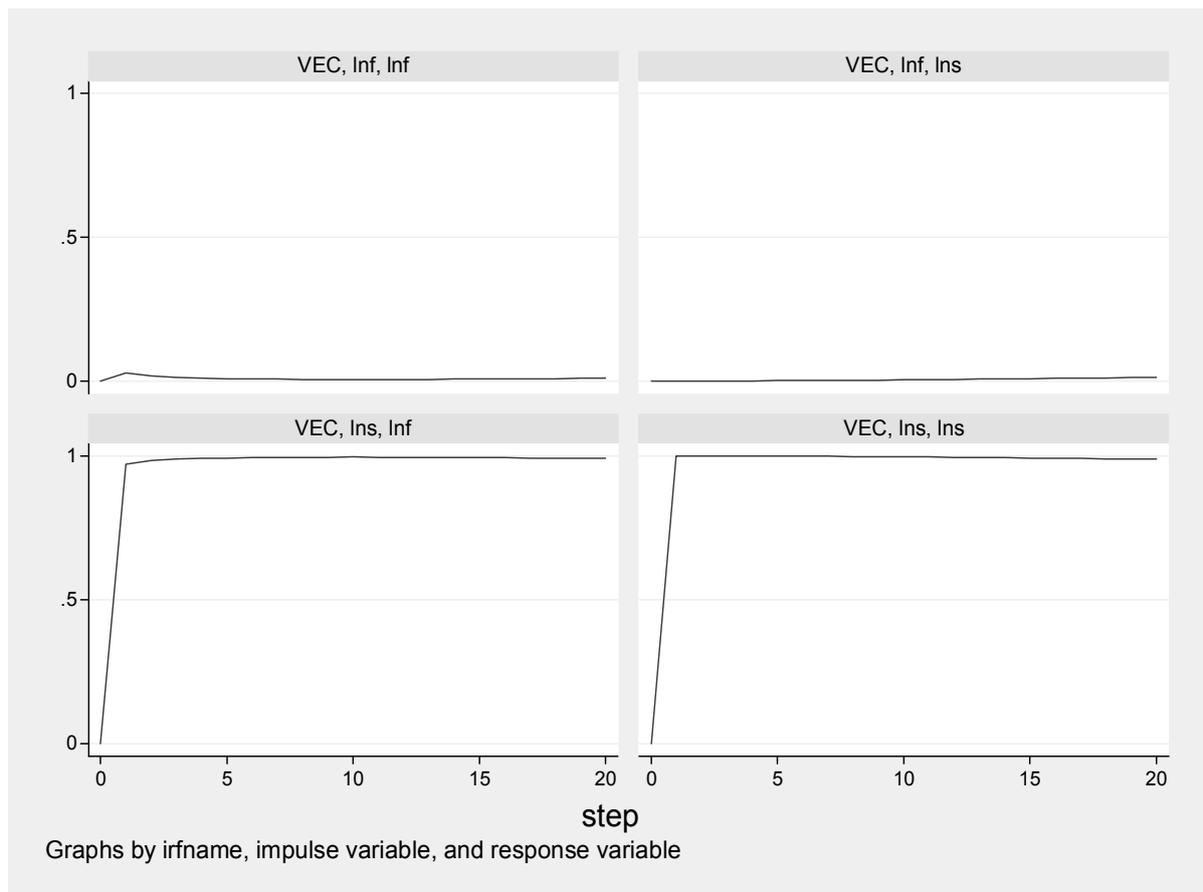


Figure 3. Variance decomposition

shows that the estimated effects of a shock to futures prices on spot prices. The impact of futures prices on spot prices has increased in the initial periods and after that the impact of futures prices is declined. Figure 3 show the variance decompositions between spot and futures prices. It shows that spot prices explain most (98%) of the variation in growth of spot prices and its impact on futures prices is greater. The futures prices explain only 17 percent of the variations in growth of its own and its impact on spot prices is very low. The impulse response function and variance decomposition analysis shows that the impact of spot markets is higher than futures market and the shocks of spot prices seem to have large effect relative to futures prices. The findings conclude that most of variations of prices in spot and futures prices take place due to the spot prices.

This paper considers two models of predicting the spot price series such as: ARIMA model and VECM to compare the forecasting performance. These two model specifications are es-

timated recursively during the out-of-sample period and generate forecasts of the spot prices up to one steps (trading days) ahead. Then, these forecast values are compared to the actual prices on the basis of standard statistical criteria of root mean square error (RMSE), mean absolute error (MAE), mean absolute percentage error (MAPE) and Theil's inequality coefficient (U- statistic). In the table 5, the results have shown that the reduction in the RMSE, MAE, MAPE and U-statistic is achieved by the VECM over the ARIMA model in forecasting spot price. The results conclude that the forecast performance of VECM is better than ARIMA model because VECM takes the lead-lag relationship between the spot and futures markets rather than simply using information contained in the univariate spot series alone.

#### 4. CONCLUSION

This paper examined the price discovery, causality and forecasting in the S&P CNX Nifty futures prices. The findings from unit root tests

have shown that Nifty spot Index and Nifty futures Index are not stationary at their levels. But they are stationary at their first difference. The cointegration test results have shown that there is a long run relationship between spot and futures prices. Therefore, a vector error correction model (VECM) is used to examine the short-run dynamics and price movements in the two markets. The Johansen's vector error correction model (VECM) results found that there is a bi-directional causality between spot and futures markets and the lead of the spot market on the futures market is more pronounced. Spot prices tend to discover new information more rapidly than futures prices. The impulse response analysis and variance decomposition analysis has shown that spot prices tend to discover new information more rapidly than futures prices. Finally the results find that the information and cointegrating relationship between spot and futures prices can be used to generate more accurate forecast of the prices.

This paper has shown that there is feedback relationship, but the spot lead was stronger than the futures index lead. The leading role of futures market weakens around the firm-specific announcements (Mukherjee and Mishra, 2006). In the futures market, the payoffs and risk that buyer and seller face are considerably more difficult than those seen on the equity market. Therefore, spot market lead is stronger than futures market. Also, the findings suggest that vector error correction model (VECM) performs well on a post-sample basis against the univariate auto regressive integrated moving average (ARIMA) model. The results show clearly that it is important to take into account the long-run relationship between the futures and the spot prices in forecasting future spot prices. The market participants can be benefited by taking the VECM to forecast the spot futures price index and it will help to design more efficient investment and speculative trading strategies.

## REFERENCES

1. Abhyankar, A.H. 1995. Return and Volatility dynamics in the FT-SE 100 stock index and stock index futures markets. *Journal of Futures Markets* 15 4: 457–488.
2. Alphonse, P. 2000. Efficient price discovery in stock index cash and futures markets. *Annales D Economie et de Statistique* 60: 177–188.
3. Arshanappalli, B. and Doukash, J. 1997. The Linkages of S&P 500 Stock index and S&P 500 Stock index futures price during October 1987. *Journal of Economics and Business* 49: 253–266.
4. Bhatia, S. 2007. Do the S&P CNX Nifty Index And Nifty Futures Really Lead/Lag? Error Correction Model: A Co-integration Approach. NSE Working Paper: 1–31.
5. Box, G.E.P. and Jenkins, G.M. 1970. *Time Series Analysis: Forecasting and Control*, San Francisco: Holden-Day.
6. Brooks, C., Rew, A.G. and Ritson, S. 2001. A trading strategy based on the lead-lag relationship between the spot index and futures contract for the FTSE100. *International Journal of Forecasting* 17: 31–44.
7. Chan, K., K. C. Chan and Kaloyi G.A. 1991. Intraday Volatility in the Stock Index and Stock Index futures Markets. *The Review of Financial Studies*. 44: 657–684.
8. Chan, K. 1992. A Further Analysis of the Lead-Lag Relationship between the Cash Market and Stock Index Futures Market. *The Review of Financial Studies* 51: 123–152.
9. Cheung, Y. and Lai, K. 1993. Finite sample sizes of Johansen s Likelihood Ratio Tests for Cointegration. *Oxford Bulletin of Economics and Statistics* 55: 313–328.
10. Engel, R.F. and Granger, C.W.J. 1987. Cointegration and error correction representation, estimation and testing. *Econometrica*, 55: 251–276.
11. Gonzalo, J. 1994. Five Alternative Methods of Estimating Long-Run Equilibrium Relationship. *Econometrica*, 60: 203–233.
12. Ghosh, A. 1993. Cointegration and error correction models: Intertemporal causality between index and futures prices. *The Journal of Futures Markets* 13:193–198.
13. Granger, C. 1986. Developments in the Study of cointegrated Variables. *Oxford Bulletin of Economics and Statistics* 48: 213–227.
14. Harris, C. 1989. The October 1987 S&P 500 Stock-Futures Basis. *The Journal of Finance* XLIV .1: 77–99.

15. Johansen, S. 1988. Statistical Analysis of Cointegrating Vectors. *Journal of Economics Dynamic and control*, 12: 231–254.
16. Kavussanos, M. and Nomikos, N.K. 2003. Price Discovery, Causality and Forecasting in the Freight Futures Market. *Review of Derivatives Research* 6: 203–230.
17. Kawaller, I.G., Koch P.D. and Koch T.W. 1987. The Temporal Price Relationship between S&P 500 Futures and the S&P 500 Index. *The Journal of Finance* XLII 5: 1309–1329.
18. Lafuente, J.A. 2002. Intraday return and volatility relationships between the Ibox 35 spot and futures markets. *Spanish Economic Review* 4: 201–220.
19. Lee, T. and Tse, Y. 1996. Cointegration Tests with Conditional Heteroscedasticity. *Journal of Econometrics* 73: 401–410.
20. Mukherjee, K.N. and Mishra R. K. 2006. Lead-Lag Relationship between Equities and Stock Index Futures Market and its Variation around Information Release: Empirical Evidence from India. NSE Working Paper: 1–36.
21. Raju, M.T. and Karande, K. 2003. Price Discovery and Volatility on NSE Futures Market. *SEBI Bulletin* 13: 5–15.
22. So, R.W. and Tse Y. 2004. Price discovery in the Hang Seng index markets: Index, futures, and the tracker fund, *The Journal of Futures Markets*, 24, pp. 887–907.
23. Stoll, H.R. and Whaley, R.E. 1990. The Dynamics of Stock Index and Stock Index Futures Return. *Journal of Financial and Quantitative Analysis* 254: 441–467.
24. Tang, G.Y.N, Mak, S.C. and Choi, D.F.S. 1992. The causal relationship between stock index futures and cash index prices in Hong Kong. *Applied Financial Economics* 2: 187–190.
25. Tenmozhi, M. 2002. Futures Trading, Information and Spot Price Volatility of NSE-50 Index Futures Contract. NSE Working Paper: 1–44.
26. Teppo, M., Jukka P. and Vessa P. 1995. On the dynamics of stock index futures and individual stock returns. *Journal of Business Finance and Accounting*, 211: 87–100.
27. Theissen, Erik 2011. Price discovery in spot and futures markets: A reconsideration. CFR Working Paper, No. 09–17.
28. Tse, Y.K. 1995. Lead-lag relationship between spot index and futures price of the Nikkei stock average. *Journal of Forecasting* 14:553–563.
29. Turkington, J. and Walsh, D. 1999. Price discovery and Causality in the Australian Share Price index Futures Market. *Australian Journal of Management*, 242: 97–113.
30. Wahab, M. and Lashgari, M. 1993. Price dynamic and error correction in stock index and stock index futures: A cointegration approach. *Journal of Futures Markets* 13: 711–742.
31. Zou, L. and Pinfold, J. 2001. Price functions between NZSE10 index, index futures and TENZ, A co-integration approach and error correction model Working paper series, No. 01.10, Department of commerce, Massey University, Auckland: 1–31.

# Share-Ownership Distribution and Extraction Rate of Petroleum in Oil Fields

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**Abstract.** We investigate the role of ownership distribution in determining the extraction rates of oil fields. We formulate an empirical equation where the percentage stake of the largest licensee and the percentage share held by the largest shareholder in the dominant company enter as dependent variables. Our sample consists of 44 oil fields in UK Continental Shelf over the period 1997–2001. We employ both fixed-effects and random-effects panel data models. The main results show that the share ownership of the largest licensee and the largest shareholder of its multinational company both have a positive and significant effect on the extraction rate. Moreover, we confirm the role of typical control variables: pay thickness has negative impact on the extraction rate, while remaining reserves are positively correlated with extraction rate. The sensitivity analysis shows that our results are robust to alternative sample selections and model specifications.

**Keywords:** Non-renewable natural resources; share-holder distribution; oil field.

## Структура акционерного капитала и степень эксплуатации нефтяных месторождений

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**Аннотация.** В работе исследуется роль структуры собственности в определении степени эксплуатации нефтяных месторождений. С этой целью сформулировано эмпирическое уравнение, где процентная доля акций крупнейшего лицензиата и процентная доля крупнейшего акционера в доминирующей компании были введены в качестве зависимых переменных. Наша выборка состоит из 44 месторождений нефти на британском континентальном шельфе

за период 1997–2001 гг. Использовано две модели – с фиксированными и случайными эффектами. Основные результаты показывают, что процентная доля акций крупнейшего лицензиата и процентная доля крупнейшего акционера в его многонациональной компании имеют положительное и существенное влияние на степень эксплуатации месторождения. Кроме того, подтвердилась роль типовых контрольных переменных: эффективная мощность пласта оказывает негативное влияние на степень экстракции, в то время как оставшиеся запасы положительно коррелируют со степенью экстракции. Анализ чувствительности показывает, что наши результаты являются устойчивыми в случае применения другой выборки и альтернативной спецификации модели.

**Ключевые слова:** невозобновляемые природные ресурсы; структура акционерного капитала; нефтяные месторождения.

## 1. INTRODUCTION

The problem of making production decisions in an exchange economy was first addressed by the Arrow-Debreu (1954) model, which assumed complete markets and the existence as well as the optimality of equilibrium. In complete markets, the firm maximizes profits when the price is normalized and there is unanimity among shareholders. However, in incomplete markets, in addition to the price normalization problem, shareholders often disagree on the effect of changes in the firm's production plans. Therefore, profit-maximization is no longer a well-defined objective for the firm, and shareholders' disagreement may occur in equilibrium as individuals differ in their share ownership.

In terms of non-renewable resources, when the resource firm realizes it can affect its price by changing the extraction rate, shareholders will disagree on the extraction rate. The reason is that an individual with a share ownership different from the average wishes to manipulate inputs relative prices. Thus, the link between shareholders' interests and extraction decisions for non-renewable resources is of central importance in the literature on natural resources and has not been explored before.

Shareholder voting reconciles shareholders' disagreement through the mechanism of majority voting, and thereby the preferences of the shareholders become consistent with the objective of the firm (DeMarzo, 1993; Renström and Yalçin, 2003). Therefore, the distribution of share ownership plays an important role, when decisions are taken through shareholder voting. The reason is that when a firm has market power it can alter prices through the redistribution among shareholders according to the sharehold-

ers' endowments. Shareholders with different endowments would support different production plans. The distribution of endowments would affect the identity of the median voter of the firm and thereby affect the firm's behaviour.

Renström and Yalçin (2003) have carried out one of the few studies analyzing the effect of share ownership distribution on production decisions, demonstrating that depending on the underlying distribution, rational voting may imply overproduction as well as underproduction, relative to the efficient level. Any initial distribution of shares is equilibrium, if individuals do not recognize their influence on voting when trading shares. However, when they do, and there are no short-selling constraints, the only equilibrium is the efficient one. When short-selling constraints are introduced, it is more likely to result in underproduction in the monopoly firm.

In the realm of natural resources economics, no previous study examines the effect of share ownership distribution on extraction of natural resources. The only example is Liu, Marsiliani and Renström (2016) that formulate a simple open-economy non-renewable resource extraction model in which individuals differ in the share ownership of a resource firm. The extraction decision is assumed to be taken by a decisive individual (the median voter in voting distribution). Given that the distribution of the voting rights is naturally left-skewed, the median-voter share increases as the share ownership of the largest shareholder increases, keeping the same distribution. They take the share of the largest shareholder as a proxy for the share of the median shareholder in the voting distribution. They show both theoretically and empirically that if the substitution elasticity between the natural

resource and labour is low, then the extraction rate is smaller if the largest shareholder holds a larger share.

Nevertheless, Liu, Marsiliani and Renström (2016) focus on firms' resource extraction when each field is owned by a distinct single firm, ignoring multiple ownership or multiple licensees of the resource.

Within the empirical literature, most of the existing econometric models of natural resource extraction are also concerned with aggregate extraction (e.g. Mabro et al., 1986; Pesaran, 1990; Favero, 1992), which may undermine the efficiency of the parameter estimates (Pesaran, 1990).

The few attempts at disaggregating production focus on oil fields and mainly analyse extraction cost functions. To our knowledge, Livernois and Uhler (1987) and Livernois (1987) have been the first to model costs of oil fields and Livernois (1987) the first to identify explicitly the role of geological characteristics as a determinant of costs of extractions for oil fields. Livernois and Uhler (1987) use a cross-sectional random sample of 166 oil pools in Alberta and find that extraction rate and number of oil wells have a positive effect on extraction cost. Remaining reserves is correlated with extraction cost negatively. Moreover, using a sample of 80 oil reservoirs in the province of Alberta in 1973, Livernois (1987) analyses how geological characteristics affect extraction cost in oil pools. Marginal costs including the marginal user cost of reservoir pressure are independent of the rate of oil extraction. The geographical factors of production are found to have a significant impact on marginal costs. Livernois (1987) finds that differences in the natural factors of production result in significantly different production possibilities among deposits under simultaneous exploitation.

Finally, when analyzing oil fields, one also needs to capture unobservable specific characteristics which potentially influence the extraction rate of each oil field. To our knowledge Kellogg (2011) is the only attempt in the literature on oil fields. Within a learning-by-doing approach, he specifies these unobservable characteristics as the 'relationship-specific learning' through accumulative working experience of the producer and the driller. When the latter accumulate experience working together, relationship-specific intellectual capital is created that cannot be ap-

propriated to pairings with other firms. Using a dataset from the U.S. onshore oil and gas drilling industry with a sample of 1354 fields and 704 producers and 1339 rigs over 1991–2005, Kellogg (2011) demonstrates that productivity of an oil production company and its drilling contractor increases in their joint experience. He shows that a drilling rig that accumulates experience with one producer improves its productivity more than twice as quickly as a rig that frequently changes contracting partners. As a consequence, producers and rigs have a strong incentive to maintain their relationships, and the data demonstrate that producers are more likely to work with rigs with which they have substantial prior experience than those with which they have worked relatively little.

This paper studies empirically the effect of the size of the share held by the largest shareholder on the extraction rate in oil fields in the UK Continental Shelf. It combines relevant factors from the work of Livernois and Uhler (1987), Livernois (1987), Liu, Marsiliani, and Renström (2016) and Kellogg (2011). As in Liu, Marsiliani, Renström (2016) we assess the impact of share-ownership distribution captured by the largest shareholder's share, and the largest licensee's share of the oil field, on extraction rate

Following Livernois we control for the effects of typical factors influencing non-renewable resources extraction rate, i.e. remaining reserves and geological characteristics such as pay thickness. Furthermore, as in Kellogg (2011), the heterogeneity across oil fields is captured by incorporating variables which account for both the geological features of each field and individual operator characteristics (i.e. the relationship-specific learning through accumulative working experience of the producer and the driller) in panel data models.

The contribution of this paper is twofold. First in focusing on oil field we solve the parameter inefficiency problem first underlined by Pesaran (1990) in connection to aggregate production estimations. Furthermore, we provide insight into the production decision making process of oil fields when, in addition to typical influencing factors, share ownership is also taken onto consideration. This has not been studied before. Using annual observations from 44 oil fields in the U.K. Continental Shelf for period 1997–2001

we find strong evidence that share ownership has significant and positive effect on the extraction rate of oil fields. The results suggest that the more share ownership the largest licensee (or the largest shareholder) holds, the higher is the extraction rate of the oil field.

The rest of the paper is organized as follows. Section 2 presents the empirical model and describes data and summary statistics. Section 3 includes the estimation and related diagnostics tests. Section 4 presents the empirical results and discussions. Sensitivity analysis is given in section 5 and section 6 concludes.

## 2. EMPIRICAL MODEL, DATA AND DESCRIPTIVE STATISTICS

Following the argument underlined by the relevant existing literature (namely Liu, Marsiliani and Renström, 2016; Livernois and Uhler, 1987, Livernois, 1987 and Kellogg, 2011) the following equation is used to estimate the effect of share ownership distribution on extraction rate of oil fields:

$$ER_{it} = \beta_0 + \beta_1 SH_{it} + \beta_2 MSH_{it} + \beta_3 RR_{it} + \beta_4 \lg Z_{it} + e_{it} \quad (1)$$

$$e_{it} = u_i + v_{it}, \quad i = 1, \dots, N, \quad t = 1, \dots, T$$

where  $ER_{it}$  is the extraction rate of oil field  $i$  in year  $t$ .  $\beta_0$  is the intercept.  $SH_{it}$  is the percentage of shareholdings owned by the largest shareholder in the field.  $MSH_{it}$  is the percentage of shareholdings owned by the largest shareholder of the responsive multinational company for variable  $SH_{it}$ .  $RR_{it}$  is the ratio of remaining reserves over total initial oil in place.  $\lg Z_{it}$  indicates the logarithm of pay thickness for oil reservoir as measurement of field size and therefore geological characteristics as in Livernois (1987),  $e_{it}$  is the error term for firm  $i$  at time  $t$  and consist of the unobservable time-invariant field-specific effect  $u_i$  and an ordinary white noise term  $v_{it}$ . As suggested by Kellogg (2011), the specific factor  $u_i$  is considered as the relationship-specific learning through accumulative working experience of the producer and the driller as firm characteristics influencing the oil extraction rate for each oil field.

To examine the effect of share ownership distribution on the extraction rate of UK Continen-

tal Shelf oil fields, we gather data from various databases. Table 1 below reports the included variables and data sources.

From the historical statistics and Brown books provided by Department of Energy and Climate Change (DECC) of the UK government, we obtain the annual production and reserves for 121 offshore oil and gas fields over the period 1997–2001. On the one hand, year 2001 is the last year which is easily accessible; on the other hand, the oil price is calm and low before year 2003. We restrict our focus to oil fields. Hence those fields producing gas are removed from our sample. Moreover, data on share ownership the largest licensee holds is collected from Brown books.

From the Thomson One Banker database, we also draw data on share ownership owned by the largest shareholder of the multinational company to which the largest licensee belongs. Accounting for geological factors, the reserves of initial oil in place and thickness of the oil field are mainly collected from United Kingdom Oil and Gas fields Commemorative and Millennium: volume No.20 (Gluyas and Hichens, 2003) and supplemented by United Kingdom Oil and Gas fields: 25 years commemorative volume (Abbotts, 1991).

For each field and variable, we go as far back as the data permit. We then dropped the oil fields that do not have complete records on three key variables used in our regressions, namely the extraction rate, share ownership of largest licensee and share ownership of the largest shareholders of the multinational companies. This left us with a sample of 216 annual observations on 44 oil fields for 1997–2001. The sample has an unbalanced structure, with the number of years of observations on each firm varying between 3 and 5.

The dependent variable in our estimation is the annual extraction rate of oil fields, denoted as ER. It is measured by dividing annual production over recoverable reserves for each oil field. The recoverable reserve is defined as the oil that can be recovered from the oil reservoir, which is calculated by multiplying the amount of oil initially in place by the recovery factor.

During a licensing round companies generally working together in consortia invest for the field on offer. According to the Department of Energy and Climate Change in the U.K., one of the consortium companies (generally the company with the largest interest in a field) takes responsibil-

Table 1. Definitions and sources of the variables

Variable name	Definition
Extraction Rate ( <b>ER</b> )	the ratio of annual oil production over recoverable reserves of oil field
share ownership distribution of licensees ( <b>SH</b> )	the percentage of share ownership the largest licensee holds
share ownership distribution of the multinational company ( <b>MSH</b> )	the percentage of share ownership controlled by the largest shareholder of the multinational company in which the largest licensee is belonged to
Remaining Reserves	the ratio(initial deposit - cumulative production)/initial deposit
Thickness of oil fields	net pay thickness in feet
	<b>Sources</b>
<b>ER, SH</b>	DECC historical statistics and Brown book <a href="https://www.og.decc.gov.uk/pprs/pprsindex.htm">https://www.og.decc.gov.uk/pprs/pprsindex.htm</a> <a href="https://www.og.decc.gov.uk/information/index.htm">https://www.og.decc.gov.uk/information/index.htm</a>
<b>MSH</b>	Thomson ONE Banker
<b>RR, Z</b>	United Kingdom Oil and Gas fields Commemorative and Millennium and 25years commemorative volume edited by Gluyas and Hichens (2003) and United Kingdom Oil and Gas fields: 25 years commemorative volume edited by Abbotts (1991).

ity for operating the field under the control of a joint operating committee of all the licensees. To examine the impact of share ownership (SH) to extraction, we use the share ownership that the largest licensee holds. Meanwhile, we also consider the role of the multinational company to which the largest licensee belongs (MSH). For instance, for one oil field named Andrew, its largest licensee is BP Exploration Operating Company Limited. In addition, to explore the effect of the largest licensee on extraction, we would identify if its parent firm, BP plc, affects the extraction decision of the oil field. The relating multinational companies list for each oil field is available from the authors on request.

The variable of remaining reserves is treated as a controllable factor of production and denoted by RR. Following Livernois and Uhler (1987), it is calculated as  $RR_{it} = (S_i - Y_{it}) / S_i$ , where  $S_i$  is the initial reserves in place and  $Y_{it}$  is cumulative extraction before year  $t$ . It accounts for the factors of initial deposit and age of the oil field. Pickering (2008) uses panel data and finds a positive and highly significant relationship between extraction rates and remaining reserves wherein differences in costs and pricing behaviour are all contained within the intercept term. Therefore, we expect that the fraction of remaining reserves is positively correlated with extraction rate.

Moreover, the differences in exogenous physical characteristics would determine the extraction rate for oil fields. According to Livernois (1987), the production is increasing in the thickness of the pay zone of the reservoir into which the well is drilled. This physical factor is measured with net pay thickness in feet, Z, which is defined as the thickness of rock that can deliver hydrocarbons to the well bore at a profitable rate. It is computed by oil column multiplied by net/gross thickness ratio. The effect of pay thickness on extraction rate is expected to be positive in our estimations.

The statistics summary of our sample is presented in Table 2. Data are available from the authors on request. Our sample consists of 44 oil fields over 1997–2001. We have a total of 305 observations for the dependent variable, i.e. annual extraction rate for North Sea oil fields.

The average rate of extraction is 6%, and the range goes from 0 to 56%. The largest licensee holds 58% of share ownership on average. There are five oil fields owned by the licensee with 100% of shareholdings, namely Andrew, Cyrus, Highlander, Miller and Tartan.

The lowest maximum for shareholdings is 20%. The share ownership distribution is apparently concentrated, while the relating multinational company's share ownership distribution is dis-

Table 2. Descriptive Statistics

Variable	Mean	SD	Minimum	Maximum	Median
ER	0.061704	0.066767	0	0.556317	0.034822
SH	0.575081	0.224240	0.2	1	0.5
MSH	0.078709	0.071028	0.0014	0.2576	0.0527
RR	0.697046	0.185114	0.290815	1	0.697502
Z	537.7958	475.6533	75.9	2135.182	337.5

**Correlation Matrix:**

Variable	Variable			
	ER	SH	MSH	RR
SH	0.0785			
MSH	0.1261**	-0.1865**		
RR	0.3171***	0.0162	-0.1337**	
Z	-0.3413***	-0.2528***	0.0107	-0.0632

\*p<0.1, \*\*p<0.05, \*\*\*p<0.01; Significance levels are based on two-tailed tests.

persed with the average share ownership 7% as well as a range from 0.0014 to 0.26. The statistics show that 70% of initial reserves are remaining in oil fields on average. The minimum level of remaining reserve is 29% and the maximum proportion of remaining reserve is 100%. Net pay thickness as the geological factor which impacts the oil reserve and production has skewed data. The average thickness of rock is 537 feet and the sample value ranges from 75 feet to 2135 feet. Thereby it is transformed into a logarithm with base 10 to achieve the data normality.

Moreover, Table 2 also shows the paired correlation for variables estimated in our regressions. The multinational company is correlated with extraction rate of oil field positively and significantly. The physical characteristics factors, remaining reserves and net pay thickness, are related to oil extraction strongly significantly (p<0.01).

### 3. ESTIMATION

Estimation is performed using panel data techniques. On the one hand, it can address the panel structure of the collected data on extraction rate of oil fields. On the other hand, the panel data models can capture both the heterogeneity across oil fields and the heterogeneity across time periods.

Our econometric analysis utilizes two specific standard panel data models: fixed-effects model and random-effects model (Hsiao, 1986). Each specific model stems from a more general model that captures differences across the various producers by incorporating an individual term for each oil field. If it is uncorrelated with the other regressors in, then a random-effects model is appropriate. The one-way random-effects model captures differences across the various producers by including a random disturbance term that remains constant over time and captures the effects of unobservable factors specific to each oil field. The two-way random effects model captures differences over time periods by additionally including a random disturbance term that is generic to all producers but captures the effects of excluded factors specific to each time period.

If the oil field-specific term is correlated with the other regressors, then a fixed effects model is appropriate. It removes any variable that does not vary within the groups. The one-way fixed effects model captures differences across oil fields by estimating a constant term for each oil field. The two-way fixed effects model captures differences over time periods by additionally estimating an individual constant term for each time period. Table 3. below shows a summary of diagnostics tests for regressions.

Table 3. Summary of diagnostics tests for regressions

<b>Diagnostics</b>		
<b>Breusch-Pagan test (<i>p value</i>)</b>	chi2 (1)	52.88 (0.000)
<b>variance inflation factor</b>		1.1
<b>Ramsey reset test(<i>p value</i>)</b>	F(3, 208)	4.04 (0.008)
<b>Wooldridge test for serial correlation(<i>p value</i>)</b>	F(1, 43)	25.928 (0.000)

Breusch-Pagan test statistics with 52.88 strongly rejects the null hypothesis that the variance of the residuals is constant. It suggests that the residual has a heteroskedasticity problem. Moreover, as the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get wildly inflated. To test the multicollinearity, variance inflation factor is measured. Generally, if a variable whose VIF values are greater than 10, the variable could be considered as a linear combination of other independent variables. In our regression model, the VIF equals 1.1 suggesting there is no multicollinearity problem. In addition, the specification error is found as Ramsey reset test with statistics 4.04 at significance level below 1%, which indicates that the estimation has omitted variables. To end, we use Wooldridge test to check the autocorrelation in panel data. We reject the null hypothesis that there is no first-order autocorrelation in panel data.

In order to ensure valid statistical inference when some of the underlying regression model's assumptions are violated, we rely on panel models regressions apply the fixed-effects model and random-effects model (Hsiao, 1986). Each specific model stems from a more general model that captures differences across the various producers by incorporating an individual term for each oil field. Thereby, to some extent, the specification error problem is mitigated. Finally, considering the above problems such as panel-specific AR1 autocorrelation and panel-level heteroskedastic error term, we correct them by clustering at the panel level. It will produce consistent estimates of the standard errors.

#### 4. ESTIMATION RESULTS AND DISCUSSIONS

In this section, we report and interpret estimation results with alternative estimators shown in Table 4 below.

Due to the coefficients of time-specific factors showing insignificant in all estimations, only one-way fixed-effects estimator and one-way random-effects estimator are used. Model 1 shows that right-skewed share ownership distribution of licensees has a significant and positive effect on the oil extraction rate of oil fields. Moreover, the share ownership distribution of parent companies to which the largest licensee belongs also impacts the extraction rate positively at significance level of 1%. The greater the right-skewed share ownership distribution, the higher is the extraction rate for oil fields. Apart from the effect of share ownership distribution, oil extraction rate is determined by geological factors of individual fields proxied by remaining reserves and net pay thickness. The results show that the oil fields with more remaining reserves tend to extract more oil. Moreover, as we expected, higher extraction rate depends on smaller thickness of rock that can deliver hydrocarbons to the well bore.

Although the pooled OLS model generates solid results, it disregards the expected heterogeneity inherent in the panel data. To exploit the heterogeneity across individual oil fields, we turn to one-way panel data models. If appropriate, the one-way random effects model is preferred to the one-way fixed effects model as fixed effects model precludes estimation of one key time-invariant factor: net pay thickness of oil fields. Much of the subsequent analysis focuses

Table 4. Estimations of oil extraction rate: Fixed and Random effects models

<i>Dependent Variable</i> <b>ER</b>	<b>Pooled OLS Model 1</b>	<b>Fixed Effects Model 2</b>	<b>Random effects Model 3</b>
<b>SH</b>	0.047*** (2.64)	0.008 (0.36)	0.046** (2.00)
<b>MSH</b>	0.288*** (4.96)	0.340** (2.71)	0.308*** (3.90)
<b>RR</b>	0.135*** (6.76)	0.235 (1.43)	0.151*** (4.47)
<b>LGZ</b>	-0.068*** (-5.53)	N/A	-0.067*** (-4.00)
<b>_cons</b>	0.102** (2.41)	-0.123 (-1.18)	0.088 (1.49)
<b>rho</b>		0.538	0.348
<b>R-squared : overall</b>	0.327	0.173	0.102
<b>within</b>		0.109	0.492
<b>between</b>		0.2267	0.326
<b>No. of observations</b>	216	216	216

*t* values are shown in parentheses; for  $p < 0.10$ , \*\* for  $p < 0.05$ , and \*\*\* for  $p < 0.01$ ; N/A indicates that a particular regressor is not applicable to the noted model; Time dummies are not included as time-specific coefficients are insignificant. In case of OLS only the values of R-squared is reported. rho is the fraction of variance due to ui. Panel-specific AR1 autocorrelation and panel-level heteroskedastic in the idiosyncratic error term are corrected by clustering at the panel-level.

on this factor when examining heterogeneity across oil fields.

The one-way random effects model dominates the pooled OLS model according to Breusch-Pagan Lagrange multiplier (LM) test under the null hypothesis that variances of groups are zero. We find strong evidence of significant differences across oil fields as LM statistics equals 44.56 at significance level below 1%. Moreover, according to Hausman test for random effects, we could not reject the null hypothesis that the individual specific term is uncorrelated with the regressors as the test statistics equals 2.69 and P value is 0.442. Therefore, the random effects model domains the fixed effects model

Model 2 reports the estimation results from the one-way fixed effects model. There is a significant and positive relationship between extraction rate and the share ownership distribution of the parent company to which the largest

licensee belongs. However, the share ownership of licensees and remaining reserves are found to be insignificant. Moreover, the appropriate F-test for joint significance of all the fixed effects – oil field-specific – confirms their importance at levels far below 1% (statistic equals 5.14). Thus, the one-way fixed-effects model dominates the comparable pooled OLS model.

As mentioned above, the one-way random effects model not only dominates the one-way fixed effects model but also the pooled OLS model. Therefore, we focus more on the random-effects model. Model 3 reports the estimation results from the one-way random effects model. The results for factors involving share ownership distributions of oil fields and the parent company of the largest licensee, the proportion of remaining reserves and the net pay thickness of oil fields are very similar to the pooled OLS results in sign and statistical significance. Inclu-

Table 5. Sensitivity analysis: alternative estimator FGLS and PCSE

Dependent Variable	FGLS AR1	FGLS AR1	FGLS AR1	FGLS AR1	PCSE AR1	PCSE AR1	PCSE AR1	PCSE AR1
ER	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SH	0.024393*** (0.00688)	0.039632*** (0.01096)	0.020502** (0.00938)	0.041799*** (0.01132)	0.03773 (0.02837)	0.059652** (0.02346)	0.028873 (0.02651)	0.056044** (0.02551)
MSH	0.199431*** (0.02837)	0.085001*** (0.02321)	0.121079*** (0.02761)	0.151949*** (0.00255)	0.338382*** (0.08585)	0.214831*** (0.08025)	0.272279*** (0.0895)	0.150215** (0.07507)
RR	0.099261*** (0.01321)	0.156953*** (0.01587)			0.085605 (0.05573)	0.113648*** (0.04359)		
LGZ	-0.07576*** (0.00813)		-0.09235*** (0.00714)		-0.10038*** (0.03276)		-0.10614*** (0.02084)	
_cons	0.16696*** (0.02756)	-0.06826*** (0.01193)	0.29417*** (0.02193)	0.040656*** (0.00674)	0.231309** (0.1244)	-0.04443 (0.03569)	0.322227*** (0.05873)	0.051624*** (0.01755)
R-squared					0.4887	0.4237	0.4620	0.3602
N	216	271	216	276	216	271	216	276

Note: a) robust standard errors are in parenthesis. b) \*, \*\*, \*\*\* denotes significance at the 10% level, 5% level, and 1% level respectively. c) Both panel-specific AR1 autocorrelation and panel-level heteroskedastic errors are corrected.

sion of these oil field-specific factors increases the coefficient of the share ownership distribution controlled by parent company to which the largest licensee of oil field belongs, from 0.288 to 0.308. Moreover, the coefficient of remaining reserves also increases from 0.135 to 0.151.

Overall, we find evidence that share ownership owned by the operator (i.e. the largest shareholder of the oil field is the operator) has a positive effect on oil extraction rate at 5% significant level. The largest shareholder from the operator's multinational company shows a strong relationship with the extraction rate of the oil field at 0.1% significant level. In particular, when the multinational firm's largest shareholder increases 1 per cent of ownership, extraction rate would increase by 0.3%. In addition, geological factor, pay thickness and remaining reserves are found to be strongly correlated with extraction rate.

## 5. SENSITIVITY ANALYSIS

Using OLS as the reference point, the robustness across these models has been evaluated in model 1 of Table 4. The results generated by OLS are consistent with our main results estimated by one-way random-effects model. This section thoroughly tests the robustness of the results across sample selection and model specification as well as different estimation methods.

Firstly, we test whether the results are driven by outliers by excluding various groups of oil fields from the sample. Two methods are used to detect outliers and influential points: the plots of leverage against residual squared and the partial regression plots. We found that field no.41 was a point of major concern. Then, we performed random effects estimation with the outlier and without it separately. Deleting field no.41 made little change in the coefficients. For instance, the most change is of coefficient for MSH and simply dropped from 0.28 to 0.25. Therefore, oil field no.41 did not affect the regression. Thus, there is no influential point which has a large effect on regression results to remove.

It is interesting to test for non-linearities by augmenting the regressions of Table 4 with quadratic and cubic terms of the share ownership distribution. The relationship between inequality of share ownership distribution and extraction rate could depend on an oil field's stage of development. We test for this by experimenting with different functional forms, such as including a squared and/or cubed term for inequality. We do not find any evidence for a significant quadratic or cubic relationship between changes in share ownership inequality and changes in extraction rate.

As a further robustness check, we enquire whether the estimation method matters. Equation (1) is re-estimated using Feasible General-

ized Least Squares estimator (FGLS) and OLS with Panel-Corrected standard errors (PCSE). Both panel-specific AR1 autocorrelation and panel-level heteroskedastic errors are controlled. We estimate a set of regressions where the dependent variable (pollution emission) is regressed on the core variable (share ownership distribution) and all possible combinations of other control variables. The results are presented in Table 5 below.

In comparison with PCSE estimations, results using FGLS appear overconfident. This problem is explored by Beck and Katz (1995) who attribute this overconfidence to time-series cross-section data where the error process has a large number of parameters as the FGLS assume the error process is known but not estimated. This oversight causes estimates of the standard errors of the estimated coefficients to understate their true variability.

Summing up, for most regressions, the coefficients of share ownership distribution variables indicate high significance with positive sign regardless of FGLS estimator and PCSE estimator. The results are again qualitatively similar to those reported in column (3) of Tables 4 and 5.

## 6. CONCLUSIONS

This chapter examines the influence of share ownership distribution on extraction rate differences between oil fields. Results based on data from an unbalanced panel set of 44 UKCS oil fields covering the period 1997–2001 show that there is positive relationship between the share ownership of the largest licensee and the largest shareholder of the largest licensee's multinational company and extraction rate. It suggests that an oil field with more right-skewed share ownership distribution tends to extract more oil after controlling for geological characteristics such as remaining reserves and pay thickness. In particular, when the multinational firm's largest shareholder increases 1 per cent of ownership, extraction rate increases by 0.3%.

Moreover, some limitations must be taken into consideration. For instance, the identity of the largest licensee and the largest shareholder possibly affects extraction decisions. Hence to have a better picture of how extraction rate is determined by share ownership, it would be worthwhile further examining the link between the identities of these decisive shareholders and level of extraction rate.

## REFERENCES

1. Arrow, K. J. and Debreu, G. (1954). "Existence of an Equilibrium for a Competitive Economy." *Econometrica* 22(3): 265–290.
2. Arrow, K. J. (1962). "The Economic Implications of Learning by Doing." *The Review of Economic Studies* 29(3): 155–173.
3. Barnett, H.J. and Morse, C. (1963). *Scarcity and Growth: The Economics of Natural resource Availability*. Johns Hopkins University Press, for the future, Maltimore, MD.
4. Baron, D. (1979). "On the relationship between complete and incomplete financial market models." *International Economic Review* 20 (1), 105–117.
5. Baum, C. F. (2006). *An introduction to modern econometrics using Stata*. College Station, Tex., Stata Press.
6. Beck, N. and Katz, J.N. (1995). "What to do (and not to do) with Time-Series Cross-Section Data." *The American Political Science Review* 89(3): 634–647.
7. Benninga, S., and Muller, E. (1979). "Majority Choice and the Objective Function of the Firm under Uncertainty." *The Bell Journal of Economics* 10(2): 670–682.
8. Berck, P. (1995). Empirical consequences of the Hotelling principle. In: Bromley, D.W. (ed.), *The handbook of Environmental Economics*. Blackwell, Oxford.
9. Black, D. (1948). "On the rationale of group decision making." *Journal of Political Economy* 56(1): 23–34.
10. Cairns, R. (1981). "An application of depletion theory to a base metal: Canadian nickel." *The Canadian Journal of Economics / Revue canadienne d'Economie* 14(4): 635–48.
11. Congleton, R.D. (2002). The median voter model. *Encyclopedia of Public Choice*. No. Part 2. 2003–01–01. Page: 707–712.
12. Cramer, J. (1986). *Econometric Applications of Maximum Likelihood Methods*. New York: Cambridge University Press.

13. Dasgupta, P.S., and Heal, G.M. (1979). *Economic Theory and Exhaustible Resources*. Cambridge: Cambridge University Press.
14. Demsetz, H. and Lehn, K. (1985). "The Structure of Corporate Ownership: Causes and Consequences." *Journal of Political Economy* 93(6): 1155–1177.
15. DeMarzo, P. (1993). "Majority voting and corporate control: the role of dominant shareholder." *Review of Economic Studies* 60(3), 713–734.
16. Demsetz H. and Villalonga B. (2001). "Ownership structure and corporate performance." *Journal of Corporate Finance* 7(3): 209–233.
17. Derwall, J., Guenster, N. et al. (2005). "The Eco-Efficiency Premium Puzzle." *Financial Analysts Journal* 61(2): 51–63.
18. Devarajan, S. and Fisher, A.C. (1982). "Exploration and Scarcity." *Journal of Political Economy* 90(6): 1279–1290.
19. Ellis, G. and Halvorsen, R. (2002). "Estimation of Market Power in a Non-renewable Resource Industry." *Journal of Political Economy* 110(4): 883–899.
20. Epple, D. (1985). "The econometrics of exhaustible resource supply: a theory and an application." In: *Energy, Foresight, and Strategy*. Ed. T.J. Sargent (Baltimore: Resources for the Future).
21. Epple, D., and Hansen, L.P. (1981). "An econometric framework for modelling exhaustible resource supply." In: *The Economics of Exploration for Energy Resources*. Ed. J. Ramsey (Greenwich, CT: JAI Press).
22. Farrow, S. (1985). "Testing the Efficiency of Extraction from a Stock Resource." *Journal of Political Economy* 93(3): 452–487.
23. Favero, C. A. (1992). "Taxation and the Optimization of Oil Exploration and Production: the UK Continental Shelf." *Oxford Economic Papers* 44: 187–208.
24. Gaudet, G. R., Lasserre, P. et al. (1995). "Optimal Resource Royalties with Unknown and Temporally Independent Extraction Cost Structures." *International Economic Review* 36(3): 715–749.
25. Geraats, P.M., and Haller, H. (1998). "Shareholders 'choice'." *Journal of Economics* 68 (2), 111–135.
26. Gluyas J.G. and Hichens, H.M. (2003). *United Kingdom Oil and Gas fields Commemorative and Millennium: volume No. 20*.
27. Gujarati, D.N. and Porter, D.C. (2009). *Basic econometrics*. Boston: McGraw-Hill.
28. Haller, H. (1986). "Market power, objectives of the firm, and objectives of shareholders." *Journal of Institutional and Theoretical Economics* 142(4), 716–726.
29. Haller, H. (1988). "Competition in a Stock Market with Small Firms." *Journal of Economics* 48: 243–261.
30. Haller, H. (1991). "Corporate Production and Shareholder Cooperation under Uncertainty." *International Economic Review* 32(4): 823–842.
31. Halvorsen, R. and Smith, T.R. (1991). "A test of theory of exhaustible resources." *Quarterly Journal of Economics* 106(1), 123–140.
32. Heckman, J.J. (1979). "Sample selection bias as a specification error." *Econometrica* 47(1): 153–161.
33. Hotelling, H. (1931). "The economics of exhaustible resources." *Journal of Political Economy* 39, 137–75.
34. Hsiao, C., (1986) "Analysis of Panel Data." *Econometric Society monographs No. 11*. New York: Cambridge University Press.
35. Kellogg, R. (2011). "Learning by Drilling: Interfirm Learning and Relationship Persistence in the Texas Oilpatch." *The Quarterly Journal of Economics* 126: 1961–2004.
36. Kelsey, D., and F. Milne (1996). "The existence of equilibrium in incomplete markets and the objective of the firm." *Journal of Mathematical Economics* 25(2), 229–245.
37. Kelsey, D. and F. Milne (2006). "Externalities, monopoly and the objective function of the firm." *Economic Theory* 29(3): 565–589.
38. Kelsey, D. and F. Milne (2008). "Imperfect Competition and Corporate Governance." *Journal of Public Economic Theory* 10(6): 1115–1141.
39. Lasserre, P. (1985). "Discovery Costs as a Measure of Rent." *The Canadian Journal of Economics / Revue canadienne d'Economique* 18(3): 474–483.
40. Levhari, D. and N. Leviatan (1977). "Notes on Hotelling's 'Economics of exhaustible resources'." *The Canadian Journal of Economics / Revue canadienne d'Economique* 10, 177–92.

41. Liu, X., Marsiliani, L., and Renström, T.I. (2016). "Share Ownership Distribution and Natural Resource Extraction." Durham University Working Paper.
42. Livernois, J. R. and Uhler R. S. (1987). "Extraction Costs and the Economics of Non-renewable Resources." *Journal of Political Economy* 95(1): 195–203.
43. Mabro et al. (1986). The market for North Sea crude oil. Oxford: Oxford University Press.
44. Managi S. and Opaluch J. J., D., Jin, T.A., Grigalunas (2005). "Technological change and petroleum exploration in the Gulf of Mexico." *Energy Policy* 33(5): 619–632.
45. Miller, M.H. and Upton C. W. (1985). "A Test of the Hotelling Valuation Principle." *Journal of Political Economy* 93(1): 1–25.
46. Milne, F. (1974). "Corporate Investment and Finance Theory in Competitive Equilibrium." *Economic Record* 50(4): 511–533.
47. Milne, F. (1981). "The firm's objective function as a collective choice problem." *Public Choice* 37(3): 473–486.
48. Pesaran, M. H. (1990). "An Econometric Analysis of Exploration and Extraction of Oil in the U.K. Continental Shelf." *Economic Journal* 100(401): 367–90.
49. Pickering, A. (2008). "The oil reserves production relationship." *Energy Economics* 30(2), 352–370.
50. Pindyck, R. S. (1978). "The Optimal Exploration and Production of Non-renewable Resources." *Journal of Political Economy* 86(5): 841–61.
51. Renström, T.I. and Yalçın, E. (2003). "Endogenous Firm Objectives." *Journal of Public Economic Theory* 5(1): 67–94.
52. Roemer, J. (1992 a). "A partial theory of the link between economic development and political democracy." WP 407, Department of Economics, University of California, Davis.
53. Roemer, J. (1992 b). "A proposal for denationalizing the state sector when pollution is an issue." WP 404, Department of Economics, University of California, Davis.
54. Roemer, J.E. (1993). "Would economic democracy decrease the amount of public bads?" *Scandinavian Journal of Economics* 95: 227–238.
55. Slade, M.E. (1982). "Trends in natural-resource commodity prices: an analysis of the time domain." *Journal of Environmental Economics and Management* 9(2): 122–137.
56. Slade, M.E. (1984). "Tax Policy and the Supply of Exhaustible Resources: Theory and Practice." *Land Economics* 60(2): 133–147.
57. Soto, M. (2010). "System GMM with a small sample." Mimeo, Instituto de Análisis Económico, Barcelona.
58. Stollery, K.R. (1983). "Mineral depletion with cost as the extraction limit: a model applied to the behaviour of prices in the nickel industry." *Journal of Environmental Economics and Management* 10(2): 151–165.
59. Uhler, R.S. (1979). Oil and gas finding costs. Calgary: Canadian Energy Research Institute.
60. Young, D. (1992). "Cost Specification and Firm Behaviour in a Hotelling Model of Resource Extraction." *The Canadian Journal of Economics / Revue canadienne d'Economique* 25(1): 41–59.
61. Zimmerman, M.B. (1977). "Modeling depletion in a mineral industry: The case of coal." *Bell Journal of Economics* 8(1): 41–65.

# Assessing the Operating Efficiency for the Vietnam Microfinance Institutions and Implication for the Transmission

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**Abstract.** This paper investigates the operating efficiency of Vietnam microfinance institutions (MFIs) in formal and informal sectors during the period from 2010 to 2015 through the operating self-sufficiency ratio, return on asset ratio and return on equity ratio. The results show that the ratios of formal MFIs were higher than these of informal MFIs. Then authors recommend that the informal MFIs in Vietnam should concentrate on operation management rather than transforming to formal MFIs by all means.

**Keywords:** microfinance institutions; formal MFIs; informal MFIs; operating efficiency of MFIs.

## Оценка текущей эффективности вьетнамских микрофинансовых организаций и выводы о путях их развития

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**Аннотация.** В данной работе исследуется текущая эффективность микрофинансовых организаций (МФО) Вьетнама в формальном и неформальном секторах в период с 2010 по 2015 г. посредством анализа коэффициентов текущей самодостаточности, рентабельности активов и капитала. Результаты исследований показывают, что коэффициенты текущей самодостаточности в формальных МФО были выше, чем в неофициальных МФО. Авторы рекомендуют неофициальным МФО Вьетнама сосредоточиться на текущем управлении, а не на попытках превращения в официальные МФО.

**Ключевые слова:** микрофинансовые организации; формальные МФО; неофициальные МФО; текущая эффективность МФО.

## I. INTRODUCTION

According to common definition of ADB (2000), microfinance institution is the provision of a broad range of financial services such as credit, saving, insurance and money transfer for the poor, low-income households and micro-corporation. Invented from the beginning of 17th century under the name of credit union in agriculture sector, MFIs become more and more popular throughout the world, especially in developing countries. MFIs are proved to be efficient approach for poverty reduction (Shirazi and Khan, 2009; Imai, Arun, and Anim, 2010; Boateng and Bampoe, 2015).

Evaluating the MFI's performance is more complicated than other financial institutions because MFIs have to face the challenges in providing financial services for the poor as well as ensuring cost recovery to avoid bankruptcy. According to Meyer (2002), evaluate the MFI's performance should be in term of critical triangle including outreach to the poor, financial sustainability and impact to the poverty. Meyer (2002) implies that the poor need financial support in the long term rather than once time in life. Moreover, MFI's target is improving the living condition for the poor, thus reducing poverty often is often an indicator to assess whether IFIs have accomplished its mission or not. Providing financial services for the poor normally are high transaction cost, the MFIs often receive additional external funding to compensate the shortfall between revenue derived from customers and cost of providing financial services. While receiving additional funding is limited, donors will sustain the grant in the future or not is uncertain. These above factors led to the low level of financial sustainability in MFIs.

Financial sustainability shows the ability that MFIs can survive in the long term by their own income without any contribution from donors. Financial sustainability is measured by operational self-sustainability (OSS) and financial self-sustainability (FSS). OSS measures whether MFIs' operating income is sufficient to cover operating costs such as salaries and wages, supplies, loan losses and other administration costs. FSS shows MFI can cover the costs of fund and other subsidies received when they value at market rates. Moreover, the return on asset (ROA) and return on equity (ROE) are also applied to measure MFIs' sustainability.

## II. LITERATURE REVIEW ABOUT THE PERFORMANCE OF FORMAL AND INFORMAL MFIS

Some study proved that informal MFIs perform better than formal MFIs. Bakker, Schaveling and Nijhof (2014) showed the negative relationship between legal status and operational efficiency in MFIs because formal MFIs have to pay more to meet the legal requirements. Similar, Ngo (2012) indicated that cost is the obstruction so the MFIs only reach the certain point in efficiency and size could consider about transforming from informal to formal MIFs. Ngoc (2015) in her study about 434 MFIs in developing countries from 2010 to 2014 proved that there is difference in sustainability between formal and informal MFIs. Then formal MFIs are less competitive than formal ones due their lower at operation efficiency and sustainability as well.

In addition, there are studies indicated that formal MFIs perform better than informal ones. Bassem (2009) examined the countries in Mediterranean region through survey and concluded that formal MFIs are better because customer trust them more so it is easier for them to reach the idle of money in residential and provide loan to customers. Meanwhile Amelie Brune (2009) researched MFIs in Africa and Asia region and proved that the scale of MFIs does not affect their operational efficiency. Thao (2015) investigated the outreach and the sustainability for the MFIs in Vietnam, but the study only conducted for the formal MFIs rather than analyzing and comparing with informal MFIs in Vietnam.

Thus previous studies give different conclusions about the relationship between legal status and operational efficiency of formal and informal MFIs.

## III. RESEARCH METHODOLOGY

### 3.1. Variable selection

In this paper, the authors used three indicators: Operational Self Sustainability (OSS), Return on Asset (ROA) and Return on Equity (ROE) to measure the financial sustainability, from which to measure and compare the performance between formal and informal MFIs. Based on the results, the authors would propose recommendations on the transition from informal to formal MFIs.

Operational Self Sustainability (OSS) is considered the most simple and common index to assess the self-sustainability of MFIs (Marakkath, 2014). This indicator is often reported publicly by microfinance institutions annually. Operational Self Sustainability measures whether revenue of a MFI cover its total costs (including operational expense, loan loss provision and financial costs). In which, the ratio greater than 100 percent indicates that the microfinance institution can cover all its costs through their activities and not rely on donations or grants from external funds to survive (Churchill and Frankiewicz, 2006). However, according to international practices, the index should be greater than 120% to ensure the self-sustainability for long-term.

Return On Assets (ROA) is the most common ratio used to measure the profitability of banks and financial institutions (Pasiouras and Kosmidou, 2007, Goddard et al, 2004, Sufian et al, 2009). ROA shows the effectiveness of asset investment and capabilities of senior executives in the use of the financial resources to make profit (Hassan et al, 2006). The higher ratio of ROA indicates the higher profitability on an asset unit of the MFI. However, the too high ROA is not necessarily good because it may be the result of investing in assets with high level of risk. According to international practices, ROA of about over 2% proved an efficient MFI.

Return On Equity (ROE) represents the ability to make profit on an equity unit. ROE is considered to be one of the most comprehensive indicators to evaluate the profitability of a business, because the ultimate goal of a business is to maximize the property of shareholders. ROE is equal to ROA multiplied by the financial leverage (total assets on equity), reflecting the trade-off between risks and profitability of the organization.

### 3.2. Hypotheses and models

To be able to give recommendations of the transformation of microfinance institutions, the paper assessed whether there were differences in the Operational Self Sustainability and profitability between formal and informal microfinance institutions. T-test was conducted to answer those questions. Before implementing t-test, Lilliefors test would be done to test the normal distribution of data. Research also performed additional non-parametric test (non-

parametric Wilcoxon sign-rank) to test the differences in the Operational Self Sustainability and profitability between formal and informal microfinance institutions. Hypotheses of the study were as follows:

$H_0$ : There is no difference in the self-sustainability and profitability between formal and informal microfinance institutions.

$H_1$ : There are significant differences in the self-sustainability and profitability between formal and informal microfinance institutions.

In each test, p-value value will be used as a basis to draw conclusions for the research questions.

### 3.3. Data Collection and Description

Research data was taken from annual data of 22 Vietnamese microfinance institutions which were announced on the website mixmarket.org during the period from 2010 to 2015. One problem was that some organizations did not have full data of all these years, making up the final data including only 76 observations. Table 1 showed that the average of operational self-sustainability and that of profitability of Vietnamese MFIs were higher than the points of reference. As analyzed above, the OSS should be over 120% to ensure the long-term performance of the microfinance institutions, while ROA over 2% proving microfinance institutions efficient. These figures of Vietnamese MFIs (average of 139.4% and 5.6%, respectively) were significantly larger than the benchmarks. However, the data also showed a high degree of volatility of variables (with large standard deviations). Specifically, OSS was the most volatile indicator, varying between only about 1.96% (which indicated the income covered little the costs of the organization) and 252% (the income was 2.5 times the total cost). ROA fluctuated from -2.92% to 14.75%, while ROE from -12.61% to 72.35%.

Table 2 presented the results of Lilliefors test for normal distribution of OSS, ROA, ROE of formal and informal microfinance institutions. The results showed that there was no reason to reject the hypothesis  $H_0$  at the significant level of 5% (only test for data series of the operational self-sustainability of informal microfinance institutions rejected  $H_0$  at 10% level of significance), which means that the data sets were normally distributed. This result indicated that the research

Table 1. Summary Statistics

	Mean	Median	Maximum	Minimum	Std.Dev	N
OSS	139.40%	141.20%	252.82%	1.96%	40.30%	76
ROA	5.60%	6.35%	14.75%	-2.92%	4.02%	76
ROE	14.68%	15.72%	72.35%	-12.61%	12.96%	76

Source: authors' own computation.

Table 2. Results of Lilliefors Test

		p-value
Formal MFIs		
OSS	0.0878	> 0.1
ROA	0.1182	> 0.1
ROE	0.1338	> 0.1
Informal MFIs		
OSS	0.1402	0.0638
ROA	0.1338	> 0.1
ROE	0.0876	> 0.1

Source: authors' own computation.

can use t-test to assess the differences in the self-sustainability and profitability between formal and informal microfinance institutions.

#### IV. RESEARCH RESULTS

Table 3 presented the average of OSS, ROA, ROE of formal and informal microfinance institutions as well as the t-test results. It showed that compared to formal microfinance institutions, informal ones had higher self-sufficiency and return on assets. Specifically, the average OSS of informal MFIs was 160% whereas that of formal MFIs was only approximately 122% (40% less). As regard to ROA, the figure for informal MFIs was 7% while that of formal MFIs only 4%. For ROE, the difference between the two groups was not statistically significant; however, the figure for informal MFIs was still higher than that of formal MFIs (16% compared to 13%). Wilcoxon test on the difference in the median values concluded with the same results.

These results were consistent with the study by Bakker et al (2014) on the self-sustainability of

microfinance institutions over post-crisis period. Accordingly, cost of regulatory compliance was the main reason that caused formal microfinance institutions less competitive, and therefore, their self-sustainability as well as profitability also worse than their informal counterparties. Another explanation for these results came from the research by Peck and Rosenberg (2000): credit cooperatives (customers both the owners and the borrowers) had lower agency cost (costs arising from the conflict between shareholders and managers) than private companies did. Costs for the problem of conflict between principal and agent led to cooperatives as effective as private companies.

In contrast, the study by Bassem (2009) found that formal MFIs would be more efficient because they are trusted by customers, and therefore, easier to access funds from residents. Peck and Rosenberg (2000) explained that the board members of NGOs paid less attention to monitoring management because they were not investors, so they were less interested in the

Table 3. Results of t-test

	Formal MFIs	Informal MFIs	differences
OSS	1.2195	1.5779	0.3583***
ROA	0.0400	0.0725	0.0326***
ROE	0.1323	0.1614	0.0291

(Note: \*, \*\*, \*\*\* denote statistical significance of the t-tests at the 10%, 5%, and 1% level, respectively. Results are based on author's own computation).

survival and the sustainable development of the institutions. The private companies were, therefore, more profitable than NGOs. According to microfinance experts, (Ledgerwood and White, 2006; White and Campion, 2002), the governance systems of non-profit organizations were less effective than those of formal microfinance institutions. Thus, as a result of effective governance system, private companies would be better controlled, and therefore, more efficient than cooperatives and NGOs. The survey results of 39 cases of transformation by Fernando (2004) also confirmed that most of the transformation cases improved the governance system and financial performance of MFIs, as typified by the case of BancoSol in 1992, FFP Caja Los Andes in 1996, Banco Ademi in 1998; Mibanco in 1998; Compartamentos in 1999. However, some empirical studies did not find the relationship between the performance of MFIs and their legal status (Mersland and Strom, 2008, 2009 and Gutierrez-Nieto et al., 2009).

The opposed results to the cases of Vietnamese microfinance institutions in the research (informal institution had higher self-sustainability and profitability) could be explained by both the difference in the research context and the Vietnamese formal microfinance institutions still not organizing an effective governance system as expected by the studies of Ledgerwood and White (2006) and White and Campion (2002). In addition, the reliability of data and consensus on recognizing and reporting standards should be considered. From the definitions of variables, the values of OSS, ROA and ROE were always influenced by risk provisions, which were calculated by expectations of risks. Lack of controls as well as inconsistencies in estimating standards may affect the value and the reliability of OSS, ROA and ROE. High value of OSS, ROA and ROE of informal organizations can be the results of investing in lucrative but

risky assets without setting up enough provisions for losses.

## V. CONCLUSION AND POLICY RECOMMENDATION

Through the tests and results, there is finding that in Vietnam, the informal MFIs have higher level of operational sustainability and return ratios. This due to formal MFIs in Vietnam pay more on issues related to legal, representatives, transforming cost and upgrade infrastructure while there is unclear about opportunity to raise capital and benefit in transforming. More detail, in Vietnam, the corporate income tax for formal MFIs is 20% while informal MFIs are free to this tax. Moreover, formal MFIs is treated as a kind of financial institution so they have to comply the safety ratios and other regulations given by State Bank of Vietnam.

Based on the empirical result about negative relationship about legal status and operational efficiency in MFIs in Vietnam, the study has generated some policy recommendations:

*Firstly*, most of MFIs in Vietnam works for social and nonprofit target, so if they transform to formal institution, their original target would be weaken and there are more tax and legal issue burden. So the formal MFIs in Vietnam do not have to transform to formal one by all the means.

*Secondly*, even though Vietnam has basic legal framework for MFIs, providing the foundation for the transforming from informal to formal MFIs but the MFI generally vulnerable to the fast changes in business environment. In addition, there is a big challenge in competition in finance and banking sector, especially when Vietnam has opened the door more and more broaden. The informal MFIs, therefore, need more proactive in operation and management as well to mitigate risk, achieve targets and especially ready to comply with regulations.

## REFERENCES

1. ADB. (2000). Finance for the poor, microfinance development strategy. *Working paper*.
2. Bakker, A., Schaveling, J., & Nijhof, A. (2014). Governance and microfinance institutions. *Corporate Governance (Bingley)*, 14(5), pp. 637–652.
3. Bassem, B.S. (2009). Governance and performance of microfinance institutions in Mediterranean countries. *Journal of Business Economics and Management*, 10(1), pp. 31–43.
4. Boateng, Gilbert O., Boateng, Akwasi A. and Bampoe, Harry S. (2015). Microfinance and Poverty Reduction in Ghana: Evidence from Policy Beneficiaries. *Review of Business & Finance Studies*, vol. 6 (1), pp. 99–108.
5. Brune, A. (2009). An empirical study on the impact of microfinance institutions on development. Bachelor thesis. *Institute for Empirical Research in Economics (IEW) at the University of Zurich*.
6. Churchill, C., Frankiewicz, C. (2006). Making microfinance work: managing for improved performance. *International Labor Organization*, Geneva.
7. Fernando, N.A. (2004). Micro Success Story? Transformation of Nongovernment Organizations into Regulated Financial Institutions. *Asian Development Bank*.
8. Goddard, J., Molyneux, P., Wilson, P. (2004). Dynamics of growth and profitability in banking. *Journal of Money, Credit and Banking*, 36, pp. 1069–1090.
9. Gutiérrez-Nieto, B., Serrano-Cinca, C., Mar-Molinero, C. (2009). Social Efficiency in Microfinance Institutions. *Journal of the Operational Research Society*, 60 (19), pp. 104–119.
10. Hasan, R. D., Mehmet, U. (2006). Institutions and Policies for Growth and Poverty Reduction: The Role of Private Sector Development. *ERD Working Paper Series No. 82*, ADB, Manila.
11. Imai, K.S., Gaiha, R., Thapa, G., & Annim, S.K. (2010). Micro-finance and Poverty (A Macro Perspective). *Research Institute for Economics and Business Administration Kobe University (Discussion Paper Series)*, pp. 1–45.
12. Kimando, L.N., Kihoro, J.M., Njogu, G. (2012). Factors Influencing the Sustainability of Micro-Finance Institutions in Murang's Municipality, *International journal of business & Commerce*, 1 (10).
13. Ledgerwood, J., White, V. (2006). Transforming Microfinance Institutions: Providing Full Financial Services to the Poor. *World Bank*.
14. Marakkath, N. (2014). Sustainability of Indian microfinance institutions. DE: Springer Verlag.
15. Mersland, R., Strøm, R.Ø. (2008). Performance and trade-offs in microfinance institutions does ownership matter? *Journal of International Development*, 20 (5), pp. 598–612.
16. Mersland, R., Strøm, R.Ø. (2009). Performance and governance in microfinance institutions, *Journal of Banking and Finance*, 33 (4), pp. 662–669.
17. Meyer, R.L. (2002). The demand for flexible microfinance products: lessons from Bangladesh. *Journal of international development*, 14, pp 351–368.
18. Ngoc, N.B. (2015). Formal or informal microfinances- what is the way for reaching the self-stability? *Seminar in banking faculty, Banking Academy of Vietnam*, pp. 178–185.
19. Ngo, T.V. (2012). Capital structure and microfinance performance: A cross country analysis and case study of Vietnam. PhD Thesis.
20. Pasiouras, F., Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union, *Research in International Business and Finance*, Elsevier, 21 (2), pp. 222–237.
21. Peck, R., Rosenberg, R. (2000). The rush to regulate: legal framework for microfinance, *CGAP Special Edition*, 4.
22. Shirazi, N.S., and Khan, A.U. (2009). Role of Pakistan Poverty Alleviation Fund's and Micro Credit in Poverty Alleviation (A case of Pakistan). *Pakistan Economic and Social Review*, pp. 215–228.
23. Sufian, F., Habibullah, M.S. (2010). Does economic freedom fosters banks' performance? Panel evidence from Malaysia. *Journal of Contemporary Accounting & Economics*, 6 (2010), pp. 77–91.
24. Thao, P.T.T. (2015). The outreach and the sustainability for the MFIs in Vietnam. *Seminar of Baking faculty, Banking Academy of Vietnam*, pp. 147–156.
25. White, V., Campion, A. (2002). Transformation: Journey from NGO to Regulated MFI.
26. Zeller, M., Meyer, R. L. (2002). The Triangle of Microfinance: Financial sustainability, outreach and impact. *John Hopkins for the International Food Policy Research Institute*, Baltimore.

# The Asean Free Trade Agreement and Vietnam's Trade Efficiency

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**Abstract.** This study employs a stochastic gravity model to estimate efficiency performance of Vietnam's trade with its main trading partners from 1995–2015. Trade efficiency is measured as the ratio of actual trade volume to the maximum likelihood. Moreover, it analyzes the effects of both natural and man-made trade barriers on trade efficiency. The empirical results suggest that the actual trade of Vietnam appears to be much smaller than a possible efficiency level and that there is large space for further progress. Export efficiency outweighs that of import. Vietnam's AFTA membership has in general improved the trade efficiency, whereas tariffs and domestic devaluation downgrade it. Our findings lead to the recommendation that Vietnam should join more Free Trade Agreements (FTAs) and eradicate the man-made barriers.

**Keywords:** FTA; trade efficiency; trade barriers.

## Соглашение о свободной торговле АСЕАН и эффективность внешнеэкономической деятельности Вьетнама

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**Аннотация.** В данном исследовании проводится оценка эффективности внешней торговли Вьетнама с основными торговыми партнерами за период 1995–2015 гг. с использованием стохастической гравитационной модели. Эффективность торговли определяется как отношение фактического объема торговли и максимально вероятного объема. Кроме того, анализируются последствия влияния как природных, так и искусственных торговых барьеров на эффективность торговли. Эмпирические результаты свидетельствуют о том, что фактическая торговля Вьетнама оказывается значительно меньше, чем возможный уровень эффективности торговли и что существуют большие

возможности для дальнейшего прогресса. Эффективность экспорта превышает эффективность импорта. Членство Вьетнама в АФТА повысило в целом эффективность торговли, тогда как тарифы и внутренняя девальвация способствовали ее снижению. Авторы статьи считают, что необходимо провести ликвидацию «рукотворных» барьеров в свободной торговле, тем самым повысить эффективность и количество заключаемых соглашений о торговле во Вьетнаме.

**Ключевые слова:** ЗСТ; эффективность внешней торговли; торговые барьеры.

## 1. INTRODUCTION

Free Trade Agreements (FTAs) have become increasingly prevalent since the early 1990s as an effective instrument to foster trade. In the year 2016 the cumulative number of physical FTAs in force was 267. International trade plays an important role in stimulating the Vietnam's economic development. In order to promoting international trade, the responsible Vietnamese authorities have dynamically expanded the number of FTAs with its trading partners. As of the beginning of year 2017, Vietnam has signed eleven FTAs. Six out of eleven FTAs were countersigned as a member of ASEAN Free Trade Area (AFTA). The trade volume with these countries (China, Korea, Japan, Australia and New Zealand, India, and Chile) has been witnessed a substantial rise.

FTA brings both, pros and cons. In terms of pros, *trade creation's* effect arises from the abolishment of trade barriers such as tariffs on domestic goods and those of other members; for cons, *trade diversion's* effect exists due to the birth of some kinds of non-tariff accompanying with FTA that induce production and administrative cost. A large number of seminar works have questioned which effects is dominant. A positive and significant impact on trade flows among members in the European Community was shown by several economists (Aitken, 1973; Abrams, 1980; Brada & Mendez, 1983). Bergstrand (1985) pointed out insignificant effects, whereas Frankel et al. (1996) found mixed results. Close to our study of AFTA's effects on Vietnam trade is Le, et al. (1996), Nguyen (2009) and Narayan and Nguyen (2016). However, they all used the conventional gravity model in trade analysis proposed by Tinbergen (1962) and found a positive impact of AFTA on Vietnam's bilateral trade.

In this study, we aim to investigate how AFTA and trade barriers affect Vietnam's trade efficiency. Trade efficiency is defined as the ratio of Vietnam's actual trade to its potential trade, that is

estimated with a stochastic frontier gravity model. We simultaneously analyze export and import flow. Our numerical results imply that Vietnam's exports and imports with a lot of its trading partners are far from its efficient level with the former exceeding the latter. Joining AFTA improve the Vietnam's trade efficiency. Man-made trade barriers have been introduced for some goods reasons, but they only benefit some limited sectors. For instance, infant industries in both developed and developing countries have been protected by those barriers under a high level of global competition. In general, it is essential to eradicate man-made trade resistance so as to narrow the gap between actual trade and trade frontiers.

## 2. METHODOLOGY: STOCHASTIC FRONTIER GRAVITY MODEL AND TRADE EFFICIENCY

This paper employs a modified version of gravity model that is one of the main paradigm of numerical analysis on international trade and FTAs' effects. Canonical gravity models estimate the mean effects of driving factors of trade. Actual trade amounts are beneath the highest possibility levels due to the existence of both natural and man-made barriers. As a consequence, the gap between actual and maximum trade always exists and it could be measured by using disturbances with non-zero and non-negative mean. Kalirajan and Findlay (2005) proposed a method to estimate trade potential with gravity model motivated by the seminar works of measuring production possibility frontiers. Trade potential is defined as the highest feasible trade that can be reached without man-made barriers.

As in Armstrong (2007), the form of stochastic frontier gravity equation is given as follows:

$$X_{it} = f(Y_{it}; \beta) \exp^{(v_{it} - u_{it})}. \quad (1)$$

where  $X_{it}$  is the bilateral trade between Vietnam and country  $i$ ,  $f(Y_{it}, \beta)$  captures factors which

determine the potential trade ( $Y_{it}$ ) without man-made resistances – and  $\beta$  represents a vector of unknown parameters which will be estimated. Both  $u_{it}$  and  $v_{it}$  are error terms. While the single-sided error term,  $u_{it}$  is technical inefficiency that captures the man-made resistances,  $v_{it}$  represents the impact on trade of the rest of variables.  $u_{it}$  lies between 0 and 1 and it is assumed to have a non-negative truncated normal distribution with a mean of  $\mu$  at a  $\sigma_u^2$ . The double-sided error term  $v_{it}$ , that is assumed to be normally distributed with a mean of zero and  $\sigma_v^2$ , captures the measurement and specification error.

Specifically, we assign the model as follows:

$$\begin{aligned} LnEX_{it} = & \beta_0 + \beta_1 LnGDP_{it} + \\ & + \beta_2 LnGDPVN_t + \beta_3 LnD_i + \beta_4 LL_i + \\ & + \beta_5 RA_i + \beta_6 P_{it} + \beta_7 PVN_t + \beta_8 T + v_{it} - u_{it} \end{aligned} \quad (2)$$

$$\begin{aligned} LnIM_{it} = & \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnGDPVN_t + \\ & + \beta_3 LnD_i + \beta_4 P_{it} + \beta_5 PVN_t + \beta_5 LL_i + \\ & + \beta_6 T + v_{it} - u_{it} \end{aligned} \quad (3)$$

Where  $EX_{it}$  and  $IM_{it}$  are the actual export and import value of Vietnam with country  $i$  at year  $t$  respectively;  $GDP_{it}$  and  $GDPVN_t$  are the gross domestic product of country  $I$  and Vietnam at year  $t$ ;  $GDP$  is used as a proxy for economic size;  $D_i$  is the weighted distance between Vietnam and country  $i$  (Head & Mayer, 2002);  $LL_i$  is a dummy variable, taking value 1 if country  $I$  is landlocked, 0 otherwise;  $RA_i$  is defined as the relative land area between country  $i$  and Vietnam;  $P_{it}$  and  $PVN_t$  capture the population of country  $i$  and Vietnam respectively.  $T$  is a time trend variable used to reflect macro-dynamic distresses. Error term  $v_{it}$  is the measurement and specification error. Error term  $u_{it}$  represents negative effects on the trade volume because of man-made trade barriers and measure the size of inefficiency of Vietnam trade with country  $i$ .

Based on the model assignment, we can now define both the export and import efficiency with a specific trading partner  $i$  as follows:

$$\begin{aligned} TRE_{it} = & \frac{\exp[LnX_{it}]}{\exp[Ln f(Y_{it}; \beta) + v_{it}]} = \\ = & \frac{f(Y_{it}; \beta) \exp(v_{it} - u_{it})}{f(Y_{it}; \beta) \exp(v_{it})} = \exp(-u_{it}) \end{aligned} \quad (4)$$

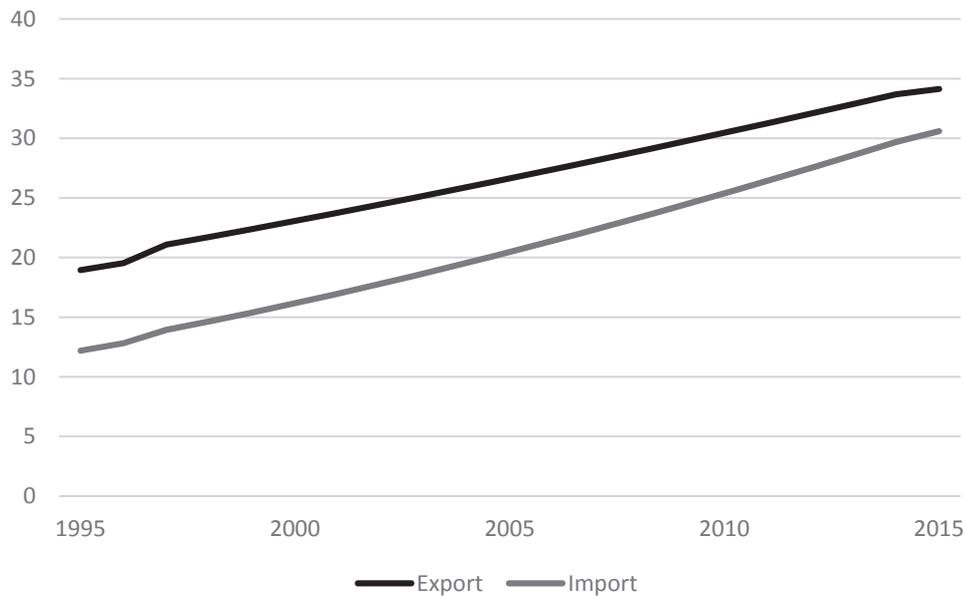
where  $\exp(LnX_{it})$  is actual exports or imports and  $\exp(Ln f(Y_{it}; \beta) + \varepsilon_{it})$  proxies the highest feasible exports to or imports from country  $i$  respectively. The higher the  $TRE_{it}$  is, the more efficient the exports/imports are, or closer to the frontier of exports/imports. The stochastic frontier gravity models are estimated by employing STATA version 13. In detail, this study used the time decay inefficiency built-in option (Battese & Coelli, 1992) to estimate  $u_{it}$ :

$$u_{it} = \eta_{it} u_i = \left\{ \exp[-\eta(t - T_i)] \right\} u_i \quad (5)$$

$\eta$  is a scalar parameter to be estimated and can be used to determine whether the efficiency increases, is constant or decreases. The last period ( $t=T$ ) for trade between Vietnam and country  $i$  contains the benchmark level of efficiency. If  $\eta > 0$ , the level of efficiency increases towards the benchmark level or the impact of country-specific man-made policy constraint to exports/imports increases over time; If  $\eta = 0$  or is insignificant, the level of efficiency remains constant or the impact of country-specific man-made policy constraint to exports/imports stays unchanged over time.

This method also applies to the parameterization of Battese and Corra (1977), who replaced  $\sigma_u^2$  and  $\sigma_v^2$  with  $\sigma^2 = \sigma_u^2 + \sigma_v^2$  and  $\gamma = \sigma_u^2 / (\sigma_u^2 + \sigma_v^2)$ . It can be said that  $\gamma$  must take the value between 0 and 1. We can test whether we should put the error term  $u$  in the form of stochastic frontier function, or not, by testing the significance of the  $\gamma$  parameter. If the null hypothesis, that  $\gamma$  equals zero, is rejected, this would mean that  $\sigma_u^2$  is non-zero and therefore the  $u$  term should be added into the model, leading to a specification with parameters that should be consistently estimated using the stochastic frontier approach.

This study utilizes panel data consisting of 30 Vietnam’s bilateral trading partners and period 1995–2015 that account for an average of 85% total international trade with the world. The list of countries included in this study is shown in Table 4, which was selected based on their relative importance to Vietnam exports in different regions including ASEAN, ASEAN+3, NAFTA, the European Union, and Others (Australia, New Zealand, India, and Russia). The main reason this study takes this period is that Vietnam joined ASEAN in 1995. We use a variety of data sources.



Trend of Vietnam's trade efficiencies, %

Exports/imports data have been taken from the International Monetary Fund (Direction of Trade Statistics-DOTS). Gross Domestic Products (GDP), Population (POP), Real Effective Exchange Rate, and all product tariff rates have been taken from the World Bank database. Data on the weighted distance measured in kilometers (D) and land area (Area) are taken from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). The economic freedom index (EF) is taken from the Heritage Foundation. The list of ASEAN member countries have been taken from official website asean.org. Export/import, gross domestic products, Real Effective Exchange Rate, and distance were transformed to logarithms. Table 6 in the appendix shows the estimation results of stochastic frontier gravity model. In general, the estimators are analogous to our expectation.

### 3. ESTIMATED TRADE EFFICIENCY

Estimated trade efficiencies are shown in Table 1 and 2, whereas Figure 1 plots the trend. Table 1 describes the estimation with Asian pacific countries, consisting of eight ASEAN countries, China, Japan, Korea, and Russian plus India. According to the definition, the estimated trade efficiencies should lie between 0% and 100%, where 100% implies that trade takes place at the frontier, the maximum possibility. In general, the empirical results infer that both export and import efficiencies of Vietnam enhanced considerably in period surveyed 1995–2015. Exports

perform much more efficiently than imports do. The average export efficiency with ASEAN countries grew from 37.54% in the years between 1995 and 1999 to 48.73% in the period 2010–2015, while imports from ASEAN rose about one and a half times, from 19.94% to 33.41% in the same periods. In particular, the trade of Vietnam with Singapore outweighed 90%, very near to the highest potential. On the other side, the trade efficiencies with Thailand and Indonesia were still less than 30%, indicating that actual trade with these nations were far from the maximum likelihoods. The space for trade's growth are enormous. Due to the adverse effects of economic sanction imposed on Myanmar by the US, its trade efficiency with Vietnam was the least among ASEAN members, only below 5%.

Regarding Vietnam's trade with China, Japan, and Korea, while efficiency of exports to Japan is the highest, followed by Korea, 61.9% and 41.25% respectively, that of imports from Korea ranks first, then Japan with the levels being 83.83% and 36.91% respectively. It is worth mentioning that until 2015 the trade with China was still less than one fourth of the estimated maximum possibility. Although ASEAN-China FTA came into force since 2005, as a member of ASEAN, Vietnam's trade could take the advantages from this FTA. In terms of exports, due to the intensive competition of similar products made in China, Vietnamese goods with high labor intensity such as textiles cannot compete successfully and are unable to

Table 1. Estimated Efficiencies of Vietnam's trade to Asia Pacific Countries + India, %

	1995-99		2000-04		2005-09		2010-15	
	Export	Import	Export	Import	Export	Import	Export	Import
Singapore	86.95	85.44	88.57	87.74	89.99	89.70	91.36	91.51
Cambodia	86.86	3.92	88.48	6.77	89.92	10.65	91.30	16.08
Lao	31.66	30.91	36.82	37.68	41.99	44.43	47.55	51.57
Malaysia	30.62	12.62	35.77	17.88	40.94	23.90	46.54	31.10
Philippines	30.53	2.42	35.68	4.52	40.85	7.62	46.45	12.24
Thailand	17.66	10.91	22.17	15.85	27.03	21.62	32.61	28.65
Indonesia	15.20	12.95	19.46	18.28	24.13	24.34	29.60	31.57
Myanmar	0.82	0.37	1.53	1.05	2.65	2.26	4.47	4.55
ASEAN	37.54	19.94	41.06	23.72	44.69	28.07	48.73	33.41
Japan	47.60	17.09	52.48	23.02	57.12	29.49	61.90	36.91
Korea	25.40	73.14	30.41	77.11	35.56	80.57	41.25	83.83
China	9.48	5.31	12.92	8.71	16.90	13.13	21.82	19.08
Australia	51.69	21.07	56.37	27.40	60.78	34.08	65.28	41.54
Russia	8.79	15.04	12.10	20.69	15.97	26.99	20.78	34.34
New Zealand	3.31	21.22	5.18	27.56	7.64	34.25	11.05	41.71
India	0.51	0.97	1.02	2.11	1.85	4.04	3.29	7.29

Source: authors' calculation.

rise the export volume in order to reach the highest likelihood, which is principally defined by the economic size of trading partners. It is odds that efficiency of imports from China was a merely 19.08% while import volumes from China accounts for one third. The reason may come from the gravity model's properties that claim that the higher the similarity between two countries is, the more efficient the trade is. China is 50 times in GDP and 15 times in population bigger than Vietnam. This reason is also used to explain why the efficiency of Vietnam's trade with India is very low, only below 10%. Moreover, the free trade agreement between ASEAN and India only came into effect several years ago, (2010) and it then has had a large effect on trade flows between Vietnam and India. The Vietnam's export volume to India in 2010 and 2015 are twice and six times, respectively, higher than in 2009.

Table 2 shows estimated efficiencies of Vietnam's trade with EU and NAFTA members. The

general picture is that the trade efficiencies with both EU and NAFTA did not exceed one half of maximum level. Among EU members, the trade efficiencies with Netherland, UK, Belgium and France are 47.57%, 33.59%, 44.08% and 27.65% respectively for exports and 28.99%, 17.65%, 32.72% and 35.55% for imports respectively. The remainders are below one fourth. By 2015, Vietnam's trade efficiency with EU are on average 21.21% and 19.78% for exports and import respectively. The efficiency with NAFTA's member countries is also moderate. In spite of the largest foreign market of Vietnam's goods (US21.8%; China 12.4%, Japan 8.3% in 2015), the export efficiency was only 41.32%. Trade efficiency with Canada and Mexico were less than 20% and 10% of the maximum respectively. The estimation expresses that, if man-made trade resistances could be abolished, Vietnam's trade with those countries surveyed could grow substantially.

Table 2. Estimated Efficiencies of Vietnam's trade to EU and NAFTA members, %

	1995-99		2000-04		2005-09		2010-15	
	Export	Import	Export	Import	Export	Import	Export	Import
Netherland	31.68	11.14	36.84	16.12	42.01	21.93	47.57	28.99
UK	18.49	4.62	23.08	7.76	27.98	11.93	33.59	17.65
Belgium	17.49	8.88	33.25	19.27	38.43	25.44	44.08	32.72
France	13.68	15.99	17.77	21.78	22.29	28.16	27.65	35.55
Italia	9.14	7.80	12.51	11.98	16.43	17.13	21.30	23.70
Spain	8.96	2.30	12.29	4.34	16.19	7.35	21.03	11.89
Poland	5.29	2.89	7.77	5.24	10.87	8.61	14.95	13.52
Sweden	5.06	8.04	7.49	12.29	10.52	17.50	14.54	24.12
Denmark	4.22	7.47	6.40	11.57	9.18	16.64	12.93	23.14
Finland	1.72	4.31	2.93	7.32	4.66	11.37	7.24	16.96
Germany	1.40	0.08	2.44	0.26	3.98	0.71	6.32	1.78
Greece	0.51	0.97	1.02	2.11	1.85	4.04	3.29	7.29
EU	9.80	6.21	13.65	10.00	17.03	14.23	21.21	19.78
USA	25.47	7.17	30.48	11.18	35.63	16.17	41.32	22.61
Canada	7.84	5.63	10.96	9.13	14.65	13.67	19.30	19.71
Mexico	2.62	0.50	4.23	1.22	6.40	2.56	7.65	3.96
NAFTA	11.98	4.43	15.22	7.18	18.89	10.80	22.76	15.43

Source: authors' calculation.

#### 4. TRADE EFFICIENCIES AND FTA

Our estimation implies that, Vietnam's trade attained very high efficiency with a few countries such as Singapore, whereas performed at very low level with most of its trading partners, such as China, India, and Canada. In order to enhance the efficiency of Vietnam's trade, it is vital to recognize driving determinants diminishing efficiency level. In this part, we employ regression analysis to discover those determinants. We consider the following regression models:

$$TRE\_Export_{it} = \delta_0 + \delta_1 ASEAN_i + \delta_2 EF_{it} + \delta_3 TR_{it} + \delta_4 LnREERVN_{it} + \varepsilon_{it} \quad (6)$$

$$TRE\_Import_{it} = \delta_0 + \delta_1 ASEAN_i + \delta_2 EF_{it} + \delta_3 TR_{it} + \delta_4 LnREER_{it} + \delta_5 EFVN_i + \delta_6 TRVN_i + \varepsilon_{2t} \quad (7)$$

In equation (6) and (7), ASEAN is the dummy variable, taking value one for the member of ASEAN, zero otherwise.  $TR_{it}$  and  $TRVN_t$  are the weighted tariff levied by country  $i$  and Vietnam to imports respectively. High tariffs reduce the Vietnam's trade efficiency.  $EF_{it}$  and  $EFVN_t$  are the indexes of economic freedom of country  $i$  and Vietnam at year  $t$ , which is a composite measure by the Heritage Foundations of ten factors, separated into four categories, rule of law, limited government, regulatory efficiency, and open market. The indexes take value between 0 and 100 with higher indexes implying lower trade barriers. While the higher economic freedom in Vietnam results into an increase in Vietnam import flows, the greater economic freedom for trading partners induces a lift in their foreign trade flows. Thus, both economic freedom in Vietnam and its partners are predicted to increase Vietnam's trade efficiency.  $REER_{it}$  and  $REERVN_t$  are the real effective exchange rate of

Table 3. Determinants of Trade Efficiency

Variables	TRE's Export	TRE's Import
ASEAN	0.3218769*** (0.0199869)	0.1453607*** (0.0231692)
EF	0.0076596*** (0.0007578)	0.0060855*** (0.000994)
TR	-0.0034488*** (0.0012272)	-0.0018702* (0.0010874)
LnREERVN	-0.1156541** (0.0478629)	
LnREER		0.0429117* (0.0412438)
EFVN		0.0031847 (0.0033066)
TRVN		-0.00885** (0.0039383)
Constant	0.2572335 (0.2325056)	-0.4543695* (0.2707365)

Note: numbers in parentheses are standard errors.

\*\*\* significance at the 1% level; \*\* significance at the 5% level; \* significance at the 10% level.

country  $i$  and Vietnam at year  $t$ . A devaluation of domestic currency is expected to boost exports and undermine imports.

Table 3 shows the regression results. The estimated coefficients of ASEAN are 0.3219 and 0.1453 for export and import respectively and all statistically significant at 1% level, suggesting that the ASEAN membership contributes positively to the Vietnam's trade efficiency. The estimated coefficients of tariff are negative and statistically significant, implying that tariffs levied by trading partners or by Vietnam plays as one of driving factors to undermine the trade efficiency between Vietnam and those countries. The trading partners' economic freedom significantly raised trade efficiency, diminishing the gap between the actual and potential trade. Vietnam's economic freedom coefficient is insignificant but positive, that partly reflected the achievements of Vietnam Economic Reform, the so-called "Doi Moi". The coefficient of LnREER is 0.0429 and significant at 10% level, whereas that of LnREERVN is  $-0.1157$  and significant at 5%. It means that Vietnam cannot enjoy the benefits from domestic currency's devaluation as its trading partners do. The low competi-

tive ability of Vietnam's products is the main reason. Moreover, the loss of Vietnam dong value increases the price of imported inputs mainly used to produce exporting goods, that dampens the competitive ability of Vietnam's exports further.

It is worthy to explain the reason why export efficiency exceeds import's as we saw in Figure 1. The adverse effects of Vietnam's trade balance deficit in the long term lead to a gap between exports and imports barriers. Trade deficit comes from the prolonged severe imbalance in the structure of export's and import's goods. To reduce the trade deficit, Vietnam in the past two decades has adjusted the exchange rate policy, implemented the restructuring of import and export goods, improved the institutional environment, and provided policies that promote export industries. As a result, the export barriers are lower than those of import, reflecting the export-oriented industrialization of Vietnam. Vietnam's government has continued to implement policies restricting imports to protect domestic industries, the average tax rates of Vietnam are twice higher than its trading partners (11.4% versus 5.7%) (World Bank

tariff database). Moreover, regression results showed that the absolute value of estimated coefficients of TRVN is five times bigger than that of Tariff, lowering import efficiency much more than export's one.

## 5. CONCLUDING REMARKS

In this paper, we estimated the trade efficiency of Vietnam with its major trading partners. Our empirical results indicate that, Vietnam's trade are much below the highest potentials

and exports contribute more to the overall efficiency than imports do. While joining AFTA and relaxing economic constraints help to rise Vietnam's trade efficiency, imposing tariffs and devaluating Vietnam dong undermines it. To improve the Vietnam's trade efficiency, it is vital that Vietnam should join more regional FTAs, improve economic freedom, cut tariffs and improve the competitive ability of its products to take the advantage of domestic currency devaluation.

## REFERENCES

1. Abrams, R.K. (1980). International Trade Flows under Flexible Exchange Rates. Federal Reserve Bank of Kansas City *Economic Review* 65, No. 3: 3–10.
2. Aitken, Norman D. (1973). The Effect of EEC and EFTA on European Trade: A Temporal Cross-Section Analysis. *American Economic Review* 5: 881–892.
3. Armstrong, S. (2007). Measuring Trade and Trade Potential: A Survey. *Asia Pacific Economic Papers*, No. 368, 1–19.
4. Battese, G.E., & Coelli, T. (1992). Frontier Production Functions, Technical Efficiency and Panel Data: with Application to Paddy Farmers in India. *Journal of Productivity Analysis*, 3 (1/2), 153–169.
5. Battese, G., & Corra, G.S. (1977). Estimation of A Production Frontier Model: With Application to the Pastoral Zone of Eastern Australia. *Australian Journal of Agricultural Economics*. 21 (03).
6. Bergstrand, Jeffrey H. (1985). The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. *Review of Economics and Statistics*, 67 (3), 474–81.
7. Brade, J.C., & Mendez, J.A. (1983). Regional Economic Integration and the Volume of Intra-regional Trade: A Comparison of Developed and Developing Country Experience. *Kyklos*. 36 (4): 589–603.
8. Frankel, J., Stein, E., & Wei, S.J. (1996). Regional Trading Agreements: Natural or Supernatural? *American Economic Review* 86 (2): 52–56.
9. Head, K., & Mayer, T. (2002). Illusory Border Effects: Distance Mismeasurement Inflates Estimates of Home Bias in Trade. *CEPII Working Paper*, No. 2002–01.
10. Kalirajan, K. and Findlay, C., (2005). Estimating Potential Trade Using Gravity Models: A Suggested Methodology, Foundation for Advanced Studies on International Development, Tokyo.
11. Le, Q.P., Nguyen, D.T., & Bandara, J.S. (1996). Vietnam's foreign trade in the context of ASEAN and the Asia-Pacific region: a gravity approach. *ASEAN Economic Bulletin*, 185–199.
12. Narayan, S., & Nguyen, T.T. (2016). Does the trade gravity model depend on trading partners? Some evidence from Vietnam and her 54 trading partners. *International Review of Economics & Finance*, 41, 220–237.
13. Kien, N. T. (2009). Gravity model by panel data approach: an empirical application with implications for the ASEAN free trade area. *ASEAN Economic Bulletin*, 26 (3), 266–277.
14. Tinbergen, J., 1962. Shaping the World Economy: Suggestions for an International Economic Policy, The Twentieth Century Fund, New York.

**APPENDIX****Table 4. Vietnam's Trading Partners**

Region/Country		Region/Country	
ASEAN		EU	
Indonesia	IDN	Belgium	BEL
Cambodia	KHM	Germany	DEU
Lao PDR	LAO	Denmark	DNK
Myanmar	MMR	Spain	ESP
Malaysia	MYS	Finland	FIN
Philippines	PHL	France	FRA
Singapore	SGP	United Kingdom	GBR
Thailand	THA	Greece	GRC
ASEAN+3		Italy	ITA
China	CHN	Netherlands	NLD
Japan	JPN	Poland	POL
Korea, Rep.	KOR	Sweden	SWE
NAFTA		Others	
Canada	CAN	Australia	AUS
Mexico	MEX	New Zealand	NZL
United States	USA	Russia	RUS
		India	IND

**Table 5. Statistical Summary**

Variable	Mean	Std. Dev.	Min	Max	Expected signs
LnEX	19.72608	1.902665	11.31447	24.26536	
LnIM	19.45836	2.087243	9.21034	25.01385	
LnGDP	26.73658	1.828001	20.97026	30.51844	+
LnGDPVN	24.85482	0.7277004	23.75514	25.98906	+
LnD	8.434485	1.011696	5.861461	9.608898	-
POPVN	82.19356	5.844866	71.9955	91.7038	+
POP	136.7221	298.5413	3.524506	1371.22	+
EF	66.1	10.29905	33.5	89.4	+
EFVN	46.92556	4.246476	38.6	51.7	+
TR	5.763222	5.974561	0	56.4	-
TRVN	11.43429	3.487111	6.63	15.57	-
LnREER	4.60641	0.3002	2.49734	7.13669	+
LnREERVN	4.705	0.1493	4.4783	4.978414	+

Source: Author's calculation based on data collection.

Table 6. Maximum Likelihood Estimates of the Stochastic Gravity

Variable	LnEX	LnIM
LnGDP	0.5031678*** (0.1047388)	0.6721288*** (0.0727893)
LnGDPVN	1.35851*** (0.3555741)	0.8101256** (0.3302682)
LnD	-0.3642712** (0.1433375)	-1.185056*** (0.1098836)
PVN	1.12*** (0.1356952)	0.4719188*** (0.1326053)
P	0.0010149** (0.0004789)	0.0013233*** (0.0003016)
LL	-0.2226489 (0.3298014)	-0.711911** (0.3241075)
T	-1.13867*** (0.1628305)	-0.5049462*** (0.157479)
Constant	-102.6388*** (16.63973)	-39.92446** (16.06557)
Mu	1.098108** (0.4479883)	1.289445*** (0.3073283)
Eta	0.0281909*** (0.0041293)	0.037003*** (0.0031502)
Sigma <sup>2</sup>	1.110187	0.9348502
Gamma	0.8339191***	0.820268***

Note: Values in parentheses () are standard errors.\*\*\* Significant at the 1 per cent level; \*\* Significant at 5 per cent level; \* Significant at 10 per cent level.

# What Impact Do Currency Exchange Rates Have on the M&A Market in BRICS Countries?

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**Abstract.** This paper tries to examine how currency exchange rates are influencing the M&A market in BRICS countries. Therefore the amount of M&A deals is defined as the dependent variable. Next to the currency exchange rate further variables like GDP growth rate, Stock (size of stockmarket) and money and quasi money growth are included this model. This data was gathered by the World Bank and modified for the right purpose. We used yearly data from 1994–2014 by 4 different countries. But in consequence of the fact that not all the data is available since 1994 we were able to obtain 64 observations. By using panel data with fix effects and lags this paper tries to display the impact of currency exchange rates on the M&A market through 4 cross-sectional units in a time period of 14 years (without timelags). After estimating the model we came to the conclusion that currency exchanges have a negative effect which is mostly significant in the second period.

**Keywords:** M&A, BRICS countries, exchange rates, panel data model, fixed effect estimator, lags.

## Влияние обменных курсов на рынок слияний и поглощений в странах БРИКС

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**Аннотация.** В данной статье исследуется влияние обменных курсов валют на рынок слияний и поглощений в странах БРИКС. Таким образом, количество сделок М&А задается в качестве зависимой переменной. Наряду с обменными курсами валют, анализируются такие переменные, как темпы роста ВВП, размер фондового рынка, темпы роста денежной массы. Данные для исследования были собраны с сайта Всемирного банка и модифицированы для целей регрессионной модели. Ввиду неполноты информации за период 1994–2014 гг. для 4 стран удалось найти 64 наблюдения. Использование временных рядов с фиксированными эффектами и временными лагами позволило продемонстрировать влияние валютных курсов на М&А через 4 cross-sectional выборки на временном интервале в 14 лет (без учета временных лагов). По результатам оценки модели можно сделать вывод о том, что рост обменного курса имеет негативное влияние на совершение сделок М&А, наиболее значимо данный эффект проявляется в следующем периоде.

**Ключевые слова:** слияния и поглощения; страны БРИКС; валютные курсы; панельные данные; фиксированный эффект; временные лаги.

## 1. INTRODUCTION

Nowadays M&A represent a significant part of FDI (Foreign Direct Investment). These capital flows have a big impact on the development of countries' economies and their GDP (Gross domestic product) growth (Neto, Brandão & Cerqueira, 2010). Especially, M&A (mergers and acquisitions) could be important "economic driver" for BRICS countries (Brasil, Russia, India & China), which are on the stage of newly advanced economic development. Along with the rest of the world the BRICS countries experience rather high economic volatility, especially in terms of currency exchange rates. For this reason investigating the impact of currency exchange rates on M&A market in BRICS countries is of high interest.

For the aim of our research we gathered macroeconomic data for 4 countries from World Bank Database and modified it in cross-sectional units with 14 time periods. To estimate the model we applied fixed effects technique and introduced lags in order to take into account long-term effects.

Specification of the model is based on Literature review section (2). To specify the model we introduced other related variables and estimated it through fixed effects technique of panel data, what is going to be explained in Model section (4). All the data gathered for the observations is described in Data section (3). In section of Empirical results (5) all the estimations could be found.

## 2. LITERATURE REVIEW

In order to specify the model our first step was to analyze works already done on this or similar topics. The first author to whom we have addressed was Mileva. In her work Mileva (2008) emphasizes that few of studies focus directly on M&A flows. Usually authors consider the total amount of investment flows. It increased our interest in investigating M&A market. Estimating the effect of FDI on domestic investment Mileva based on emerging and transition economies rather than on developed countries. The author said that from long-term perspective each dollar of FDI usually generated at least one additional dollar of local investment. But in less developed countries the effect could differ significantly, what is interesting to study. In our project we decided to stand by this idea and to focus on BRICS countries.

Wong (2008) tried to apply gravity model to explain M&A flows. The investigation showed that geographic, linguistic and colonial variables are not suitable. That is why we decided not to include such variables in our model.

The study of Neto, Brandão and Cerqueira (2010) identifies macroeconomic factors, affecting cross-border M&A. The authors found out that one of the important factors is the size of economy. In our model we have included economic growth (as annual% of GDP growth). Another significant factor is the size of capital markets. For capturing capitalization factor in our model we decided to use the total value of shares traded (as % of GDP).

Hyun and Kim (2010) determining factors of cross-border M&A focused on the role of institutions and financial development. The authors based on gravity model but extended it with some extra variables. For example, applying method of Di Giovanni (2005), who found using panel dataset of M&A that deep financial markets can play a significant role for M&A, Hyun and Kim included in their model financial market development indicators (the stock market capitalization and the amount of credit provided by banks and other financial institutions to the private sector). The authors also supposed that currency exchange rates could affect M&A flows. So, depreciation of the currency can make it more attractive to invest in this country, for example because of decreasing production costs or decreasing value of assets. The estimation of the model showed that market size had positive and significant effect, while coefficient for exchange rates appeared statistically insignificant.

Brooks, Edison, Kumar and Sløk (2004) also claimed that there is no clear connection between M&A and exchange rates. Authors provided some reasons. First of all lots of cross-border deals are financed through share-swaps. Furthermore, acquiring companies can already have cash in currency or they can issue a debt in that currency. In their model authors investigated the influence of M&A flows on exchange rates and they found the coefficients statistically insignificant. Still we were interested in testing the opposite influence (effect of changes in exchange rates on M&A), including also long-term effects (lags).

Baker, Foley and Wurgler (2009) in their work empirically evaluated the effect of cheap assets on

Table 1. The numbers of M&amp;A deals in BRICS countries since year 1994

Year	Brazil	Russia	India	China
1994	97	85	-	106
1995	153	202	-	120
1996	191	163	-	191
1997	233	112	-	302
1998	387	96	-	357
1999	353	210	423	340
2000	530	418	895	530
2001	408	398	721	570
2002	258	403	599	1064
2003	212	501	723	1704
2004	270	406	790	2400
2005	273	477	1283	1951
2006	377	699	1524	2212
2007	871	999	1570	2963
2008	940	1783	1503	3408
2009	530	3357	1372	3089
2010	712	3775	1451	3721
2011	864	3312	1116	4103
2012	836	2610	1169	3810
2013	629	2096	1022	3964
2014	566	1958	1155	5122

Source: <https://imaa-institute.org/statistics-mergers-acquisitions/>.

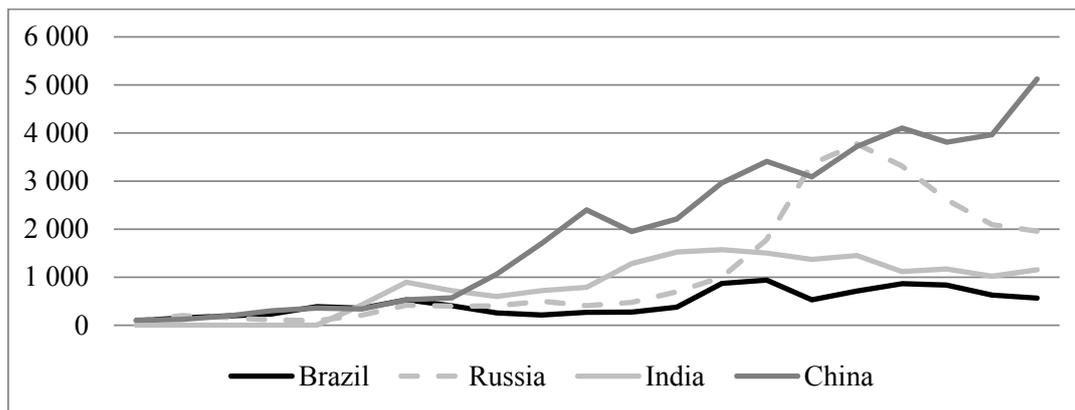
FDI. The results didn't support the existence of a cheap asset effect. But we suppose that focusing exactly on M&A deals, which nowadays represent a big part of FDI, can allow us to find a correlation between the costs of assets, what in our model is expressed by changes in currency exchange rates, and the investment flows.

### 3. DATA

For analyzing M&A market we decided to use the annual numbers of M&A deals. This data was gathered from the IMAA (Institute for Mergers, Acquisitions and Alliances). The web-site allows downloading database for each country. So, we exported to Excel the numbers of M&A deals in Brazil, Russia, India and China (Table 1).

Graphically this information could be presented as did in graph below (Graph 1).

To explain M&A we collected data for exchange rates, annual GDP growth rates, total values of stocks traded and growth rates of amount of money and quasi money in the economies. To gather the statistics we used the World Bank Database. It is possible to export all the data from the web-site to Excel. We used yearly data from 1994 to 2014 for 4 different countries. But in consequence of the fact that not all the data is available since 1994 we were able to obtain 64 observations. The results are presented in the annex (Annex 1). For the aims of our project we present exchange rates as differences of logarithms of exchange rates. All variables will be explained in more details later in the section 4.



Graph 1. Amount of M&A deals since 1994

## 4. MODEL

### 4.1. Description of variables

#### 4.1.1. Dependent variable

To measure the effect of currency exchanges on M&A we firstly thought about two different ways to model this variable. One way to measure M&A deals is the volume of money (e.g. € in one year). The problem in this case is that one big merger or acquisition can have a huge impact on the data in one year. This distortion can be reduced by describing the dependent variable as the amount of M&A deals in one year. In this case the problem might be that a “small” M&A deal is weighted equally as a “big” deal. But we decided that this way is the most appropriate to describe our dependent variable as it reflects the activism. To specify our model we decided to concentrate just on a few countries because otherwise we would have a very complex model in which it is almost not possible to find any potential relationships. Following the work of Mileva we would like to focus on emerging and transition economies which are rather uniform and experience volatility of currency exchange rates. The BRICS countries fulfill these conditions. Therefore we decided to define the dependent variable as the amount of M&A deals in each of BRICS countries during one year.

As this variable has positive and rather volatile values it is more suitable to apply logarithms.

#### 4.1.2. Independent variables

In the introduction we explained that we are going to analyze the impact of the currency exchange rates on M&A deals in BRICS countries. Except of

the independent variable for currency exchange rates we additionally added in our model other variables like GDP growth rate, size of stockmarket within a country and money and quasi money growth to make the model closer to reality and more statistically significant. So, we gathered data for each of the BRICS countries for our model.

#### Currency exchange rates

It is a matter of common knowledge that BRICS countries do not use the same currency. Therefore to obtain data in a useful and reasonable form we downloaded the annually exchange rates which were calculated as an annual average (based on monthly averages) of local currency units relative to the U.S. dollar. To make exchange rate of each country comparable we decided to use differences of logarithms for current and previous years. In comparison with actual differences we can now use the percentage differences of the exchange rate in each country as a comparable structure for each country. The problem with actual differences is that they are depending on the quantitative differences of each exchange rate. Because of this we assume that for our purpose the best way to describe and model our first independent variable is as following:  $Ex = [\ln(ex_t) - \ln(ex_{t-1})]$ .

#### GDP growth rate

In our case the GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. We included the GDP because it is a common and frequently used indicator not only for macroeconomic purposes but also for financial analysts and investors all over the world. It is used to gauge the health of economy, so investors are concerned about negative GDP

```

Model 7: Fixed-effects, using 56 observations
Included 4 cross-sectional units
Time-series length = 14
Dependent variable: l_AmountofMAdealsinnumbers
Omitted due to exact collinearity: dt_14

```

	coefficient	std. error	t-ratio	p-value	
const	7.81450	0.237538	32.90	6.48e-028	***
LNexch	0.562755	0.779080	0.7223	0.4749	
Moneyandquasimon~	-0.0324532	0.0101957	-3.183	0.0031	***
Stockstradedtota~	0.00133843	0.00228887	0.5848	0.5625	
GDPGrowthrate	-0.0344396	0.0265574	-1.297	0.2032	
dt_1	-0.842890	0.251090	-3.357	0.0019	***
dt_2	-0.878987	0.250126	-3.514	0.0012	***
dt_3	-0.481261	0.263090	-1.829	0.0759	*
dt_4	-0.387418	0.263654	-1.469	0.1507	
dt_5	-0.222957	0.270558	-0.8241	0.4155	
dt_6	0.141544	0.272554	0.5193	0.6068	
dt_7	0.476968	0.295505	1.614	0.1155	
dt_8	0.336792	0.246408	1.367	0.1804	
dt_9	0.165914	0.256141	0.6477	0.5214	
dt_10	0.613152	0.262437	2.336	0.0253	**
dt_11	0.490129	0.245274	1.998	0.0535	*
dt_12	0.158968	0.231383	0.6870	0.4966	
dt_13	0.0257201	0.231547	0.1111	0.9122	
Mean dependent var	7.021701	S.D. dependent var	0.834226		
Sum squared resid	3.668354	S.E. of regression	0.323744		
LSDV R-squared	0.904161	Within R-squared	0.813524		
LSDV F(20, 35)	16.50985	P-value (F)	2.45e-12		
Log-likelihood	-3.143516	Akaike criterion	48.28703		
Schwarz criterion	90.81942	Hannan-Quinn	64.77675		
rho	0.355842	Durbin-Watson	1.059902		

Figure 1. Model 1

growth rates. In our model we assume that using of the growth rate in percentage is the most reasonable approach.

#### Size of stockmarket within a country

As another indicator for the market situation of the country we include the size of the stockmarket. In fact it is described by the value of shares traded, both domestic and foreign, multiplied by their respective matching prices.

#### Money and quasi money growth

Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time savings, and foreign currency deposits of resident sectors other than the central government. This definition is frequently called M2. The change in the money supply is measured as the difference in end-of-year totals relative to the level of M2 in the preceding year.

#### Dummy Variables

Because of the reason we have four different countries with different data at the beginning we decided to use dummy variables to differentiate the countries. As we have 4 countries we have to use 3 dummy variables. But during our work we decided that the use of panel data is a more elegant way in our case and that because of this modification we can avoid manual introducing of dummies in the model. For this reason in our latest model dummy variables explain not countries but years, because the differentiation of countries is already included through cross-sectional units in panel data techniques of Gretl.

#### 4.2. Model specification

Following the literature and experts' recommendations and assuming our thoughts presented in the Literature review section, the basic specification of the model is:

```

Model 4: Fixed-effects, using 48 observations
Included 4 cross-sectional units
Time-series length = 12
Dependent variable: l_AmountofMAdealsinnumbers
Omitted due to exact collinearity: dt_14

      coefficient  std. error  t-ratio  p-value
-----
const          8.37904    0.159123   52.66   9.36e-029 ***
LNexch_2       -1.99466    0.518532   -3.847  0.0007   ***
Moneyandquasimon~ -0.0216951  0.00736552 -2.945  0.0066   ***
Moneyandquasim~_1 -0.0218680  0.00764178 -2.862  0.0080   ***
Moneyandquasim~_2 -0.0160080  0.00738679 -2.167  0.0392   **
Stockstradedto~_2  0.00434553  0.00157335  2.762  0.0102   **
GDPGrowthrate_2  -0.0489731  0.0175220  -2.795  0.0094   ***
dt_3           -0.448959   0.162120   -2.769  0.0100   **
dt_4           -0.290118   0.159355   -1.821  0.0798   *
dt_5           -0.256555   0.165107   -1.554  0.1319
dt_6            0.0379849  0.175220    0.2168  0.8300
dt_7            0.447955   0.179230    2.499  0.0188   **
dt_8            0.522890   0.168611    3.101  0.0045   ***
dt_9            0.112194   0.192517    0.5828  0.5649
dt_10           0.275885   0.162165    1.701  0.1004
dt_11           0.292100   0.170059    1.718  0.0973   *
dt_12           0.0801814  0.165800    0.4836  0.6326
dt_13          -0.139554   0.152281   -0.9164  0.3676

Mean dependent var  7.153632  S.D. dependent var  0.813427
Sum squared resid  1.071642  S.E. of regression  0.199225
LSDV R-squared      0.965540  Within R-squared    0.914118
LSDV F(20, 27)     37.82589  P-value(F)          8.56e-15
Log-likelihood      23.13917  Akaike criterion    -4.278331
Schwarz criterion   35.01689  Hannan-Quinn        10.57139
rho                 0.392838  Durbin-Watson        1.146004

Joint test on named regressors -
  Test statistic: F(17, 27) = 16.905
  with p-value = P(F(17, 27) > 16.905) = 3.42207e-010

Test for differing group intercepts -
  Null hypothesis: The groups have a common intercept
  Test statistic: F(3, 27) = 114.247
  with p-value = P(F(3, 27) > 114.247) = 1.86595e-015

Distribution free Wald test for heteroskedasticity -
  Null hypothesis: the units have a common error variance
  Asymptotic test statistic: Chi-square(4) = 3.16413
  with p-value = 0.530744
    
```

Figure2. Model 2

$$MA = \beta_0 + \beta_1 Ex + \beta_2 GDPGr + \beta_3 Stock + \beta_4 M + u. \quad (1)$$

As we have time-series observations for the same objects (the same countries) the data should be considered as pure panel data (each observations through time). So, we have 4 cross-sectional units (Russia, Brazil, China and India) with time-series length of 14. The total amount of observations equals 56.

### 5. EMPIRICAL RESULTS

The model was estimated through the panel data technique of fixed effect. For using it we had to

introduce a new variable ( $\alpha$ ) in the model, eliminating  $\beta_0$ :

$$MA = \beta_1 Ex + \beta_2 GDPGr + \beta_3 Stock + \beta_4 M + \alpha + u. \quad (2)$$

The results of this specification are presented in the figure below (Figure 1). We discovered that all our variables apart from M (money and quasi money growth) are not statistically significant. Because of the low p-value for Ex that is 0.4749 and is much higher than the critical value of 0.05, we didn't find out the expected effect of exchange rates on M&A deals.

These results drove us to think more deeply about specification of the model and to modify our variables.

After some attempts of specifying the model we figured out that the most significant result could be obtained by including long-term effects of the factors (using lags). So, the best specification can be described as following:

$$MA = \beta_1 Ex\_2 + \beta_2 GDPGr\_2 + \beta_3 Stock\_2 + \beta_4 M + \beta_5 M\_1 + \beta_6 M\_2 + \alpha_1 + u. \quad (3)$$

Empirical results are presented in the figure (Figure 2). The p-values for all variables (apart from time dummies) are lower than 0.05, so our variables are statistically significant. The  $R^2$  is 0.9655 what means that 96,55% of the dependent variable is described by the model, that is very high and indicates a high Goodness of fit. The joint significance of the model is also satisfying as the P-value for F-test is much lower than 0.05.

## 6. CONCLUSION

Following the results of our final model we can conclude that there is a significant relation between the exchange rates and the M&A market. We established this significant connection by introducing lags of mostly two years. We found this result surprising because we expected that the M&A and their analysts would react in a quicker way. For interpreting the coefficient of our model we have to take into account that our dependent variable is in logarithm. In the case of the exchange rate we can see that in our model we have a negative relation between the amount of M&A deals and the exchange rate. In our final model we interpret that if the exchange

rate increases by 1% the amount of M&A deals will decrease in the second following year by 1.99%.

Our results are opposite to those obtained by Hyan and Kim (2010), in whose model the coefficient for exchange rates appeared statistically insignificant. As well our results are in contrast with the paper of Baker, Foley and Wurgler (2009). The authors didn't find the existence of a cheap asset effect on FDI flows. But as we supposed in the beginning, dealing exactly with M&A and not with FDI in general allowed us to establish a correlation between costs of assets (expressed through exchange rates) and investment flows.

Despite the fact that the results obtained in this work do not agree on previous researches, the negative relation of exchange rates and M&A seems economically logical and fits with our initial expectations.

Nevertheless, our model has some limitations. One of them is that for our paper we used only data for BRICS countries. To extend the investigation it could be interesting to compare our results with estimations obtained for other groups of countries (e.g. developed, PIIGS (Portugal, Ireland, Italy, Spain), emerging etc.). Other limitation is the number of periods observed, because BRICS countries do not have a long history of established M&A and financial markets (e.g. Russia's market starts its existing only after the dissolution of the Soviet Union).

To extend the model the monthly data can be used, other countries can be included and the time period can be increased. The R-square of our model is rather high (99,55%), but maybe it can be increased by including some other variables. Other way to continue our study is to estimate M&A markets not in numbers but in value terms and then compare if the results are quite similar.

## REFERENCES

1. Baker, M., Foley, C. F., & Wurgler, J. (2009). Multinationals as arbitrageurs: The effect of stock market valuations on foreign direct investment. *Review of Financial Studies*, 22 (1), 337–369.
2. Brooks, R., Edison, H., Kumar, M. S. & Sløk, T. (2004). Exchange rates and capital flows. *European Financial Management*, 10 (3), 511–533.
3. Hyun, H. J., & Kim, H. H. (2010). The Determinants of Cross-border M&As: The Role of Institutions and Financial Development in the Gravity Model. *The World Economy*, 33 (2), 292–310.
4. Mileva, E. (2008). The impact of capital flows on domestic investment in transition economies. European Central Bank, *Working Paper Series*, no. 871.
5. Neto, P., Brandão, A., & Cerqueira, A. (2010). The macroeconomic determinants of cross-border mergers and acquisitions and greenfield investments. *IUP Journal of Business Strategy*, 7 (1/2), 21.
6. Wong, W. K. (2008). Comparing the fit of the gravity model for different cross-border flows. *Economics Letters*, 99 (3), 474–477.

## Annex 1. Data gathered for BRICS countries

Nº	Year	Amount of M&A deals (in numbers)	LN(excht)-LN(excht-1)	Money and quasi money growth (annual%)	Stocks traded, total value (% of GDP)	GDP Growthrate (%)	Country
1	1994	97	2.85447198	1102.383252	14.649049	5.334551702	Brazil
2	1995	153	0.322523208	44.30215492	10.04305444	4.416731354	Brazil
3	1996	191	0.091008102	31.03490423	13.65531198	2.207535524	Brazil
4	1997	233	0.070012703	17.24332067	24.61494984	3.39502864	Brazil
5	1998	387	0.073765566	12.01934813	20.01362137	0.338356177	Brazil
6	1999	353	0.446632023	18.1153445	26.50197649	0.469066589	Brazil
7	2000	530	0.008503352	19.70463724	14.34974741	4.112564911	Brazil
8	2001	408	0.250257913	14.35346436	11.52665705	1.657817967	Brazil
9	2002	258	0.217449333	9.861412337	7.751491745	3.05316092	Brazil
10	2003	212	0.052401564	20.45463125	12.62335851	1.140319046	Brazil
11	2004	270	-0.050774177	16.62980714	16.98484861	5.760880726	Brazil
12	2005	273	-0.183639091	18.46659893	19.16938816	3.202051527	Brazil
13	2006	377	-0.112517382	17.97593593	25.23172582	3.960502029	Brazil
14	2007	871	-0.110859158	18.67847251	46.19898042	6.072283693	Brazil
15	2008	940	-0.059947547	17.77519265	33.60385371	5.093767007	Brazil
16	2009	530	0.086489087	16.30237029	42.46300374	-0.12614741	Brazil
17	2010	712	-0.127986883	15.81598252	41.11292333	7.528797377	Brazil
18	2011	864	-0.050358285	18.50999909	31.55071272	3.910255352	Brazil
19	2012	836	0.154885724	15.90464201	33.79741521	1.915458618	Brazil
20	2013	629	0.09889422	8.912126126	29.99781629	3.015140514	Brazil
21	2014	566	0.087374692	13.53125026	26.65571032	0.103371356	Brazil
22	1994	106	0.402661806	31.50013453	12.12472219	13.07807061	China
23	1995	120	-0.031508027	29.4610222	10.59090248	10.99384345	China
24	1996	191	-0.004469296	25.2731568	35.74852876	9.924722663	China
25	1997	302	-0.002934036	20.72731167	38.72579973	9.226887728	China
26	1998	357	-0.001310699	14.90435007	27.73786276	7.853489523	China
27	1999	340	-8.55619E-05	14.66647771	18.80891678	7.618173474	China
28	2000	530	3.07025E-05	12.32478198	62.44152103	8.42928216	China
29	2001	570	-0.000173456	15.04241351	34.73708447	8.298374411	China
30	2002	1064	-1.33905E-05	13.14043628	23.13473555	9.090909091	China
31	2003	1704	9.56466E-06	19.23976666	23.51627896	10.01997337	China
32	2004	2400	-2.84929E-05	14.88692014	26.34206713	10.07564297	China
33	2005	1951	-0.010015696	16.7416524	17.29555186	11.35239142	China
34	2006	2212	-0.027325015	22.11611885	42.4572463	12.6882251	China
35	2007	2963	-0.046976934	16.73553458	178.9747162	14.19496167	China
36	2008	3408	-0.090590759	17.77810755	85.66670368	9.623377486	China

Nº	Year	Amount of M&A deals (in numbers)	LN(excht)-LN(excht-1)	Money and quasi money growth (annual%)	Stocks traded, total value (% of GDP)	GDP Growthrate (%)	Country
37	2009	3089	-0.017016135	28.42327787	154.7761808	9.233551095	China
38	2010	3721	-0.008991156	18.94831461	136.7253186	10.63170823	China
39	2011	4103	-0.046685321	17.32296979	89.07634935	9.484506202	China
40	2012	3810	-0.023350192	14.39165202	59.41175899	7.750297593	China
41	2013	3964	-0.018640391	13.58890221	81.09054129	7.68380997	China
42	2014	5122	-0.008481036	11.01193614	115.4951568	7.268460929	China
43	1999	423	0.042610199	17.14918048	0	8.845755561	India
44	2000	895	0.042875664	15.17170763	4.606709729	3.840991157	India
45	2001	721	0.048742035	14.32055069	30.74621329	4.823966264	India
46	2002	599	0.029729821	16.76116474	24.52523941	3.803975321	India
47	2003	723	-0.042594069	13.03361109	43.99294975	7.860381475	India
48	2004	790	-0.027571299	16.73233295	54.43146629	7.922936613	India
49	2005	1283	-0.027211253	15.5999039	55.60436663	9.284831507	India
50	2006	1524	0.027002514	21.63314112	68.67261762	9.263958898	India
51	2007	1570	-0.091424779	22.27150287	92.30519222	9.801360337	India
52	2008	1503	0.050843137	20.49520988	75.60304759	3.890957062	India
53	2009	1372	0.106728535	17.99583922	79.87247579	8.479786622	India
54	2010	1451	-0.056945668	17.80217706	63.27669484	10.25996299	India
55	2011	1116	0.020448604	16.13758934	35.1585227	6.63835345	India
56	2012	1169	0.135396197	11.04569666	33.63248973	5.081417925	India
57	2013	1022	0.092190172	14.83153	28.88478265	6.899217233	India
58	2014	1155	0.040659663	10.5873816	35.6698877	7.286253239	India
59	2001	398	0.036283219	35.84545974	9.198125911	5.091984231	Russia
60	2002	403	0.07207567	33.72158294	13.81221622	4.743669897	Russia
61	2003	501	-0.021163039	38.32511281	18.52522667	7.295854331	Russia
62	2004	406	-0.063150434	33.74554283	20.08296921	7.175949192	Russia
63	2005	477	-0.018540526	36.39268629	19.35632049	6.376187027	Russia
64	2006	699	-0.039427385	40.38872099	58.85758395	8.153431973	Russia
65	2007	999	-0.06104066	40.57945254	98.25464613	8.535080209	Russia
66	2008	1783	-0.028870404	14.3331788	69.54364405	5.247953532	Russia
67	2009	3357	0.244615565	17.31984985	41.74476562	-7.820885026	Russia
68	2010	3775	-0.04420237	24.588653	33.23799815	4.503725625	Russia
69	2011	3312	-0.032992774	20.86233565	29.0966645	4.264176566	Russia
70	2012	2610	0.04841322	12.07389426	16.87979921	3.405546804	Russia
71	2013	2096	0.031826567	15.65641834	11.32790537	1.340797614	Russia
72	2014	1958	0.186856129	15.45453814	8.59614579	0.640485765	Russia

Source: <http://data.worldbank.org/>.