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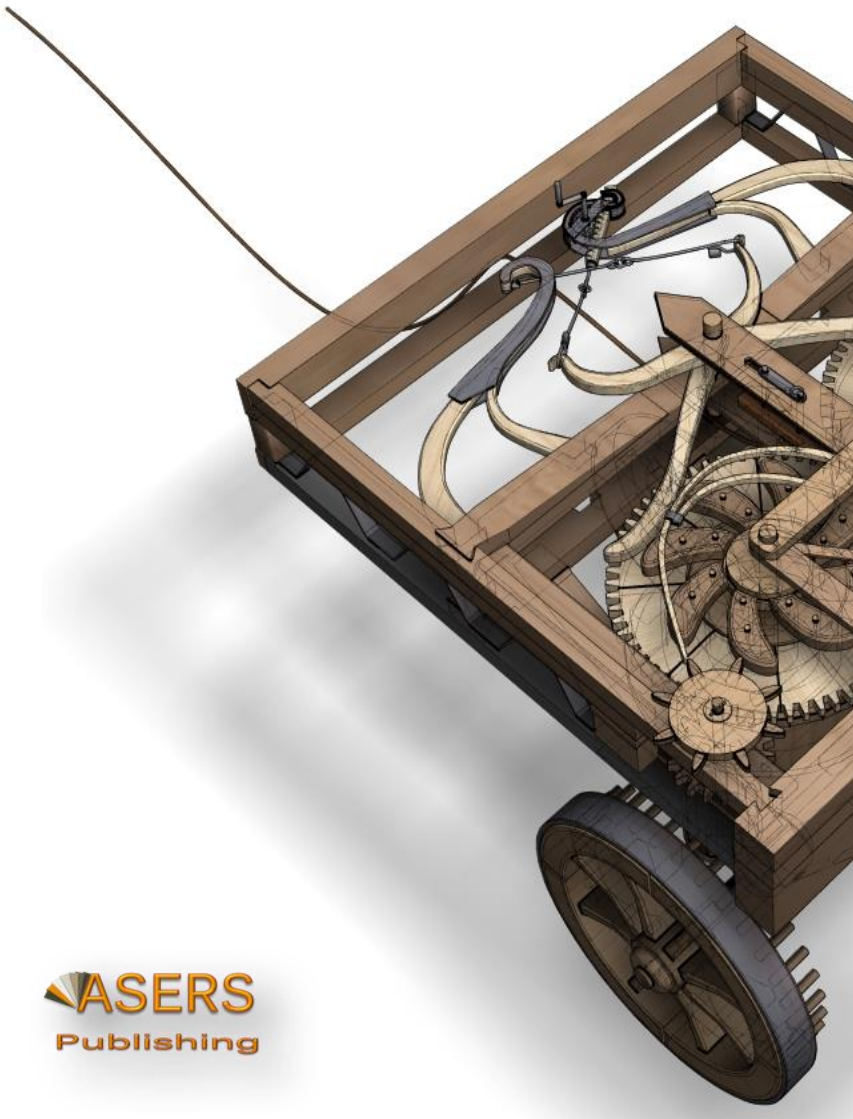

Biannually
Volume VII
Issue 1(13)
Summer 2016

ISSN 2068 – 7710
Journal **DOI**
http://dx.doi.org/10.14505/tpref

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Summer 2016
Volume VII
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ASERS Publishing
http://www.asers.eu/asers-publishing
ISSN 2068 – 7710
Journal's Issue **DOI**:
http://dx.doi.org/10.14505/tpref.v7.1(13).00

Contents:

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Volume VII, Issue 2(14), Winter 2016

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DOI: http://dx.doi.org/10.14505/tpref.v7.1(13).01

Is Foreign Portfolio Investment Beneficial to India's Balance of Payments? An Exploratory Analysis

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Suggested Citation:

Justine George (2016). Is Foreign Portfolio Investment Beneficial to India's Balance of Payments? An Exploratory Analysis, *Theoretical and Practical Research in Economic Field*, (Volume VII, Summer), 1(13): 5-10. DOI:10.14505/tpref.v7.1(13).01. Available from: http://www.asers.eu/journals/tpref/curent-issue.

Article's History:

Received April, 2016; *Revised* May, 2016; *Accepted* June, 2016.

Abstract

As oppose to the expectation, financing of Balance of Payments (BoP) with foreign investment exerted huge cost on India's BoP. Dividend and capital gain are found to be the two cost of FPI on BoP, in which latter would considered as cost on BoP only if it is repatriated. Foreign portfolio investment (FPI) earns huge capital gain as compared to dividend and has significant evidence for repatriation.

Keywords: balance of payment, foreign portfolio, investment.

JEL Classification: G11, G17.

1. Introduction

With the onset of liberalization and consequent drastic change in the economic policies in the 1990's, there has been a shift in the BoP financing from debt flows to non-debt flows. The academicians and policy makers considered it as a positive sign since the non-debt creating flows are expected to remove vulnerabilities in BoP. The underlying logic is that more dependence on non-debt flows or foreign investment for financing BoP would reduce the cost of financing BoP and impart more stability to BoP. Moreover, in the long run foreign investment is expected to strengthen the BoP by way of additional foreign exchange earnings possibly through export of goods and services from the firm which received the Foreign Direct Investment (FDI). Foreign investment consists of two parts, one is FDI and other is Foreign Portfolio Investment (FPI). FDI actually received by different companies in India whereas most of the FPI goes to secondary market and acquire the shares of different companies through stock market. Unlike debt creating flows, both FDI and FPI have no fixed cost of amortization. Due to distinct nature of operation of these two capital flows, their respective effect on BoP will be different. In this context, the major objective of this paper is to analyze the extent of Foreign Portfolio Investment (FPI) to finance BoP and its impact on BoP.

2. Foreign portfolio investment and its effect on balance of payments

Since liberalization, major proportion of foreign investment in India is coming in the form of FPI. Therefore to a great extent, we used it for financing BoP. Thus it is worthwhile to assess its effect on BoP. FPI essentially consist of three element namely foreign institutional investment (FII), American depository receipts (ADR) and global depository receipts (GDR). In the entire post liberalization period, FII mainly dominates in the FPI. From 2000 onwards government allowed the FII to invest in debt instruments. However, the investment of foreign institutional investors is mostly concentrating in equities of different companies through stock market. Because of its size and volume of transactions in stock market, here we consider only the FII part of FPI and its respective effect on BoP. FPI have no fixed cost of amortization like debt flows, but dividend and capital gain are found to be two cost of FII on the BoP, in which latter would consider as cost only if it is repatriated from India.

For measuring the cost of financing BoP with FII; market capitalization, capital gain and dividend of FII are calculated with the help of PROWESS data base (CMIE). Market capitalization means total market value of FII. For getting FII's market capitalization, we measured the market value of FII investment in Bombay stock exchange (BSE) listed companies. FII market capitalization is measured at the end of every financial year and it is the average of every March month market capitalization of FII. This method is adopted mainly to reduce the problem of volatility in the market capitalization. Market capitalization of FII is calculated through two variables such as total market capitalization of each companies and FII share of equities in the respected companies. Market capitalization of FII in a particular company is arrived by multiplying above two variables. Then add all the companies for getting total market capitalization of FII. Capital gain of FII is calculated by the difference between the cumulative net investments of FII from SEBI database (historical cost) and total market capitalization of FII (March month average). FII's dividend is calculated by multiplying the variables dividend per share and FII's latest number of shareholding in a company (closer to dividend date). In PROWESS database, FII share holdings are available only on quarterly basis. FII shareholding is available in every quarter of financial year. Dividend earning of FII for a financial year is the sum of quarterly dividend earning in a year. Quarterly dividend is calculated by multiplying dividend per share with FII's shareholdings in that quarter[1]. Cumulative net investments of calculated with the help of SEBI database and we have used PROWESS database for calculating market capitalization of FII. Due to the unavailability of relevant variable in PROWESS database we are not able to calculate market capitalization, capital gain and dividend earning of FII before 2000.

From the Table 1 it can be seen that, apart from capital gain, dividend earned by the FII's is more or less same throughout the study period. High dividend repatriation of $ 479.9 million have found only in 2000-01 and after that it suddenly fell down at $ 208.8 in 2001-02 and since then it is mildly fluctuating around $ 200 million.

Table 1 - Foreign Portfolio Investment and its effect on Balance of Payments (Values are in millions of US $)

Year (1)	Gross purchase (2)	Gross sales (3)	Net investment (4)	Cumulative net investment (5)	FII's market capitalization (market value) (6)	Capital gain (7)=(5- 6)	Dividend (8)
1992-93	6	1	4	4	NA	NA	NA
1993-94	1783	149	1635	1639	NA	NA	NA
1994-95	2430	903	1528	3166	NA	NA	NA
1995-96	2898	823	2075	5242	NA	NA	NA
1996-97	4381	1966	2416	7657	NA	NA	NA
1997-98	5030	3427	1603	9260	NA	NA	NA
1998-99	3831	4207	-377	8884	NA	NA	NA
1999-00	13121	10785	2336	11220	NA	NA	NA
2000-01	16209	14035	2175	13394	12785	-609	480
2001-02	10467	8631	1836	15230	12948	-2282	209
2002-03	9724	9169	555	15786	11930	-3856	215
2003-04	31524	21565	9959	25745	32975	7230	235
2004-05	48285	38074	10211	35956	51942	15986	233
2005-06	78372	69006	9366	45322	101906	56584	229
2006-07	114941	108130	6810	52132	121247	69114	234
2007-08	235586	219140	16445	68578	193002	124424	255
2008-09	132287	141957	-9671	58907	72868	13961	222

Source: Computed from SEBI database, PROWESS database (CMIE)

Note: First five columns are calculated from SEBI database and column six, seven, eight are calculated with the help of PROWESS data base database (CMIE). All the values in the tables are first calculated in Rupees and then converted into Dollar the using implicit exchange rate

According to RBI in 2008-09 total foreign investments (in India) repatriated dividend and profit worth $ 3168 million. As per our calculation FII account for around $ 222 million repatriation in the same year. Hence we can argue that FII cause around 14% in the total dividend repatriation from India in that particular year. In 2005-06, share of dividend by FII is only 10% which is increased to 14% in 2006-07. FII are active traders in the stock market for whom dividend matters little whereas capital gain seems to be most important attraction for them.

[1] FII share holdings are available only in quarters, so we use latest quarterly share holding of FII closer to dividend announcement date.

From The table 1, it is clear that FII earns substantial capital gain from Indian stock market especially from 2003-04 onwards. However, between 2000-01 and 2002-03, it in was negative that means their total market value of shares was lower than the cumulative stock in those years. FII had only $ 7.2 billion worth of capital gain in 2003-04, but it is increased to very high at $ 124.4 billion in 2007-08 and suddenly declined to $ 13 billion in the end of 2008-09 due to global economic crisis. Whole of the capital gain of FII cannot be considered as a cost on BoP, because it would became cost in BoP only when it is repatriated from India. With the available data it is difficult to assess how much capital gain is repatriated from India. Increase in the amount of portfolio outflows in recent years may be a significant evidence for their repatriation of this huge amount of capital gain. For instance, the ratio of gross sales to gross purchase of FII was only about 0.68 in 2003-04. Since then, this ratio is dramatically increasing and it reached very high at 0.93 in 2007-08. Thus, large outflows of FII starting from 2003-04 might have reflecting the repatriation of high capital gain from India. However capital gain and its repatriation are not recorded in the current account, but it would affect only in the capital account and reserve account of BoP[2].

Capital gain and its repatriation of FII could have reduced that much of capital account surplus through FII outflows, therefore it consequently reduce that much of foreign exchange reserve. However, it can be concluded that financing with these forms of foreign investment have not only made instable BoP[3], but also they are exerting huge cost on BoP through capital gain repatriation. But interestingly, this repatriation is seems to be an 'invisible' element in BoP. Invisible element here means no one can measure the exact amount they repatriated from India.

3. Capital gain of foreign institutional investment in India, a recent experience

Though there are evidences of repatriating capital gain of FII, but it is difficult to measure the exact amount repatriated and remains as 'invisible' in BoP. Foreign investors cause around $ 15 billion net outflow in financial year 2008-09 and it is one of the major factors responsible for the low capital account surplus in that year whereas in the previous financial year they created net inflows worth $ 20 billion. Why this much of net FII outflows occurred in the year 2008-09?

Quarterly data shows that FII had been continuously showing net outflows in the five successive quarters, in which occurrence of net outflows started from the last quarter of 2007-08 and continues in the entire quarter of 2008-09. The global economic crisis severely affected the third and fourth quarter of 2008-09. Nevertheless, the cumulative sum of net outflows in the fourth quarter of 2007-08 and the first quarters of 2008-09 is at $ 9.3 billion. This is slightly higher than the sum of cumulative net outflows of FII in the last two quarters of 2008-09, in which it caused only at $ 8.4 billion. Sum of net outflows of FII in the last two quarters of 2008-09 occurred in the peak stage of global economic crisis[4] but this period's net outflow seems to be low when we compare sum of net outflows in the last quarter of 2007-08 and the first quarter of 2008-09.

Table 2 - Shareholding of FII in Bombay Stock Exchange (Number of shares is in Crores)

Last quarter of financial year	A	B	T	S	TS	Z	TOTAL
2000-01	181.2	33.2	8.4	0.5	0.3	2.3	225.9
2001-02	196.2	31.7	6.2	0.5	0.1	2.7	237.3
2002-03	223.5	34.7	11	0.8	0.2	2.4	272.5
2003-04	360.3	67.5	10.8	1.6	0.3	2.2	442.7
2004-05	566.6	102.0	12.0	6.0	0.6	1.8	688.9
2005-06	961.4	216.6	18.5	17.0	2.0	2.1	1217.6
2006-07	1130.7	341.4	35.6	28.5	5.5	1.2	1542.8
2007-08	1341.5	438.5	46.4	50.2	8.3	0.6	1885.5
2008-09	1188.1	382.7	38.2	51.9	38.1	0.4	1699.6

Source: Computed from PROWESS database (CMIE)
Note: Share holding of FII measured in the last quarter of every financial (Jan to Mar) year

[2] Balance of Payment manual 5th edition considered holding of capital gain and losses are not classified as income on investment. Hence it would not record in the current account of Balance of Payment. But all the realized holding gains and losses arising from the transaction are included in capital account

[3] Instable BoP means, for any uncertainty it can go of the country and would make pressure in BoP. Two times it is happened. One situation is happened at the time of Asian Financial crisis and second is happened at the time of Global economic Crisis. In the second time management of BoP became a difficult task in India due to outflow of capital flows particularly FII

[4] After the Lehman brother filed for bankruptcy

In India, there has been high amount of net investment of FII occurred during the first three quarter of 2007-08 which helped the SENSEX to rise above magical figure of 20000 Points[5]. Definitely, capital gain of FII could be very higher in that period. Since then, due to world economic slowdown, FII became a net seller in the market for the five successive quarters (from fourth quarter of 2007-08 and all the quarters of 2008-09) and expect that they repatriated a miniscule amount of huge capital gain they had in the stock market.

Certainly one can ask the question why this much of outflow in the entire quarter of 2008-09 and the last quarters of 2007-08. The heavy capital gain of FII could be the main reason for such heavy outflows. When there is an uncertainty especially at the time of having high capital gain, they probably have the mentality to sell their share and if they do so, they would get more amount per share than it purchased. Consequently, at the time of having high capital gain of FII, outflow would be more than expected.

Interestingly, most of the FII investment has been concentrating in blue chip shares[6]. For instance, in Bombay Stock Exchange there are six categories of shares namely A, B, T, S, TS, and Z[7]. However, FII investment mostly concentrating around A group shares, in which A group consist of 200 companies. Not only the FII investment is concentrated on A group shares, but also most of their significant market capitalization are also belong to this group (See Table 3)

Table 3 - FII market capitalization in different company categories in BSE (Values are in RsCrores)

BOMBEY STOCK EXCHANGE							
Years	A	B	T	S	TS	Z	TOTAL
2000-01	52099 (89)	5961 (10)	322	20	6	1	58409
2001-02	56720 (92)	4826 (8)	168	14	1	21	61750
2002-03	53529 (93)	3973 (7)	171	44	2	16	57735
2003-04	140088 (93)	10712(7)	456	256	9	2	151524
2004-05	211469 (91)	20002 (9)	950	901	59	0	233382
2005-06	393919 (87)	50849 (11)	2072	4048	286	2	451175
2006-07	478002 (87)	59278 (11)	2942	7883	959	1	549065
2007-08	687396 (89)	74447 (10)	3276	10545	994	1	776658
2008-09	312746 (94)	18397 (6)	555	2611	157	0	334465

Source: Computed from PROWESS database, (CMIE)
Notes: Values in the bracket Indicate Percentage share to the Total

In the case of FII, we have seen that gross sales were very higher than gross purchase in the five successive quarters, especially from the last quarters of 2007-08 to last quarters of 2008-09. Sum of the net outflows in all the five quarters is equal to $19 billion, out of which 2008-09 financial year alone contribute $15 billion. Thus one could probably expect that the total number of shares holder by FII in the end of 2008-09 would be probably very lower than the share they had hold in the end of 2007-08. This expectation is because for large FII outflows normally they have to sell large number of shares. We can test this hypothesis by analyzing shareholding of FII in Bombay stock exchange.

FII hold 1699.5 Crores of shares in Bombay Stock Exchange at the end of 2008-09 financial years which shows only a marginal reduction worth 185.9 Crore of shares as compared to the end of previous financial year

[5] BSE Sensex or Bombay Stock Exchange Sensitive Index (SENSEX) is a value weighted index composed of 30 stocks that started January 1, 1986. The Sensex is regarded as the pulse of the domestic markets. It consists of the 30 largest and most actively traded stocks, representative of various sectors, on the Bombay stock exchange. These companies account for around fifty per cent of the market capitalisation of the BSE. The base value of the sensex is 100 on April 1 1979, and the base year of SESEX is 1978-79. The index has increased by over ten times from June 1990 to the present. The Sensex on February 6, 2006 touched 10,003 and crossed 20,000 mark in October 29, 2007and reached its ever time peaks at 21078 in January 8, 2008.

[6] A blue chip shares means shares of a well-established company having stable earnings, no extensive liabilities and having less chance of capital lose to the shareholders. Blue chip stocks pay regular dividends, even when business is faring worse than usual. In Bombay Stock Exchange, blue chips shares are belong to 'A' group categories of shares.

[7] The Bombay Stock Exchange (BSE), India's leading stock exchange, has classified Equity scripts into categories A, B, S, T, TS, and Z to provide guidance to the investors. The classification is on the basis of several factors like market capitalisation, trading volumes and numbers, track records, profits, dividends, shareholding patterns, and some qualitative aspects. Group A is the most tracked class of scripts consisting of about 200 scripts. Market capitalisation is one key factor in deciding which scrip should be classified in Group A.

(2007-08), in which they hold 1885.5 Crores of shares. FII investments are concentrated in A group shares but this group also bears the substantial share in the market capitalization of FII (See Table 3). But A group shares shows only a reduction in the holding of 153.3 Crores shares in 2008-09 as compare to the end of last financial year See Table 2). Put it differently, FII have 1188.1 Crores of A group shares in 2008-09 as compared to 1341.5 Crores of share in 2007-08. How the net sales of 153.3 Crores of A group shares can create that much of outflow? Definitely, high capital gain could be the main reason behind the heavy net outflow of FII. At the time of selling the shares, high capital gain allows the FII to get a higher price for every share than it purchased. Therefore selling few number of A group share can also make huge outflow from India. Interestingly, other small categories like TS and S, they actually increase their share holding at the end of 2008-09 as compared to the end of previous financial year that again strengthen our argument (see Table 2).

FII share of market capitalization in Bombay Stock Exchange

FII had $ 124.2 billion worth of capital gain at the end of 2007-08, due to the effect of global economic crisis it got reduced to only $ 13.9 billion in 2008-09. However FII net outflow in 2008-09 was $ 15 billion seems to be very low in relation to the large fall in the capital gain of FII. In other words they were not able to repatriate full amount of capital gain they had in the market. Despite a huge net outflow of FII in 2008-09, having $ 13 billion worth capital gain of FII in the end of 2008-09 found to be interesting. Thus we can argue that in 2008-09, they have had a further more potential for net outflows than they did in that year. Due to the heavy net sales of shares, market capitalization of BSE is greatly reduced at the end of 2008-09. However, even after the heavy net sales of FII in Indian stock market in 2008-09, FII's share in the total market capitalization of BSE was at 11% in the end of 2008-09 and this share of market capitalization of FII is even higher than 2002-03 (See Table 4).

Table 4 - FII share in the market capitalization of BSE (Values are in RsCrore)

Year	FII market capitalization	BSE market capitalization (March end)	FII share of market capitalization (%)
2000-01	58,409	571,553	10
2001-02	61,750	612,224	10
2002-03	57,735	572,198	10
2003-04	151,524	1,201,207	13
2004-05	233,382	1,698,428	14
2005-06	451,175	3,022,191	15
2006-07	549,065	3,545,041	15
2007-08	776,658	5,138,015	15
2008-09	334,465	3,086,076	11

Source: Computed from RBI (2009a), PROWESS database (CMIE)

Conclusion

To conclude with the available evidence, we can argue that capital gain and its repatriation of FII are very high in India. However high FII outflows as a result of capital gain can affect only the capital account and reserve account of BoP. But capital gains and its repatriation have any effect on current account of BoP because it is not recorded in the current account of BoP. Again the stock market started booming in the initial stage of 2009-10 and trend seems that it would go back to pre-crisis levels. However the situation of uncertainty prevails at any time, in that occasion outflow would be many times higher than it were in the recent past. There has been an accepted view among the academicians and policy makers that, shift in BoP financing from debt to non-debt flows is expected to remove the vulnerabilities in India's BoP. Due to the more dependence of non-debt flows, cost of financing BoP is expected to be reduced in the liberalization period. However, the 'years of achievement' of financing BoP with foreign investment in post liberalization period is mainly due to the contribution from FPI part of foreign investment.

As oppose to the expectation, financing BoP with foreign investment has exerted huge cost on BoP. For measuring the cost of financing BoP with non-debt flows we looked for both FDI and FPI. Dividend and capital gain are found to be two cost of FPI on BoP, in which latter would considered as a cost in BoP only if it is repatriated from India. As oppose to dividend earning, FPI earns huge capital gain from India. For FPI, they are not only making huge capital gain from India, moreover there is significant evidence for repatriation. However capital gain and its repatriation would not affect current account of BoP. But capital gain and its repatriation would increase FPI out flows and therefore it would reduce capital account surplus and in turn it would reduce our foreign exchange reserves. Evidence shows that high capital gain of FII would create high FII outflows from

especially at the time of uncertainty. When there is an uncertainty at the time of having high capital gain, they probably have the mentality to sell their share and if they do so, they would get more amount per share than it was purchased. Consequently, at the time of having high capital gain of FII, outflow would be more than expected. And this is what happened in 2008-09 financial year, due to global economic crisis FPI created $ 15 billion worth net outflows.

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DOI: http://dx.doi.org/10.14505/tpref.v7.1(13).02

Friedman, Monetarism and Quantitative Easing

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Suggested Citation:

Romero, V.O. (2016). Friedman, Monetarism and Quantitative Easing, *Theoretical and Practical Research in Economic Field*, (Volume VII, Summer), 1(13): 11-29. DOI:10.14505/tpref.v7.1(13).02. Available from: http://www.asers.eu/journals/tpref/curent-issue.

Article's History:

Received April, 2016; *Revised* May, 2016; *Accepted* June, 2016.

Abstract:

This paper argues that the theoretical origin of Quantitative Easing (QE) programs, as a general concept, clearly links to Friedman's (and monetarist) ideas, but that the specific implementation of QE operations to cope with the 2008 financial crisis does not comply with key principles developed by Friedman. Based on Friedman's work during the sixties, I contend that his monetary framework links to QE through what he (and Anna Schwartz) called the "monetary" effects of monetary policy and not the portfolio balance effect highlighted by Nelson (2011) and Bernanke (2012). The combination of the "monetary" effects and the stabilizing role of monetary policy should produce QE programs with a path of the monetary base (central bank assets) and M2 that differs dramatically from what transpired under the 2008-2014 QE arrangements based on the portfolio balance effect.

Keywords: Monetary Policy, Quantitative Easing (QE) programs, Behavioral Macroeconomics

JEL Classification: E52, E58.

Introduction

Many economists and other analysts have pointed out that Milton Friedman's remarks on the necessity of an expansive monetary policy in Japan after its 1991 financial crisis, is a prima facie evidence that he would have supported the Quantitative Easing (QE) schemes implemented by the Federal Reserve (Fed) and other major central banks since the 2008 financial crisis. This unqualified extrapolation of Friedman's comments to the QE programs put in practice since 2008, however, ignores completely the monetary policy framework that Friedman developed specially during the sixties. In contrast to the loosely supported connections between Friedman's ideas and the 2008-2014 QE programs, Nelson (Nelson 2011) and Bernanke (Bernanke 2012) argue formally that Friedman's monetarist portfolio balance theory provides a solid theoretical link between its monetary framework and the most recent QE operations developed by the Fed and other major central banks.

This paper argues that the theoretical origin of QE programs as a general concept clearly links to Friedman's (and monetarist) ideas, but that the specific implementation of QE operations to cope with the 2008 financial crisis does not comply with key principles developed by Friedman. Based on Friedman's work, I contend that his monetary framework links to QE through what he (and Anna Schwartz) called the "monetary" effects of monetary policy and not the portfolio balance effect highlighted by Nelson (Nelson 2011) and Bernanke (Bernanke 2012). The "monetary" effects should consider Friedman's concern with the use of monetary policy as an important tool for the stabilization of the economy. The "monetary" effects emphasize the capacity of monetary policy of providing enough high-powered money to maintain M2 growing during periods of financial distress at rates similar to those registered in "normal" times. In contrast, the portfolio balance effect focuses on the capacity of monetary policy to affect the structure of interest rates.

The combination of the "monetary" effects with the stabilizing role of monetary policy should produce QE programs with a path of the monetary base (central bank assets) and M2 very different to what we have seen under the 2008-2014 QE programs based on the portfolio balance effect.

The paper is organized as follows: Sections 2 and 3 discuss briefly the role of monetary policy based on large expansions of the monetary base (central bank assets) in the currently dominant schools of thought, New Classical and New Keynesian; Section 4 revises some of Friedman's and other monetarist economists ideas that provide a theoretical support for Quantitative Easing; Section 5 uses the elements supplied by section 4 to analyze the QE programs put in place by the Federal Reserve (Fed), the Bank of England (BOE), the European Central Bank (ECB) after 2008, and the Bank of Japan (BOJ) after 2001; Section 6 presents some concluding remarks.

New classical economics and quantitative earnings (QE)

New Classical (NC) economics have developed several neutrality propositions whose central theme is that economic agents are basically indifferent among the financial instruments they could employ to finance their operations. Wallace extends the Modigliani – Miller theorem to open market operations (Handa 2009). The Wallace-Modigliani-Miller (W-M-M) theorem states that open market operations between money and another asset, with government consumption held constant, will not exert any real effects, or even change the price level. The W-M-M theorem is developed in the context of an overlapping generation's model in which two assets; money and a stored commodity are used as to transfer purchasing power from period t to $t+1$.

To ensure a positive demand for money, it is assumed that the stored commodity has a stochastic gross return that just compensates the risk anticipated by a risk-averse individual. A government's open market purchase is represented as the exchange of dk_t of the stored commodity against dm_t of money balances. Since the open market operations do not alter the budget constraints of the old or the young, neither their utility functions, the optimal paths of consumption and saving are unchanged. In the money market, money demand increases by the amount dm_t equivalent to the increase in the money supply, so that the price level will also not be affected by the open market operations.

To adapt the W-M-M theorem to an economy with bonds, we can introduce a central bank that issues fiat money and bonds and puts these liabilities into circulation by purchasing commodities which it stores (Handa 2009). It is assumed that the central bank uses the return obtained from the stored commodities to pay interests on bonds. As in the previous case if the stochastic gross return on the stored commodity (bonds) just compensates the risk assumed by a risk-averse individual, there will be a positive demand for money. Since fiat money and bonds are equivalent in terms of being a medium of saving with the same expected return, the public will be indifferent between them. The aggregate demand for money and bonds relative to their aggregate supply will determine the price level. The composition of this aggregate, however, is irrelevant in the determination of the price level. Therefore, an open market operation between fiat money and bonds would have no effect on the price level and on real variables.

Also in the vein of the Modigliani-Miller theorem, Williamson (Williamson 2014) points out that modern theory of banking and financial economics consider that financial assets are malleable objects. In contrast with goods and services, financial assets can be transformed in various ways by banks and other financial intermediaries. For example, a bank can transform long-maturity, risky, and illiquid assets into short-maturity, safe, and liquid liabilities which are then held in the private sector. From this perspective, QE operations may have little impact in a liquidity trap.

Thus, it is not surprising that New Classical economists will put little faith in the capacity of QE schemes to have any meaningful effect on economic performance, at least if they believe that the aseptic conditions under which their theories are derived provide a good approximation to the real world.

New Keynesian economics and quantitative earnings (QE)

The standard New Keynesian (NK) model is composed of an IS equation, an expectations-augmented Phillips equation, and a Taylor-type interest rate rule. Woodford (Woodford 2007) argues that this model is consistent with a world in which there is no special role for money in facilitating transactions, and hence, money is perfectly substitutable for any other nominal asset of similar risk. According to Woodford, the derivation of the standard model without frictions is a way to clarify that its basic relationships do not have an intrinsic connection with the evolution of the money supply. Woodford, however, holds that the model does not require assuming that open market operations are irrelevant, or that there is not a uniquely defined trajectory for the money supply associated to the policy rule. The model is still consistent with a well-defined demand for money function which

gives rise to an equilibrium in the money market. But this additional equation is not necessary for the model to determine the evolution of inflation, the price level, output, and the interest rates under a given interest rate rule.

An issue than can emerge in this environment, is the zero lower bound problem associated with monetary policy conducted with an interest rate instrument. As discussed in Walsh (2010) and Olivo (2011), Benhabib, Schmit-Grohé and Uribe (2002) and Schmit-Grohé and Uribe (2009) hold that simple and reasonable monetary policy rules that follow the Taylor principle changing the nominal interest rate more than proportionally in response to changes in inflation, could generate macroeconomic instability that would drive the economy toward a liquidity trap. In this context, there is a stationary equilibrium with the inflation rate equal to π^* (the inflation target of the central bank). For inflation rates that start below π^*, however, the inflation rate decreases. Absent a zero lower bound for the nominal interest rate, $\pi \to -\infty$, but this trajectory should be discarded as it violates a transversality condition necessary for the optimizing behavior of the representative agent. If the deflation rate is bounded from below, because the nominal interest rate cannot be less than zero, the economy converges to a liquidity trap with a nominal interest rate equal to zero and a stable deflation rate π^{**}.

There have been several proposals to deal with the zero lower bound problems in the context of the NK model. Taylor and Williams (2010) point out that the zero lower bound of the nominal interest rate has implications for the settings of the parameters in the interest rate rule. They review several arguments on this issue. For example, Reifschneider and Williams find that an increase in the response to the output gap in the interest rate rule helps to reduce the effects of the zero lower bound of the nominal interest rate.

Taylor and Williams point out, however, that this approach can increase the variability of inflation and the interest rate. Additionally, a general result from the literature is that the optimal coefficient of the output gap in the policy rule declines in the presence of measurement errors in the gap. Given the limitations of the approach of responding more aggressively to the output gap, Reifschneider and Williams suggest other modifications to the policy rule. One of the proposals consists in reducing the interest rate more aggressively than normal in the vicinity of a liquidity trap. This approach, however, is based on an atypical behavior of the central bank when is confronted with the zero lower bound, and this could confuse economic agents and, in turn, generate unforeseen consequences. An alternative approach promoted by Eggertsson and Woodford is to adopt an explicit price level target instead of an inflation target when the economy approaches a liquidity trap. A price level target promises a stronger monetary stimulus and more inflation in the future than an interest rule with an inflation target. On the other hand, a liquidity trap provides an argument to use a higher inflation target than the one that would be used absent this restriction. Taylor and Williams hold that if the target inflation rate is sufficiently high, the liquidity trap will rarely affect monetary policy and the macro economy.

The previous discussion suggests that open market operations and monetary base expansions are not, at least directly and explicitly, in the range of options considered by New Keynesian economists to deal with the zero lower bound problems.

Friedman, Monetarism and quantitative earnings (QE)

Friedman (1960) and Friedman and Schwartz (1961) have argued cogently that the reduction in the quantity of money by a third from 1929 to 1933 made the depression much longer and more severe. In a Program for Monetary Stability (1960), Friedman states:

"All told, from July 1929 to March 1933, the money stock fell by over a third, with over two-thirds of the decline coming after England's departure from the gold standard and the accompanying deflationary action by the system.

I have described this episode in some detail because it has played such an important role in forming –or should I say deforming– opinions about monetary policy. It was interpreted to mean that monetary policy is an ineffective instrument for stemming deflation. In fact it is a tragic testament to the harm that inappropriate policy can do. It may well be that a different policy might not have prevented a severe contraction; it certainly could have made it much less severe that it was and could have prevented the collapse of the banking system. It is noteworthy that every country that followed Britain in going off gold experience revival in 1931 or shortly thereafter; every country that followed the U.S. in accepting monetary deflation saw the contraction drag on to 1933 or later."

In the *Monetary History of the United States, 1867-1960*, Friedman and Schwartz (1961) characterize the monetary policy during the critical period 1929 – 1933 as "inept". In fact, the following paragraph of the book is very illuminating on the intellectual atmosphere outside and inside the Fed during that time:

"One can read through the annual Proceedings of the American Economic Association or of the Academy of Political Science and find only an occasional sign that the academic world even knew about the unprecedented banking collapse in process, let alone that it understood the cause and the remedy.

That climate of intellectual opinion helps to explain why the behavior of the Federal Reserve System from 1929 to 1933 was not checked or reversed by vigorous and informed outside criticism. But neither the climate of opinion nor external financial pressures nor lack of power explains why the Federal Reserve System acted as it did."

After 1933, Friedman (1960) points out that the Fed followed "a policy of almost complete inactivity." Friedman attributes this to a defensive reaction to the failure to counteract the contraction during the critical years, and to the shift in the intellectual climate of opinion which assigned the main countercyclical role to fiscal policy.

In fact, as many economists have pointed out, Friedman made several explicit assertions before passing away about the active role that monetary policy should play during financial crisis. For example, in his 1996 interview with Snowdon and Vane (2005), Friedman makes the following statements:

> *"Take Japan right now. They are wasting their time and money in trying to have an expansive fiscal policy without an expansive monetary policy."*
>
> *"It is a very interesting phenomenon because the behavior of the Japanese central bank in the past five years duplicates the behavior of the Federal Reserve after 1929."*

In a very frequently cited interview with David Laidler in 2000, Friedman touched upon again on the case of Japan, insisting in the necessity to go beyond low interest rate and expanding vigorously the money supply.
However, these clear statements of Friedman in favor of an active monetary policy during periods of financial turmoil should be balanced against other arguments advanced in connection to the role of money and monetary policy in the economy. They cannot be extrapolated as an unqualified support to the kind of QE operations implemented after 2008 by the Fed and other central banks. In The Role of Monetary Policy, Friedman (1967) also makes the following interesting assertions:

> "*Experience suggests that the path of wisdom is to use monetary policy explicitly to offset other disturbances only when they offer a "clear and present danger."*
>
> *"The first and most important lesson that history teaches about what monetary policy can do – and it is a lesson of the most profound importance – is that monetary policy can prevent money itself from being a major source of economic disturbance."*

These statements from Friedman are in line with Nelson's (2011) interpretation that by stabilizing and enhancing the money stock, monetary policy could limit the damage that credit market disturbances could inflict to the economy. The stabilization of the money stock, however, is a secondary issue in Nelson's paper.
Nelson's (2011) and Bernanke's (2012) core argument in favor of the idea that QE programs after 2008 have followed Friedman's guidelines is based on the monetarist portfolio balance effect. Nelson (2011) focuses on the short-run non-neutrality of monetary policy in general, and open market operations in particular. Such non-neutrality follows from a transmission mechanism that relies on a wide-spectrum portfolio effect. This is a point extremely important in Friedman's analysis and for Monetarist economists in general. Monetarists hold that money is a close substitute of an ample variety of assets: bonds, equities, physical assets, durable and semi-durable goods (see Friedman and Schwartz Money and Business Cycles 1963).

I claim, however, that Friedman's main argument in favor of QE operations during a period of financial turmoil does not rest on his belief in the portfolio balance effect, but in what he (and Anna Schwartz) called the "monetary" effects of monetary policy. Friedman and Schwartz (1963) in their discussion about the impact of the "bills only" doctrine on the open market operations, argue that from the point of view of the Federal Reserve action on the stock of money what really counts is the amount of high-powered money created, which is determined by the size of open market operations, not by the kind of securities exchanged. Here Friedman and Schwartz (1963) highlight the crucial distinction between the "monetary" effects of monetary policy from the "credit" effects:

> *"If the bills only policy has nonetheless aroused considerable controversy, it is largely because of the tendency we have noted on the part of economists and others to emphasize the "credit" effects of monetary policy rather than the "monetary" effects, which is to say, the effects on the structure of interest rates rather than on the stock of money. The major criticism levied against the bills only policy was that the*

> *System was denying itself an instrument, considered potent by the critics, for affecting economic activity, namely, affecting the relative yields on long- and short-term securities."*

Nelson (2011) enters into some detail in Friedman's conception of the portfolio effect of a money increase to explain why, his original view of open market operations as exchanges between money and short-term debt, could be extended to allow for the possibility of operations in long-term government debt.
Other Monetarists as Meltzer (2001), however, have been more explicit in explaining how open market operations in assets different to Treasury bills could work to avoid a liquidity trap:

> *"The liquidity trap, by assumption, makes short-term Treasury bills (or similar securities) a perfect substitute for base money or bank reserves. Exchanging one for the other does nothing of interest. Exchanging either money or Treasury bills for some other asset such as foreign money, domestic or foreign long-term bonds, equities, or commodities changes relative prices and real wealth. In this hypothetical case, base money plus bills is a composite good. The composite good is a gross substitute for other assets; increasing either component, or both, is expansive.*

For a full liquidity trap to be effective, the composite asset – money plus bills – must be a perfect substitute for all other assets. When the marginal rate of substitution of money for bonds goes to zero, all marginal rates of substitution must go to zero. All assets are part of a single composite good.
If assets other than bills and money remain gross substitutes, liquidity trap means only that one row and one column in the matrix of marginal rates of substitution have been eliminated. All other marginal rates of substitution remain. Monetary policy remains effective. The standard class of models gives the wrong answer about policy. It implies that a liquidity trap is possible and, for some, is a reality, (Krugman 1988, Ito 1998). The alternative denies that a liquidity trap is possible except in the limit when all prices are zero."

Here I contend that, though Friedman did not directly address the issue of using open market operations in long-term bonds during periods of financial market distress, he was not explicitly opposed to this kind of operations. In *A Program for Monetary Stability* (1960) Friedman comments on the "bills only" policy adopted by the Open Market Committee of the Reserve System in 1953. He considers it, in principle: *"a device for allocating responsibility among different government agencies and imposes hardly any limits whatsoever upon the monetary actions that the Federal Reserve and the Treasury together can undertake."* Some paragraphs below, he further expresses the following:

> *"Let us suppose that is desired to add high-powered money by reducing the amount of long-term securities in the hands of the public. In the absence of the "bills only" policy, the Federal Reserve could do this itself simply by buying long-term securities. Given the "bills only" policy, the same result can be accomplished by cooperation between the Federal Reserve and the Treasury."*

Thus, it is highly possible that in an environment of short-run interest rates close to zero, Friedman would have recognized that outright purchases of long-term securities could be a more effective mean to achieve the "monetary" effect than the traditional open market operations through the purchase of short-term Treasury bills.

From the previous discussion, there is little room for doubt that Friedman would have supported some kind of QE scheme to face the major disturbances that the US and other developed countries economies have been experiencing since 2008, or Japan after its 1991 financial crisis. This statement could reasonably be extended to those economists that still follow Monetarists ideas. But Friedman's view about the usefulness of an expansive monetary policy during financial crisis does not rest on the portfolio balance effect, though he certainly believed in the relevance of this transmission channel. Therefore, an important question is how these monetary policy interventions should be designed and implemented in order to comply with Friedman's standards. I argue that those standards are grounded in the "monetary" effects and the idea that monetary policy should aim to be a stabilizing force. The emphasis in the stabilization properties of monetary policy may explain why Friedman was less concerned with the composition of the open market operations and their potential "credit" effects, than with their influence on the overall quantity of high-powered money (the "monetary" effects). Thus a QE scheme based on Friedman's views should principally aim to provide sufficient high-powered money to guarantee a stable growth of a broader monetary aggregate such as M2, at annual rates similar to those observed in "normal" times. In order to achieve this, the emphasis should be placed on the "monetary" effects of monetary policy and not on its "credit" effects, which by the way are subjected to long and variable lags (Friedman 1961).

From an operational point of view, the central bank should rely exclusively on open market operations through outright purchases of financial assets. Open market operations should be conducted mainly through purchases of long-term securities that are more effective than operations in short-term securities to expand high-

powered money in an environment of near zero short-run interest rates. Open market operations via outright purchases should provide the means to increase the monetary base at rates significantly higher than those observed at "normal" times but, in a way that these increases can be sustained for a relatively long period. Repeated cycles of sudden and enormous increases in the rate of growth of the monetary base (central bank assets) that can only be maintained for short periods and are followed by sharp reductions or even negative rates, will cause vast volatility that opposes to the basic idea of promoting stability.

Evaluation of Quantitative Easing experiences from Friedman's perspective

This section examines the QE experiences of the United States, the United Kingdom, the Euro zone, and Japan, from what I claim would have been Friedman's perspective. The paper employs monthly data of the monetary base (or central bank assets) and M2, in levels and year to year (yty) percentage changes. I try to use relatively long series of more than thirty years, when possible, in order to assess the magnitude of the QE operations in a historical dimension. The paper also examines the volatility of the relevant time series by using 12-month moving standard errors of the year to year percentage changes (12 MMSE).

As pointed by Fawley and Neely, QE programs in response to financial crisis should be distinguished from temporary increases in the monetary base that are occasionally used to provide liquidity for short-periods. In general, a QE program can be defined as a deliberate attempt of the central bank to increase the monetary base (or alternatively its stock of assets) at a rate substantially higher than that observed during "normal" times, for a relatively long period of time (six months or more).

The central bank can increase high-powered money (its stock of assets) through open market operations and lowering the interest rate of its lending programs. But some qualitative measures, as extending the maturity of the lending programs or the variety of assets accepted as collateral, can also have a quantitative impact on the monetary base/central bank assets. Thus, qualitative measures can be considered as part of a general definition of QE programs. As was discussed in the previous section, however, a QE program that accords to Friedman's views should be based almost exclusively on outright purchases of short-run and long-run securities.

Quantitative Easing in the United States

Analysis of QE in the United States is based on monthly data of the Monetary Base and M2 for the period 1959.01 – 2014.12. The data was obtained from the St. Louis' FRED data base. In the US the first stage of QE operations was introduced between October 2008 – May 2009 in response to the bankruptcy of Lehman Brothers (Fawley and Neely 2013). Between mid-2007, when the first signs of the financial crisis appeared and the Lehman Brothers collapse, the Fed concentrated in lowering the Federal Funds rate. Figure 1 shows the evolution of the monetary base in levels and growth rates yty from 1960.01 until 2014.12. In the first eight months of 2008, the monetary base grew mostly below 2% on ayty basis (Figure 1). In September 2008 the pace accelerated to 9.94 %, 37.08% in October, 72.87% in November, and 99.04% in December. The peak in the yty growth of the monetary base was reached in May 2009 (112.67%), and then it started to decrease unevenly showing negative values in November and December 2010.

Although QE2 was officially announced in November 2010, the monetary base only began to grow significantly again since March 2011 (15.18% yty), stabilizing over 30 % (yty) between June 2011 – November 2011. In December 2011, it started to fall rapidly until reaching negative values for the period June 2012 – October 2012. QE3 was announced in September 2012, but high-powered money only grew above 10% (yty) again since March 2013. From that moment on the rate of growth of the monetary base accelerated gradually until reaching a peak in November 2013 (39.21%). Then, it began to fall gradually until growing below 10 % in the last two months of 2014.

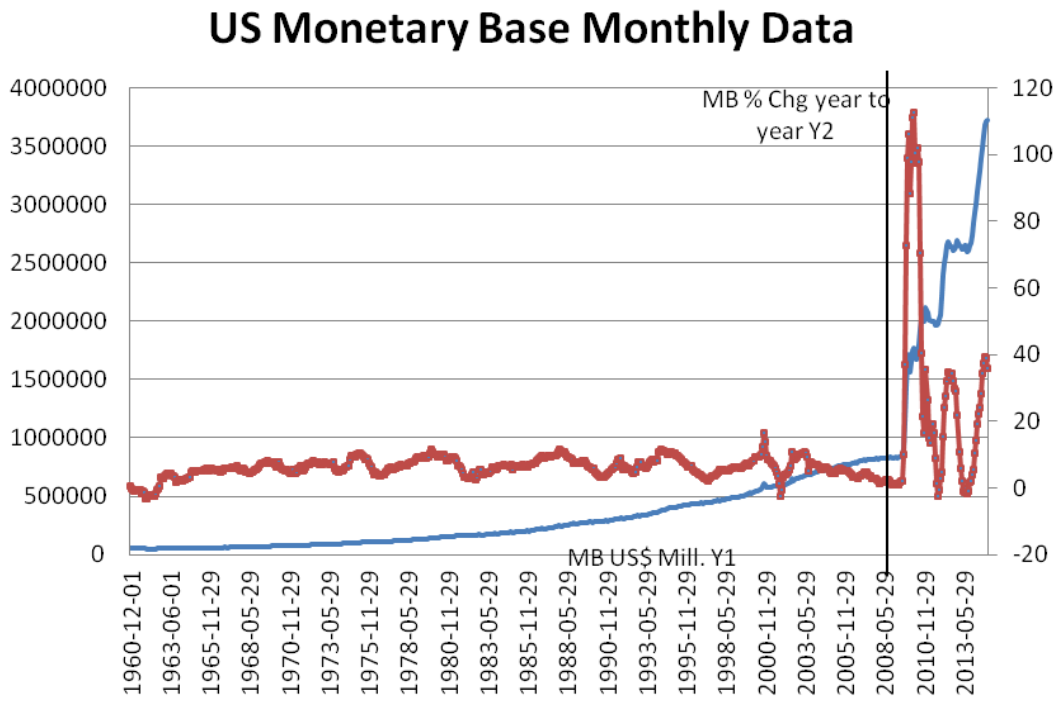

Figure 1 - US Monetary base monthly data

This strong but uneven growth in the monetary base is reflected in a drastic increase in its volatility as shown in Figure 2. From 1960.11 to 2008.09, the maximum value attained by the 12-month moving standard error (12MMSE) of the yty percentage changes was 4.17. This value jumped to 10.35 in October 2008, and reached its peak value of 47.27 in April 2009. The 12MMSE falls to 13.25 in October 2009, and then starts to climb up again up to 38.88 in April 2010. The ups and downs continue until the end of 2014, with smaller peaks: September 2011, 15.29; August 2012, 15.14; November 2013, 13.09.

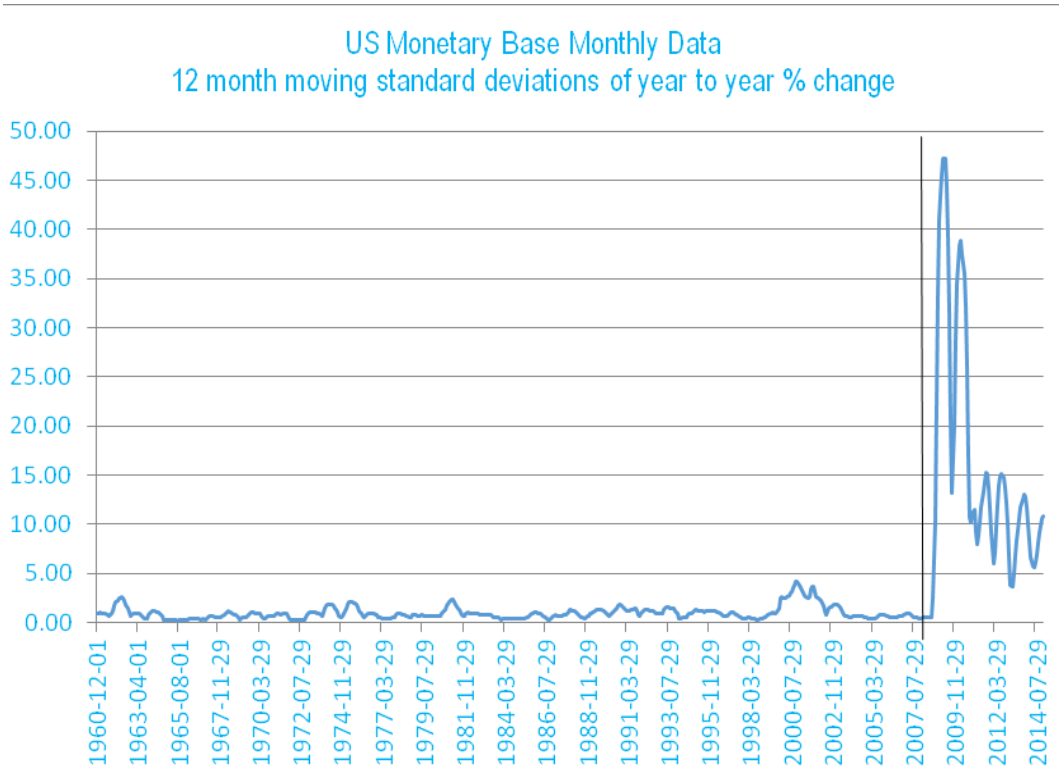

Figure 2 - Increase of volatility

The data for M2 in levels and yty percentage changes for the period 1960.01 – 2014.12 is shown in Figure 3. During 2007, when the first signs of the financial crisis appeared and September 2008 just before QE1 kicked off, M2 was growing between 5.5% and 7% yty. Beginning in October 2008, M2 growth accelerated above 7% yty, and kept growing well above that level (close to 10%) until June 2009. Starting in July 2009, the yty rate of growth of M2 started to slow down substantially, reaching values below 2% during the period 2010.03 – 2010.07. M2 continued growing less than 5% yty until March 2011. The pace of M2 picked up again in April 2011, growing close to 10% yty between 2011.08 and 2012.06. From 2012.07 until 2013.05 M2 expanded, most of the time, above 7% yty. From 2013.06 until 2014.12 M2 grew below 7% yty.

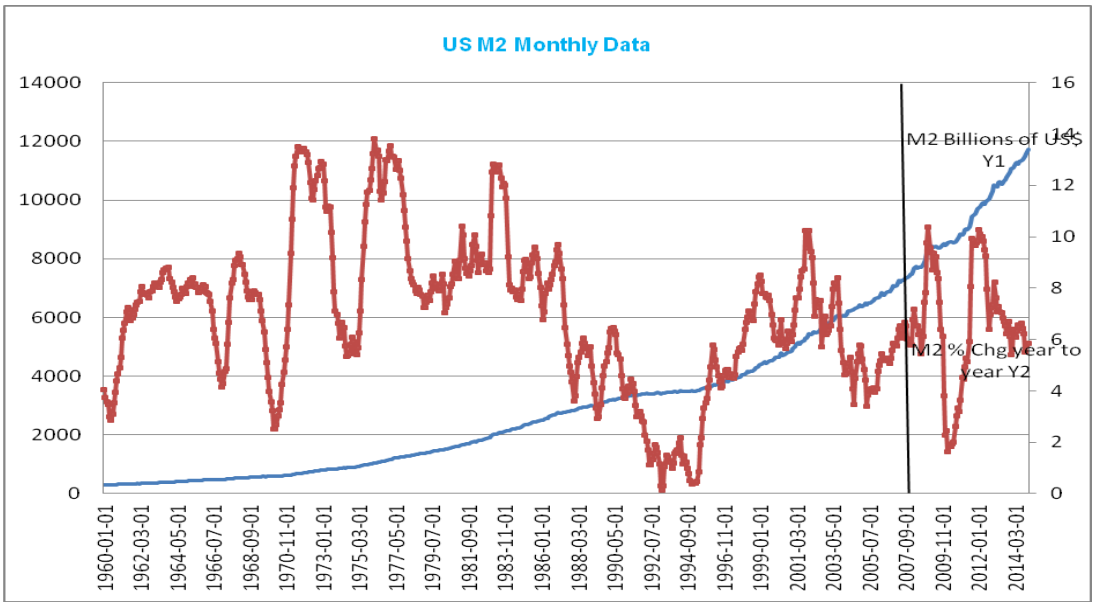

Figure 3 – US M2 monthly data

Figure 4 graphs the 12 month moving standard errors of yty percentage changes of M2. Many of the values observed for this volatility indicator after QE1 are among the highest in the complete sample (1960.01 – 2014.12). Of the 77 observations of the 12MMSE since QE1 (2008.10), 16 observations were above 2.

Thus, the Fed QE programs were able to avoid a fall in the level of M2 after 2008 as pointed by Nelson [1], but they did not maintain its rate of growth, which in fact fell drastically during part of the implementation of QE, and increased substantially its volatility to levels only observed during the seventies. It seems that part of the extreme volatility of the monetary base was transmitted to the broader aggregate.

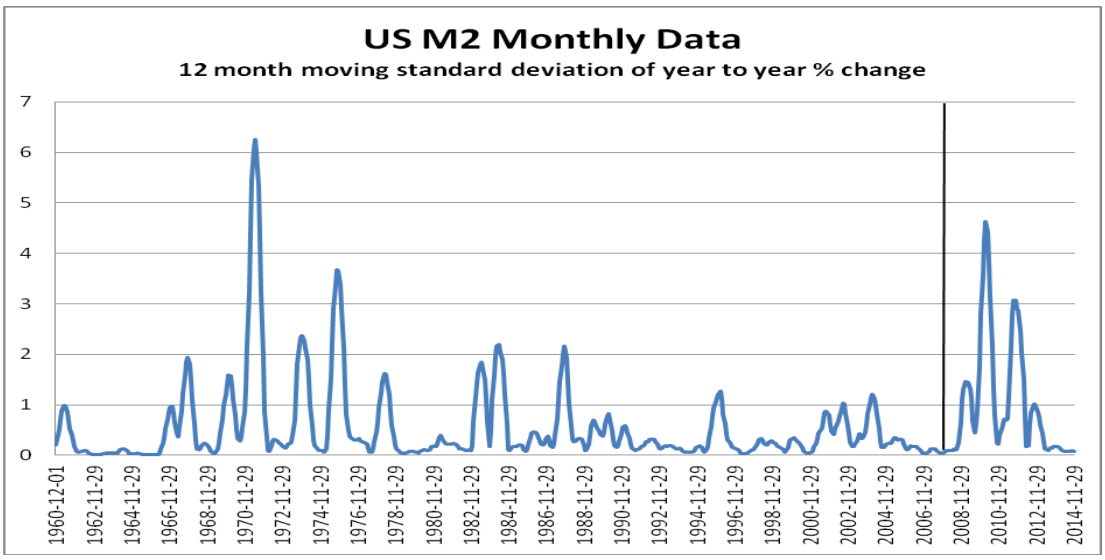

Figure 4 – Standard deviation of year to year % change

Quantitative Easing in the United Kingdom

The analysis of QE operations in the UK uses data for a hybrid series of the monetary base (M0) and the Bank of England (BOE) assets from 1969.06 to 2013.12. The MO series that starts in June 1969 was discontinued in April 2006. From May 2006, the BOE began to publish a series of its monthly assets that also was discontinued in September 2014. The series for M2 is available from 1982.07 to 2013.12. All information was obtained from the Federal Reserve of St. Louis (FRED) database.

QE programs in the UK began formally in March 2009. Purchases of private assets announced and conducted in January 2009, were offset by selling short-term assets (Fawley and Neely 2013). The BOE figures, however, indicate that a substantial expansion of its total assets began several months before the official announcements. As shown in Figure 5, the yty rate of growth of M0 was generally below 10% since the beginning of the 80s until the data was discontinued in April 2006. The yty rate of growth of BOE assets was negative in May, June and July of 2007, and expanded just 1.66% in August. But in September 2007, there was an important jump in the BOE total assets, that started to grow (yty) between 12% and 25% until August 2008. Then, the yty rate of growth of the BOE assets jumped to 40.38% in September 2008 and to its maximum value of 187.89% in October 2008. BOE total assets continued growing above 100% on a yty basis until January 2009, slowdown to around 80% in 2009.02 – 2009.03 and then accelerated again above 100% from 2009.04 – 2009.08. Since September 2009, BOE assets exhibited a marked but erratic deceleration up to October 2011. In September 2011, coinciding with official announcements to extend QE (Fawley and Neely 2013), the BOE started a new round of expansion of its balance sheet. BOE total assets began to grow at double digits' rates (yty) in November 2011, reaching progressively a peak of 64.38% in September 2012. In October 2012 started a fairly gradual reduction in the yty rate of growth of the BOE assets, until reaching negative values between 2013.10 – 2013.12.

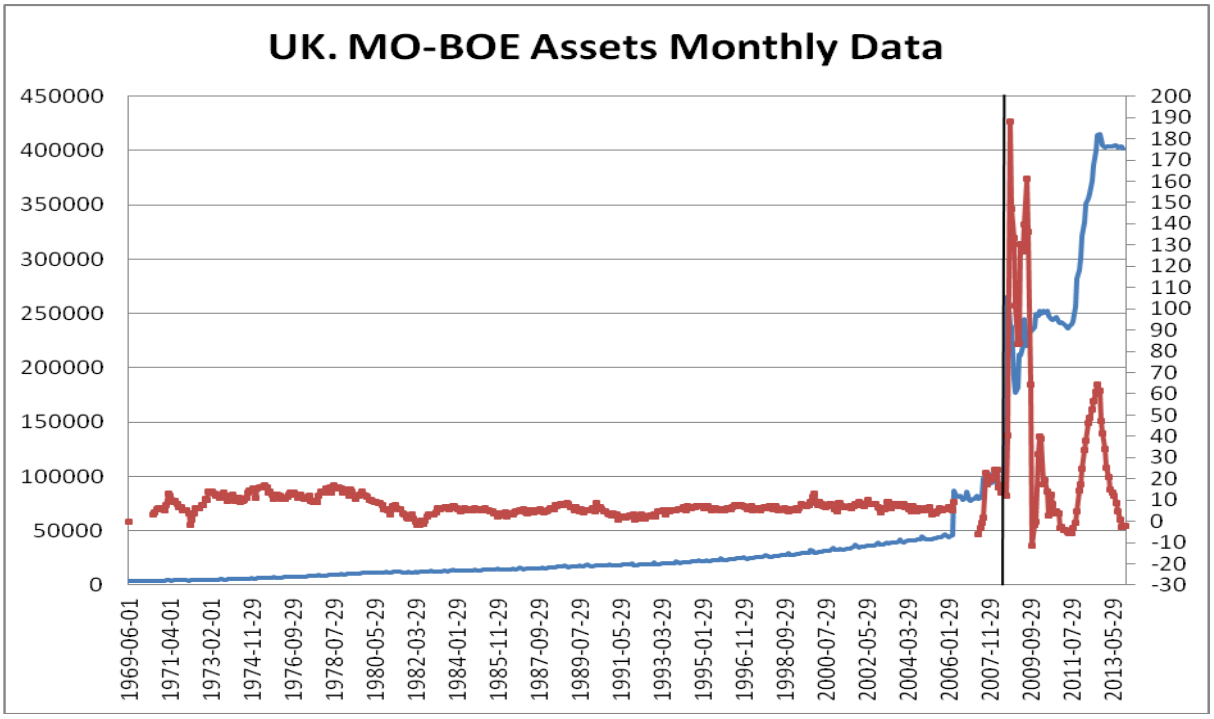

Figure 5 – UK. MO-BOE Assets monthly data

The massive increase in the BOE total assets translated into tremendous volatility as shown by the 12 month moving standard errors (12MMSE) of the yty rates of growth reported in Figure 6. For the monetary base (M0), the 12MMSE since the mid-eighties until 2006.04, rarely surpassed the value of 2. In contrast, the 12MMSE of the BOE total assets jumped from values close to 10 in the period 2008.04 – 2008.09 to 48.95 in October 2008. It reached its highest value of 63.37 in January 2009, just when the first official announcement of a QE like program was made. A clear reduction of this volatility indicator was observed in September 2010, and continued until December 2011. In January 2012, the 12MMSE indicator of the BOE assets started to climb up again reaching a peak of 21.08 in June 2012. Double digit values of the 12MMSE were observed until the end of the sample period (2013.12).

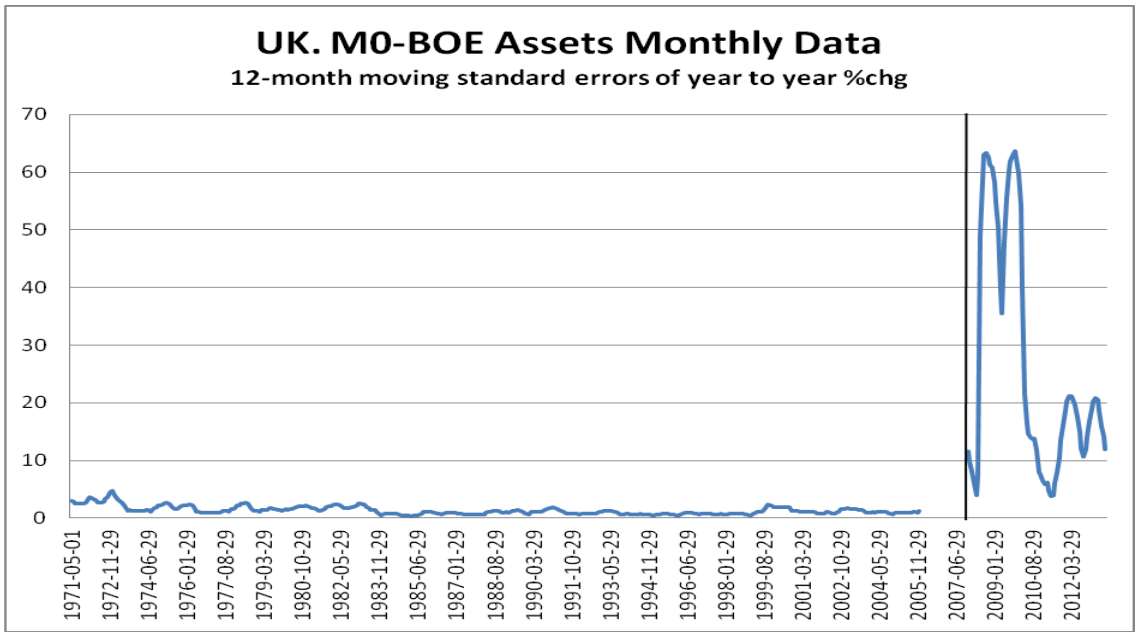

Figure 6 – 12- month moving standard errors of year to year % change

Figure 7 shows the evolution, in levels and yty growth rates of M2, for the period 1982.07 – 2013.12. Between 2001.01and 2006.12, M2 was growing fairly steadily in the range of 7 - 10% yty. It decelerated below 7% for the period 2007.01 – 2007.11, and then returns to rates over 7% during 2007.12 – 2008.08. But in September 2008, M2 started to decrease its pace gradually, reaching a low value of 1.9%yty in April 2009. From then on, it recovers slowly, but keeping yty growth rates that barely surpassed 5% between 2010.02 – 2010.04. From May 2010 until August 2011, M2 was growing on ayty basis below 5%.Beginning in September 2012; M2 resumed its growth around 5-6% until November 2013, falling to 4.55% in 2013.12. Thus after September 2008 until the end of 2013, M2 never recovered its yty rate of growth above 7% observed in the first six years of the current century.

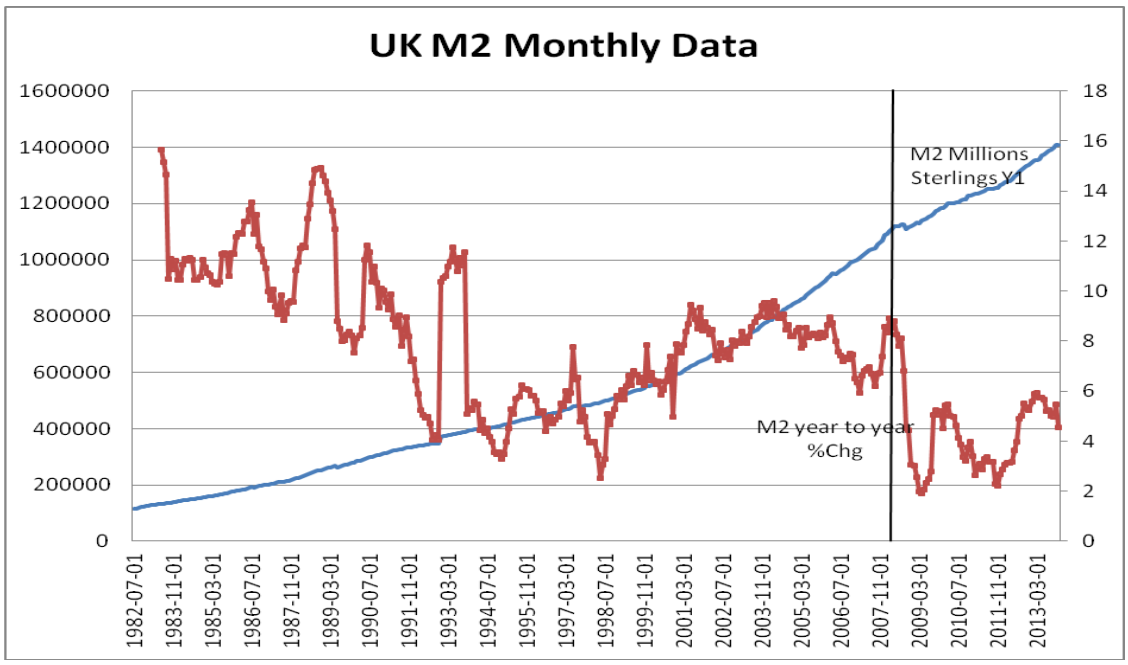

Figure 7 – UK M2 Monthly data

Figure 8 shows that the reduction in the rate of growth (yty) of M2 observed after September 2008 until December 2013.12, was accompanied by a noticeable increase in its volatility (the 12MMSE of the yty % change of the rates of growth) compared to that registered in the period 2002.01 – 2007.12. Therefore, the enormous

expansion in the BOE total assets that began in September 2008 was very erratic, did not maintain the pace of growth of M2 and increased the volatility of this broader monetary aggregate.

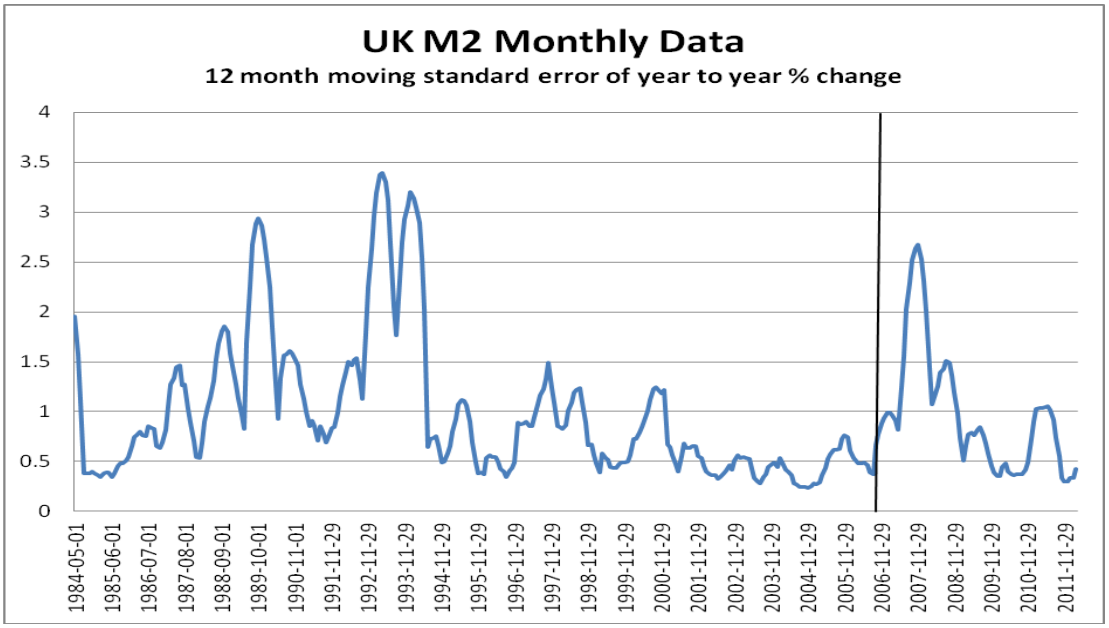

Figure 8 – 12 month moving standard error of year to year % change

Quantitative Easing in the Euro Zone

The analysis of QE for the Euro Zone employs data from 1998.12 to 2014.12 for the European Central Bank (ECB) assets, and from 1980.01 -2014.12 for M2. Both series are obtained from the Federal Reserve Bank of St. Louis (FRED) database.

Before the financial crisis, between 2000.01 and 2006.12, the balance sheet of the ECB exhibited a rather unstable behavior, growing frequently above 10% (yty), but also registering a period of marked and continuous contraction between September 2001 and January 2003 (Figure 9). July 2005 – December 2006, was a period of straight growth of the ECB assets above 10% (yty), with several observations higher than 15%. Then from 2007.01 until 2007.08, ECB assets grew below 10%, and then accelerated again from 2007.09 to 2008.09 to rates around 20% (yty).

In October 2008, the ECB announced its first QE measure: to lend as much as banks wanted at a fixed-rate tender with an expanded list of collateral accepted (Fawley and Neely 2013). This measure produced a jump in the yty rate of growth of the ECB assets to 60.78% in October 2008, 52.56% in November 2008, 37.61% in December 2008, 42.57% in January 2009, and 36.17% in February 2009. ECB assets continued growing close to 30% (yty) from 2009.03 to 2009.08. Additional impulse to the ECB assets came from new measures announced in May 2009, including asset purchases (Fawley and Neely 2013). But in November 2009, December 2009 and January 2010, ECB total assets contracted. Growth resumed in February 2010, but generally below 10% with another short period of contraction (2011.04 – 2011.07). This happened despite new measures announced by the ECB in May 2010.These measures, however, were mainly based on sterilized operations (Fawley and Neely 2013). In October 2011, the ECB announced a second round of asset purchases and a new extension of credit facilities. These actions stimulated a new period of rapid expansion of total ECB assets from 23.09% (yty) in October 2011 to a peak of 57.3% (yty) in June 2012. Growth of ECB assets continued strong until November 2012. But from 2013.03 to 2014.12 the ECB assets contracted continuously and at double digit rates.

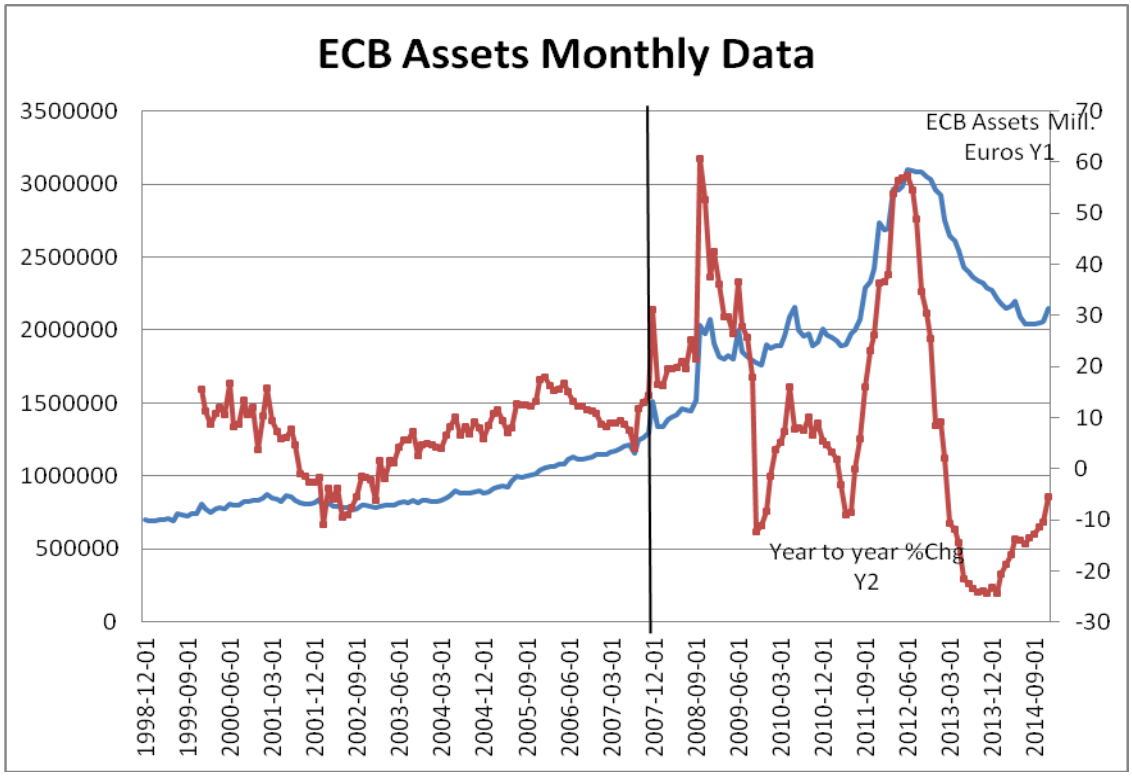

Figure 9 – ECB assets monthly data

The previous account of the behavior of the ECB total assets is reflected clearly in the volatility indicator of this series (Figure 10). The 12-month moving standard errors of the yty rate of growth of the ECB assets were under the value of 6 between 2000.11and 2007.11. But after 2007.12, the 12MMSE frequently overshoot the value of 10, and in many occasions registered values above 15 and 20.

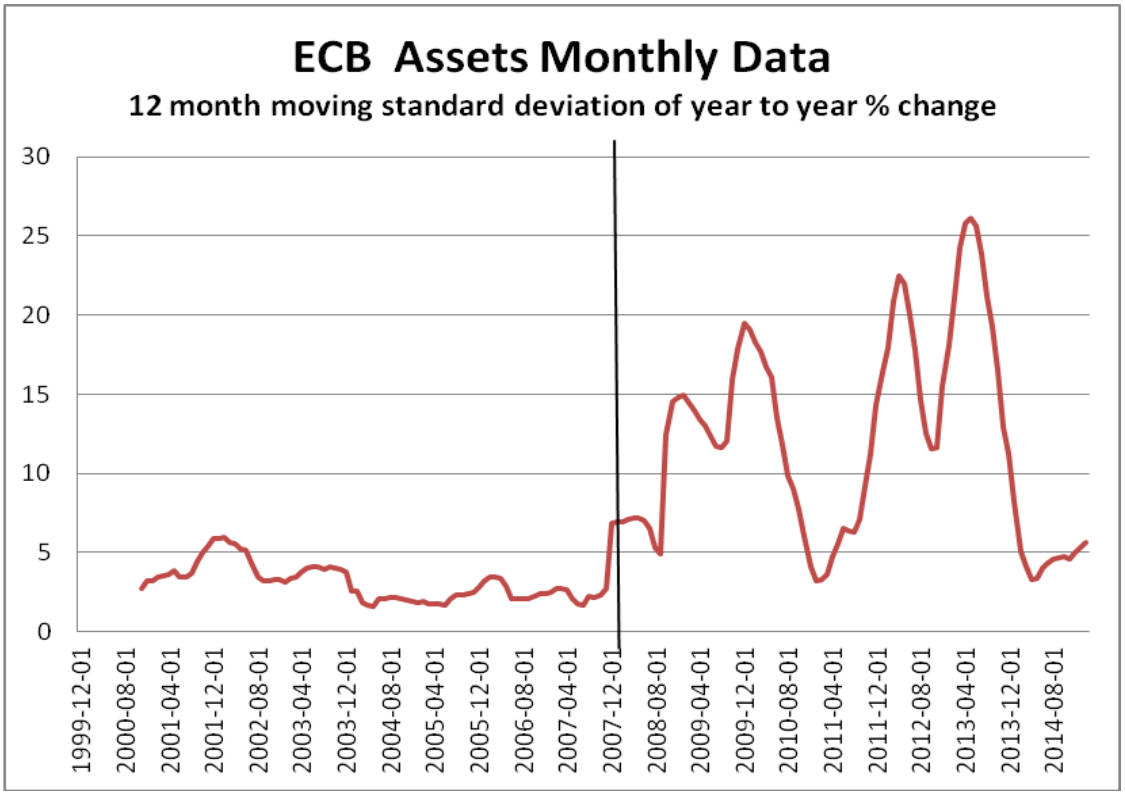

Figure 10 – The 12-month moving standard errors of the yty rate of growth of the ECB

As shown in Figure 11, M2 in the Euro Zone grew well above 5% on a yty basis since January 2001 until August 2009. In fact, during the period 2007.07 – 2008.11, it grew most of the time above 10% (yty). But in September 2009, its rate of growth was 4% (yty), and from then on it started to reduce its pace to values under 2% (yty) during the period 2010.01 – 2010.06. In July 2010, it returned to growth rates above 2%, but it never reached the 5% level again in the sample period that ends in 2014.12.

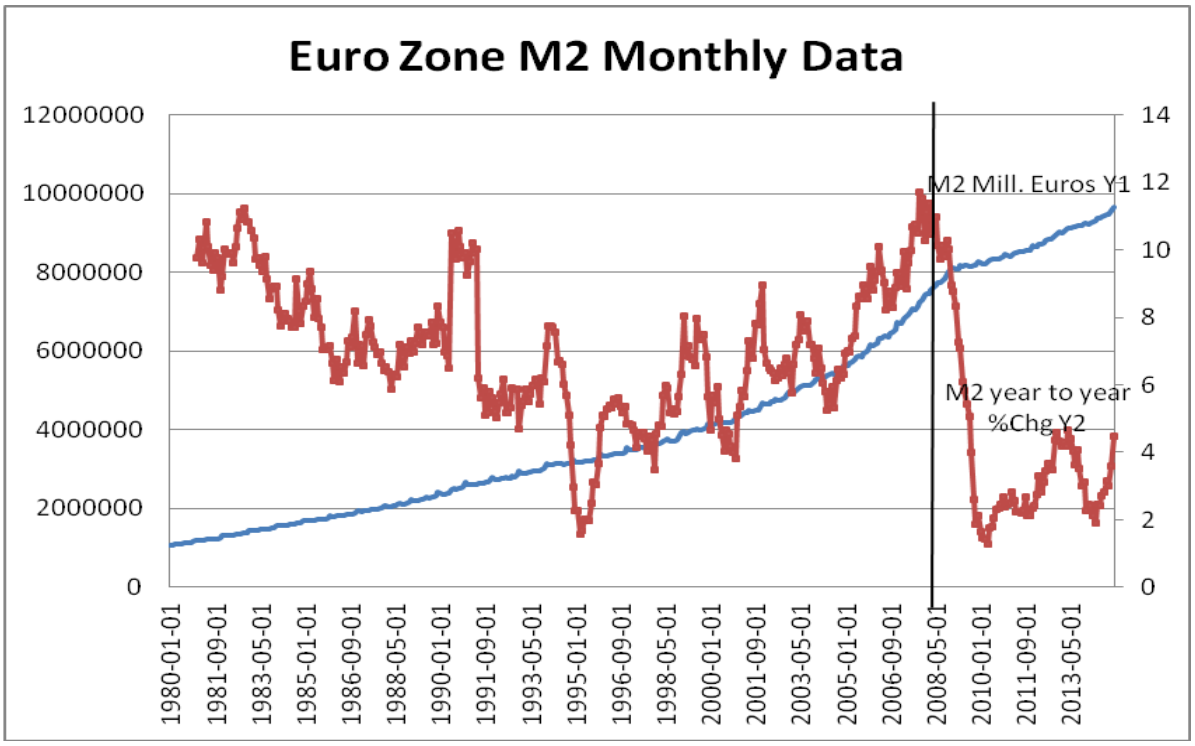

Figure 11 – Euro Zone M2 monthly data

Figure 12 shows that the volatility of the M2 series of Euro Zone increased substantially during the period of acute deceleration of its yty rate of growth. The 12MMSE of the yty rates of growth of M2 were below one from February 2002 until February 2009. In contrast, this volatility measure of the yty rate of growth of M2 was above 2 from 2009.09 until 2010.03, and well above 1 from 2010.04 until 2010.07. In fact the maximum value of the 12MMSE series (2.33) was reached in December 2009.

Thus, in the Euro Zone, QE programs did not result in a contraction in the level of the broad aggregate M2, but the strong expansion and uneven behavior of the ECB total assets did not translate in a stabilization of its rate of growth around pre-crisis values, and a substantial increase of its volatility was observed during part of the implementation period.

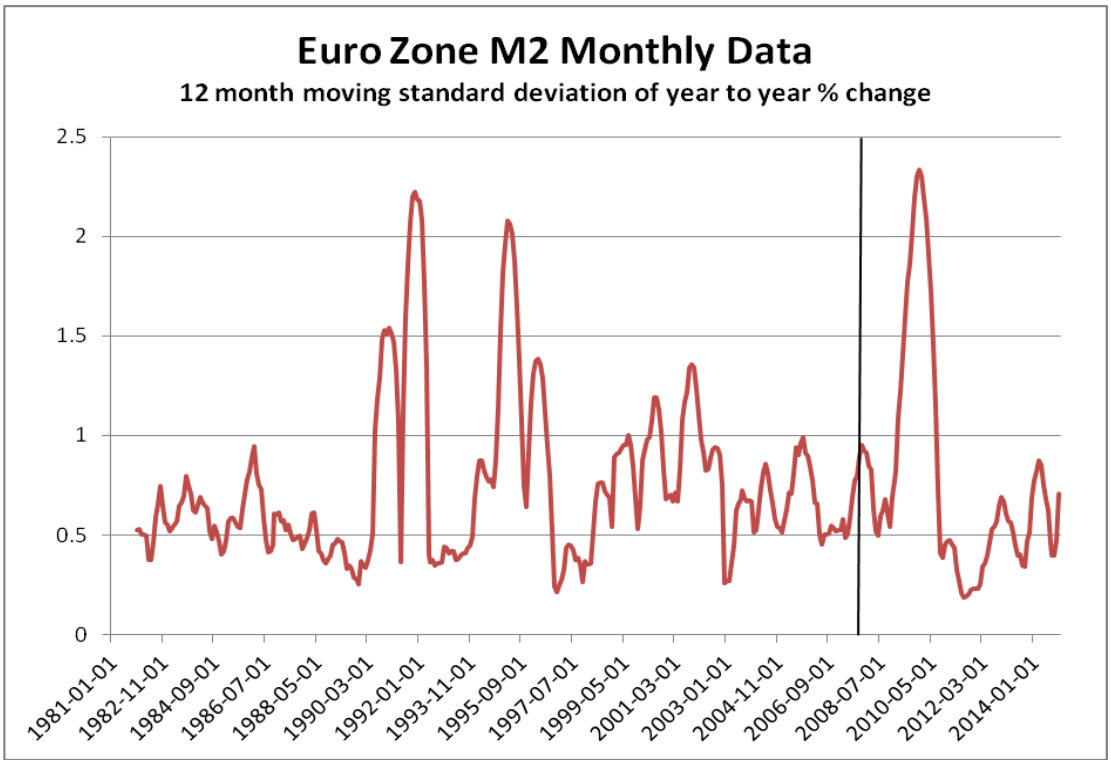

Figure 12 – The volatility of the M2 series of Euro Zone

a) QE in Japan

The case of Japan is very particular, because it economic woes are not entirely the product of the 2008 international financial crisis, but the legacy of its 1991 domestic financial crisis that up to date remains unresolved.

The analysis of Japan's QE programs is based on monthly average data of the monetary base from 1970.01 to 2014.12. This time series is obtained from the Bank of Japan database. The end of period series of the monetary base is only available since July 1996, and the Bank of Japan total assets starts in April 1998. Because we want to take account of the 1991 financial crisis, these last two series are not adequate.

The M2 series extracted from the Federal Reserve of St. Louis FRED database covers the period 1967.01 – 2014.11.

Greenwood (2006) points out that the attempt of the Bank of Japan (BOJ) to coordinate policy internationally after 1985, and the abandonment of monetary targeting undermined the conduct of domestic monetary policy. In particular, Greenwood considers that the extended monetary easing from 1985 - 1989 was central to the strong increase in assets prices. The average monetary base rate of growth (yty) data (Figure 13) indicates November 1986 as the point from which monetary policy turned more expansive relative to values observed sincemid-1979.This period of mostly double-digit growth ends in 1990.09.

In order to reverse asset inflation, the BOJ started rising interest rates in May 1989 (Greenwood 2006). But the BOJ underestimated the impact on GDP growth and non-assets prices of its "bubble-busting" policy. The initial response to the deceleration of the Japanese economy was completely on the fiscal side (Greenwood 2006). From 1991 to 2001 the BOJ continued conducting monetary policy using the interest rate strategy in place before the financial crisis (1985), lowering the official discount rate from 2.5% progressively to 0% in February 1999 (Greenwood 2006). In March 2001the BOJ officially abandoned its interest rate strategy and formally adopted a QE strategy (Greenwood, 2006).

The average monetary base data (Figure 13) shows an increase in the yty rates of growth around August 2001 (9.03% yty), reaching a peak of 36.34% yty in April 2002. It kept growing above or close to 20% yty until December 2002. Between 2003.01 – 2003.04 the monetary base slowed down to yty rates close to 10%, but picked up pace growing slightly above 20% during the period 2003.06 – 2003.10. From then on, it started to slow down rapidly, exhibiting straight negative values between 2006.03 and 2007.07. The average monetary base continued growing yty under 10% until February 2011. From March 2011 to February 2012, the average monetary base grew mostly in the 10% - 20% range, with a peak value of 23.9% yty in April 2011. A new stage of slow growth was observed in the period 2012.03 – 2013.01. The first formal announcement of a QE program

based on asset purchases as part of the economic plan of Prime Minister Shinzo Abe, was made on April 2013. An extension of the program was announced in October 2014. From February 2013 until 2014.12, the average monetary base exhibited a rapid pace, growing well above 30% yty. Until 2014.12, the peak yty value was 55.68% in February 2014.

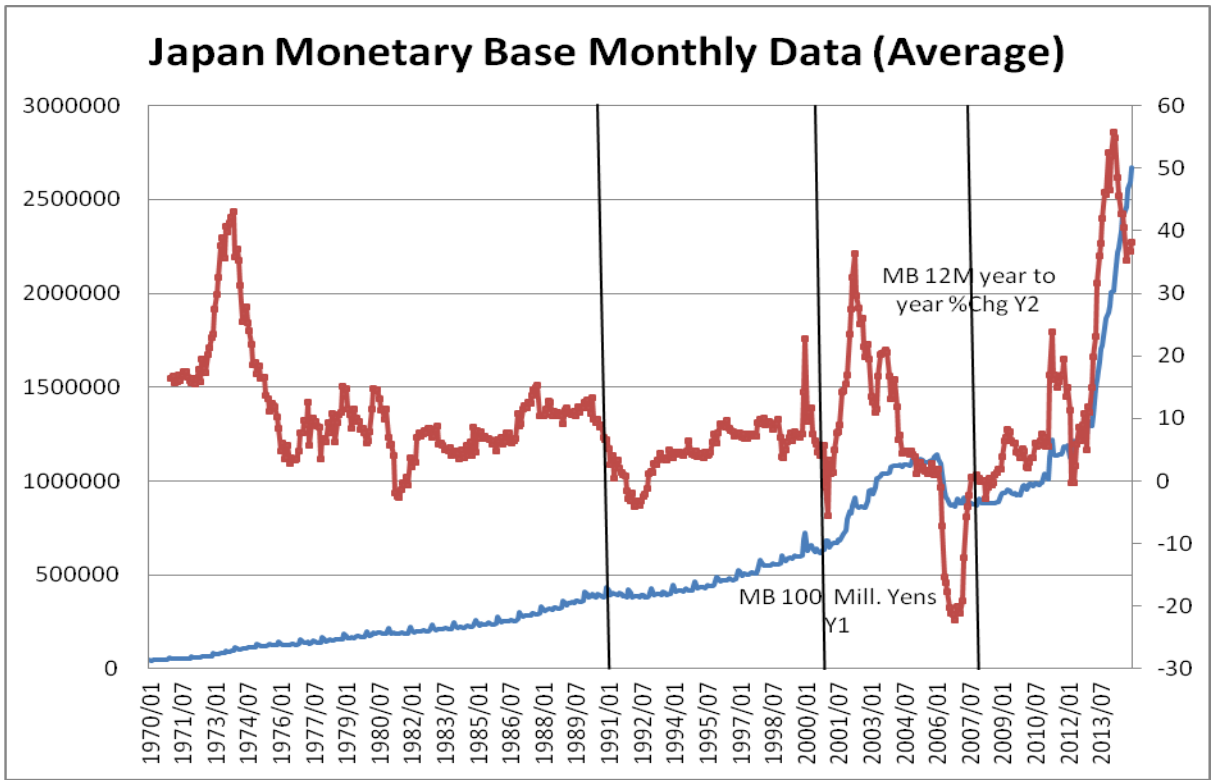

Figure 13 – Japan monetary base monthly data

As shown in Figure 14, after a period of relatively high volatility since the beginning of the 70s until the early 80s, the 12-month moving standard error of the yty rate of growth of the average monetary base was generally below 2 from 1983.03 to 1999.11. During the period of the financial crisis, between 1990.11 and 1993.08, there was a slight increase in the volatility indicator with values frequently above 2. But, in general, the financial crisis did not have a noticeable effect on the volatility of the monetary base. In contrast, the period around the application of the first QE program (March 2001), presents an evident increase in the 12MMSE of the rate of growth of the average monetary base. From 2000.01 until 2005.01, the 12MMSE always registered values above 3, with a peak of 10.26 in April 2002. The period of strong deceleration of the monetary base, 2006.03 - 2007.07, also elevated substantially the volatility of the series.

There is a new period of relative low volatility between 2008.04 – 2011.02, but in March 2011 this indicator started to climb again, reaching the highest value of the sample employed, 14.52 in November 2013, a few months after the beginning of prime Minister Abe's expansionary program. Thus, as the experiences previously described in the US, the UK, and the Euro Zone, Japan's QE operations have produced a substantial increase in the volatility of the monetary base.

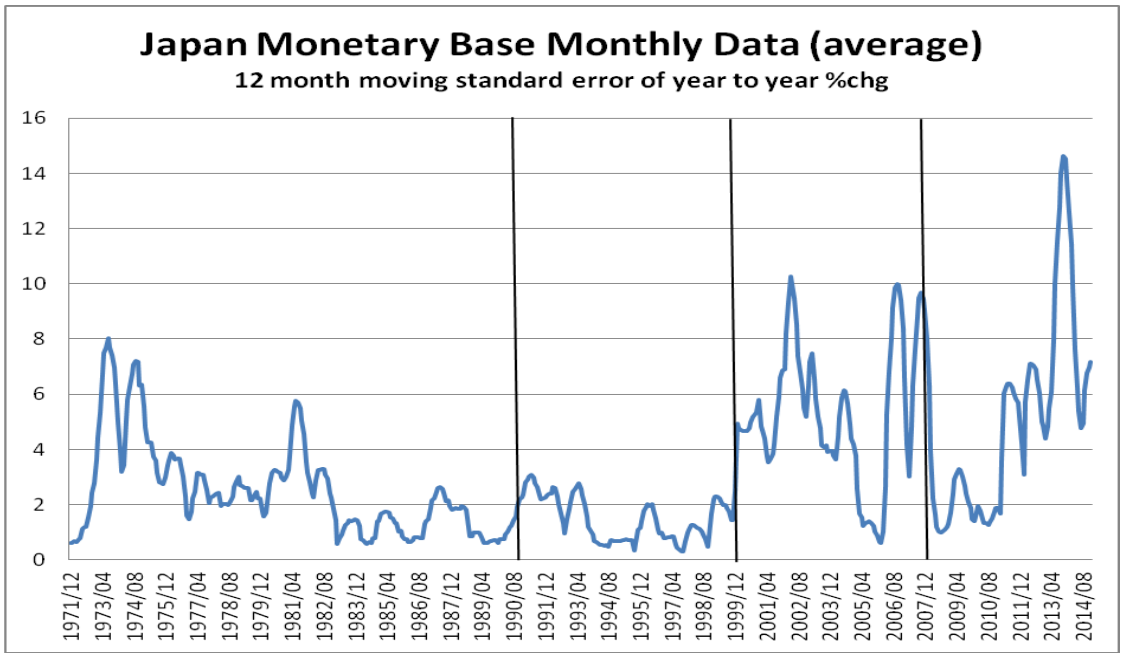

Figure 14 – The 12-month moving standard error of the yty rate

The evolution of the monthly values of M2 is presented in Figure 15. Before the 1991 financial crisis, M2 grew vigorously. From 1967.01 until 1979.12, M2 rate of growth on ayty basis was generally above 11%. It slowed down to a range between 7% - 11% during the period 1980.01 – 1987.08. During the period 1987.09 – 1988.10, M2 growth rate yty kept hovering 11%. From 1988.11 to 1989.12 the yty rate of growth moved around 10%, and then again from 1990.01 to 1990.10, the yty rate registered values over 11%. But since the beginning of 1991, M2 started to grow at a much slower pace, presenting consecutive values under 1%, and six negative values yty, in the period 1992.06 – 1993.04. Since February 1991 until November 2014, M2 only grew once, in February 1998, at 5% yty.

During the period of rapid growth of the monetary base under the first QE program (2001.08 – 2002.12), the rate of growth yty of M2 was mostly above 3%. The implementation of the second QE program under Abe's administration has produced a modest acceleration in the yty rate of growth of M2. The yty rate of growth of M2from 2013.02 until 2014.11 has been mostly above 3%, with some values higher than 4% between 2013.10 and 2014.01.

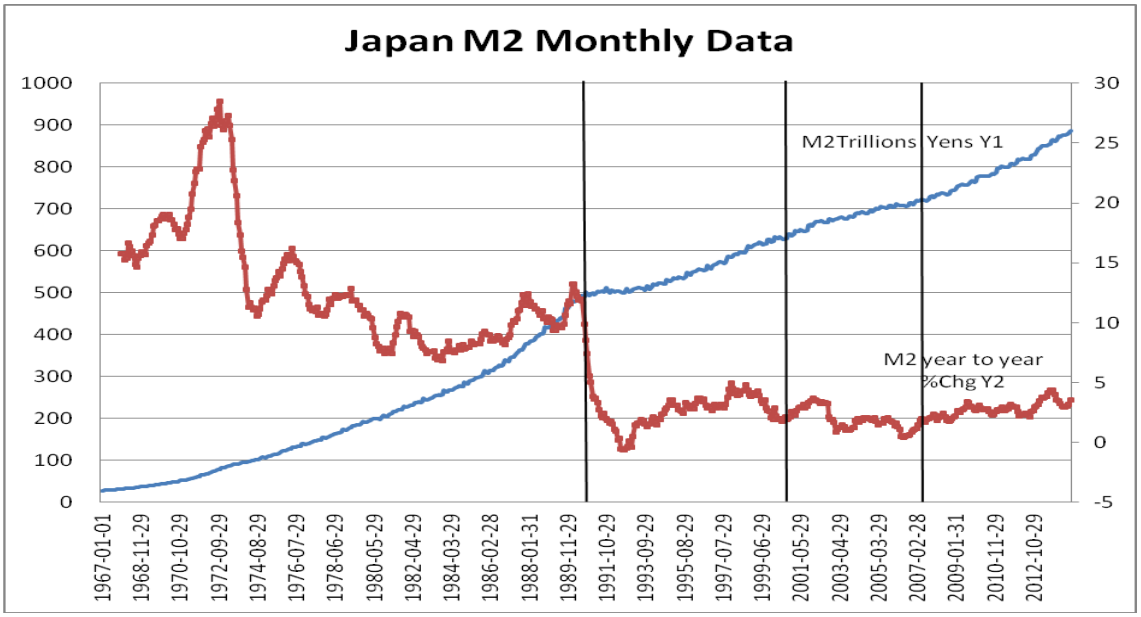

Figure 15 – Japan monthly data

Figure 16 displays the 12-month moving standard errors of the yty rate of growth of M2. The sharp fall in the rate of growth of M2 that started during the 1991 financial crisis, increased notably the volatility of the series, registering values above 2 between 1991.02 – 1991.11 However, the M2 series exhibits a relatively low volatility since the beginning of 1992 until the end of the sample period (2014.11). For most of this period, the values of the 12MMSE of the yty rate of growth of M2 have been below 1.

Hence, in the case of Japan, the QE1 (2001.08 – 2004.02) and the ongoing QE2 have produced strong and erratic expansions in the monetary base with little effects on the rate of growth of M2.

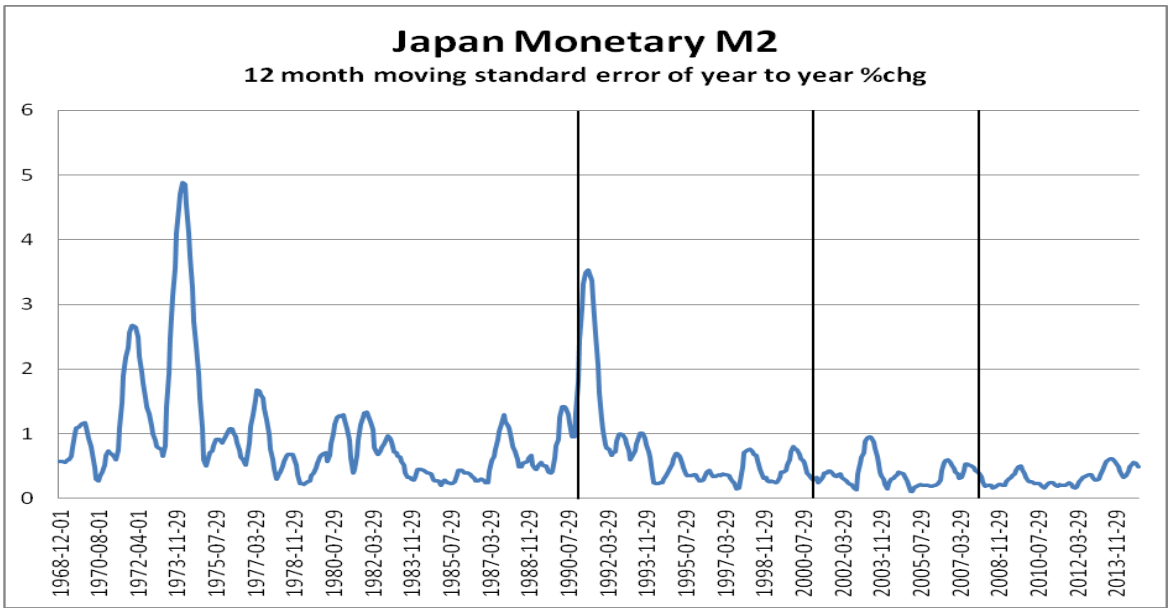

Figure 16 - The 12-month moving standard errors of the yty rate of growth of M2

Conclusion

This paper main argument is that Quantitative Easing (QE), as a general concept, is consistent with Friedman's core views about the role of monetary policy during financial crisis, but the specific way in which QE have been implemented by the Fed and other major central banks since the 2008 does not comply with Friedman's basic principles.

From a doctrinal point of view, QE can be traced back to Friedman's works during the sixties and some comments on Japan's situation after its 1991 financial crisis. Other monetarists such as Allan Meltzer have explained in detail how open market operations in long-term debt could make monetary policy effective in a zero interest rate environment. Support for QE cannot be found in the current dominant schools of thought in economics (New Classical and New Keynesian), that have minimized the role of monetary aggregates as a tool of economic policy.

Friedman's remarks on the necessity of an expansive monetary policy in Japan after the 1991 financial crisis cannot be taken as an open support to any type of QE arrangement. The paper presents evidence that Friedman backing of QE programs during episodes of financial turmoil rests mainly on what he (and Anna Schwartz) called the "monetary" effects of monetary policy and the requirement that monetary policy actions should be an stabilizing force in the economy. A QE program consistent with Friedman's tenets can be achieved through the use of outright open market operations to produce a significant (relative to "normal" times), and sustained increased in high power money capable of stabilizing the behavior of broader monetary aggregates such as M2.

Though Nelson (Nelson 2011) is a very serious and academically solid work, I consider that its attempt to connect Friedman's views to QE through the monetarist portfolio balance theory is misguided. The monetarist portfolio balance theory centers on the capacity of monetary policy to affect the path of the long-run interest rate relative to the short-run interest rate, but this is not the main theme in Friedman's argument in favor of QE operations. The portfolio balance theory is neither necessary to establish a link between Friedman's ideas on QE and the intensive use of open market operations in long-term securities in the implementation of the QE programs since 2008. In his discussions on the "bills only" doctrine, Friedman makes clear that open market operations in

long-term government debt are a valid instrument to expand high-powered money in order to attain the "monetary" effects.

From an empirical perspective, the paper examines the QE experiences in the United States, the United Kingdom, the European Union and Japan. In all these cases, the QE programs have been implemented through enormous jumps in the rate of growth of the monetary base/central bank's assets that cannot be sustained for long and rapidly revert to low or negative rates. When a new round of QE is approved this cycle repeats again. This modus operando translates into a huge increase in the volatility of the rate of growth of high-powered money/central bank assets. Moreover, the QE programs have been ineffective in terms of maintaining the rate of growth of M2 at the levels observed in "normal" times, and in all cases, except for Japan, has raised the volatility of this monetary aggregate. From this analysis conclude, that the type of QE programs put in practice by the Fed and other major central banks since the 2008 financial crisis (Japan since 2001), do not comply with Friedman's views about the role of monetary policy during periods of financial distress.

Fawley and Neely (2013) detailed analysis illustrates an important point that contributes to explain why QE programs implemented since the 2008 financial crisis were not able to sustain a stable rate of growth of the monetary base/central bank assets. The Fed and the BOE that operate in economies where bond markets are relatively more dominant, executed their QE programs mainly through bond purchases, but in many occasions, especially the Fed, offset the effects of these purchases on the monetary base/central bank assets using different types of sterilization operations. On the other hand, the ECB and the BOJ that operates in economies that rely relatively more on banks, implemented their QE operations mainly through loans to the banking system, and also sterilized some of their asset purchases.

Fawley and Neely (2013) also note another aspect of the QE programs of these four major central banks that separate them from Friedman's principles: they were initially centered in reducing financial market distress, but they were soon deviated to a variety of purposes, including hitting inflation targets, stimulating the real economy, and containing the European sovereign crisis.

Fawley and Neely (2013) corroborate an important empirical finding of this paper: that while the monetary expansion policies of all four central bank examined led to sharp increases in the monetary base, none led to sharp increases in broader monetary aggregates.

From some of Friedman's arguments previously reported, I think that he would have coincided with Taylor's (2015) position that even during a period of financial instability, monetary policy should preserve, as much as possible, a rule-like predictability.

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Theoretical and Practical Research in Economic Field

DOI: http://dx.doi.org/10.14505/tpref.v7.1(13).03

Policy Rate Divergence in the ASEAN-4: Impact of Global Risk Perception and Financial Market Characteristics

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Suggested Citation:

Fermo, L. B. (2016). Policy Rate Divergence in the ASEAN-4: Impact of Global Risk Perception and Financial Market Characteristics. TPREF (Volume VII, Summer), 1(13): 30-52. DOI:10.14505/tpref.v7.1 (13).03
Available from: http://www.asers.eu/journals/tpref/curent-issue.

Article's History:

Received May, 2016; *Revised* June, 2016; *Accepted* July, 2016.

Acknowledgement:

The author gratefully acknowledges the financial support by the Japan Society for the Promotion of Science's (JSPS) Ronpaku Program. The author also wishes to thank Colin McKenzie, Felipe M. Medalla, and Akira Kohsaka for their helpful and constructive comments on earlier drafts of this paper.

Abstract:

Monetary policymakers want to know how much influence they can exert over market interest rates. Looking at how far and when benchmark market interest rates are deviating from policy rates provide them with a perspective of how the degree of influence of the central bank's policy rate over market interest rates changes over time, and help them understand what factors are causing the divergence. The focus and main contribution of this study is that for four small, open emerging market economies of the Association of Southeast Asian Nations (ASEAN), the gap between policy rates and market interest rates follows a Markov-type regime-switching process. In addition, the study finds that some domestic financial market characteristics—particularly the degree of foreign ownership of the relevant money markets, and global factors that drive foreign risk-taking and search for yield—particularly indicators of global risk perception are the significant determinants of the transition probabilities.

Keywords: Markov, regime-switching, ASEAN-4, monetary policy, divergence, global risk appetite, Trilemma

JEL Classification: E5, F31

1. Introduction

In this study, we would like to: establish that the gap between the policy rate and the short-term market interest rate in the case of the Philippines, Indonesia, Malaysia, and Thailand follow a Markov-type regime-switching process and test further whether the transition probabilities of the regime-switching in the rate gap for these economies are time-varying, by identifying what variables, either common to emerging markets such as measures of global risk appetite and US monetary policy, or idiosyncratic factors relating to the financial market characteristics of each economy, are driving the transition probabilities. We will use a Markov-Switching (MS) Regression model with time-varying transition probabilities (TVTP) based on Filardo (1994, 1998).

Establishing what factors are driving the switches in the rate gap can help policymakers understand why there are periods of divergence, and at the same time identify those indicators which would then be important to follow closely and possibly be used as early warning system or leading indicators to help anticipate periods of weaker influence versus periods of stronger monetary policy influence, or as part of an interest rate forecasting model. Our objective in this paper is to characterize the data on the rate gap, rather than explicitly model its

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behavior. The paper goes as follows: Section 2 summarizes the literature in this area of study. Section 3 discusses the characteristics of financial markets in the ASEAN-4, the data used, and the empirical methodology. Section 4 presents and analyses the empirical results. In Section 5 we conclude and submit areas for future study.

2. Review of Related Literature

In theory, money market rates and Treasury bill yields are expected to be at a premium over overnight monetary policy rates reflecting term, liquidity, and credit or counterparty risk factors. This relationship reflects the interest rate channel which remains as the key transmission channel of monetary policy in emerging markets (EMs) (Mohanty and Turner 2008). For the purposes of this paper, the degree of influence or the effectiveness of monetary policy is represented conceptually by the gap computed as the policy interest rate less the benchmark interest rate identified for four ASEAN-4 economies (ASEAN-4), Indonesia, Malaysia, the Philippines and Thailand, and we term this gap as the rate gap. The closer or higher the benchmark interest rate is compared to the policy rate, the more effective monetary policy is in influencing market interest rates. Policymakers are not concerned about periods of close to zero or negative rate gaps because they are expected given term and the other risk factors we enumerated above. More importantly, low or negative rate gaps represent periods when the degree of influence of the central bank policy rate is the strongest.

However, it is during those periods when market interest rates fall below the policy rate - the high rate gap periods - when policymakers are most worried. Given that the relevant market interest rate acts as a benchmark for lending rates in the transmission process, a positive and high rate gap means that the impact of policy rates on lending rates are believed to be blunted. This is a concern for central banks because when market interest rates are below the policy rates, they could translate to lending rates which are lower than the levels which are consistent with the central bank's forecasts, its intended policy stance as well as its targets for policy objectives.

There is a girth of literature where the time series properties of short-term market interest rates are estimated. However, only a few studies such as Panigirtzoglou *et al.* (2000) and Affandi and Peiris (2012) have studied empirically the behavior of the divergence of market interest rates from the policy rates used by central banks. Panigirtzoglou *et al.* (2000) looked at the volatility and persistence of the divergences between short-term market interest rates and policy rates using Brenner *et .al.'*s (1996) class of models that combine a model of the levels and a volatility GARCH model of market interest rates for Germany, Italy and the United Kingdom. More recently, Affandi and Peiris (2012), assessed whether the gap between the central bank policy rate and Treasury bill rates (but computed as Treasury bill rates less the policy rate) has blunted the effectiveness of the interest channel of monetary policy for the Philippines. They, too, utilized a single-regime GARCH model where the conditional variance process accommodated both volatility clustering and dependence on the level of interest rate as in Panigirtzoglou *et al.* (2000) and Brenner *et al.* (1996). Affandi and Peiris (2012) also estimated the persistence and volatility of the deviation of market rates from policy rates, the determinants of the divergence of market rates from policy rates, and the interest rate transmission mechanism and its relation to prevailing lending conditions in the Philippines. Based on their findings, liquidity, portfolio flows, fiscal factors and the supply of government securities appeared to be driving the rate gap for the Philippines, but proposed that global factors such as monetary policy in advanced economies and global liquidity may also be driving the divergence.

In contrast to these two studies which utilized single-regime GARCH models, we relax the assumption of a single regime in this study, in favor of a Markov-type regime-switching regression model for the rate gap. Regime-switching models in general allow us to model data generated by shifting or changing economic mechanisms within a single unified model, and are therefore more complex, flexible structures. To account for the possibility that the economic relationships that generate the gap between the policy rate and the market interest rate undergo a finite number of changes over the sample period, the coefficients in this model are different in each regime. Although the regimes are unobserved, the coefficients can be estimated, and probabilistic statements can be made about the relative likelihood of the occurrence of the regimes, conditional on given information set (Gray 1996).

The Markov-switching mechanism was first considered by Goldfeld and Quandt (1973). Hamilton (1988, 1989) introduced the fixed transition probability (FTP) Markov-switching model and applied it for use in dynamic macroeconomic analysis. As an extension of the FTP Markov-switching model to incorporate time-varying transition probabilities, Filardo (1994) developed a first-order Markov process with state-dependent transition probabilities governing the switching between regimes. In this time-varying transition probability (TVTP) Markov-switching model, transition probabilities are allowed to vary with variables such as the strength of the economy, deviations of fundamentals from actual values, and other leading indicators of change (Filardo 1998). His work on

the Markov-type regime-switching TVTP model was first applied to business cycle analysis for the US. As of this writing, there is yet no published study in the literature delving on the implication of changing global risk appetite and financial market idiosyncrasies on the divergence between the policy rate and the benchmark interest rate. The application of Markov-switching regression as an empirical technique for data on the rate gap and its relationship with global factors and financial market characteristics are also relatively new and more so for emerging Southeast Asia as a group.

In identifying potential variables that could account for the switching in the rate gap, the literature points out that while central bank objectives affect the level and direction of the policy rate, financial market characteristics affect the *sensitivity* of asset market yields to international investment flows. On the other hand, global factors such as the perception of risk on EMs that is prevailing in global markets, US monetary policy and global liquidity affect the *attractiveness* of these asset markets to foreign investors. Because these two classes of factors affect either the supply, the demand or the price of the relevant asset, both affect movements in benchmark yield rates and hence, the rate gap. Cerutti *et al.* (2015) found in their study that financial market characteristics, such as liquidity in the recipient country and composition of the foreign investor base, rather than macroeconomic fundamentals, most robustly explain some emerging countries' sensitivity to global factors affecting capital flows. The taper-tantrum in May-June 2013 illustrated that not all EMs are equally exposed to the same changes in global conditions. Meanwhile, Ahmed et al (2015), Forbes and Warnock (2012) and Ghosh *et al.* (2014) have documented the importance of global factors such as advanced economy interest rates and global risk appetite in affecting capital flows to small open economies. Cerutti *et al.* (2015) noted as well that various episodes of large, on and off waves of non-resident capital flowing to and from EMs over the past decade has re-emphasized the importance of common factors in driving global capital flows. Milesi-Ferretti and Tille (2011) and Rey (2015) are in consensus on the significant impact of US monetary policy, the supply of global liquidity, and global risk perception in helping explain the flow of foreign capital into asset markets of EMs. What is central in all the literature we have discussed above is that various global factors including measures of risk perception, as well as the idiosyncratic characteristics of the relevant asset markets, are the relevant variables in understanding the movements in the rate gap of the ASEAN-4 because they are the main drivers of non-resident capital flows that affect both the policy rate and the benchmark interest rate and hence, the rate gap.

It is interesting to note further, that the monetary policy objectives of the central bank could also have an effect not only on the policy rate per se, but also on either the sensitivity of relevant asset markets or the attractiveness of these asset markets to international flows, or both. This is because the central bank's decision among three objectives: monetary independence, exchange rate stability, and financial openness has some bearing on not only the policy rate itself, but also on the wedge between the policy rate and the market interest rate. In understanding the behavior of the rate gap and the factors that are driving its recurring cycle of convergence and then divergence, it is therefore helpful to look at it within the context of the Impossible Trinity principle. For one, an important factor to consider in understanding the movements in the rate gap in emerging economies is that what is "chosen" by the domestic financial market as the benchmark rate with which to price loans - the direct channel by which policy interest rates are transmitted into lending rates and ultimately into prices and output in Ems - are the yields for assets which are attractive to both resident investors as well as non-resident ones. As long as this asset market is liquid enough and volumes are adequate, it becomes the natural "benchmark" interest rate. For the same reason, this benchmark asset market is potentially highly responsive to non-resident investment flows.

The theory of the Impossible Trinity or the Trilemma in fact usually requires an extremely high degree of substitutability between domestic and foreign assets, but this perfect substitutability is rarely seen in the real world. What we do see, however, is that the yields of assets which are invested upon by both residents and non-residents alike is the most responsive to both monetary policy and global factors so that often, asset markets with this characteristic is where we can observe the Trilemma story coming into play. We can say descriptively that the constraints of the Impossible Trinity become binding during periods of positive and high rate gaps in the relevant asset markets, whereas the Impossible Trinity constraints become loosened during those periods of close to zero or negative rate gaps or when the benchmark rate is close to or higher than the policy rate. Periods of high global risk premia in emerging economies act as a "natural wall" against disruptive capital flows, so that in this environment, impossible trinity constraints have been loosened because the third side of the Trilemma triangle—perfect capital mobility—appear to be irrelevant because high risk premia acts as some form of a natural barrier against volatile or yield-seeking foreign capital. Meanwhile, during periods of low global risk premia when this natural wall disappears, the reverse is true.

The literature on global financial market analysis also noted that an important repercussion of both the Asian financial crisis (AFC) and the global financial crisis (GFC) relevant to our study at hand is that the financial system of emerging Asian economies became entrenched in an environment where some kind of a risk-on, risk-off (RoRo) cycle in short-term foreign investment flows prevails. Grenville (2011) recognized this as well, describing how global investors have been taking advantage of the opportunities from interest rate differentials in emerging countries in their favor, in waves of confidence with retreats or sudden stops when confidence evaporates and the rational investor exits, analogous to a bank run. He adds that these sudden changes in assessment are explicable in terms of global investors' imperfect knowledge, so that shifts in assessment can be triggered by the arrival of news, or by other investors' actions. In the end, these leave emerging countries as the reluctant hosts to non-resident short-term capital flows, which cause volatility not only to exchange rates, but to asset prices as well. Indeed, global investors appear to be caught in a binary view of the world and as a result, their appetite for risk rises and falls over time.

Risk-on, risk-off behavior is particularly true for portfolio funds, where periods of perceived low financial risk encourage investors to take risk, therefore creating a risk-on situation, and periods of perceived high financial risk cause investors to take less risk, creating a risk-off situation.[2] RoRo could cause investors to behave in a herd-like manner and is more likely to occur in times of economic uncertainty.[3]Hence, the switching between high and low appetite for emerging market bonds and securities began to happen more frequently and in greater intensity in the fallout to the GFC, and the subsequent adoption of unconventional monetary policy by the US Federal Reserve, the European Central Bank, and the Bank of Japan and, more recently, with the uncertainty about the timing of exits from such policies. The 2008 GFC, for example, is generally viewed as a risk-off year, when global investors reduced risk by selling existing risky positions and moving money to either cash positions or low to no-risk positions, such as US Treasury bonds. Meanwhile, during 2009-2010, global funds were invested in higher-risk instruments in search of better yields, and when EMs showed a higher degree of resilience and registered better economic and inflation performance than the advanced economies, global funds were transferred into emerging financial markets as a result - a risk-on period.

We can then relate these three themes together: the regime switching in the rate gap, the risk on, risk off or RoRo cycle in global investor appetite, and the Trilemma story. The regime-switching in the rate gap is potentially driven by changing global risk perception which, in turn, is driven by the risk-on, risk off behavior of short-term foreign capital. There is some kind of "natural wall" provided by high global risk perception during risk-OFF episodes, which discourages the influx of these disruptive, short-term foreign capital flows especially those of the carry trade variety into relevant EM financial markets. Meanwhile, during episodes when global risk premia are low - the risk - O Nepisodes—this natural wall is gone and the Trinity constraints become binding, but only in the asset markets that are accessible and attractive to speculative, short-term non-resident flows, such as portfolio capital. In this sense, we can find unique regimes in EMs when the Impossible Trinity story is prevailing not in the entire financial system, but only in those bond markets which are both *attractive* and *sensitive* to non-resident portfolio flows.[4]Policy-overwhelming international capital flows and its implications to monetary policy are central to the Impossible Trinity[5] story.

Aizenman and Ito (2014) and Ito and Kawai (2014) both shared how for small, open emerging economies, the Trilemma policy constraints are binding such that given the varying degrees of free capital mobility in these countries, they are wrought with the challenges of disruptive capital flows to monetary policy. Based on a case study by Hsing (2012), there is a Trilemma situation in the Philippines, Malaysia, and Singapore, but he did not find evidence for a similar situation in Indonesia and Thailand. Hsing (2012) noted further that different

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[2] Geordie Clarke, Financial Times, http://lexicon.ft.com/Term?term=risk-on,-risk-off

[3] Aimee Steen, Financial Times, *Ibid*.

[4] Foreign direct investment and other long-term flows have an indirect impact on benchmark interest rates, and an entirely different impact on policy rates. As these types of capital flows are also driven by a separate set of global indicators, the dynamics and effects of these types of flows are outside of the purview of this study, and we reserve its study for future research.

[5] The purest or "strict" view of the policy constraints under the impossible trinity is that countries that have barriers to capital mobility and a floating exchange rate can achieve a substantial degree of monetary policy independence, while countries with a fixed exchange rate but an open capital account would attain a lower level of monetary policy independence (Obstfeld *et al.* 2005). A more nuanced view, however, is that the impossible trinity represents trade-offs, with an economy gaining greater monetary independence as it either allows more exchange rate flexibility or as it prohibits some types of international capital flows permanently or restricts them during certain periods or episodes (Rummel 2014).

macroeconomic policy combinations prevailed in these three economies over time, rendering the ability to switch to different policy combinations in order to deal with major economic events, such as a crisis.

3. Description of the data and empirical framework used

a. The Data

In this study, we use the available monthly data from January 2000 to May 2015 for each of the four member countries of the ASEAN-4—the Philippines, Indonesia, Malaysia, and Thailand. In measuring the rate gap that we will be using in the estimation, we have identified the appropriate short-term benchmark interest rates for the four economies being reviewed based on stylized facts in the literature as well as through central bank consultations describing the asset markets which are most liquid and attractive to both resident and nonresident investors. Meanwhile, the main policy rates were obtained from each of the ASEAN-4 central banks. As discussed in the previous section, the rate gap represents the degree by which the monetary authority maintains its influence or control over the market interest rates prevailing in each of the four economies: the lower the rate gap, the higher the degree of influence of monetary policy over short-term market interest rates and vice versa. All interest rate data series were taken mainly from the CEIC database augmented by respective central bank data, as needed. Financial market data were either in monthly or quarterly frequency obtained largely from the Asian Bonds Online database of the ADB, augmented by central bank data, where applicable. Data available, however, were not uniform in frequency and in terms of the number of observations, and can vary depending on each specific data and for each country. Appendix Table 1 shows in detail further information on data definitions and specific sources and series names used in the empirical estimation, as well as the expected signs for each variable in the empirical exercise.

The interest rate gap

Policy interest rates are expected to anchor money market rates, whereas Treasury bill (Tbill) yields act as benchmarks for deposit and loan rates. As noted earlier, money market rates and Tbill yields should be higher than overnight policy rates in theory, reflecting term, liquidity and credit risk factors. In the ASEAN-4, however, there were specific periods when benchmark interest rates have become significantly lower than the policy rate. Figure 1 displays the movements of the policy rate, the benchmark interest rate and a risk premium measure in each of the four countries between January 2000 and May 2015. We can see from Figure 1 how the divergence between the main policy rate and the short-term benchmark interest rate in the ASEAN-4 has evolved over time. The gap between the dotted line and the solid line in the figure is the rate gap, while the bars are the levels of sovereign risk premium in basis points. What we can surmise from interest rate gap data is that the magnitude of the divergence and convergence between the policy rate and the benchmark interest rate and the timing of the regime-switching in the rate gap appear to vary over time for the four economies, so that the dynamics behind rate gap movements could be different for each economy. This variation and the potentially different impact of global factors and idiosyncratic financial market characteristics on the rate gap would have been lost under panel data estimation. This holds support to our use of a Markov-switching, time-varying transition probability model in order to understand the dynamics and drivers of the regime-switching rate gap for each individual country in the ASEAN-4.

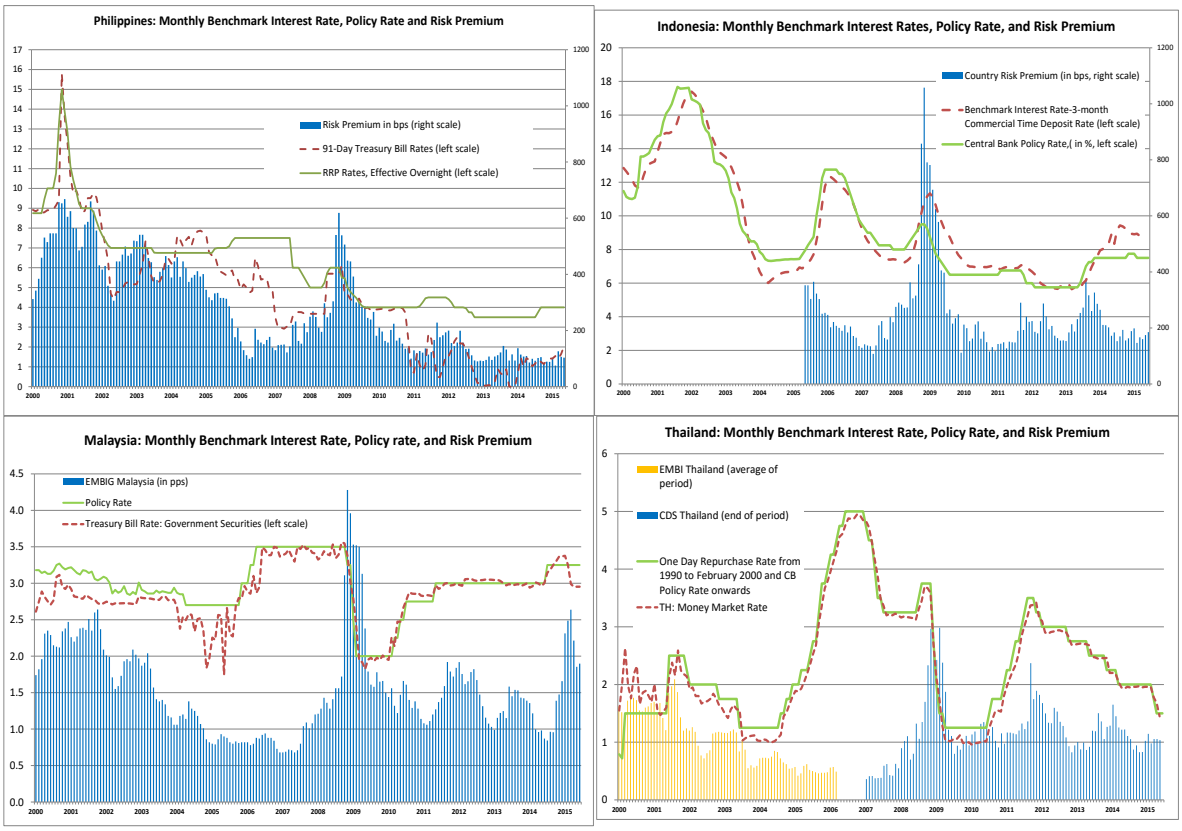


Figure 1 - The Rate Gap vs. Country Risk Premium in the ASEAN-4

For the Philippines, for example, what is observable from Figure 1 is that there are two distinct alternating cycles of larger and then smaller or zero to negative gap between the policy rate and the short-term benchmark interest rate, associated with increasing country risk premiums versus periods of declining country risk premiums, respectively. This trend is also shared by Indonesia where recently, money market rates have fallen well below the policy rate. In Malaysia, Sharifuddin and Ling (2014) pointed out that due to the surge in portfolio flows in 2007, and then again in 2010 and 2011, the entire yield curve fell below the overnight policy rate. In Thailand, the decline in spread of country sovereign bond prices to risk free bond prices (CDS spreads) in 2005, and the lower Emerging Bond Market Index+ (EMBI+) spreads for Thailand in 2007 and then again in 2009 to 2011 was associated with one-month Tbill rates falling below the policy rate.

Financial market characteristics

Data on financial market characteristics, primarily the investor profile of local currency bonds as well as foreign currency bonds which we have hypothesized in the previous section as potential variables affecting the sensitivity of the rate gap, are available either a monthly or quarterly frequency. The majority of the data available begins in January 2000 and ends in March 2015 and were obtained primarily from the Asian Development Bank's (ADB) Asian Bonds Online database with url www.asianbondsonline.adb.org, as well as the central banks and finance ministries in the case of countries whose data are not available in this website.

Data for the Philippines' foreign holdings of local currency-denominated (LCY) bonds from the Department of Finance is available from 2005 to 1Q2015, and non-residents' vs. residents' holdings of foreign currency denominated (FCY) bonds is available from the Central Bank of the Philippines (BSP) from 2006 to 2015 Q1. The frequency of the available data is quarterly for the more recent period and annual for earlier years. Meanwhile, data for Indonesia, Malaysia and Thailand on the foreign holdings of LCY bonds are reported in AsianBondsOnline.com as a quarterly series. As such, we used the ECOTRIM© program to interpolate all three sets of data into a monthly frequency, using unvaried methods. We recognize here there are potential drawbacks of such an interpolation method.

Based on data for the size and domestic financing profile of asset markets in each of the four economies, we see that the Philippine asset market is the thinnest in terms of the volume of domestic financing composed of domestic credit, bonds, or equity among the ASEAN-4, followed by Indonesia. This is especially so for the bond market, as the Philippine bond market amounts to only US$D21.0 billion in 2000 and US$104 billion in 2014,

which is about 28% and 21% of total domestic financing, respectively, compared to Indonesia's US$52.8 billion in 2000 and US$123 billion in 2014 (or about 32.0% and 12.3% of the total),Malaysia's US$68.7 billion in 2000 and US$316 billion in 2014 (or about 22.0% and 25% of the total) and Thailand's US$31.0 billion in 2000 and US$281.3 billion in 2014 (or 18.0% and 27% of the total). This observation will be especially relevant in the analysis of empirical results later on.

Meanwhile, in terms of the investor profile of LCY bonds, banks accounted for the biggest share in the total holdings of LCY bonds historically for the Philippines, Indonesia, Malaysia and Thailand. More recently, however, bank holdings have been on a declining trend, accompanied by a trend increase in foreign holdings of government securities. Graphical inspection would in fact show us some sort of an inverse relationship between foreign holdings and commercial bank holdings—while foreign holdings were on the rise, commercial bank holdings of government securities (GS) were on a declining trend in all four economies. Nevertheless, in the case of both the Philippines and Indonesia, commercial banks still account for the biggest share of LCY bond ownership as of 2014 and early 2015.

In terms of the investor profile of foreign-issued and foreign currency-denominated government securities or FCY bonds, we find that historically, the Philippines had the biggest level of FCY debt in US$ value among the ASEAN-4. Indonesia, however, has recently surpassed it with the steepest climb in the levels by the first quarter of 2015. FCY bonds issued by the government as a share to total issuance is also the largest in the Philippines at about 80 percent historically, followed by Indonesia at about 50 percent. In Malaysia, the government's share of FCY bond issuance has shrunk to about 5.0 percent of the total by Q1 2015, where as banks and financial institutions' share climbed to about 55.0 percent for the same period. Corporate account for the biggest share of FCY bond issuance in Thailand, peaking at about 65.0 percent in 2009, and falling to around 40.0 percent in Q1 2015. The share of the corporate sector in FCY, is also high in Malaysia, following Thailand, at about close to 40.0% on the average.

Global factors

In Section 2, we proposed that global factors are expected to influence the *attractiveness* of the benchmark bond markets to global investors for the ASEAN-4. The global indicators we have used were taken mainly from Bloomberg, the International Monetary Fund (IMF) online database, the CEIC Economic database, the Emerging Portfolio Fund Research, Inc. (EPFR) Web interface, as well as the Institute of International Finance (IIF) online database, using data series available from 2000 to Q1 or March 2015.

We computed and/or obtained several indicators for changes in global risk perception associated with the emerging market assets under review. One is the differential between the interest rate on 10-year dollar-denominated sovereign debt of each country and the interest rate on US 10-year Treasury Notes, which has become a benchmark for most emerging countries in tracking global markets' view of country risk vis-à-vis safe haven assets, such as US Treasuries. Another more commonly used indicator of global risk perception in financial market analysis, and among the most readily available, consist of market information extracted from JP Morgan's Emerging Market Bond Index (EMBI)spreads as well as the spreads of country sovereign bond prices to risk-free bond prices(CDS), both available from Bloomberg. Changes in the market-implied default probabilities extracted from EMBI+ Global Index and the EMBI Index per country, as well as the 5-year CDS premia on sovereign debt are often used in the literature and by market participants as an indirect measure of the market's perception of sovereign risk. We also tested for the significance of HSBC's Risk On – Risk off (RORO) index in the analysis. This index takes the rolling correlations between the daily returns of the 34 assets they monitor around the world and combines them into a single index. HSBC constructed the index by using principal component analysis to decompose the 34 asset return time series into 34 principal components, which are mutually uncorrelated variables that explain the observed asset returns.

What we finally used in the empirical estimation as the main country-specific risk premium data, which also captures the RoRo, or risk-on, risk-off episodes of global investments in the empirical analysis for each of the ASEAN-4, is the 10-year dollar-denominated sovereign bond rate minus 10-year US Treasury Note for the Philippines and Indonesia, and the EMBI Index spreads for Malaysia. For Thailand, we have combined the CDS data which is available from January 2000 to February 2006 only, with the EMBI Thailand data, which is available from January 2007 to March 2015, in order to have a longer, more useful data series to be used as the risk premium indicator specific to Thailand. The EMBI+ Global spreads as well as HSBC's RORO Index (HSBC Global Research 2012), meanwhile, serve as global indicators of risk perception that is common to all four emerging economies.

Apart from the individual countries' and global risk premium data, the other global factors we tested as possible repressors of the regime-switching in the rate gap as well as determinants of the transition probabilities consist of global indicators that represent US monetary policy, measures of global liquidity or bond flows going into each emerging market, as well as global volatility indices relevant to emerging markets. These include the US real Federal Reserve Fund rates, the US 10-year Treasury as well as US secondary market yields, EPFR's Bond Flows data going into the Philippines, Indonesia, Malaysia and Thailand and the Chicago Board Options Exchange (CBOE)'s Volatility Index[6] or VIX data.

Further information on the sources, any transformation on the data used, as well as the expected signs for the variables used as regress or of the rate gap or as determinants of the transition probabilities in the study are summarized and presented in Appendix - Table 1.

b. Empirical Framework: The Markov Regime-Switching Regression Model

Following Hamilton (1988) and Filardo (1994, 1998), we illustrate the Markov regime-switching regression process by assuming that the random variable of interest, g_t, follows a process that depends on the value of an unobserved discrete state variable S_t. We assume there are 2 possible regimes, and the process is said to be in state or regime m in period t when $S_t = m$, for m = 1, 2. The switching model then assumes that there is a different regression model associated with each regime. We assume an autoregressive process of the following form:

$$g_t - \mu_t(m) = \varphi_m (g_t - \mu_t(m)) + \varepsilon_t m = 1,2 \quad (1)$$

Where $\mu_t(m)$ is given by:

$$\mu_t(m) = \beta_m, \text{ for } m = 1,2 \quad (2)$$

and ε_t is an identically, independently (i. i. d.) and normally distributed random variable. From (13), if $\varphi_1 = \varphi_2$the coefficient of the AR (1) process will be regime independent. If $\varphi_1 = \varphi_2 = 0$, there will just be regime-dependent constants in the regression model. It is assumed further that the probability of being in a regime depends on the previous state, that is, it is governed by a first-order Markov process[7] so that

$$P(S_t = j \mid S_{t-1} = i) = P_{ij}(t) \quad \text{for } i = 1, 2; j = 1,2. \quad (3)$$

The Basic Model assumes that these probabilities are time invariant, so that $P_{ij}(t) = P_{ij}$ for all t. Clearly, the transition probabilities must satisfy $P_{i1} + P_{i2} = 1$. The transition matrix governs the random behavior of the state variable, and is given by

$$P = \begin{pmatrix} P(S_t = 1 \mid S_{t-1} = 1) & P(S_t = 2 \mid S_{t-1} = 1) \\ P(S_t = 1 \mid S_{t-1} = 2 & P(S_t = 2 \mid S_{t-1} = 2 \end{pmatrix} = \begin{pmatrix} \mathbf{P}_{11} & 1 - \mathbf{P}_{11} \\ 1 - \mathbf{P}_{22} & \mathbf{P}_{22} \end{pmatrix} \quad (4)$$

Our Basic MS-Regress Model refers to the combination of (2) and (4). We are also considering time-varying transition probabilities (or TVTP) model where the transition probabilities may postulated as being functions of some of the exogenous or predetermined variables, so that the transition probabilities may vary with time. In this case, instead of (4), the stochastic process on S_t can be summarized by the transition matrix:

$$P(S_t = s_t \mid S_{t-1} = s_{t-1}, z_t) = \begin{pmatrix} \mathbf{P}_{11}(z_t) & 1 - \mathbf{P}_{11}(z_t) \\ 1 - \mathbf{P}_{22}(z_t) & \mathbf{P}_{22}(z_t) \end{pmatrix} \quad (5)$$

Where the history of the economic indicators variables is $z_t = \{z_t, z_{t-1},\}$. $P_{11}(z_t)$ and $P_{22}(z_t)$ are given by:

[6] VIX is a trademarked ticker symbol for the CBOE Volatility Index, a popular measure of the implied volatility of S&P 500 index options calculated by the Chicago Board Options Exchange (CBOE). Often referred to as the fear index or the fear gauge, the VIX represents one measure of the market's expectation of stock market volatility over the next 30-day period.

[7] See also Filardo (1998) and Kim and Nelson (1999) for a more thorough analysis of the model and its estimation.

$$\mathbf{P}_{11}(z_t) = \frac{exp(z_t\alpha_1)}{1+exp(z_t\alpha_1)} \quad (6)$$

$$\mathbf{P}_{22}(z_t) = \frac{1}{1+exp(z_t\alpha_2)} \quad (7)$$

Where α_1 and α_2 are the vectors of coefficients to be estimated. When $\alpha_1 = \alpha_2 = 0$, the model reverts to being a model with time invariant transition probabilities.

It should also be noted that given (6) and (7):

$$\frac{\partial \mathbf{P}_{11}(z_t\alpha_1)}{\partial z_t} = \alpha_1 \mathbf{P}_{11}(z_t\alpha_1)(1-\mathbf{P}_{11}(z_t\alpha_1)) \quad (8)$$

$$\frac{\partial \mathbf{P}_{22}(z_t\alpha_2)}{\partial z_t} = -\alpha_2 \mathbf{P}_{22}(z_t\alpha_2)(1-\mathbf{P}_{22}(z_t\alpha_2)) \quad (9)$$

So that provided all the transition probabilities are nonzero, $0 < \mathbf{P}_{11}(z_t\alpha_1) < 1$ and $0 < \mathbf{P}_{22}(z_t\alpha_2) < 0$, then the sign of α_1 and $\frac{\partial \mathbf{P}_{11}(z_t\alpha_1)}{\partial z_t}$ are the same, while the sign of α_2 and $\frac{\partial \mathbf{P}_{22}(z_t\alpha_2)}{\partial z_t}$ are the opposite of one another. Of course,

$\frac{\partial \mathbf{P}_{12}(z_t\alpha_1)}{\partial z_t} = -\frac{\partial \mathbf{P}_{11}(z_t\alpha_1)}{\partial z_t}$, and $\frac{\partial \mathbf{P}_{21}(z_t\alpha_2)}{\partial z_t} = -\frac{\partial \mathbf{P}_{22}(z_t\alpha_2)}{\partial z_t}$.

In addition, the regression component of (1) can be extended to

$$\boldsymbol{\mu}_t(m) = \boldsymbol{\beta}_m + X_t'\boldsymbol{\gamma}_m + W_t'\boldsymbol{\delta}, \quad \text{for } m = 1,2. \quad (10)$$

Where $\boldsymbol{\gamma}_m$ and $\boldsymbol{\delta}$ are vectors of coefficients to be estimated, and X_t and W_t are vectors of explanatory variables. As can be seen from (8), the coefficients on X_t (W_t) are regime dependent (independent). Our Markov-Switching TVTP model refers to the combination of (5), (6), (7) and (8).

Equations (10) and (5) show how information can enter the model in two ways, one directly through the regression component and another indirectly through the transition probabilities, respectively. We hypothesize that indicators of global risk perception and other global factors as well as on financial market characteristics per country could affect both the transition probabilities and the regression component.

It is natural to want to test the null hypothesis that there is 1 regime against the alternative of 2 regimes, that is, to test whether there are any changes in the regime at all. However, the likelihood test of this hypothesis fails to satisfy the usual regularity conditions, because under the null hypothesis, some of the parameters of the model are unidentified. The best alternative is to use and compare the Akaike Information Criterion (AIC) for the MS Regressions for the models assuming 1 and 2, and this is what we have done in this study. The models with 2 regimes presented in section 4 dominated the similar model with only 1 regime in each of the four countries.

4. Presentation and analysis of results

All models are estimated using EViews 8. We begin the analysis with a discussion of our Basic MS Regress results, by looking at the coefficients and indicators of model performance of the basic Markov-switching models per country presented in Table 1 below. We denote this model as "Basic" because in this regression, we first look at the basic parameters without considering possible determinants for the transitional probabilities. The results are arranged so that the first regime represents the high rate gap regime, when the divergence between the policy rate and the benchmark interest rate is large. Conversely, regime 2 is the regime when the rate gap diminishes, or when the divergence between the policy rate and the benchmark interest rate is small or even

negative. We see this in the estimates of the intercepts β_1 and β_2 which, in our basic specification, are estimates of the average rate gap for regimes 1 and 2, respectively. Under this model specification, the Philippines recorded the highest average rate gap during regime 1, or the high rate gap regime, at 2.60%t over the 2000-2015 periods. Indonesia recorded the second highest average rate gap at 0.69%, followed by Malaysia and then Thailand.

During regime 2, or the low rate gap regime, the Philippines still had the highest positive average rate gap at 0.21%, but the rankings for the other countries changed. The Philippines' average rate gap is now followed by Malaysia at 0.02%. Indonesia and Thailand both recorded a negative average rate gap under regime 2. This means that for both Indonesia and Thailand, not only does the level of the benchmark interest rate approach or converge towards the level of the policy rate in regime 2, the low rate gap regime, but the market rates in fact surpasses the policy rates, thus resulting in the negative average rate gap levels. Among the four economies during the period in review, therefore, the Philippine policy rate appears to have the comparatively weakest influence over market interest rates, as it recorded the highest average rate gap for both regime 1 and regime 2, and always surpassing the second in rank and the rest of the ASEAN-4 countries by a significant amount. The average rate gap in Malaysia and Indonesia, are both relatively low, which is an indication that based on our definition of the rate gap, the central bank policy rate appears to have a relatively stronger influence or control over the benchmark interest rate in Malaysia and Thailand, compared to that in the Philippines and Indonesia.

Table 1. Results from the Basic MS Regression Model of Conditional Mean

	Variables	Philippines	Indonesia	Malaysia	Thailand
Number of Observations		**185**	**185**	**185**	**185**
Coefficients in Regression					
Constant Term, Regime 1	β_1	2.60	0.69	0.33	0.12
z-statistic		28.26***	10.45***	15.98***	9.63***
Constant Term, Regime 2	β_2	0.21	-0.99	0.02	-0.57
z-statistic		2.12**	-13.90***	1.88*	-12.53***
Parameters in Transition Probabilities					
Constant Term, Staying Probability in Regime 1	a_1	3.25	3.30	3.02	5.36
z-statistic		6.07***	6.12***	4.62***	4.94***
Constant Term, Switching Probability from Regime 2 to 1	a_2	-3.16	-3.45	-3.53	-4.01
z-statistic		-5.82***	-5.55***	-6.57***	-2.28**
Transition Probabilities					
Probability of staying in Regime 1	P11	0.96	0.96	0.95	1.00
Probability of switching to Regime 2, when already in Regime 1	P12	0.04	0.04	0.05	0.00
Probability of switching to Regime 1, when already in Regime 2	P21	0.04	0.03	0.03	0.02
Probability of staying in Regime 2	P22	0.96	0.97	0.97	0.98
Expected Durations, in number of months					
Regime 1		26.90	28.11	21.55	214.47
Regime 2		24.59	32.57	35.27	56.33

Source: Author's estimates.

APPENDIX TABLE 1: Data Definitions and Expected Signs

		Expected Sign of the Variable as Regressor	Expected Sign of the Variable as Driver of P11 and P21 transition probabilities	**Philippines**	**Indonesia**	**Malaysia**	**Thailand**
				2000-2015 May	2000-2015 May	2000-2015 May	2000-2015 May
The Dependent Variable: Rate Gap = Benchmark Interest Rate - Main Policy Rate of CB							
Sources: central bank websites, CEIC, Bloomberg	Benchmark Interest Rate			91-Day Treasury-bill (Tbill) Rates	3-Month Commercial Time Deposit Rate	Treasury Bill Rate: Government Securities	Money Market Rate
	Series Name			TBIL91	STRATE	STRATE1	STRATE3
	Main Policy Rate			Reverse Repurchase (RRP) Rate of the Bangko Sentral ng Pilipinas (BSP)	Central Bank Policy Rate, end period	Intervention Rate (or the 3-month Interbank Rate) for 2000 to March 2004; Overnight Policy Rate from April 2004-2015 latest	Policy Rate, month end
	Series Name			CBPOLRT	CBPOLRT	CBPOLRT	CBPOLRT
	Interest Rate Gap			INTGAP1	INTGAP2	INTGAP1	INTGAP2
Independent Variables Tested and Used in the MS-Regress Model with Conditional Mean and TVTP							
Financial Market Characteristics							
Sources: AsianBondsOnline.com, Bangko Sentral ng Pilipinas, PHI Department of Finance	Foreign Holdings of LCY: as % of total holdings of LCY and in Levels	+	+	FORLCY	FORLCY, FORLCYLEV	FORLCY, FORLCYLEV	FORLCY, FORLCYLEV
NOTE: Data series from AsianBondsOnline for Indonesia, Malaysia and Thailand are quarterly, so that they were interpolated using ECOTRIM into monthly data using Univariate methods; For the Philippines, data from 2005 to 2013 are annual from the Department of Finance (DOF), and 2014 to latest are either quarterly or monthly. In cases when available data is quarterly or annual for the Philippines, they were interpolated into monthly series using ECOTRIM, Univariate methods.	Foreign Holdings of GS; Foreign Holdings of Tbills in Levels	+	+	FORGSLEV	FORGSLEV, FORTBILEV	FORGSLEV, FORTBILEV	FORGSLEV, FORTBILEV
	LCY owned by Banks as % of Total	-	-	LCYBANK	LCYBANK	LCYBANK	LCYBANK
	FCY total outstanding in levels (USD Billion)	+	+	FCYTOTLEV	FCYTOTLEV	FCYTOTLEV	FCYTOTLEV
	FCYRES in levels from DOF	-	-	Resident holdings of FCY			
	FCYNONR in levels from DOF	+	+	Non-Resident holdings of FCY			
Indicators of Global Factors	*Indicators of per Country Risk/Return Perception*						
Sources: Bloomberg and AsianBondsOnline.com	Country Risk Premium (10-Year Sovereign Rate - US 10-Year Treasury Note)			RISKPR1	RISKPR	RISKPR	RISKPR
	EMBI Global per country and EMBI+ for PHI	-	-	EMBIPHIP, EMBIFPHI	EMBIINO	EMBIMAL	Combined EMBITHA and CDSTHA
	CDS per country	-	-	CDSPHI	CDSINO	CDSMAL	
	HSBC Bond Return per country	+	+	HSBCRET	HSBCRET	HSBCRET	HSBCRET
	Other Global Indicators						
	Real US Fed Funds Rate: USRealRt	-	-	USREALRT	USREALRT	USREALRT	USREALRT
	10-Year US Bond Yield Rate	-	-	USTENNOTE	USTENNOTE	USTENNOTE	USTENNOTE
	10-Year US Secondary Market Rate	-	-	USTENSEC	USTENSEC	USTENSEC	USTENSEC
	US Inflation	-	-	USINFLRT	USINFLRT	USINFLRT	USINFLRT
	Chicago Board Options Exchange (CBOE) Volatility Index or VIX, end of period, or period average	-	-	VIXEOP/ VIXAVE	VIXEOP/ VIXAVE	VIXEOP/ VIXAVE	VIXEOP/ VIXAVE
	EMBI+ Global for Emerging Markets	-	-	EMBGLOB	EMBGLOB	EMBGLOB	EMBGLOB
	HSBC's RORO Index, which takes the rolling correlations between the daily returns of the 34 assets identified and combines them into a single index. HSBC constructs the index by using principal component analysis (PCA) to decompose the 34 asset return time series into 34 principal components (PCs), which are mutually uncorrelated variables that explain the observed asset returns.[a]	-	-	RORO	RORO	RORO	RORO
	Monthly Change in the Cross-border bond flows from the Global area and the Emerging Markets area, respectively, going into the Philippines, Indonesia, Malaysia, and Thailand taken from the Equity Bond Money Market Balanced Specialty Fund Flows (EPFR) Global online database	+	+	FLOBONGLOB FLOBONEM	FLOBONGLOB FLOBONEM	FLOBONGLOB FLOBONEM	FLOBONGLOB FLOBONEM
Dummy Variables used in the MS Regress Regime 1 Estimated Smoothed Probabilities charts per country	Changes in the Trilemma Indexes of greater than or equal to 20 basis points (bps) by Aizenman, Chinn and Ito (2013), 2000-2014						
	Risk premium peaks and troughs based onCountry Risk Premium data for the Philippines and Indonesia, EMBI Index spreads for Malaysia and Thailand and CDS spreads for Thailand, 2000 - 2015						

[a]HSBC Global Research. Currency Strategy from Currency Weekly, 17 April 2012.

If we examine the probabilities that the rate gap will stay in regime 1 when it is already in regime 1, $P_{11,}$ it is the highest for Thailand at 0.995 or almost 1.0 when rounded off. This is influenced by the outcome of the estimated smoothed regime probabilities, where Thailand recorded only one switch in 2001 from the low rate gap regime to the high rate gap regime, and no other switch was estimated by the model. It also follows that the expected duration of regime 1 is highest for Thailand's rate gap, at 214.5 months, whereas the expected duration for regime 2 is still the highest for Thailand compared to the other three countries, estimated at 56 months. The expected duration for regime 1 in Indonesia is at 28 months, followed by the Philippines at 27 months and Malaysia at 21.6 months. Meanwhile, Indonesia has the second highest P_{11}, at 0.964, followed closely by the Philippines at 0.963 and then Malaysia at 0.953.

The estimated transition probabilities for all four economies to stay in regime 2 when it is already in regime 2, P_{22}, are all high as well—all in the 0.96 to 0.98 level. The estimated switching probabilities, meanwhile, show that Malaysia has the highest probability of shifting to regime 2 when it is in regime 1, at 0.046 followed by the Philippines at 0.037, and then Indonesia at 0.036. Thailand has the lowest P_{12}result.When we look at the estimated probability of switching to regime 1 when it is already in regime 2, we see that the highest probability is for the Philippine rate gap, which could be interpreted to mean that this country tends to stay in the high rate gap regime, regime 1, or move towards the high rate gap regime, when it is already in regime 2. In terms of estimated expected duration, regime 1 or the high rate gap regime tends to last the longest in Indonesia at 28 months, while it tends to last for 26 months in the Philippines. Meanwhile, regime 2 or the low rate gap regime is expected to last the longest in Malaysia and Indonesia, at 35.3 and 32.6 months for both economies, respectively.

We proceed to look into the timing of the regime switches in the rate gap of the ASEAN-4 economies by presenting estimates of the smoothed regime probabilities from our basic MS-Regress Model in Figure 3. It can be observed that the four economies experienced regime switches at different times over the period of our study. Whereas this model specification detected seven (7) Markov-type regime switches in the Philippines, it detected six (6) Markov switches each in Indonesia and Malaysia, but only one (1) regime switch in 2001detectedin Thailand. The high rate gap periods - those months when the transition probability for Regime 1, the high rate gap regime, is close to, or is at exactly 1.0, and the low rate gap periods - those months when the transition probability for Regime 2, the low rate gap regime, is close to or is at exactly 1.0, for each ASEAN-4 economy are depicted in Table 2.

As a supplementary step in the empirical analysis, we also compare the timing of the regime switches by superimposing two of the most important variables—significant Trilemma changes and the changes in global risk perception—to see how they match graphically. One may recall that in the literature review, we proposed a connection between the Trilemma story, the RoRo periods of global risk appetite, and the high rate gap vs. low rate gap regimes. We have decided to include this graphical analysis of dummy indicators against the regime switches as a way to verify this connection because the Trilemma indexes are estimated in annual terms, so that the annual frequency does not allow us to test it directly as a determinant of the transition probabilities within the MS Regress methodology itself. The most updated and readily available indicator of significant movements along the Impossible Trinity triangle, reflecting changes in at least one, two or all of the three main objectives of a central bank, is based on the estimated Trilemma indexes from Aizenman *et al.* (2013) available via http://web.pdx.edu/~ito/trilemma_indexes.htm for the data series covering 2000 to 2014. For our purposes, we constructed a dummy variable that has the value of one (1) for periods when there were any changes greater than or equal to 20 basis points in absolute value terms in the level of one, two or all of the three indexes comprising the main index: Exchange Rate Stability Index, the Monetary Independence Index, and the Financial Openness Index, and zero (0) otherwise.

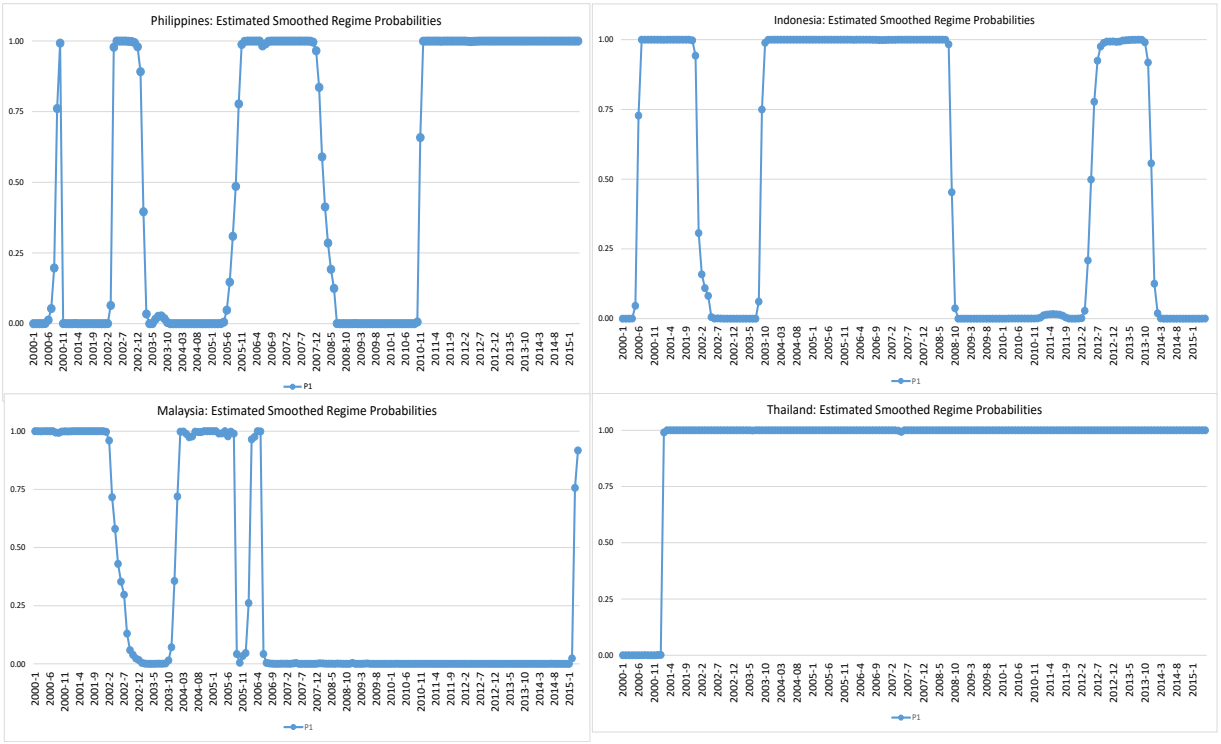


Figure 3 - Estimated Smoothed Regime Probabilities from the Basic MS-Regress Model

Table 2. HIGH RATE GAP AND LOW RATE GAP PERIODS			
Philippines	Indonesia	Malaysia	Thailand
Regime 1: High Rate Gap periods			
Oct 2000	Aug 2000 to Jan 2002	Jan 2000 to Mar 2002	Apr 2001 to May 2015
Jun 2002 to Jan 2003	Dec 2003 to Aug 2008	Mar 2004 to Aug 2005	
Nov 2005 to Apr 2008	Aug 2012 to Dec 2013	Mar to May 2006	
Jan 2011 to May 2015		May 2015	
Regime 2: Low Rate Gap periods			
Jan to Jul 2000	Jan to May 2000	Jul 2002 to Nov 2003	Jan 2000 to Jan 2001
Nov 2000 to Feb 2002	May 2002 to Aug 2003	Nov to Dec 2005	
May 2003 to Jul 2005	Dec 2008 to Apr 2012	Aug 2006 to Feb 2015	
Aug 2008 to Oct 2010	Apr 2014 to May 2015		
Source: Author's estimates			

Another dummy variable we have chosen to include in our graphical analysis is that which marks the periods when the risk premium measure per country have recorded peaks and troughs, which acts as our indicator of risk-on and risk-off behavior in global risk perception. We have constructed this dummy variable to have the value of one (1) for the month marking a peak or a trough in the County Risk Premium data (10-Year sovereign yield rate minus 10-Year US Treasury yield rate for the Philippines and Indonesia, and the EMBI Index spreads for Malaysia, and the combination of EMBI Index spreads and CDS spreads for Thailand), and zero (0) otherwise. As with the case of the Trilemma index dummy variable, plotting these indicators as dummy variables alongside the regime probabilities by country allows us to conduct a preliminary assessment whether the timing of

the regime switches we obtained from the Markov model are detected by, or associated with, the changes in the Trilemma indexes and the risk-on, risk-off events indicated by each variable.

From Table 3 and Figure 4, it can be seen that both the risk premium dummy variable and the Trilemma index dummy variable are associated with at least two regime switches per country, especially so for the Philippines, Indonesia and Malaysia. The risk premium peak and trough dummy indicators are most associated with the regime switches, as it coincides with five out of the seven switches for the Philippines, and with three of the regime switches for both Indonesia and Malaysia, but none for Thailand. Trilemma indexes, nonetheless, are annual indexes, so that by design there would expectedly be fewer matches or association with the rate gap regime switches, the estimation of which involved monthly data. Nevertheless, we see at least two matches between the regime-switches and the significant changes in the Trilemma Indexes for the first three countries.

Across the four ASEAN-4 economies, the timing of the regime switches as well as of the high rate gap regimes versus the low rate gap periods does differ, but there are also some common switches among them. This finding is a reflection of the fact that global factors common to these emerging Asian economies, such as changes in global risk perception on EMs in general, could affect the rate gap of all four countries at the same time, so that there would be periods when the timing of the regime switching could be identical. At the same time, however, the magnitude and timing of the impact of global indicators can differ across the four countries being reviewed and can vary over time. This indicates that there must then be other idiosyncratic factors which are driving as well whether a Markov-type regime switching will occur in one country or not for that period.

Table 3. TIMING OF THE REGIME SWITCHES AND ASSOCIATED CHANGES IN GLOBAL RISK PERCEPTION AND MONETARY OR OTHER POLICIES				
Regime Switches per Country	Associated Monetary and Other Policy Changes or Global Shocks[a]	Comparison with Dummy Variables on Risk Premium Peaks and Troughs and Trilemma Changes		
Philippines		Risk Premium Peaks dummy	Risk Premium Troughs dummy	Trilemma Changes dummy
Aug to Sep 2000	In early 2000, the BSP decided to shift to inflation targeting.			
Nov 2000	In late 2000, the BSP was confronted with the challenges of dealing with severe market turbulence in the events leading up to the removal of then President Joseph Estrada, including a massive loss of confidence and pressure on the Philippine peso.	Sep 2001		
March to May 2002	The BSP finally implemented the inflation targeting framework by January 2002. In Sep 2002, the rediscount window had been liberalized to allow a generalized and uniform access to the facility by all sectors of the economy at market rates, reorienting it to be used for money supply management (complementing open market operations) instead of selective credit allocation.		May 2002	2002
Feb to Apr 2003	The current account shifted to a surplus beginning in 2004, and has remained in surplus to this time.		Aug and Nov 2003	2004
Aug to Oct 2005	The EVAT Law was enacted in May 2005--a signal to global investors of sustained fiscal reforms; the current account shifting from historically negative balance into a surplus beginning in 2004 largely from sustained OF remittances, the emerging BPOs**, and a growing international reserve base .	May 2005	Apr 2005	2005
May to Jul 2008	2008-2009 Global Financial Crisis (GFC) with EMBI Philippines Spreads reaching a peak in December 2008.	Dec 2008		
Nov to Dec 2010	Philippine GDP Growth has begun to accelerate after the GFC, and at a rate even higher than its neighbors. Given constraints on issuance on its own securities, and its limited holdings of government securities for use as collateral in its reverse repurchase transactions, the BSP nearly exhausted its holdings and relied increasingly on other instruments such as nontradeable Special Deposit Accounts--the levels for which peaked during 2010-2011. On 28 October 2010, the BSP further amended the FX regulatory framework to keep FX transactions attuned to current economic conditions.		Dec 2010	2010
Indonesia				
Jun to Jul 2000	In 1999, a new central banking law enacted establishing the independence of Bank Indonesia (BI), setting of the inflation target, and the shift from base money targeting to interest rate targeting; Big Bang fiscal decentralization formally implemented in 2001.			
Feb to Apr 2002	July 2005: the reference rate changed to the overnight cash rate; implementatio of the BI rate through open market operations.	Jul 2005		
Sep to Nov 2003	Bank Indonesia and the national government established an Inflation Management Team in 2004 to implement an integrated policy roadmap.			
Sep to Nov 2008	2008-2009 GFC with EMBI Indonesia Spreads reaching a peak in November 2008.	Nov 2008	Apr 2007	2007 and 2008
May to Jul 2012	Beginning mid-2010, Indonesia added macroprudential measures to manage capital flows and safeguard financial system stability within its monetary policy framework.		Oct 2010	2010 and 2011
Jan to Mar 2014	When the taper tantrum hit in mid-2013, BI rapidly unwound the term deposit facilities with banks, particularly in the June-July 2013 period. Bank Indonesia also raised the secondary reserve requirement (RR) in September 2013 (fulfilled by banks' holding of treasury and BI securities) from 2.5 percent to 4.0 percent, to be phased in by December 2013.	Aug 2013	Jul 2014	2013
Malaysia				
Apr to Jun 2002		Oct 2002	Apr 2002	
Dec 2003 to Feb 2004	Malaysia undertook successive stages of foreign exchange liberalization measures beginning in 2004. The New Interest Rate Framework was also implemented in 2004.[b]	May 2004		2004
Sep to Oct 2005	July 2005: BNM moved to a managed float; Easing of restictions on capital flows; liberalization of restrictions on international transactions, leading to the accumulation of foreign assets by private entities as well as reserves. During the GFC in 2008-2009, the reduction in capital inflows in large part offset by repatriation of domestic capital abroad. Large sales by foreign investors were absorbed with minimal impact on domestic yields.			
Jan to Feb 2006	As a key enhancement to the breadth of the		December 2006	2006
Jun to Jul 2006	BNM's monetary policy instruments is the		January 2007	
Mar to Apr 2015	With the 2014 budget approved in October 2013, Malaysian authorities have continued to impose a series of targeted, gradual, and escalating Macroprudential Policies (MAPs), which have been mainly directed at speculative purchases of homes and unsecured credit.	Mar 2015	July 2014	2013
Thailand				
Feb to Mar 2001	Coming from a managed float under the IMF Program, the BOT announced the adoption of its inflaton targeting framework in 2001, implementing monetary policy by influencing short-term money market rates via the policy rate.*	Aug 2001		2000

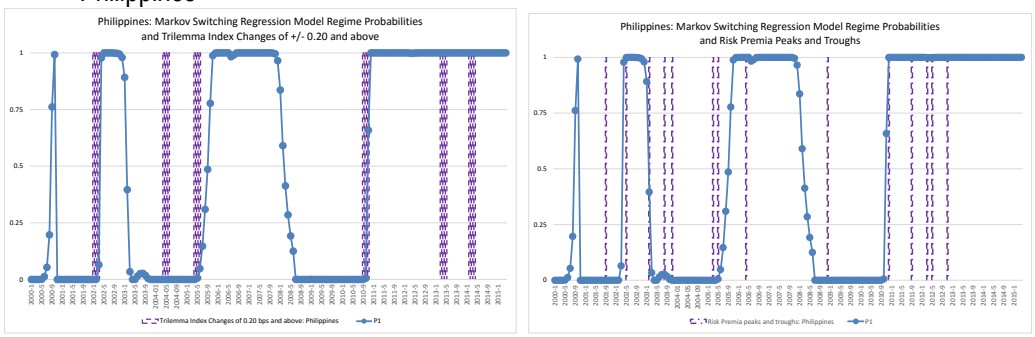
[a] The table includes only a general listing of the most prominent or major policy changes or shocks; The author does not claim it to be a comprehensive listing.

[b] Please see Sharifuddin et. al. (2014), Appendix 3, for a complete listing of the foreign exchange liberalization measures implemented by BNM in 2004.

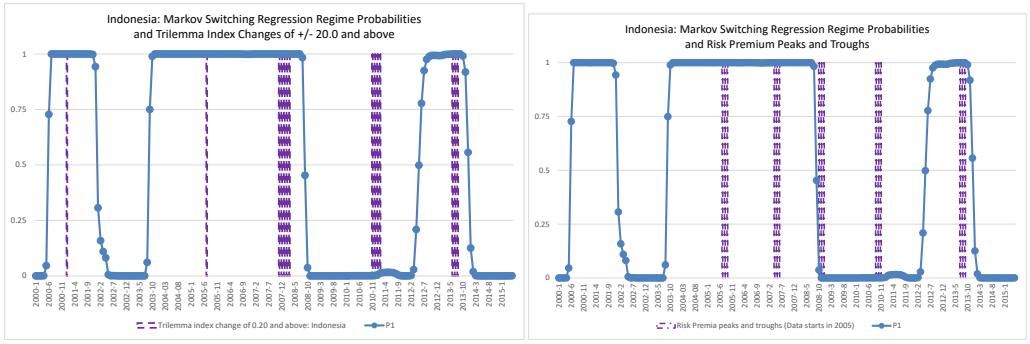
* From May 2000 to January 2007, the policy rate was the 14-day repurchase rate. Effective January 2007, the policy rate has been the 1-day repurchase rate.

Sources: Regime switches are based on Author's estimates; Policy changes and shocks are based on materials from Central Bank websites such as the BNM's Annual Reports, IMF Article IV Reports and Selected Issues Papers 2010-2015, Asian Development Bank and the AsianBondsOnline.com, and the Bank for International Settlements.

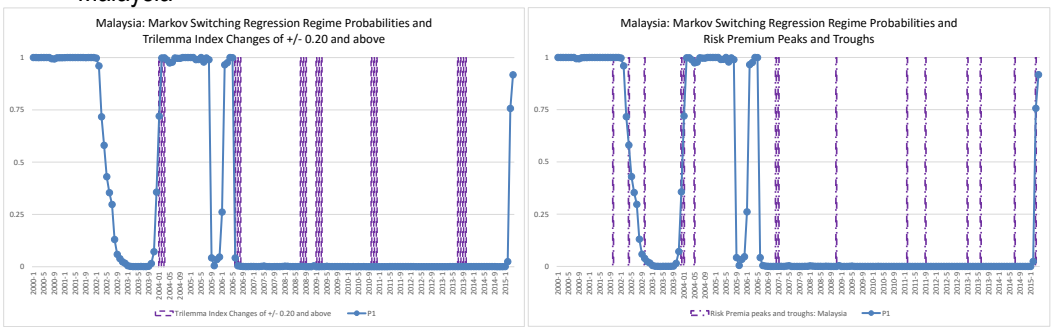
Philippines



Indonesia



Malaysia



Thailand

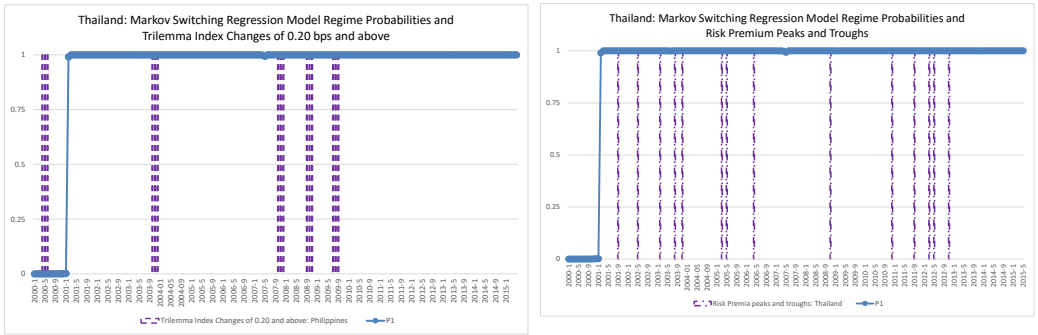


Figure 4 - Estimated regime 1 probabilities from the basic model and comparison with dummy indicators

One of the most interesting regime switches is the one detected in 2008, common to both the Philippines and Indonesia. This outcome is not surprising as the impacts of the global financial crisis (GFC) were of such scale, magnitude and coverage that it wrought havoc in emerging Asian countries' financial markets. The GFC affected the monetary and financial policies and interest rate-setting in central banks as well as the prices of, and returns to, assets which are accessible to foreign funds—generally leading to a narrowing of the rate gap and expectedly triggering a switch from the high rate gap to a low rate gap regime. During 2008, in fact, all four

economies recorded a peak in their respective risk premium indicators based on Figure 2, as the global perception of risk on emerging economies rose at that time–a risk-OFF episode. As we had proposed, high risk premia acts as a "natural wall" that effectively shielded off the flow of speculative capital, and this is achieved even without any change in capital controls or any movement in the Trilemma index particularly in terms of policies relating to financial market openness or capital mobility.

Other common switches which were detected by the estimated smoothed regime probabilities were in 2000 and 2003 for the Philippines and Indonesia, 2002 for the Philippines, Indonesia and Malaysia and in 2005 for the Philippines and Malaysia. On these occasions, the risk premium dummy variable series we had utilized marked either a peak or a trough in risk premia levels for these periods, except for Indonesia in 2000 and Malaysia in 2005. Interestingly, the year 2000 for Indonesia, and the year 2005 for Malaysia marked important milestones in the monetary policy framework of these economies, so that the regime switching may have been driven by these policy changes even without significant movements in the country risk premia (see Table 3). Additionally, both 2002 and 2005 are also associated with positive changes in the monetary and other financial policies in the Philippines, Indonesia and Malaysia which could have either directly affected the level of the rate gap—either via the policy rate or via the benchmark interest rate—or indirectly by reducing the level of global risk perception attached to these economies and opening up its domestic asset markets to foreign investment flows and hence driving down the returns—thus affecting the rate gap in two ways. We also see the MS Regress model detecting very recent switches in 2014-2015 for Malaysia and Thailand. Both switches coinciding with the risk premier peaks and troughs dummy indicator, as well as changes or movements in the Trilemma Indexes of these two economies for these periods.

Based on Table 3 and Figure 4, one result that deserves attention is that in contrast to the case for the Philippines and Indonesia, the MS-Regress model for both Malaysia and Thailand did not detect a switch in 2008, which we would expect to be the case as well for these two emerging economies. When we look at the regime probabilities for both Malaysia and Thailand in Figure 2, it appears as if either the level of the rate gap has effectively shielded itself from the effect of global factors, or that financial market characteristics were static or unchanged, remaining stable all throughout 2006 to 2014. During the GFC, the reduction in capital inflows in Malaysia was reported to have been largely offset by sales of foreign reserves and the repatriation of domestic capital invested abroad, given its well-developed and relatively large domestic capital market. Large sales of domestic bonds by foreign investors were absorbed with minimal impacts on domestic yields. The stabilizing role of reserves and private outflows, coupled with the greater flexibility of the exchange rate and strength of domestic financial institutions, could have allowed Malaysia to weather the global financial crisis, effectively establishing firmly its monetary policy independence during this time. This could well be the reason why no regime switching occurred in Malaysia during the GFC. In the case of Thailand, beginning in the first quarter of 2008, a new Bank of Thailand Act strengthened the transparency and accountability of Thailand's monetary policy process, and at the same time, the bond market of Thailand has expanded and deepened by this time. The Act established a clear and formal framework for monetary policy, where the Monetary Policy Committee was charged with legal responsibility in the realm of both the monetary policy target and exchange rate management policy (Grenville and Ito 2010). This strategy appears to bode well for maintaining stability and monetary independence in the country all throughout the GFC in 2007-2008. These policy developments could well account for the reason why the rate gap did not experience a regime switch in 2008 for Thailand.

Table 4. Results from the Full MS Regression Model of Conditional Mean and TVTP					
	Variables	**Philippines**	**Indonesia**	**Malaysia**	**Thailand**
Number of Observations		**111**	**120**	**124**	**185**
Coefficients in Regression					
Common Regressors (time-invariant)					
JP Morgan's EMBI+ Global Index	δ	-0.21			
z-statistic		-2.06**			
Switching Regressors (time-varying)					
Constant Parameters, Regression					
Constant Term, Regime 1	β_1	3.41	1.08	0.43	0.18
z-statistic		7.19***	5.33***	10.52***	0.15
Constant Term, Regime 2	β_2	1.94	0.78	0.01	0.18
z-statistic		4.03***	2.27**	0.32	5.87***
Coefficient Parameters, Regression					
JP Morgan's EMBI+ Global Index, lagged one period, Regime 1	V11		-0.56		
z-statistic			-10.89***		
JP Morgan's EMBI+ Global Index, lagged one period, Regime 2	V12		-0.04		
z-statistic			-0.32		
Risk Premium = 10-Year Sovereign Rate minus 10-Year US Bond Yield Rate, Regime 1	V21				-0.35
z-statistic					-4.38***
Risk Premium = 10-Year Sovereign Rate minus 10-Year US Bond Yield Rate, Regime 2	V22				-0.05
z-statistic					-1.89*
Autoregressive component, lag 1 for Regime 1	ϕ_1	0.85		1.24	
z-statistic		10.04***		6.30***	
Autoregressive component, lag 1 for Regime 2	ϕ_2	0.89		0.43	
z-statistic		12.64***		5.28***	
Coefficients in Transition Probabilities					
Risk Premium = 10-Year Sovereign Rate minus 10-Year US Bond Yield Rate,	α11	-2.70	0.42		
z-statistic		-1.69*	0.98		
Risk Premium = 10-Year Sovereign Rate minus 10-Year US Bond Yield Rate	α21	-4.26	-1.19		
z-statistic		-2.15**	-2.39**		
Foreign Holdings of Local Government Assets as % of Total	α12	0.77	0.08		
z-statistic		2.31**	2.04**		
Foreign Holdings of Local Government Assets as % of Total	α22	0.61	0.03		
z-statistic		1.68*	0.60		
JP Morgan's EMBI+ Global Index, staying probability in Regime 1	α13				0.65
z-statistic					5.33***
JP Morgan's EMBI+ Global Index, switching probability from Regime 2 to 1	α23				-0.94
z-statistic					-9.13***
Foreign Holdings of Tbills	α14			12.84	
z-statistic				1.6*	
Foreign Holdings of Tbills	α24			14.66	
z-statistic				2.9**	
US 10-Year Bond Yield Rate	α15				0.24
z-statistic					1.67*
US 10-Year Bond Yield Rate	α25				-0.23
z-statistic					-9.44***
HSBC's RORO Index	α16			-11.98	
z-statistic				-1.59*	
HSBC's RORO Index	α26			-15.38	
z-statistic				-4.45***	
[b] For Thailand, including AR(1) it in the full model, whether as a common regressor or as switching regressor makes the parameters either NAs or insignificant. For Indonesia, AR(1) was estimated in another model, separate from the basic because it made regime switching probabilities unclear when included.					

We proceed to the discussion of the estimation outputs from the full MS Regress models with TVTP for the four economies, tabulated in Table 4. Under this full model specification, we consider AR(1) coefficients and time-varying transition probabilities as in Filardo (1994,1998), and test which of the global factor or financial market characteristics are significant in the models either as regressors of the switching rate gap or as determinants of the transition probabilities. For the full TVTP specification, the AR(1) coefficient enters the model significantly as a switching regressor for Malaysia and the Philippines. This is indicative of the autoregressive component of the rate gap stemming from policy interest-rate smoothing by these central banks, or the stickiness in the market interest rates, or perhaps from both.

The EMBI+ Global Index emerged as a significant common regressor for the Philippines and a switching regressor for Indonesia. For the Philippines, the coefficient of EMBI+ Global is negative, which means that when the index increases, the rate gap falls regardless of what regime the economy is in. This is consistent with our expectation that higher risk perception acts as a "natural wall" discouraging the inflow of non-resident funds, allowing for the market interest rate to rise and converge towards the level of the policy rate, and the rate gap falls, and the converse is true as well. For Indonesia, the coefficient of EMBI+ Global is more negative during regime 1, the higher rate gap regime, which again lends support to our hypothesis that the higher the indicator of risk perception, the lower the rate gap. Additionally, the coefficient of EMBI+ Global is a lower negative number, but is nonetheless insignificant, under regime 2 for Indonesia.

The EMBI+ Global is also a significant driver of transition probabilities in Thailand. The coefficient sign of EMBI+ Global as a driver of its transition probabilities is negative, which is as expected for both P_{11} and P_{21}. The higher the risk premium, the lower the probability of staying in regime 1, the high rate gap regime, and the lower the probability of switching to regime 1 when it is already in regime 2. What we had expected based on our earlier discussions for all four emerging ASEAN-4 economies is that higher risk perception in emerging economies would mean that foreign investors would be on a risk-OFF mode, and would tend move funds away from emerging Asia, drive up domestic market interest rates, and therefore cause the rate gap to move into, or stay in, the low rate gap regime, regime 2.

The country risk premium indicator is a statistically significant determinant of the transition probabilities P_{11} and P_{21} for the Philippines. This variable enters the model with a negative coefficient as expected, with an absolute value higher for P_{21} and lower for P_{11}. This would mean that the higher the risk premium, the lower the transition probability in both cases, but the magnitude of its impact is higher for the probability of switching to regime 1 when it is already in regime 2, than for staying in regime 1 when it is already in regime 1. For Indonesia, the risk premium indicator is a significant determinant for P_{21} as well. The coefficient of the risk premium indicator for the transition probability of switching from regime 2 to regime 1 has a negative sign, just as we expected. The coefficient of the same variable for P_{11}, however, is insignificant and positive, which would mean that for Indonesia, the probability of staying in regime 1 when it is already in regime 1 increases with higher risk premium levels.

The share of foreign ownership of local currency debt is also a significant determinant of the transition probabilities for the Philippines and Indonesia, with the expected signs in the coefficient values. It is significant and positive for both the switching (P_{21}) and staying (P_{11}) transition probabilities in the Philippines, and although it is also of the expected sign and significant as a driver for P_{11} in Indonesia, it is of the expected sign but insignificant for P_{21}. This outcome means that the higher the share of foreign ownership of local currency debt for the Philippines and Indonesia, the higher the probability of staying or switching into regime 1, the high rate gap regime. This is a result we are expecting based on the hypothesis we have set out in the beginning, that higher non-resident funds' buying into domestic bonds drives down the benchmark interest rate, widening the rate gap.

Foreign investments in Tbills are a significant determinant for Malaysia's rate gap, and the signs are as expected. The coefficient is in fact high at 12.84 for the staying probability, and at 14.66 for the switching probability, which means the higher the foreign ownership of Tbills in Malaysia, the higher the probability of the rate gap staying in regime 1, and the higher the switching probability to regime 1 when it is already in regime 2. Meanwhile, HSBC's Risk-On, Risk Off (RORO) Index entered as a significant driver of both the staying and switching probability to regime 1 in Malaysia, and with the expected negative sign. This could be interpreted to mean that the higher the RORO Index— an indicator that increases when the risk on behavior is prevailing among global investors and decreases otherwise—the lower the probability of staying in the high rate gap regime, and switching into a high rate gap regime when it is already in the low rate gap regime.

For Thailand, the US 10-Year Bond Yield rate is a significant determinant of its transition probabilities, but with coefficients at different signs. Its coefficient is negative, as expected, for the switching probability P_{21}, which means that the higher the US 10-year bond rate, the lower the probability of the rate gap moving into regime 1 or the high rate gap regime. However, it is positive for the staying probability, which is not what we expected. Nonetheless, Thailand's monetary policy and domestic financial markets appears to have a relatively stronger linkage with global financial markets and particularly with US monetary policy, possibly reflecting its managed float exchange rate regime as well as its highly developed and flexible bond markets. Within the ASEAN, it is perhaps acting in the same way as a financial hub over the period being investigated.

From these empirical results, we observe that the ASEAN-4 does not comprise a homogenous set. Looking more closely into the different results, there is what seems to be two sub groupings within the ASEAN-4 economies: Philippines and Indonesia showing more frequent and more prominent switches and longer duration

of staying in regime 1, the high rate gap regime on one end, and Malaysia and Thailand depicting less and a longer duration for staying in regime 2, the low rate gap regime. For the Philippines, the average rate gap is the highest under both regime 1 and regime 2, so that within the definition used in this paper, its policy rate has the weakest influence over market interest rates among the ASEAN-4. Regime-switching in the rate gap of the Philippines is also the most frequent and prominent in the region. This outcome could possibly be traced to factors beyond global attractiveness indicators and financial market sensitivity variables. As seen by Affandi and Peiris (2012), the limited amount of government securities held by the BSP for repo operations and the inability of the BSP by law to issue its own securities could be the structural factors that are keeping Philippine Tbill rates at even more depressed levels even when compared to Indonesia. A second plausible factor is the Philippine National Government's significant foreign borrowing abroad, resulting in numerous rejections in the issuance of domestic Tbills which is limiting the supply of this asset market even further. Given the already thin volumes of government securities available in the Philippine domestic financial markets, a more limited issuance means that when large non-resident funds access the market, interest rates are brought down even further. A deeper examination of these structural issues could be a potential topic for future research.

For factors common to the Philippines and Indonesia, we can point out two most plausible reasons that account for these economies' relatively more pronounced, more frequent recurrence of alternating divergence and then convergence in the rate gap, and a longer duration for the high rate gap regime. One, relates to the *attractiveness* of their domestic assets to foreign investors arising not only because of factors common to EMs, but from remarkable improvements in each of their macroeconomic performance, monetary policy credibility, stability in the external accounts and overall sovereign credit worthiness, compared to how it was performing relative to its ASEAN neighbors in the past. These factors have improved significantly for the two economies during the period in review, and perhaps even more so for the Philippines which achieved some sort of a paradigm shift towards low and stable inflation, consistent current account surpluses up to the present, a high level of foreign reserves, a stable currency, and remarkably improved fiscal discipline all resulting in non-resident capital flows flocking into safer Philippine government securities in search of yield.

A second issue emerging from our analysis is that the higher average rate gaps and the more frequent regime-switching in the rate gap could also a product of relatively thinner and underdeveloped financial markets in both the Philippines and Indonesia, making them more *sensitive* to foreign inflows. The supply of government securities is much more limited in these two countries, and to a larger extent is dominated by government compared to Malaysia and Thailand, so that surges and stops in foreign funds buying into these domestic assets affect benchmark interest rates in a much bigger way. Meanwhile, the financial markets of Malaysia and Thailand are deeper and more developed than in the Philippines and Indonesia. This adds to the stability in domestic interest rate movements so that foreign investors buying into domestic assets are not as disruptive to benchmark interest rate levels for the latter set of countries.

The BOT, in particular, carefully plans the types of bonds it issues to fill in the tenor gaps, i.e. by issuing only shorter-term bonds with tenors that do not replicate national government issues—a strong sign of coordination between the national government and the central bank. More recently, the issuance of BOT bonds in 2011 has contributed to an even wider range of securities for Thailand, so that the domestic bond market has increasingly attracted investors of all types–both locals and non-residents alike. Monetary authorities of Thailand believe that the allocation of absorption instruments needs to be designed such that it takes both the effectiveness of monetary policy transmission and financial market developments into account (Bank of Thailand, 2013). Meanwhile, the BNM and other regulatory agencies in Malaysia undertook large-scale efforts to develop a ringgit bond market resulting in its bond market emerging as one of the biggest and most advanced in the region (Sharifuddin and Ling 2014). During the GFC, for example, the reduction in capital inflows to Malaysia were largely offset by sales of foreign reserves and the repatriation of domestic capital invested abroad. Large sales of domestic bonds by foreign investors were therefore absorbed with minimal impact on domestic yields.

Conclusion

We began this study with the hypothesis that the gap between the policy rate and the benchmark market interest rate follows a Markov-type regime-switching process for ASEAN economies: Indonesia, Malaysia, the Philippines, and Thailand. In addition, we espoused further that the transitional probabilities of the regime-switching in the rate gap for these economies are time-varying, and that the switching from one regime to the next is driven by either variable common to EMs (what we denoted as *attractiveness* factors), such as global risk perception and global liquidity, or other idiosyncratic factors relating to financial market characteristics of each economy (which we denoted as *sensitivity* factors).

From our empirical exercise, we established that the rate gap of the Philippines, Indonesia, and Malaysia could be depicted as a 2-regime, Markov-type regime-switching model of conditional mean and time-varying transition probabilities using the model specification from Filardo (1994, 1998). The result for Thailand is not as robust, however, in that it is only showing one regime switch that occurred in 2001. Unlike in the other three economies, the rate gap of Thailand does not seem to strongly depict a Markov-type regime-switching process whereby there is a recurrence of divergence and convergence over the period being reviewed. Nonetheless, the AIC criterion and the MS Regress results confer that the rate gap of Thailand behaves as a Markov-type regime-switching process, and with two variables emerging as significant determinants of its time-varying transition probabilities.

We have also established in this study that indeed, there are country-specific *sensitivity* factors, as well as external or global *attractiveness* factors which influence the evolution and regime-switching in the degree of influence of monetary policy on market interest rates in the ASEAN-4. Among the indicators of financial market characteristics, it is foreign ownership of local currency debt securities—either as a share to total, or in terms of the levels—that emerged as drivers of the transition probabilities in the rate gap of the ASEAN-4 particularly so for the Philippines, Indonesia and Malaysia. Among the attractiveness factors, changes in global risk perception, such as the country risk premium variable and HSBC's RORO Index, have emerged either as a common regressor of the switching rate gap, or as a determinant of the transition probabilities for the ASEAN-4. For Thailand, US 10-year bond rates turned up as a significant driver of its regime-switching transition probabilities.

These determinants are variables that could be helpful if followed closely by monetary policymakers and perhaps be used as early warning system or leading indicators. They could signal the probability and the number of periods of either staying in or entering a high rate gap period or staying in or switching into a low rate gap period, and hence incorporating the changing relationships between the rate gap and global factors as well as financial market indicators within these two distinct regimes. If incorporated into a macroeconomic forecasting model, for example, the central bank could take into account and anticipate, based on expectations on the global risk premier and foreign ownership variables which were found to be significant drivers of the switching probabilities, those periods when the policy rate has an expectedly weaker influence over market interest rates versus when it has a stronger influence on market rates as additional information in the setting of the appropriate monetary policy stance. The high rate gap and low rate gap periods, and the variables identified for each country as determinants of the switches, could also be used in an interest rate forecasting model which could, if so desired, establish the preferred gap between the policy rate and the relevant market rate over the policy horizon by the monetary authorities in the ASEAN-4.

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Theoretical and Practical Research in Economic Field

DOI: http://dx.doi.org/10.14505/tpref.v7.1(13).04

Drivers of Low Inflation in Malta after the Crisis

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Suggested Citation:

Micallef, B. (2016). Drivers of Low Inflation in Malta after the Crisis, *Theoretical and Practical Research in Economic Field*, (Volume VII, Summer), 1(13): 53-61. DOI:10.14505/tpref.v7.1(13).04. Available from: http://www.asers.eu/journals/tpref/curent-issue.

Article's History:

Received March, 2016; *Revised* April, 2016; *Accepted May*, 2016.

Acknowledgments

This paper benefited from my participation in the ECB Task Force on Low Inflation (LIFT). I am particularly indebted to Elena Bobeica and Marec Jarocinski for the design of the BVAR simulations. Estimation was performed using the Bayesian Estimation, Analysis and Regression (BEAR) Toolbox, developed by Romain Legrand, Alistair Dieppe and Björn van Roye. The views expressed in this paper are those of the author and should not be interpreted as reflecting the views of the Central Bank of Malta.

Abstract

Despite robust growth, inflation in Malta has been subdued after the crisis and lower than what a Phillips curve would imply. This study examines the determinants of low inflation by comparing inflation forecasts conditioning on three groups of variables – real activity, external and financial – to see which one of these categories best explains post-crisis inflation. The analysis is conducted within a Bayesian VAR (BVAR) framework over two different disinflation periods, the first one starting in mid-2008 and the other one in 2012. For Malta, forecasts conditional on the path of the external variables are the closest to the actual path of inflation in both periods. On the contrary, in the euro area, the first episode was driven by external factors but domestic factors played a more important role in the second one. This point to the significant cross-country heterogeneity among euro area countries even in the face of apparently similar patterns in headline inflation.

Keywords: Inflation, Conditional forecasts, Bayesian Vector Autoregression, Cross-country comparison, Malta.

JEL classification: E31, E32, E37

Introduction

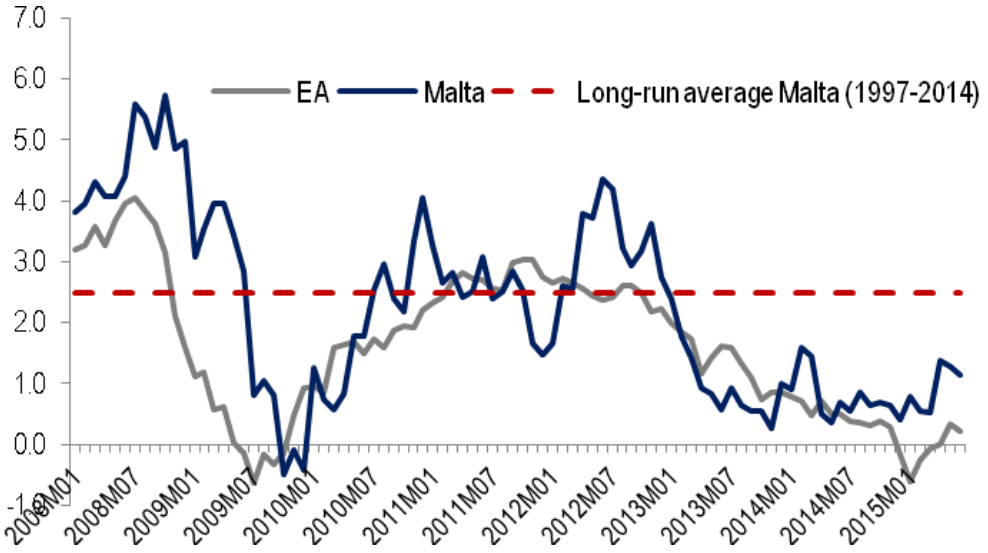
Inflationary pressures in Malta, the smallest and one of the most open economies in the euro area, have been weak after the crisis despite above average economic growth. Inflation followed a similar pattern as in other euro area countries, with two disinflation periods; one starting around mid-2008 and the second one in 2012 (see Figure 1). While the first period was driven mainly by developments in the energy and food components, the second period was much more prolonged and more broad-based, driven by the contribution of energy from the reduction in utility tariffs and services inflation. Since 2013, inflation has also been systematically over-predicted and has been lower than what a Phillips curve would imply, especially given the strong GDP growth, the drop in unemployment to historical lows and the closure of the output gap.

Against this background, this study asks the following question: given the typical co-movements between macroeconomic variables, which group of variables does the best job explaining inflation dynamics after the crisis? This question is answered using forecasts of inflation conditional on three groups of variables – real activity, external and financial variables – over the two different disinflation periods computed with a Bayesian VAR (BVAR) framework.

For Malta, the forecasts conditional on the path of the external variables are the closest to the actual path of inflation in both periods. On the contrary, in the euro area, while external variables are best in explaining the disinflation period starting in 2008, the forecasts conditional on domestic real activity are the closest to the actual

path of inflation for the second period. This pattern is shared by the largest members of the monetary union but not the smallest ones. This point to significant cross-country heterogeneity among euro area countries even in the face of apparently similar patterns in headline inflation.

The rest of the paper is organized as follows. Section 2 provides a brief literature review. Section 3 describes the model and section 4reports the main findings for Malta. Section 5 tests the sensitivity of the results and section 6 applies the same framework on a number of euro area economies. Section 7 concludes.



Source: own calculations using Eurostat data

Figure 1 - HICP inflation in Malta and the euro area: 2008-2015 (annual growth rates)

Brief literature review

Various facets of the inflation process in Malta have been well-studied in recent years. Since the mid-1990s, the inflation rate in Malta has fluctuated around a broadly constant mean of 2.5%, higher than the corresponding inflation in the euro area. Estimates of inflation persistence in Malta stand at around 0.3, implying a half-life of slightly more than six months (Micallef and Ellul 2013). These estimates are lower than those typically found for the euro area, which range between 0.4 and 0.8 (Altissimo *et al.* 2006).

Inflation in Malta tends to be more volatile than in the euro area, in part reflecting the interplay of external shocks, such as high commodity prices, with domestic rigidities, such as monopolistic practices and low competition in certain sectors of the economy. The latter are, to a certain extent, structural features of a small economy. Using a two-country DSGE model of a monetary union, Micallef (2013) finds that around two-thirds of the inflation differentials between Malta and the euro area are explained by cost-push shocks. Gatt (2015) documents a weakening in the slope of the Phillips curve in Malta over time, whereas the link between import prices and domestic inflation has increased since the late 1990s. The flattening of the Phillips curve, which downplays the relationship between inflation and real economic activity, has been documented for a number of advanced economies in recent years (Blanchard *et al*. 2015).

Despite the increasing literature, there is no single narrative on the drivers of low inflation after the crisis in most advanced economies, including in the euro area. After the 2009 global financial crisis, Ball and Mazumder (2011) document 'missing deflation' in most developed economies, that is, the drop in inflation being less than what a Phillips curve would imply. On the contrary, Constancio (2015) refers to 'excessive disinflation' in the euro area after 2012, as price pressures have declined by more than suggested by economic fundamentals. Contrary to the flattening of the Phillips curve hypothesis, some studies find that, at least since 2013, the relationship between inflation and economic activity in the euro area has been strengthened (Riggi and Venditti 2015; Oinonen and Paloviita 2014).In addition, some countries also find an asymmetric relationship between inflation and activity, with inflation being more responsive to shocks in the contractionary phase of the business cycle (Alvares *et al.* 2015).

Another growing body of literature argues that inflation is heavily influenced by global factors. This is due, for instance, to the process of globalization which increased the sensitivity of inflation to foreign disturbances

such as commodity prices, the prices set by competitors and the synchronization of monetary policies across the globe. Within this strand of the literature, Ciccarelli and Mojon (2010) argue that a global common factor explains a substantial portion of the variation in inflation across countries.

This paper is closest to Jarocinski and Bobeica (2016) who use both reduced form and structural analysis to assess the relative important of domestic and external factors in driving inflation in the euro area and the US after the crisis. These authors attribute the disinflation period after the 2009 recession to external factors but the subsequent period of low inflation starting in 2012 to mostly domestic factors. On the contrary, the situation in the US is different than in the euro area, with the first fall in inflation being more domestic in nature while the second one was more externally driven.

The Models

Following Jarocinski and Bobeica (2016), this study applies a reduced form approach to determine which group of variables does the best job in explaining inflation dynamics after the crisis. This is done using conditional forecasts of inflation computed with VAR models condition on the actual values of three groups of variables: real activity, external and financial variables. In turn, the in-sample conditional forecasts of inflation are compared with the actual values of inflation.

Importantly, this exercise does not depend on any assumptions regarding shock identification and follows the approach that Jarocinski and Smets (2008) used to study the drivers of the US housing boom.

In addition to the price index (HICP), the baseline BVAR includes 12 variables that are grouped in three broad categories. The first group refers to business cycle variables. These include three real activity indicators – real GDP, the unemployment rate and real investment – together with wages. The category is intended to capture the linkages between the real economy and the labor market. For reporting purposes, a distinction is made between this category with and without wages. This is done to single out the potentially important role of structural changes in the labor market that kept wage pressures contained. The second group refers to foreign variables and consists of the following four variables: foreign demand, oil prices in US dollars, the nominal effective exchange rate (NEER) and the non-energy commodity prices. This category is especially important for a small and open economy with a high degree of import content. The third group refers to the financial variables and consists of a short-term money market interest rate (3-month Euribor), as well as the lending rate and real credit to non-financial corporations (NFCs).

In addition, a larger VAR incorporating 16 variables is also estimated to cross-check the results from the baseline model. This VAR takes into consideration a bigger financial block intended to better account for the crucial changes in monetary policy and financial conditions after the crisis. More precisely, it adds a measure of long-term interest rates, proxies for the lending conditions for households (interest rate and loans) and a stock price index. Appendix A summarizes the variables included in each VAR and the data sources.

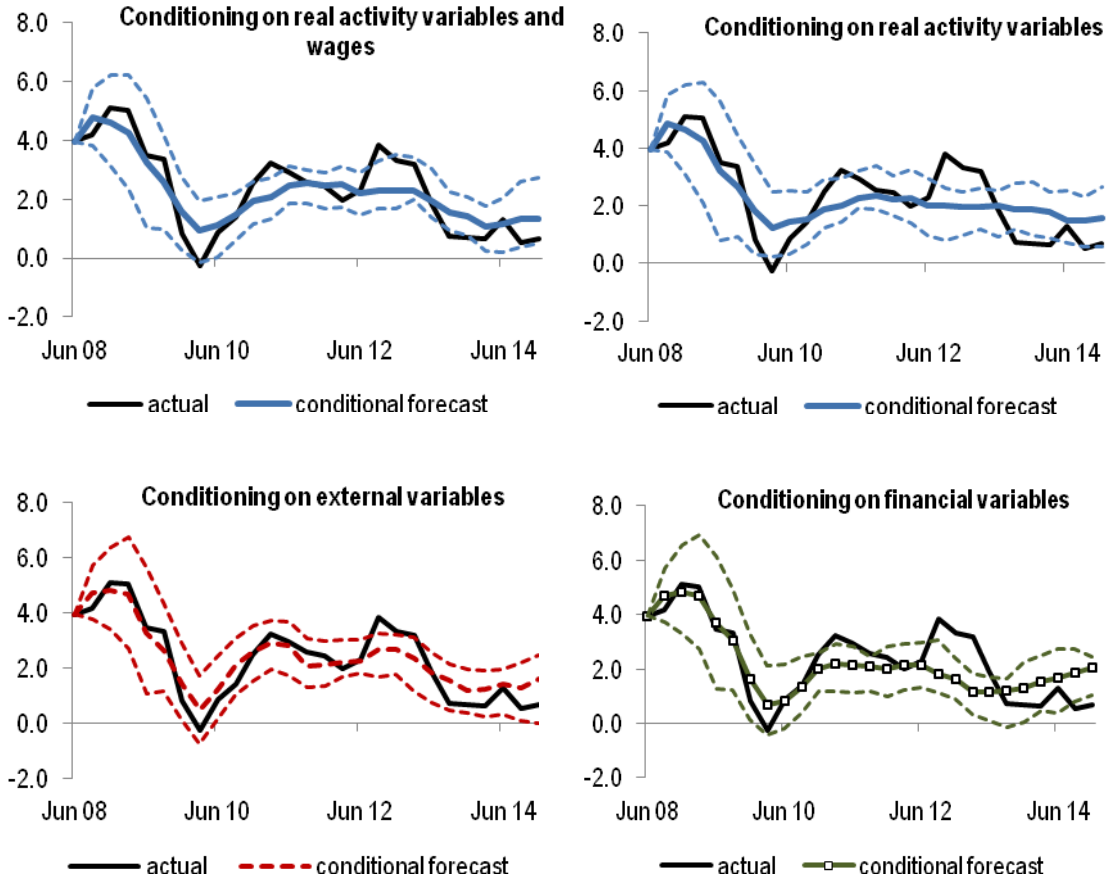
All the variables are measured at the quarterly frequency over the sample 2000Q1 to 2014Q4. The VARs are estimated using Bayesian methods in the tradition of Sims *et al.* (1990). All variables are included in log levels and seasonally adjusted, except interest rates using Bayesian priors of Litterman (1979) and Sims and Zha (1998) with standard settings. Thus, in terms of the Sims and Zha (1998) notation, the `tightness' parameter $\lambda_1$ =0.2, the `other weight' parameter λ_2=1, the `decay' parameter $\lambda_3$=1, the standard deviation of the constant term $\lambda_4$=100, the weight of the `no-cointegration prior' λ_5=1, and the weight of the `one unit root prior' λ_6=1. All the VARs include an intercept. As is the common practice in quarterly VARs, I include four lags of the endogenous variables.

Empirical Results

Figure 2a illustrates the main findings using the baseline BVAR with headline HICP inflation. The four panels plot the actual path of inflation (the solid black line) and the median conditional forecast based on each group of variables. While the BVAR is specified in terms of the (log) price level index, for the purpose of reporting the levels are transformed into year-on-year changes. The exercise is in-sample and the forecast starts from 2008Q2 onwards.

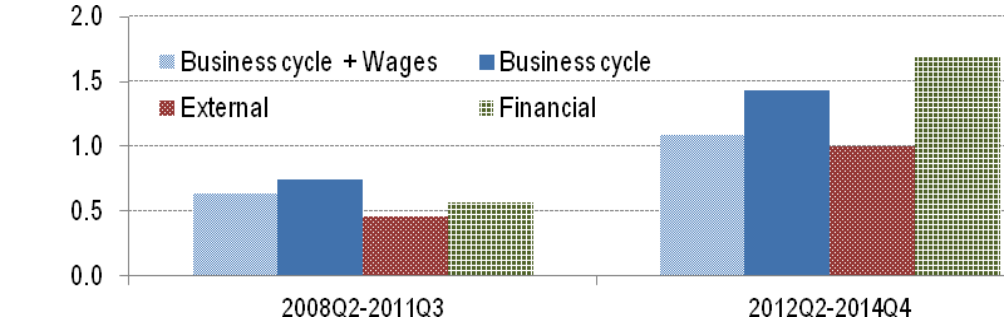
Figure 2b summarizes the findings by reporting a summary measure of the difference between actual inflation and each conditional forecast in the two episodes (2008Q2-2011Q3 and 2012Q2-2014Q4). This is done using the root mean squared error (RMSE), computed by averaging the squared difference between the actual inflation and the median conditional forecast over the indicated period.[1]

[1]The results also hold when normalizing the RMSE with a measure of inflation variability over each period.



Source: own calculations

Figure 2a - Conditional forecasts of HICP (annual growth rates)



Source: own calculations

Figure 2b: RMSE of conditional forecasts of HICP inflation from baseline BVAR

The main result is that in both sub-periods, the forecast conditioning on the external variables are closest to the actual inflation. It is also worth mentioning that actual inflation lies below the conditional forecast based on all four blocks of variables in the second disinflation period. However, only in the external case does actual inflation remain within the 95% confidence bands during this period.

It is important to note that during this period, inflation was also affected by policy initiatives, such as the reduction in utility tariffs for households in March 2014. The introduction of this policy is not captured by the model. However, it is likely that the drop in inflation is still captured by the external category as it coincided with the decline in non-energy commodity prices and, in mid-2014, by the collapse in international oil prices. For instance, the contribution of food to headline HICP averaged 0.2 percentage points in 2014Q2 and 2014Q3, down

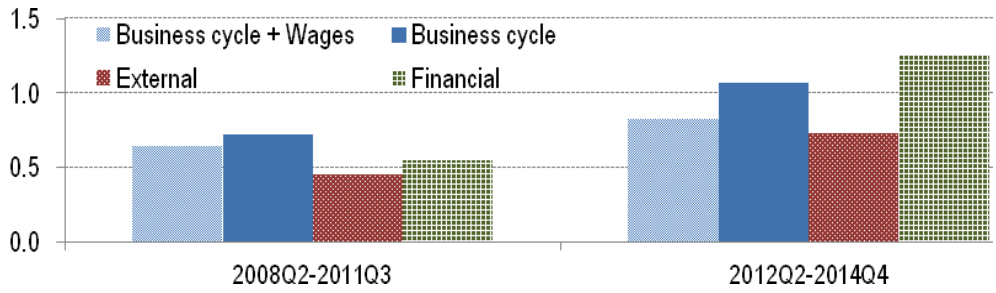
from 0.5 percentage points in the preceding two quarters. The decline in international oil prices in mid-2014 also works in favor of the external category despite the fact that energy prices in Malta are regulated and that Malta's energy corporation entered into oil hedging agreements intended to provide stability in utility prices.

The inclusion of wages in the real activity category lowers the RMSE in both periods given that wage pressures were relatively subdued in the post-crisis period. In the model, wages are intended to capture the structural changes in the domestic labor market, for instance, the various policy initiatives to raise the female participation rate, the influx of migrant workers and the pension reform that gradually increased the retirement age.[2] All these changes led to a sharp increase in the labor supply that kept wage pressures contained despite robust economic growth and a decline in the unemployment rate.

In the second disinflation period, forecasts conditioning on financial variables produce the largest RMSE given the absence of stress in the domestic financial system since Malta was not affected by the European sovereign debt crisis of 2012.

Finally, no category is able to capture the high inflation in mid-2012, with this period being generally outside the confidence bands. This is due to methodological changes adopted by the country's statistical authority in the measurement of travel and accommodation prices, which led to a sharp increase this category's price index.

The main findings from the baseline BVAR are confirmed using the large BVAR (see Figure 3). In particular, the inclusion of a more comprehensive financial block did not yield any significant improvement in the RMSE of the financial category.



Source: own calculations

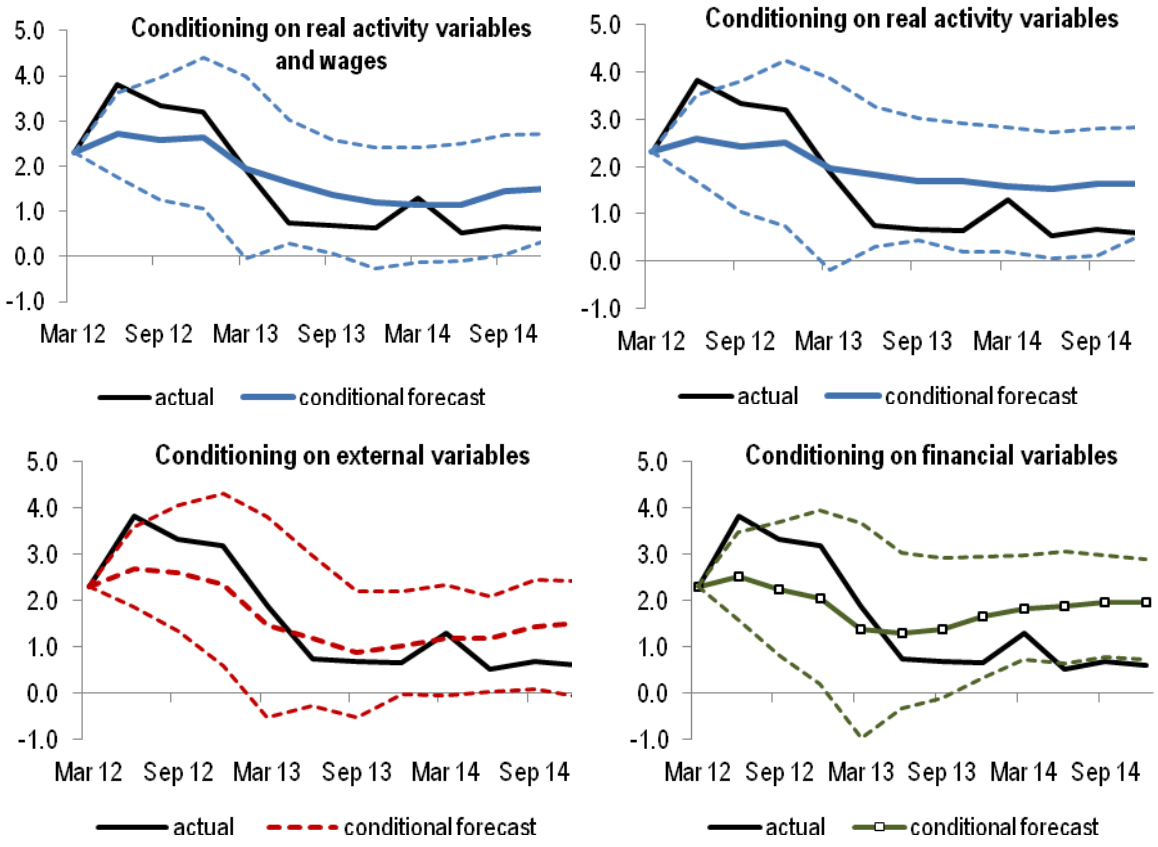
Figure 3 - RMSE of conditional forecasts of HICP inflation from large BVAR

Sensitivity analysis

The main findings are tested for robustness along two dimensions. First, the whole process is repeated by starting the conditioning in 2012Q2, thereby focusing only on the second disinflation period. The latter may be considered to be more interesting than the first one as the prolonged period of low inflation took many policy institutions and forecasters by surprise, leading to a sequence of inflation over-predictions.

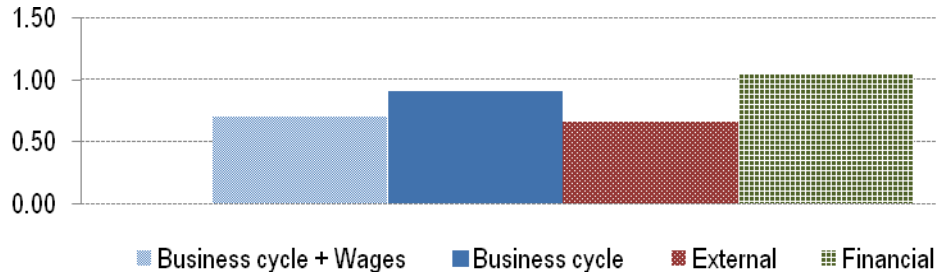
The main results remain broadly unchanged. In all cases, actual inflation stood lower than the conditional forecasts during 2013 and 2014. Forecasts conditioning on external variables produced the lowest RMSE, followed closely by the real activity group with wages. As in the previous section, the latter category fared much better in terms of RMSE than the same group without wages. Forecasts conditioning only on financial variables produced the highest RMSE, with actual inflation from mid-2014 even lying outside the confidence bands.

[2] Details on the impact of the increase in the female participation rate and migration on the Maltese labour market are available in Micallef (2015) and Grech (2015), respectively.



Source: own calculations

Figure 4a - Conditional forecasts of HICP (conditioning period: 2012Q2-2014Q4)



Source: own calculations

Figure 4b - RMSE of conditional forecasts of HICP inflation for period 2012Q2-2014Q4

Second, both the baseline and the large BVAR were estimated using 3 different measures of inflation to investigate the drivers of several price indices. In each case, the headline HICP index was replaced with the following price variable: (i) HICP excluding energy and unprocessed food; (ii) HICP with constant taxes and (iii) GDP deflator.

Table 1 reports the categories with the RMSE for the four different measures of inflation and the two sub-periods. While most specifications confirm the findings of the previous section, there are some differences among the prices indices, reflecting the different sectorial exposure of the groupings. As expected, the importance of external variables is reduced when considering core inflation, defined as HICP excluding energy and food prices, with the financial variables and the business cycle (with wages) producing the lowest RMSEs. On the contrary, foreign variables yield the lowest RMSE for HICP using constant taxes since Malta did not experienced any of the tax changes that had to be imposed on stressed countries in order to consolidate their budgetary position. External and financial variables produce the lowest RMSEs for the GDP deflator (depending on the time period and VAR used) although this price index exhibited somewhat different dynamics than the HICP, remaining more resilient during 2013 and 2014, hovering around 2%.

Table 1 - Sensitivity analysis

	2008Q2-2011Q3							
	Baseline BVAR				Large BVAR			
Price index	Real	External	Financial	Real + Wages	Real	External	Financial	Real + Wages
HICP	0.76	0.47	0.57	0.65	0.73	0.45	0.55	0.64
HICP excluding energy & food	0.68	0.70	0.63	0.62	0.64	0.62	0.58	0.59
HICP constant taxes	0.71	0.44	0.66	0.67	0.74	0.37	0.49	0.71
GDP deflator	0.77	0.59	0.66	0.78	0.76	0.56	0.53	0.79
	2012Q2 - 2014Q4							
	Baseline BVAR				Large BVAR			
Price index	Real	External	Financial	Real + Wages	Real	External	Financial	Real + Wages
HICP	1.11	0.77	1.30	0.84	1.07	0.73	1.26	0.82
HICP excluding energy & food	1.06	0.85	1.08	1.01	1.12	0.90	1.07	1.01
HICP constant taxes	1.26	0.69	1.35	0.94	1.16	0.72	1.19	0.91
GDP deflator	0.54	0.40	0.36	0.44	0.49	0.40	0.38	0.48

Source: Author's calculations

Cross-country comparison

The disinflation after the crisis, especially the one starting in 2012, was a widespread phenomenon among euro area countries, affecting both those economies that were the most affected by the sovereign debt crisis but also the least affected ones. In addition, low inflation in the euro area is not entirely attributable to developments in international commodity prices, like energy and food, since other components of the euro area's price index, such as non-energy industrial goods and services, have also been characterized by subdued dynamics. As a result, weak aggregate demand could also be playing an important role in explaining the low inflation developments (Constancio 2014).

This section compares the Maltese results with those from the euro area by running the baseline BVAR model with euro area data. In addition to the euro area average, it also assesses whether the drivers of low inflation differ between the four largest economies in the euro area and the smallest member states. Overall, these countries include both those that were heavily affected by the impact of the 2009 recession and the sovereign debt crisis as well as some that emerged largely unscathed.

The results show that, in the euro area, while external variables are best in explaining the disinflation period starting in 2008, the forecasts conditional on domestic business cycle (which also includes wages) are the closest to the actual path of inflation for the second phase of the crisis.

The results point to cross-country heterogeneity among the largest and smallest members of the monetary union, especially in the second phase of the crisis. In the first phase of the crisis, external factors were the dominant category in explaining the drop in inflation in both large and small economies. After 2012, however, domestic factors were the most important category in explaining low inflation in the four largest economies of the euro area. This could be due, for instance, to the protracted weakness in activity and investment in some economies and the need to regain competitiveness, which, together with the relatively high unemployment, kept wage pressures contained. On the contrary, with a few exceptions, external factors continued to play the most important role in explaining headline inflation in most of the small economies.

Table 2: Cross-country comparison

	FIRST PHASE			SECOND PHASE		
	Business cycle	External	Financial	Business cycle	External	Financial
Euro area		X		X		
Large economies						
Germany		X		X		
France		X		X		
Italy		X		X		
Spain		X		X		
Small economies						
Malta		X			X	

	FIRST PHASE			SECOND PHASE		
	Business cycle	External	Financial	Business cycle	External	Financial
Cyprus			X		X	
Slovenia		X			X	
Luxembourg		X			X	
Portugal		X		X		

Source: Author's calculations based on the LIFT results

Conclusion

This paper investigates the drivers of low inflation in Malta after the crisis using conditional forecasts within a Bayesian VAR framework. The reduced form nature of the exercise, however, captures correlations and not causal relationships. The latter requires a more structural approach, which is beyond the scope of this paper.

The two phases of low inflation since the crisis in Malta were both driven mainly by external factors. This is not surprising given the Malta is one of the most open economies in the EU with a high degree of import content. These results are also consistent with the view of a flattening of the Phillips curve in Malta, which explains why the robust GDP growth and the drop in unemployment to historical lows did not result in inflationary pressures. The inclusion of wages in the real activity indicators improves the fit of the model, suggesting that the structural changes in the domestic labor market could have potentially played an important role in keeping price pressures contained.

Cross-country comparisons point to a considerable degree of heterogeneity among the largest and smallest members of the monetary union, especially in the second phase of the crisis. For the euro area as a whole, the first disinflation period is best explained by the external variables but the second period was driven to a larger extent by domestic factors. This pattern is shared among the biggest economies but not by the smallest ones, for which external factors remain the most important category.

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Appendix A
Variables included in the Bayesian Vector Auto regression Models

Variable	Baseline BVAR	Large BVAR	Source
Price index			
HICP	X	X	**Eurostat**
Wages			
Compensation per employee	X	X	**ECB Statistical Data Warehouse**
Real activity variables			
Real GDP	X	X	**Eurostat**
Unemployment rate	X	X	**Eurostat**
Real investment	X	X	**Eurostat**
Foreign variables			
Price of oil in USD	X	X	**ECB Statistical Data Warehouse**
Price of non-energy commodities	X	X	**ECB Statistical Data Warehouse**
Nominal effective exchange rate	X	X	**ECB Statistical Data Warehouse**
Foreign demand	X	X	**European Central Bank**
Financial variables			
3-month Euribor	X	X	**Eurostat**
10-year government bond yield		X	**Eurostat**
Lending rate to NFCs	X	X	**Central Bank of Malta**
Mortgage interest rate		X	**Central Bank of Malta**
Loans to NFCs	X	X	**Central Bank of Malta**
Loans for house purchase		X	**Central Bank of Malta**
Stock index		**X**	**Central Bank of Malta**

Notes: Symbol x implies that a variable is included in the VAR.

Theoretical and Practical Research in Economic Field

DOI: http://dx.doi.org/10.14505/tpref.v7.1(13).05

Lessons from Enterprise Reforms in China and Vietnam Can Stylized Necessary Conditions for the Sustainability of Socialist-Oriented Economic Strategies Be Identified?

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Suggested Citation:

Gabriele, A. (2016). Lessons from Enterprise Reforms in China and Vietnam Can Stylized Necessary Conditions for the Sustainability of Socialist-Oriented Economic Strategies Be Identified? *Theoretical and Practical Research in Economic Field*, (Volume VII, Summer), 1(13): 63-80. DOI:10.14505/tpref.v7.1(13).05. Available from: http://www.asers.eu/journals/tpref/curent-issue

Article's History:

Received May, 2016; *Revised* June, 2016; *Accepted* June, 2016.

Abstract

This paper surveys a few key features of socialist-oriented economic (SOE) reforms in China and Vietnam, focusing particularly on the evolution of ownership structures and on the relative weight of market regulatory mechanisms, and discusses their general implications for socialist development. It tentatively concludes that some broad principles informing and constraining any feasible socialist-oriented economic strategy can indeed be identified.

JEL Classification: O10, 014, 020, P26, P27, P30, P31

Keywords: socialism, socialist economies, socialist planning, property rights, socialist enterprises, SOE, corporatization.

Introduction

Marx's interpretation of the forces shaping the formation of average production costs, and hence of productive and unproductive labor, income distribution and the dynamic of capital accumulation, is still relevant to understand some basic features of the contemporary globalizing economy. More specifically, his (very few) observations on how to deal with inter - sectoral and personal distribution under socialism are very helpful to realize the constraints faced by present-day socialist planners. However, a proper understanding of the renovation perspectives, the sustainability, and the very possibility of existence of socialism in the XXI century requires a new and partly modified utilization of some of Marx's fundamental categories. I begin my argument discussing briefly those of Mode of Production (MP), Social and Economic Formation (SEF), and Law of Value (LV).[1]

1. A stylized reassessment of a few key Marxian categories

A mode of production (MP) is a pattern of interaction between productive forces and social relations of production which broadly characterize and define the material base and reproduction of human civilizations over very long periods of time: *"A mode of production is an articulated combination of relations and forces of production structured by the dominance of the relations of production"* (Hindless and Hirst 1975, 9).

Among many quotes from Marx himself, the following is particularly telling: "The *totality of relations of production constitutes the economic structure of society, the real foundation, on which arises a legal and political superstructure and to which correspond definite forms of social consciousness. The mode of production of material life conditions the general process of social, political and intellectual life."* (Marx 1859, Preface).

The whole edifice of Marx's thought revolves around this key holistic and ontological category, to which he

[1] See Marx 1845, 1857-58, 1859, 1867, 1875, 1894.

refers in most of his works, focusing to varying degrees on one or another of its multiple features and dimensions.

Relative stability predominates in some periods, while other periods are characterized by the transition from one prevalent MP to another one. The relation between an MP's universal/structural/ permanent features and its particularistic/ historically and geographically specific ones is not straightforward and simple. Any attempt to properly analyze and evaluate such a relation requires difficult balancing and fine-tuning exercise, especially in the case of capitalism.

Marx also introduced the less famous, almost obscure category of SEF (Marx 1859, Preface). Marx utilized the term rather sparingly, and in his own work he often attributed to it a meaning practically equivalent to that of MP. Yet, in other cases he appears attached to the term SEF a less universalistic and holistic character, arguing that diverse socio-economic formations can coexist and reciprocally interact in a global context characterized by the prevalence of a given MP. Their endogenous evolution and their mutual relations can eventually lead in the long term to a shift from one MP to another.

Other thinkers in the Marxian tradition (among them Lenin and Althusser) subsequently re-interpreted the concept of SEF in a partly different and more restrictive way, that allows it to be rather clearly differentiated from that of MP. Among many other ones, I consider particularly valid Lorimer's interpretation: "The SEF is an integrated social system the totality of relations of production in a SEF based on a distinct mode of production is almost never homogeneous - there exists a long side the dominant property from other relations of production" (Lorimer 1999, 109-111). The term SEF can be heuristically reinterpreted in the early XXI century as referring to social and economic "sub-sets" largely, but not fully contained and constrained by a larger "set," constituted by the prevailing MP. The latter, an all-encompassing category belonging to the very long period, is dominated by the principle of necessity.

The emergence and unfolding of SEFs takes place over long but relatively shorter periods of time, necessarily within the boundaries imposed by the structural characteristics of the slow-changing MP. The evolution of SEFs is strongly affected by changes in the superstructure, and in the consciousness and organization of social classes. Therefore, it is at least partly characterized by the principle of freedom, while by its very nature the category of MP is dominated by the principle of necessity. Each *SEF "is the specific complex of social relations of production and exchange obtaining in a certain country or group of countries during a long period of time"* (Gabriele and Schettino 2012, 23-24), and as such can differ significantly different from its counterparts in other countries. In each historically-determined SEF several MPs can (and usually do) coexist as different subsets. In this dimension, the SEF is characterized by the principle of generality and totality and each MP by those of particularity and partiality.

However, at a more abstract and theoretical level, the opposite is true. The MP is characterized by the principle of generality and totality and each SEF by those of particularity and partiality. A small number of different MPs have slowly evolved over centuries and millennia, eventually prevailing over pre-existing ones in vast areas of the world. In doing so, they have been informing, governing and organizing social and economic relations of production and exchange to various extents in myriads of relatively short-lived and geographically-limited SEFs. The contemporary world is characterized by the existence of multiple nation states and various forms of inter-state cooperation and rivalry, in a context where international trade and financial relations are predominantly market-based (see below, section 2). International markets, in turn, are neither free nor fair or perfect, but they remain based on a global structure of production prices ultimately predicated on average production costs.[2]

According to Marx (who reformulated an approach common also to Smith and Ricardo)[3] production prices are ultimately predicated on the foundations of the "Law of Value" (LV). In general terms, the LV implies that the prices of goods and services are broadly correspondent to the amount of labor needed to produce them, taking into account the technology prevailing worldwide. In Marx's terminology, this is equivalent to state that "normal" production prices[4] ultimately correspond to the amount of necessary (direct and indirect) labor they embody, which also determines the macroeconomic magnitudes of total wages and surplus value. [5]

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[2] Contingent supply and demand oscillations do play a role as well in the short and medium term.

[3] Marx inherited the labor theory of value from the classical school (Mandel 2004) see also Sewell (2014a).

[4] This determination only appears clearly as an explication of medium and long-term price movements. In the shorter run, prices fluctuate around values as axes. Marx never intended to negate the operation of market laws, of the law of supply and demand, in determining these short-term fluctuations. (Mandel 2004)

[5] After Marx's death, many critics pointed out that a straightforward application of the LV in its original form in order to calculate production prices led to formal logical contradictions. A long and often obscure debate ensued, the intensity of which peaked in the 1960s and 1970s but (as usual in the domain of economic science) never led to clear-cut conclusions shared by all participants.

In my view, the debate basically showed that Marx's theory of value was not exempt from logic aporias, but could be improved and developed in what came to be known as the "surplus approach", (and, later, the "new interpretation approach"), which is both internally consistent and realistically suitable to interpreter the basic features of contemporary economies operating in the global modern MP framework. (Ritter von Bawerk 1898, Sraffa 1951 and 1960, Garegnani 1984, Brooks 2002, Mandel 2004, Cesaratto 2012, Sewell 2014a and 2014b, Pala 2015, Screpanti 2015)

In the remainder of this article, therefore, the term LV is not to be identified in a strict and formal fashion with the concept put forward by Marx in his pioneering XIX century contribution. Rather, it should be interpreted in a broad and heuristic sense - as its utilization is instrumental to the understanding of basic principles governing real-life contemporary economies - yet referring to a strong and robust concept that has been fully legitimated by the results of theoretical economic science.

Marx also argued that in any capitalist economy not all labor is productive (of productive of surplus value). In value terms, this means that unproductive workers (no matter how worth their work might be in terms of population welfare, as for public workers in health and education) must be ultimately subsidized by productive workers via direct or indirect taxation (see Marx 1863[6], 1861-64 and Gough 1972, Brooks 2005).

In the economy of this paper, the LV is to be understood in broad and heuristic terms as an imminent principle that governs value creation and exchange in all capitalist and socialist modern economic systems that are underpinned by commodity production and markets. While it is philosophically true that all economic value in human societies is ultimately generated by labor[7], the LV is not to be interpreted as a mechanical algorithm aimed at calculating an exact correspondence between quantities of labor and prices.

Marx realized that the LV cannot be superseded under socialism (at least, in its early stage[8]). As a matter of fact, socialism was conceived by Marx as an intermediate stage where production is socialized, capitalist exploitation is eliminated, and the socialist distribution principle "to each one according to her/his work" prevails.[9] Under socialism, the surplus is no longer privately captured. However, far from disappearing, it is collectivized and allocated to various forms of investment and social consumption. In fact, in the Critique of the Gotha program, Marx envisaged that the early socialist society would need to divide the total social product into an (individual) consumption fund (distributed according to labor) and a surplus. The surplus shall be used to finance various "funds" needed for economic and social reproduction and accumulation.

> *"The co-operative proceeds of labor are the total social product. From this must now be deducted: First, cover for replacement of the means of production used up, second, additional portion for expansion of production, third, reserve or insurance funds to provide against accidents. These deductions from the "undiminished" proceeds of labor are an economic necessity.*

There remains the other part of the total product, intended to serve as means of consumption. Before this is divided among the individuals, there has to be deducted again, from it: first, the general costs of administration not belonging to production, second, that which is intended for the common satisfaction of needs, such as schools, health services, etc.[10] From the outset, this part grows considerably in comparison with present-day society, and it grows in proportion as the new society develops…[11]. Then, third, funds for those unable to work, etc. Only now do we come to the "distribution" namely, to that part of the means of consumption which is divided among the individual producers. *Here, obviously, the same principle prevails as that which regulates the*

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[6] See, in particular, Chapter IV, Theories of Productive and Unproductive Labor.

[7] "Every child knows that any nation that stopped working, not for a year, but let us say, just for a few weeks, would perish the things we need have to be produced in certain quantities and then distributed according to the requirements of society. This constitutes the economic laws of all societies, including capitalism and every child knows, too, that the amounts of products corresponding to the differing amounts of needs, demand differing and quantitatively determined amounts of society's aggregate labor" Marx 1868, Letter to Kugelmann. pp. 68-69.

[8] According to Marx, socialism itself was supposed to be only a transitional, very imperfect step on humankind's way towards communism. Actually, the very raison d'être of socialism is the impossibility of jumping directly from capitalism to communism. Accordingly, in Marx's view the prevalence of the LV would be dominant in the early stages of socialism, and it would progressively wither out as society was approaching communism.

[9] Of course, this is not tantamount to say that each worker personally obtains the full product of his work (see below, the rest of this subsection).

[10] Workers in these sectors (which are necessarily public under socialism) are non-productive in Marxian terms.

[11] Historical experience confirmed this prediction. Socialist-oriented and, more generally, progressive governments have always attached a high degree of priority to social spending.

exchange of commodities, as far as this is exchange of equal values. Content and form are changed, because under the altered circumstances no one can give anything except his labor, and because, on the other hand, nothing can pass to the ownership of individuals, except individual means of consumption. But as far as the distribution of the latter among the individual producers is concerned, *the same principle prevails as in the exchange of commodity equivalents: a given amount of labor in one form is exchanged for an equal amount of labor in another form*[12]*."* (Marx 1875)[13].

1.6. In The state and the Revolution, (1917a), Lenin referred approvingly to the Critique of the Gotha program, and fully shared its argument and conclusions:

What we have to deal with here is a communist society, not as it has developed on its own foundations, but, on the contrary, just as it emerges from capitalist society; which is thus in every respect, economically, morally, and intellectually, still stamped with the birthmarks of the old society from whose womb it emerges. Accordingly, the individual producer receives back from society -- after the deductions have been made -- exactly what he gives to it….The same amount of labor which he has given to society in one form, he receives back in another[14]*…Here, obviously, the same principle prevails as that which regulates the exchange of commodities, as far as this is exchange of equal values. Content and form are changed, because under the altered circumstances no one can give anything except his labor, and because, on the other hand, nothing can pass to the ownership of individuals, except individual means of consumption. But as far as the distribution of the latter among the individual producers is concerned, the same principle prevails as in the exchange of commodity equivalents: a given amount of labor in one form is exchanged for an equal amount of labor in another form."* (Lenin 1917)[15].

Consistently with Marx's and Lenin's approach, any modern economy can be seen as being constituted by two macro-sectors: the productive macro-sector, which comprises productive workers, and the non-productive macro-sector, which comprises non-productive workers. The latter includes all public services, among them essential ones such as health and education, which crucially contribute to people's human development both directly and indirectly (via their impact on human capital formation), and the financial sector. The productive macro-sector generates a surplus (*i.e.,* surplus value). Conversely, the non-productive macro-sector does not sell the bulk of its output at market prices. Thus, the government must engineer a net transfer from one macro-sector to the other via direct and indirect taxation. The proper handling of this inter-macro-sectoral relationship is a key strategic and policy issue. The non-productive macro-sector, differently from the productive one, should as much as possible be managed and regulated directly by the state via non-market policy tools. Financial services, in particular - due to their central role in determining investment, employment, and growth - should as far as possible be run as a public service as well.[16]

2. Socialism under the modern mode of production

In the Introduction I have exposed selectively some basic tenets of Marxian thought on some crucial categories (such as MP, SEF, LV, productive and non productive labor, the persistence of commodity-like exchange and distribution principles under socialism) which I consider still very relevant for the understanding of the globalizing world economy in the XXIth century.

Conversely, I maintain that a number of historical lessons from the XXth and the early XXIth century require a novel and partly modified view of the prevailing MP in the contemporary era – thereby departing from orthodox Marxist tradition while maintaining a methodological fidelity to its inspiration.

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[12] Marx clearly recognizes that early post-capitalist societies, due to their very underdevelopment, could not go beyond this socialist distribution principle. Yet, he stigmatized its ethical and humanistic limitations, due to the fact that individuals' working capabilities and needs are uneven and randomly matched. As a result, for instance, many very needy individuals are endowed with little or no productive potential, and therefore they would be unethically penalized if the socialist distribution principle were fully and exclusively applied, without any humanistic-oriented correction.

[13] My emphasis

[14] Here Lenin appears to envisage a socialist society where money and the exchange of commodities have been replaced by labor certificates that entitle workers to directly draw consumption goods and services from a centralized consumption fund. Yet, he notices that distribution of means of consumption among individuals "the same principle prevails as in the exchange of commodity equivalents". In practice, no real-world post-revolutionary society has ever fully superseded money, commodities and commodity-monetary relations.

[15] My emphasis

[16] If left to private agents and market forces, eager to capture ever-increasing portions of socially-produced wealth, the expansion of financial capital tends to worsen income distribution and to provoke disruptive systemic crises.

The main lessons, in extremely synthesized terms, are as follows:

- Attempts to bring about a socialist-oriented global political revolution that might have brought to power almost contemporarily socialist forces in all (or many) advanced capitalist countries did not succeed. A full-fledged overhauling of the global dominant MP over a historically very short period (*i.e.,* one or two generations) looks impossible nowadays, contrarily to the belief of many Marxist and other revolutionaries of the XIX and early XXth century.
- A corollary of i) is that the very conception of the nature and feasibility of socialism (which was previously strongly imbued with a holistic and, in some cases, millenarian and scatological aura) must be interpreted in a more limited and less ambitious fashion, acknowledging the inevitability of the long-term persistence of multiple contradictions in the context of any socialist-oriented historical process. It is therefore preferable to avoid discussing about socialism/non-socialism in the framework of an essentialist, dichotomist, black and white approach, realizing that in many cases the evaluation of concrete socioeconomic realities is to a large extent a matter of degree and of value judgment, and that a large gap often separates reality from intentions (both subjectively and objectively). In this context, heuristic, approximate and ad hoc terms and analytical tools can be of practical use to grasp the basic elements of otherwise excessively complex and contradictory objects of study. For this reason, I utilize in some parts of this article terms such as positive and normative criteria[17], socialist-oriented[18], and even "socialisticity"[19]. As a matter of fact, in my view, excessively simplified statements such as this or "country a (or b, or c) is socialist" or "is not socialist" are off the mark. Conversely, prudent statements such as "country a is more "socialistic" than country b from the vantage point of modernizing its governance of the economy in order to suit the objective degree of advancement of its own relations of production and exchange, thereby effectively combating poverty, but is less socialistic with respect to the degree of equality" are more likely to be meaningful and scientifically defendable[20].

Since the Russian Revolution, there have been many instances where socialist forces have gained power in relatively backward peripheral countries[21], characterized by embryonic, immature, dependent and /or colonial forms of capitalist development. Subsequent attempts to build socialist economies in these countries have struggled with extraordinary hurdles, stemming to a large extent from the very underdevelopment of productive forces, on one hand, and – for a long time - under conditions of isolation and of very harsh hostility on the part of the advanced capitalist powers. However, at least in some cases, these national experiments have exhibited a rather high degree of depth, radicalism, consistency and resilience. Hence, in my view, they constitute (or constituted) examples of socialist-oriented SEFs.

Most of these pioneering attempts eventually collapsed under the combined pressure of external aggressiveness and internal contradictions. Without underestimating the weight of the former, or the important achievements of the USSR and other European socialist countries in areas such as the universal provision of housing, food and basic services, "Soviet-style command economies proved to be too rigid to be able to absorb from outside, internally generate and diffuse innovations in a satisfactory manner" (Gabriele and Schettino 2012, 28).

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[17] Positive criteria represent structural features of social production relations, such as the relative weight of the State and of the market respectively, the distribution of the ownership of the main means of production, and the class(es), or social group(s) controlling the economy as whole, and determining the joint process of accumulation and technical progress. Normative criteria represent the degree of achievement of intermediate (e.g., GDP growth, GINI coefficient) and final goals (such as poverty elimination, universal satisfaction of basic needs, equity in opportunities, an ethically and socially satisfactory income distribution, and environment protection). One country might be seen by some analysts are more socialist according to some of these criteria, and less according to other criteria. Other analysts might legitimately interpret the same evidence in a different way. (Elliot 1978, Gabriele and Schettino 2012)

[18] The term "socialist-oriented "is a useful one in discussing the objective reality of many countries according to various positive and normative criteria, without implying a definitive value judgment on whether they are in fact socialist or not.

[19] Degree of approximation to socialism proper, according to positive and/or normative criteria

[20] Even taking into account the relative weak definition of science itself which is (rightly) prevailing in the domain of social sciences

[21] The socialist-oriented processes launched in relatively advanced capitalist countries such as East Germany and the Czech Republic, apart from having been essentially a by-product of the Cold War rather than of home-grown political processes, also took place under conditions of isolation and hostility from the advanced capitalist powers. Hence, they faced difficulties not so different from those of other communist-run socialist construction attempts.

Conversely, communist parties formerly supported by the USSR were maintained power in China and in a few other developing countries. In other developing countries, socialist forces climbed to government via the ballot box, and embarked in broadly socialist-oriented development strategies with different degrees of success and sustainability. In the vast majority of cases[22] (and, arguably, especially so in the most successful ones) socialist-oriented development strategies are being implemented under conditions very different from those of the past. Externally, these countries are far less isolated from the capitalist world than it was the case for the USSR and Mao's China, and actively strive to integrate their national economies with global trade, financial and technological flows. Domestically, they re-introduced (or maintained) a number of market-based regulation mechanisms, and also – to different extents – private property rights on some means of production.

Results in terms of development of the productive forces and poverty reduction have been spectacular in the case of China, very favorable in that of Vietnam, and mixed in other cases (see the Appendix). It is also fair to acknowledge, however, that market-oriented reforms have contributed to rising social inequality and that the fabric of China's and Vietnam's economies is so complex that their very socialist nature is far from clear-cut. In fact, no one – included their own governments[23] - claims that they constitute full-fledged examples of socialism.

Many observers would acknowledge that in both countries there are elements of socialism[24] (such as the large weight of the State in the economy, and the very relevant role of SOEs, State-Controlled Mixed Enterprises and other non-private firms), as well as elements of capitalism and even of pre-capitalist MPs (in the most backward rural areas). Therefore, they see China and Vietnam as mixed economies with both socialist and capitalist features. Many other analysts are inclined to believe that they have now become fully capitalist in all but name – or that they have anyway embarked on a path that cannot but lead to such an outcome.

A quarter of a century after the end of the Cold War the relation of forces in the world economy has not fallen back to its pre-1917 situations. Colonialism in its traditional form is dead. Global trade and financial relations among countries at different level of economic and technological development are prevalently governed by rule-based market relations rather than sheer imperialist spoliation.[25] Due to the emergence of China, the BRICs and other developing countries, the distribution of economic and financial power in the world is now multi-polar to a large extent.

Thus, the profound changes occurred worldwide since the time of Marx suggest that contemporary international relations of production and exchange are prevalently market-based, yet no longer resemble those typical of the XIXth century or the first half of the XXth century. On one hand, it is no longer thinkable to expect these relations to change radically in a relatively short period of time, being substituted by a full-fledged socialist MP on a global scale. On the other hand, many elements of the traditional global capitalist order have been modified by history, and the viability of national, at least partly non capitalistic development paths has now increased in many areas of the world.

These considerations suggest – as a provisional working assumption - that the prevalent MP worldwide is no longer fully capitalistic. On the other hand, the globalization process offers also to socialist-oriented countries opportunities for international economic integration – while diminishing, with respect to the past, the degrees of freedom of which planners may dispose in trying to pursue non-capitalist development paths. It is therefore preferable to refer neutrally to the prevalent MP worldwide as the Modern Mode of Production. The dominant, modern MP is predicated on market-based social relations of production and exchange. In my view, actually, as the state of such relations at the global level can evolve only along the dimension of history's long time, their market-based foundations are bound to prevail globally for an indefinitely long period, thereby justifying the strong

[22] Pre-Raùl Cuba and North Korea are obvious exceptions. Even in the latter country, however, some market-oriented reforms appear to be taking place, see Talmadge (2015).

[23] Official interpretations range from stating that their societies are still in a very backward stage of socialism to acknowledge that they are not (yet) even socialist in proper sense, but only "socialist-oriented". The latter expression may be variously interpreted as meaning an objective fact (*i.e.* China and Vietnam are actually moving towards socialism) or a declaration of intent (their governments and peoples are trying hard to advance in the direction of socialism), see Nguyen Phu Trong (2012), CPC (2013), Xinhua (2015).

[24] At least, according to positive criteria

[25] This is not to deny that neo-colonial power relations have not disappeared in many areas of the world, or that the formal regulation and the practical functioning of international trade and financial relations do not disproportionally favor the most advanced capitalist powers, while penalizing most of the developing world.

and holistic term MP. If this sweeping assumption is true, it implies as a corollary that any attempt to overhaul it through quixotic, subjective political action would be futile and counterproductive.[26]

The arguments put forward in the preceding sub-sections suggest that the categories of SEF and MP are to be understood as tools aimed to analyze some structural features of human societies existing as objects belonging to the space of historical time.[27]

The fundamentally market- and value- based nature of the modern MP cannot, and will not be undermined in the foreseeable future, as it intrinsically corresponds to the historical degree and form of development of humankind's evolution of social relations and to its relationship with nature. Yet, at a theoretical level, it is crucial to stress that the market-based foundations of the modern MP are not synonymous with capitalism (and much less with its neo-liberal variant). As a matter of fact, in the context of the basic global compatibilities determined by the MP, several diverse forms of socioeconomic systems can develop in different points of space and time as a result of various factors, including scientific analysis and conscious collective action.

Historical experience is consistent with this theoretical framework. Nowadays, capitalist relations of production and exchange (leading to forms of - mostly oligopolistic- competition), and therefore of class power, are both dominant and hegemonic worldwide. However, their dominance is neither complete, unchallenged, nor inevitable for an endless period of time. Embryonic non-capitalist capitalist relations of production and exchange and of class power have been emerging, following an uneven pattern, in some areas of the periphery, since the first decades of the past century. In some of these areas socialist-oriented SEFs[28] have been established. Some of them eventually collapsed due to endogenous and exogenous factors, while others have proved resilient (at least so far), and new ones have emerged. In many other countries in the periphery non-socialist forms of mixed economies prevail, some of them are led by progressive political forces pursuing novel human development-centered national development strategies. The advanced, traditionally dominant core capitalist countries produce a constantly shrinking share (well below 50%) of the world GDP[29]. Moreover, they are mired in the longest and deepest crisis of their history, and are sliding back into pre-Keynesian, regressive relations of production and exchange.

In my view, it has to be recognized that historical experience has shown that modern economies are characterized by a high and ever-increasing degree of complexity.[30] This complexity is linked to the continuous and stratified knowledge accumulation on the part of numerous and diverse agents, and does not allow for simplistic or over-centralized solutions to the core problem of governance. Such a degree of complexity and the related dispersion of relevant information can partly be counteracted, but not fully overruled by the increasing sophistication of information and computing technologies. Material balances-based centralized administrative planning (while useful to a limited extent, to perform basic tasks under given circumstances) is inadequate as a sole device to deal with such complexities. Therefore, simplistic, over-centralized solutions to the core problem of economic governance and planning are neither efficient not ultimately sustainable.

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[26] However, in order to maintain a balanced analytical approach, it is always crucial to avoid falling in the too common pitfalls of traditional "economism", revolving around the fabulous fictional character named "homo economicus". The economic structure, albeit crucial, is but one of the dimensions shaping human life, and all-too-important and ever-evolving "cultural factors interact in a complex way both with the economic mode of production (the so-called "material" basis of society) and with the psychological orientations and conflicts of the persons involved" (Hermann 2012, 5, Note 2), in a context where individual decisions are the product of a very "non-linear" bounded rationality-based process.

[27] In turn, the latter is sub-set of the much longer-term process of life's evolution on Earth, as the dialectic between competition and cooperation is a key founding characteristic of all living beings and therefore also, a fortiori, of human societies. (Novak 2011)

[28] The term socialist-oriented SEF refers broadly to a country run in a rather stable context by a political force declaring officially to be engaged in steering a process aimed at establishing, strengthening, or improving and further developing a socialist socioeconomic system, and actually implementing economic policies that are broadly consistent with the socialist goal. At the second condition is not easy to verify, it is likely that external observers might disagree on whether a specific country is in fact a socialist-oriented SEF or not. In any case, the term "socialist-oriented" is much weaker than the term "socialist".

[29] According to World Bank estimates (in PPP terms) the share of global output accruing to rich OECD member countries was 45% in 2010 and 43% in 2013 (source: World Bank WDI).

[30] Lenin was popularly believed to have said that, once capitalist exploitation was overcome, the governance of the state and the economy would become such an easy task that "any cook can govern the state". In fact his view was rather the opposite one: "We know that an unskilled laborer or a cook cannot immediately get on with the job of state administration." Lenin 1917b.

The socialization of the principal means of production and the control on the part of the state of the commanding heights of the economy do not bring about a complete social homogenization. Therefore, economic governance and planning cannot constitute a not over-centralized, autistic exercise, but shall take fully into account the constraints posed by objectively-existing social relations of production and exchange, individuals' incentives and aspirations, objectively-existing social relations of production and exchange, and the degree of consciousness of different population groups. The complexity of economic governance and strategic development planning latter must be dealt with via partly price- and market-based regulation mechanisms

Advancing towards socialism under the constraints imposed by the modern MP implies the adoption of an adequate planning approach, solidly founded on a vast array of information and forecasts, and which must necessarily be ultimately market-compatible[31] and intrinsically democratic.

With respect to private agents, planners can leverage the State's potentially superior (albeit not infinite) information-gathering, processing and forecasting capabilities to provide the foundations for a conscious, forward-looking an effort to shepherd the endogenous trends emerging from the market. In this endeavor, they can try to utilizing an array of diverse policy tools aimed at optimally shaping the trajectories of investment, innovation, and relative prices[32]. The condition of ultimate market compatibility of this kind of planning, however, imposes a significant prudential limitation on its degrees of freedom, as the outcome in the medium- and long-term (especially in terms of domestic prices structure) shall not be allowed to diverge unduly from the global structure of relative prices.

3. Concluding remarks

3.1. "Laws" of socialist-oriented economic development?

Hinting at the existence of "laws" of socialist-oriented socioeconomic development which are of general applicability can be considered so far as little more than an informed working assumption. Even if these "laws" did in fact exist, it would be foolish on the part of any analyst to pretend having fully discovered and properly understand all of them.

Moreover, the economy of a paper like the present one does not allow for an in-depth analysis of the extremely complex and contradictory reforms implemented or attempted in presently-existing socialist-oriented developing countries and of their outcomes in terms of economic, social, and human development. A few synthetic indicators and graphs illustrating some stylized facts are presented in the Appendix, which mostly focuses on China, Vietnam and Cuba. It is well known that the two Asian countries embarked since the late 1970s- early 1980s on a market-socialist path, while Cuba (due partly to the objective constraints imposed by the US embargo, and partly to the subjective attitude of the island's leadership) maintained until recently[33] a very centralized command economy model.

Within the boundaries imposed by such self-evident methodological disclaimers, I tentatively argue that after almost one century of attempts to establish and develop socialist-oriented economic systems in various parts of the world, a few propositions of general and universal applicability can be synthesized. They are proposed in the following subsection.

3.2. General principles governing and constraining development strategies in the XXI century

Any country's economy is constituted by two macro-sectors: the productive macro-sector and the non-productive macro-sector. Accordingly, the productive macro-sector generates a surplus. The non-productive sector (which includes all public services, among them essential ones such as health and education) does not. Therefore, the only way to maintain a sustainable socioeconomic equilibrium is to earmark towards the non-productive macro-sector part of the surplus generated by the productive macro-sector.

Within the boundaries imposed by this accounting constraint (which is formally corresponds to an identity similar to those of standard national accounts) , the essence of planning consists in an array of consistent state-orchestrated interventions aimed at changing what, in absence of such policy actions, would be the

[31] A 'market-compatible' economic activity is one that, even if it is not necessarily directly geared towards selling in presently existing markets, is however oriented towards the creation of future market competitiveness in advanced sectors, usually via a more roundabout and long innovation and production process (Gabriele 2001).

[32] A potentiality is not by itself a fact. Socialist-oriented countries' record in promoting and broadly steering technical progress and innovative activities, in particular, is not very satisfactory so far.

[33] The process of "updating" of the Cuban socialist model was officially launched by the VI Congress of the Communist party of Cuba in April, 2011 (Castro 2011). Its gradual implementation is still in an infant stage.

"spontaneous" outcome of the interplay of domestic and foreign market forces. The purpose of such a proactive attitude on the part of the State is to induce policy-led resource transfers that benefit sectors, subsectors or population groups at the expense of others. In turn, these transfers are aimed at achieving distributive, social and environmental goals (such as lessening inequalities, fostering public services, or protecting nature), or at accelerating economic development.

The latter set of interventions are commonly referred to as industrial policies, and can include a number of actions aimed at earmarking resources (via administrative or price-related tools) towards strategic sectors, such as infrastructure, capital goods, high-tech industries, R&D and S&T activities.[34] If properly formulated and implemented, industrial policies can indeed be quite effective. For this to be the case, however, industrial policies require two necessary conditions to be satisfied, as planners must:

- base their actions on a set of information that goes far beyond market signals (without, of course, ignoring the need to properly analyze and interpreter market signals as well);
- be endowed with an adequate and effective set of administrative and non-administrative, direct and indirect policy tools.

Policy makers should always realize a simple, commonsensical fact of life: national States' planning capabilities are limited – especially so in developing countries. The domestic structure of relative prices (including the real wage) and the real exchange rate must be broadly consistent with the structure of international prices. As the State cannot control and manage all the economy in a direct fashion, it must concentrate its limited planning resources on what is really strategically crucial. Among other things, this implies that monetary-commercial relations must be allowed to prevail in non-strategic sectors.

3.3. Principles governing socialist-oriented development strategies

The considerations put forward in the preceding sub-section apply, by and large, to any economy, and thus also to socialist-oriented ones. Therefore, they can be regarded as basic principles constraining the policy space of socialist-oriented planners in a binding fashion. However, in my view, the theoretical and empirical arguments discussed in the other sections of this paper allow to identify other economic "laws" that apply specifically to the subset of developing countries constituted by socialist-oriented SEF[35]. The main ones are as follows:

- The LV cannot be thoroughly superseded under socialism. Policy makers operating in a socialist-oriented context must acknowledge that attempting to plan against the constraints implied by the LV inevitably generates strains and tensions that can be satisfactorily governed only up to a point. From a practical vantage point of policy making, socialist planners can go a long way if they basically:
- Respect the socialist principle of distribution (i.e. try to favor the emergence of a structure of wages that is approximately consistent to individuals' labor productivity);
- do not push state-mandated inter-sectoral transfers too far, and thus do not allow the domestic structure of relative prices to depart excessively from that of international prices.
- The allocation of labor, capital and other resources in the productive sectors should not be a blind mechanical byproduct of the LV. However, planners should avoid to unduly challenging the law beyond a reasonable point. Well-meant attempts to excessively penalize the productive macro-sector in order to fund public services risk to cause a progressive de-capitalization of the former, weakening the surplus-generating capability of the whole country, and leading to economic decay.
- As far as they are financially sustainable, traditional state-mandated, centralized transfers from the productive to the non-productive macro-sector should be maintained and possibly strengthened, while the former is being reformed. These transfers are indispensable to ensure the public, free or quasi-free provision of basic services such as health and education, according to the principle of non-market-based universal access.[36] As a general rule, efforts should not be spared to avoid any form of privatization and the establishment of heavy user fees. In this respect, the negative experiences of China and Vietnam in the 1980s and 1990s should not be forgotten.[37]

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[34] The rationale behind industrial policies is the belief that the automatic working of market forces would induce a sub-optimal allocation of resources - due to an array of well-known systemic failures, such as the speculative and opportunistic behavior of private agents, the distortionary and risk-prone nature of the international and domestic private financial systems, and the pervasiveness of positive and negative externalities and information asymmetries.

[35] These principles circumscribe and identify an inner, smaller policy space internal to the former one.

[36] This principle is broadly consistent with the communist principle of distribution.

[37] See Gabriele 2006, Gabriele and Schettino 2008a, b.

- Resist any suggestion to privatize and liberalize financial services. A very strong and centralized control on the strategic core[38] of the domestic financial system - overwhelmingly constituted by public banks and other non-private financial institutions - must be enforced.[39]
- Market-oriented reforms should focus essentially on the productive macro-sector. Socialist-oriented countries where glaring a locative distortion have not been adequately tackled so far should urgently re-establish (both formally and in practice) the basic tenets of the LV. Relative prices must be rationalized and indispensable key markets must be re-constituted (including wholesale and inputs markets and markets for at least some capital goods). Little can be accomplished in terms of substantial systemic improvement until this necessary condition is satisfied.
- SOEs, with few exceptions, are not a form of enterprise conducive to the development of agriculture (or, at least, of most agricultural sub sectors, first of all the food-producing ones). Attempts to enact a mandatory transformation of rural SOEs into formally, yet not really autonomous cooperatives are bound to fail, especially if they take place in absence of at least partly functioning markets.
- Without ignoring the profound differences between the agrarian structure of each socialist-oriented developing country, experience appears to show that (at least, during the initial stage of the reforms) the most feasible and promising path to increase agricultural productivity and enhance food self-sufficiency is to re-establish to a large extent farmers' individual property rights, promoting rural household farms as the basic production units in the countryside. In a parallel fashion, the formation of (mainly credit-, trade, and other service-oriented) authentic, bottom-up cooperatives and other forms of associations might be promoted. In this respect, it is important to realize fully that no cooperative can properly function in any sector in absence of autonomy and markets.
- Industrial and infrastructural SOEs must be profoundly restructured. In this context, the general and universal validity of the motto "grasping the large and letting the small go" must be fully assumed by policy makers. The number of SOEs shall be drastically curtailed, and the remaining ones (exclusively concentrated in strategic sectors) should be strengthened, capitalized and thoroughly reformed, establishing an adequate incentive structure for managers and workers alike and enhancing enterprise autonomy.
- In strategic sectors that are not intrinsically monopolistic, the role of market mechanisms should be increased, with the goal of establishing forms of managed and regulated oligopolistic[40] competition among few reformed SOEs in the domestic market. Strong national SOEs can also successfully compete with foreign TNCs in increasingly concentrated international markets.[41]Domestic and foreign private firms might as well be allowed to compete with SOEs in some of these markets, under firmly regulated conditions.
- The structure of SOEs' property rights in non-monopolistic markets should undergo a gradual transformation. Traditional, centralized and administrative hands-on forms of state control should be superseded, as well as most forms of physical planning. Taking into account the progressive re-establishment of the LV, state control of SOEs should undergo a progressive transition towards modern, flexible, indirect, finance-based mechanisms, with a view at establishing various tiers of state-controlled corporations as the core structure of public industry.
- Most industrial and services SMEs cannot be successfully managed as SOEs. Therefore, small and medium-sized SOEs should be transformed in other types of collective, cooperative or private firms. In the worst scenario - if they are hopelessly loss-making and no better solution is available- they should simply be closed down. In some cases, privatization can be in practice the best solution. The

[38] Market-based competition can be promoted in non-strategic areas among private and cooperative financial SMEs, including credit unions (Vidal 2012).

[39] Once a certain degree of development has been reached in a not-so-small country, it is probably necessary to establish a national stock exchange market as well. However – far from being wantonly liberalized – this market must remain strongly controlled and regulated

[40] This class of SOEs is formed by large and advanced SOEs or state-controlled mixed enterprises. They tend to operate in markets where only few similarly large enterprises can compete, and which are therefore oligopolistic.

[41] "During capitalist globalization, industrial concentration occurred in almost every sector the number of leading firms in most industrial sectors shrank and the degree of industrial concentration increased greatly" (Nolan 2012, Section 2.1). Globalization and industrial concentration. Using data from 2006-09, Nolan showed that the number of globally dominant businesses in most globalizing manufacturing sectors ranged from two to a maximum of ten. Dominant firms controlled between half and all of the world market. See also Wolf 2013.

transformation of some formerly state-owned SMEs into authentic cooperatives might be actively promoted, but always taking into account the big caveat mentioned in para (v). Mandatory attempts to (formally or informally) force SME workers to take over their - often ailing - enterprises as collective owners would inevitably fail, thereby jeopardizing also the perspectives for a future recovery of the cooperative movement.

- The reform strategy outlined above inevitably implies by itself a significant deterioration in the distribution of primary incomes, with a marked increase in inequality. Such a deterioration is due only in part to the application of the socialist principle "to each one according to her wok" and to the superseding of excessive egalitarianism. In practice, the re-appearance of non-labor forms of income in those areas of the economy where capitalist relations of production and exchange are allowed to be re-established can be controlled, but not totally avoided.
- However, it is also well-known that the degree of de facto inequality in a poorly functioning socialist-oriented economy can actually be quite high as well, due among other things to the proliferation of illegal and informal rent-seeking behaviors of individual economic agents (Romanò 2012). If properly managed, the transition towards a new socialist-oriented economic model can succeed in substantially diminish the diffusion of these negative phenomena, thereby reining in the increase in overall income and social inequality.
- Governments in socialist-oriented countries dispose in principle of relatively ample policy space, and of several potentially well-targeted and fine-tuned policy tools. They can use them to control, stop and eventually invert the trend towards increasing inequality, once the transition towards a new type of socialist economic model is basically accomplished. The main instruments available to reforming socialist-oriented countries to rein in increasing inequality trends are two. Neither of them is new, yet their potential is often underestimated. One is the consolidation and (once the economic recovery of productive sectors makes sufficient resources available) the strengthening and expansion of public services provided on a non-market basis, according to principles such as need and/or universal access. The other is the establishment of a modern and effective system of progressive taxation.

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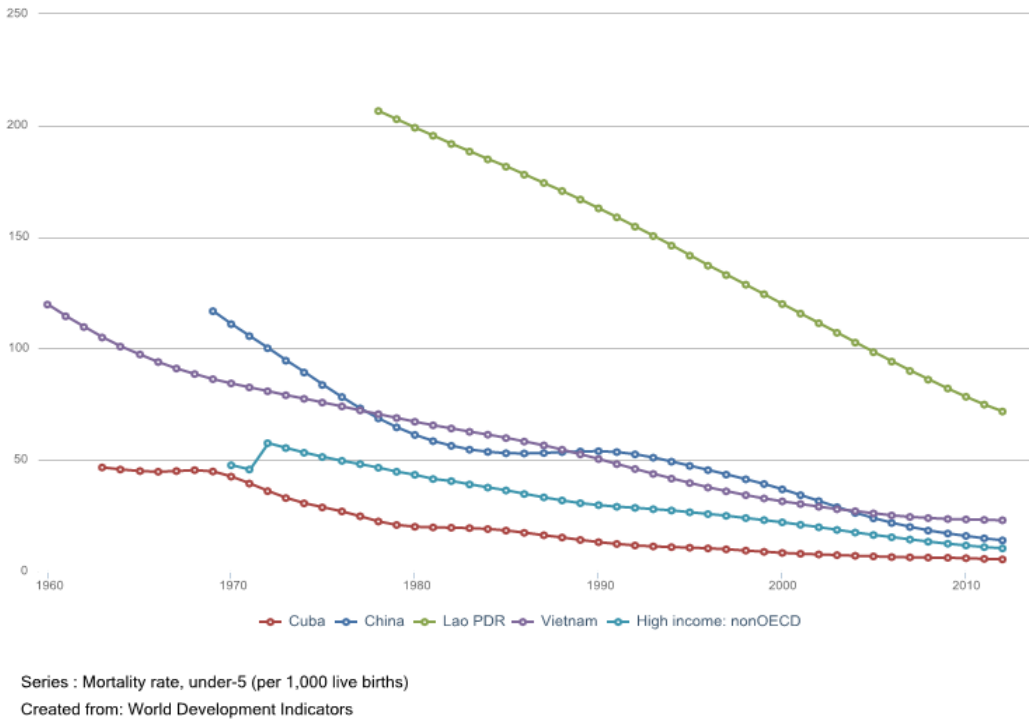
APPENDIX

Cuba, China, Vietnam and Laos: four socialist-oriented SEFs in a comparative perspective

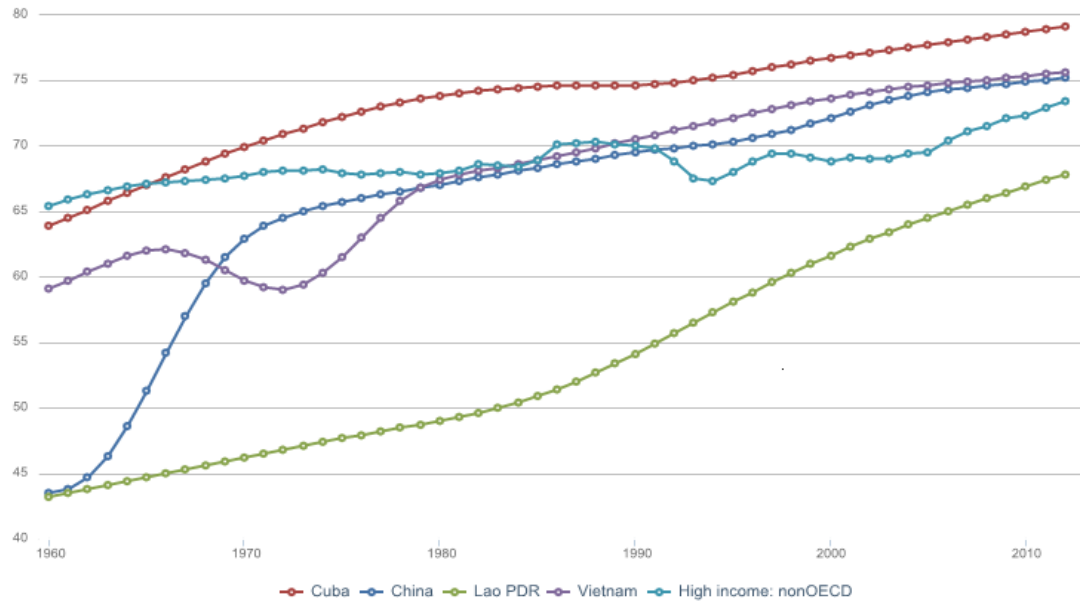
This section aims at illustrating and discussing some basic facts on the structural economic and demographic characteristics and the main features of economic and social development in four socialist-oriented SEFs (*i.e.* Cuba, China, Vietnam and Lao PDR) in a comparative perspective.

Graphs 1, 2 and 3 show that all these socialist-oriented SEFs have been performing far above the developing countries' average in terms of human development. Their rates of improvement in three key human development indicators - child mortality, life expectancy, and female literacy rate – are superior to those of (far richer) high-income non-OECD countries, and in many cases even the absolute levels of the indicators are better. Trends in terms of the most well-known synthetic indicator of human development - UNDP's Human Development Index (HDI) – show a similar picture. China's average annual rate of improvement of the HDI, at 1.52% per year, is the highest among all countries belonging to the very high and high human development grouping. Cuba's record (+0.73% per year) is among the best among countries with very high human development, especially so when compared to other Latin American and Caribbean countries. Vietnam and Lao PDR also performed very well and even more so in terms of a new indicator, the inequality-adjusted HDI[42] (see UNDP 2015).



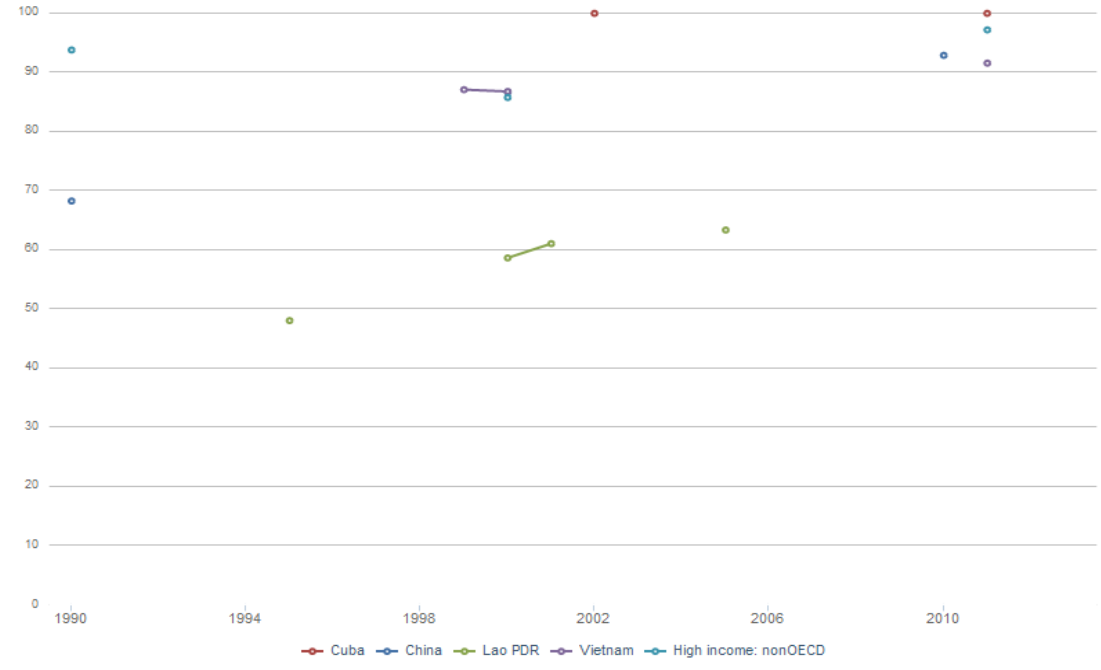
Graph 1 - Mortality rate under 5

[42] The UNDP was unable to estimate the inequality-adjusted HDI for China and Cuba



Series : Life expectancy at birth, total (years)
Created from: World Development Indicators

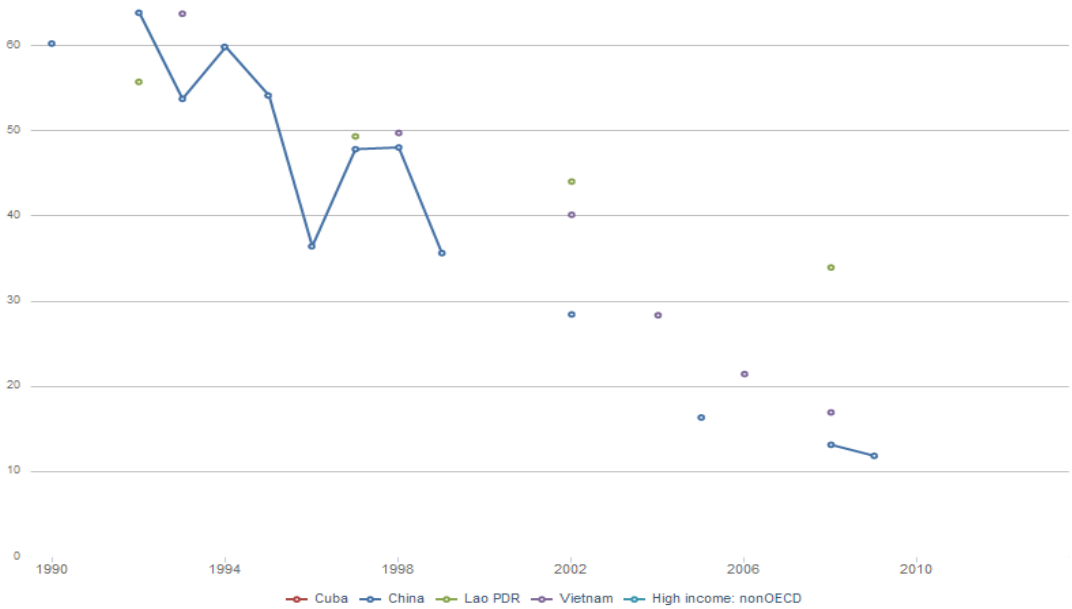
Graph 2 - Life expectancy



Source: World Development Indicators

Graph 3 Literacy rate, female adult (%)

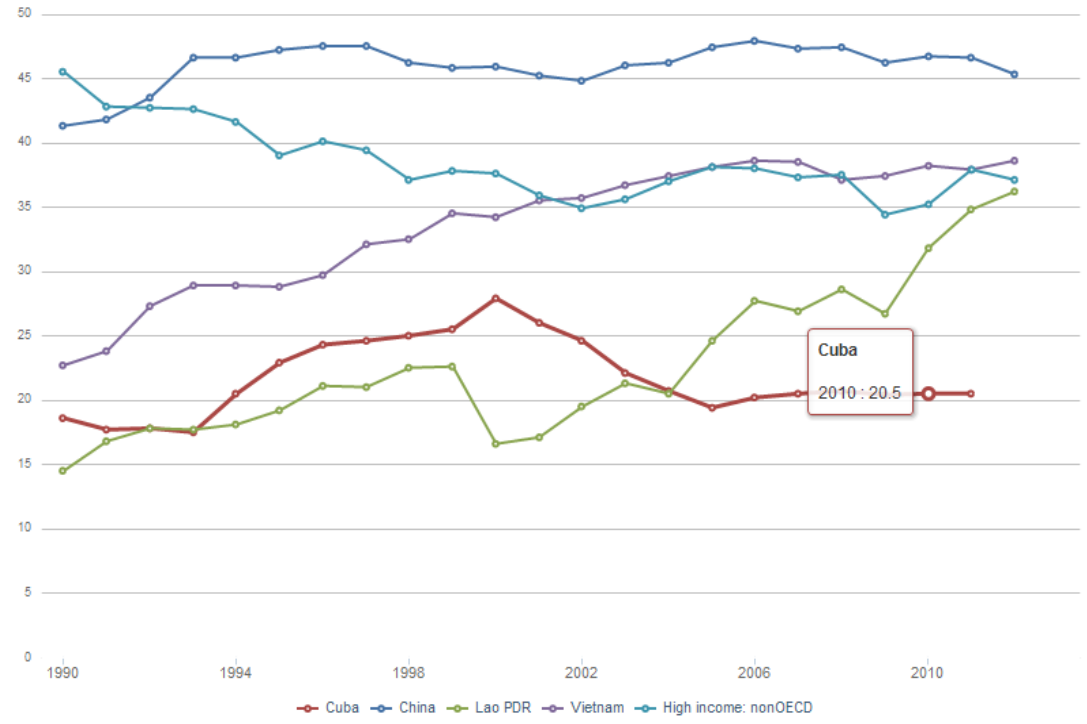
Trends in extreme, absolute poverty are also generally favorable in comparative terms, especially for the three Asian countries where (differently from Cuba) this phenomenon was still dramatically severe – to varying degrees - in the 1970s (see Graph 4).



$ Source: World Development Indicators

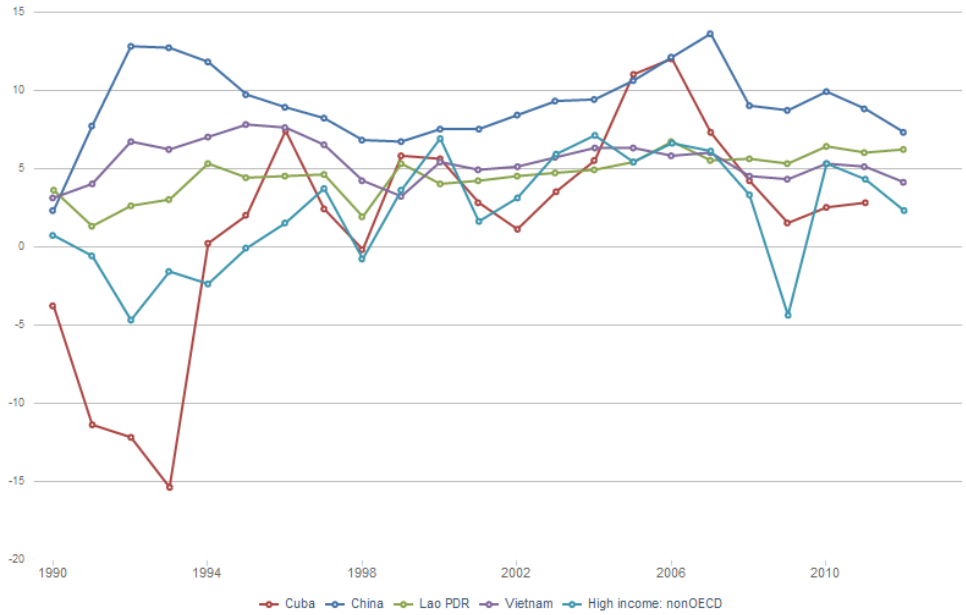
Graph 4 - Poverty PPP % 1.25

Conversely, the evolution of the structural composition of the GDP shows major differences between China, Vietnam and Lao PDR, on one hand, and Cuba, on the other hand. The Asian countries have undergone a process of rapid industrialization (reflected by a high and growing share of industry in the GDP), while Cuba's economy has experienced de-industrialization and an extremely pronounced trend towards tertiarization (see Graphs 5 and 6).



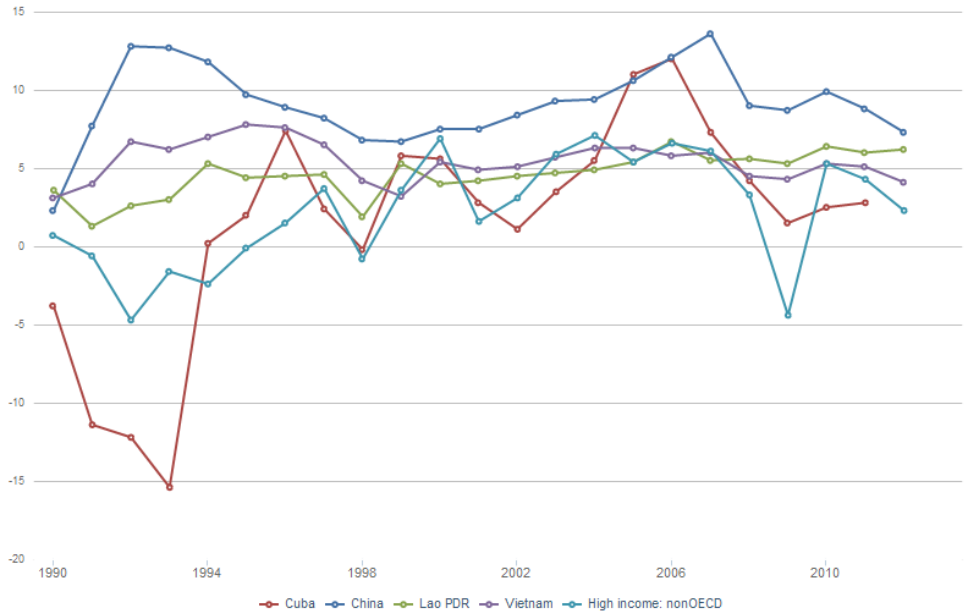
Source: World Development Indicators

Graph 5 - Services (GDP share, %)

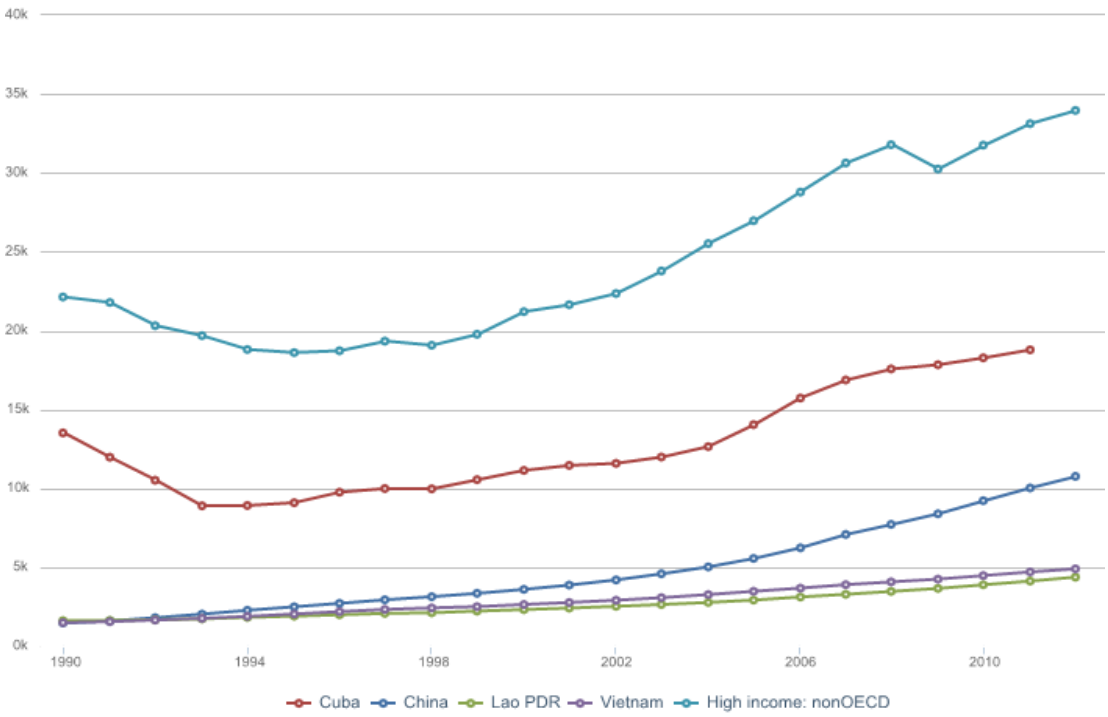


Graph 6 - Industry (GDP share, GDP %)

GDP per capita growth has been very fast in the three Asian countries, Vietnam and Lao PDR, not so in Cuba. Yet, its absolute level appears to be still higher in Cuba than even in China (see Graphs 7, 8).



Graph 7 - GDP PC growth



Series : GDP per capita, PPP (constant 2011 international $)
Created from: World Development Indicators
Created on: 06/02/2014

Graph 8 GDP per capita, PPP (constant)

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DOI: http://dx.doi.org/10.14505/tpref.v7.1(13).06

Straight-Time and Overtime: A Sequential-Lottery Approach

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Suggested Citation:

Vasilev, Aleksandar (2016). Straight-Time and Overtime: A Sequential-Lottery Approach, *Theoretical and Practical Research in Economic Field*, (Volume VII, Summer), 1(13): 81-84. DOI:10.14505/tpref.v7.1(13).01. Available from: http://www.asers.eu/journals/tpref/curent-issue.

Article's History:

Received June, 2016; *Revised* June, 2016; *Accepted* July, 2016.

Abstract:

This note explores the problem of aggregation with non-convex labor supply decisions in an economy with both straight time and overtime. In contrast to Hansen and Sargent (1988), the paper models this as a sequential decision. Instead of changing from one to infinity, with a sequential non-convexity, the aggregate elasticity of labor supply for overtime work is a function of overall participation rate, and the aggregate elasticity of labor supply for full-time work depends on the share of workers doing overtime.

Keywords: Indivisible labor, straight time, overtime, sequential lottery

JEL Classification: E1, J2, J4

1. Introduction

This note explores the problem of non-convex labor supply decision in an economy with both straight time and overtime. In contrast to Hansen and Sargent (1988), the paper models this as a sequential decision. The aggregate representation features disutility of both regular and overtime hours that are dependent on the other types of hours.

2. Model Description

2.1. Household's problem

The theoretical setup is a static economy without capital. There is a unit mass of ex-ante identical households. Preferences are defined over consumption (c) and leisure (l), and utility function u(c, l) as follows:

$$u = \ln(c) + \alpha \ln(l), \quad (1)$$

where parameter $\alpha > 0$ measures the relative preference for leisure, and each household has one unit of time. The household faces a sequential labor-supply decision: In stage 1, each household must decide whether to work or not. In stage 2, conditional on working, the household decides whether to work straight-time ($\bar{h}$), or overtime (h^o). Those are taken as given, *e.g.* $\bar{h}$ = 40 hours per week, and ho = 8 hours of overtime work. The wage rate is *w* for straight-time hours and *wo* for over-time hours, with $w^o > w$. In addition to the labor income, each household claims an equal share of profits π in the economy ($\pi = \Pi$). This is more of a technical assumption, which is imposed to guarantee that even if a household does not supply any labor, it will enjoy a positive consumption.

Household's utility maximization problem of choosing {*c, h*} optimally by taking {*w, w^o, π*} as given, can be split into three sub-cases: c^u will denote consumption of households that do not work, with $c^u = \pi$ and $l^u = 1$. Similarly, full-time workers enjoy $c^{e,f} = w\bar{h} + \pi$ and $l^{e,f} = 1 - \bar{h}$ and overtime workers enjoy $c^{e,o} =$

$w\bar{h} + w^o h^o + \pi$ and $l^{e,o} = 1 - \bar{h} - h^o$ (where superscript *e* denotes workers, *f* refers to the full-time workers, and *o* denotes overtime workers).

2.2. Firm

There is a representative firm producing a homogeneous final consumption good (its price is normalized to unity). The production function is given by

$$Y = F(\bar{H}, H^o), F_1 > 0, F_2 > 0, F_{11} < 0, F_{22} < 0, F_{12} = 0 \quad (2)$$

There are two capacity constraint: (i) If all households work straight-time only, the marginal product of a regular hour of work is zero, *i.e.* $F_1(\bar{h}) = 0$; (ii) If every employee works overtime, the marginal productivity of overtime labor also becomes equal to zero, *i.e.* $F2(h^o) = 0$. As in Hansen and Sargent (1988), the firm treats straight-time labor and overtime labor differently.

The firm acts competitively by taking wages $\{w, w^o\}$ as given, and chooses hours $\{\bar{H}\}$ and $\{H^o\}$ to maximize profit:

$$\max_{\bar{H}, H^o} F(\bar{H}, H^o) - w\bar{H} - w^o H^o \quad \text{s.t.}$$
$$\bar{H} \geq 0, H^o \geq 0.. \quad (3)$$

2.3. Decentralized Competitive Equilibrium

A Decentralized Competitive Equilibrium (DCE) is defined by allocations $\{c^u, c^{e,f}, c^{e,o}, \bar{H}, H^o\}$, wage rates $\{w, w^o\}$, and aggregate profit Π *s.t.* (i) all households maximize utility; (ii) the stand-in firm maximizes profit; (iii) all markets clear.

2.4. Characterizing the Equilibrium

It will be shown that in the DCE, if it exists, only some of the households will be employed. Indeed, if nobody works, nothing is produced, so $\pi = 0$ and $u = -\infty$. In addition, given that $\lim_{\bar{H}\to 0} F_1(\bar{H}) = \infty$, the firm would pay a very high wage rate to hire a bit of labor. Accepting such a wage would improve substantially household's utility, so nobody working is not an equilibrium (market-clearing) outcome.

Following the same argument, everyone working full-time only is not an equilibrium, as then $w = F_1(\bar{h}) = 0$, and nobody would choose to work for free. Similarly, nobody working overtime does not constitute an equilibrium, since $\lim_{H^o\to 0} F1(H) = \infty$. That is, the firm would be willing to offer an extremely high premium to hire a bit of overtime labor, and it would not be optimal to refuse such an offer. Lastly, everyone working overtime does not constitute an equilibrium outcome either as $w^o = F_2(h^o) = 0$, and nobody would choose to work overtime for free.

Denote the mass of workers by $q \in (0, 1)$, and the unemployed by $1 - q$. Out of those working, $\lambda \in (0, 1)$ will work overtime, while the rest, $1 - \lambda$, will work only straight-time. Thus, a total of $q\lambda + q(1 - \lambda) = q$ would at least work full-time, while $q\lambda$ will work overtime.

Thus, in equilibrium, $\bar{H} = q\bar{h}$, and $H^o = q\lambda h^o$. Also, $c^{e,o} > c^{e,f} > c^u$ and $l^u > l^{e,f} > l^{e,u}$. Lastly, all three groups of households enjoy the same utility level.

From the firm's problem, the wage rate is

$$w = F_1(q\bar{h}), \quad (4)$$

and the overtime wage equals

$$w^o = F_2(q\lambda h^o). \quad (5)$$

Economic profits equal

$$\pi = \Pi = F(q\bar{h}, q\lambda h^o) - F_1(q\bar{h})q\bar{h} - F_2(q\lambda h^o)q\lambda h^o > 0, \quad (6)$$

which follows from the assumption that the production function features decreasing returns to scale. To show that the DCE actually exists, it is sufficient to show the existence of a unique pair $(q, \lambda) \in (0, 1) \times (0, 1)$ by analysing a system of two non-linear equations using the fact that in equilibrium utility is the same for all households: In stage 2, it must be that households are indifferent between working straight time and working overtime:

$$u(c^u, l^u) = u(c^{e,f}, l^{e,f}), \tag{7}$$

or

$$\ln(\pi) = \ln(w\bar{h} + \pi) + \alpha \ln(1 - \bar{h}). \tag{8}$$

This equation determines the split between full-time $(1 - \lambda)$ and overtime (λ) workers, conditional on the fact that only a certain share q of the population has decided to work. That is, $\lambda = \lambda(q)$.

Similarly, in stage 1, households deciding not to work should be indifferent to households who work full time:

$$u(c^u, l^u) = u(c^{e,f}, l^{e,f}), \tag{9}$$

or

$$\ln(\pi) = \ln(w\bar{h} + \pi) + \alpha \ln(1 - \bar{h}). \tag{10}$$

This equation implicitly defines the proportion q of households deciding to work, conditional on the $q\lambda$ share of those who will work overtime. Note that the two wage rates and profit will all be functions of q, λ (and the values of straight and overtime work, $\bar{h}$ and h^o, respectively, which are assumed to be given). Plugging those back into the utility functions, we obtain two non-linear equations in two unknowns. Proving existence and uniqueness of optimal $(q, \lambda) \in (0, 1) \times (0, 1)$ follows trivially from the Intermediate Value Theorem and the assumptions imposed on the functional forms of utility and the production function.

In addition, given the indivisible labor, the First Welfare Theorem does not hold, as shown in Rogerson (1988), so this equilibrium is not Pareto efficient. By giving each household the same consumption (independent of the fact whether they worked or not, or whether they worked full-time or not), the equilibrium allocation can be improved upon. This is demonstrated in the claim below.

Claim: The consumption bundle $\{c^u, c^{e,f}, c^{e,o}\}$ obtained from the DCE above is not efficient, *i.e.*, there is an alternative feasible allocation that will make everyone better off

Proof: The proof involves solving a the problem backwards. In stage 2, a λ fraction of the already employed workers from stage 1 is chosen to supply overtime labor services. Re-gardless of total hours worked, all workers are given the same consumption c^w, where:

$$c^w = (1 - \lambda)c^{e,f} + \lambda c^{e,o}. \tag{11}$$

In stage 1, a fraction q of the population is chosen to work, but all households are given $\tilde{c}$, where

$$\tilde{c} = qc^w + (1-q)c^u = q[(1-\lambda)c^{e,f} + \lambda c^{e,o}] + (1-q)c^u. \tag{12}$$

Note that he bundles offered need to be feasible and constitute a Pareto improvement. Showing feasibility is trivial:

$$qc^w = q[(1-\lambda)c^{e,f} + \lambda c^{e,o}] = q(1-\lambda)c^{e,f} + q\lambda c^{e,o}. \tag{13}$$

Next that the new allocations makes households better off in expected terms, follows directly from the concavity of the logarithmic functions and the restrictions imposed on the production function. Thus, the initial DCE allocation can be improved if we allow for employment lotteries, or randomization. In particular, the SP runs a lottery, where q share of the population is chosen to work at least full-time, and then out of those q, λ proportion is selected to work over time, while at the same time everyone receives the same consumption bundle. In that

equilibrium every household receives the same consumption level, which is independent of the employment status. Next, re-define $C = c^{\sim}$ to obtain an aggregate utility function of the form

$$U = \ln(C) + q\lambda\alpha\ln(1 - \overline{h} - h^{o}) + q(1-\lambda)\alpha\ln(1 - \overline{h}), \tag{14}$$

or

$$U = \ln(C) + q\lambda\alpha\ln(1 - \overline{h} - h^{o}) + q\alpha\ln(1 - \overline{h}) - q\lambda\alpha\ln(1 - \overline{h}). \tag{15}$$

Letting

$$A \equiv -\alpha\ln(1 - \overline{h} - h^{O}) + \alpha\ln(1 - \overline{h}) > 0, B \equiv -\alpha\ln(1 - \overline{h}) > 0, \tag{16}$$

the resulting utility function becomes

$$U = \ln(C) - Aq\lambda - Bq, \tag{17}$$

which differs from Hansen and Sargent's (1988) formulation with simultaneous labor decision (not work, work straight time, or work overtime):

$$U = \ln(C) - \tilde{A}\lambda - \tilde{B}q, \tag{18}$$

where $\tilde{A}$ and $\tilde{B}$ are coefficient that come out as a result of the aggregation under Hansen and Sargent's (1988) one-stage, three-realization lottery. Due to the non-convexities in both cases, the elasticity of labor supply at micro level differs from the aggregate one. Instead of changing from one to infinity (and the two types of hours becoming separable), as in Hansen and Sargent (1988), with a sequential non-convexity the elasticity of labor supply for overtime work is a function of overall participation rate, and the elasticity of labor supply for full-time work depends on the share of workers doing overtime. Such a non-linear interdependence of the two types of hours would affect the first-order conditions for hours and affect model dynamics when the propagation of technology shocks is considered. However, incorporating such a utility function in a real-business-cycle model is left as a venue for future research.

Conclusion

This note explored the problem of two-stage non-convex labor supply decisions in an economy where agents first decide whether to participate in the labor market or stay unemployed, and then, conditional on being hired, need to decide whether they will work only the full-time equivalent, or engage in overtime hours. The novelty was that the aggregated utility function produced interesting non-linearities that were not present at individual level. Instead of changing from one to infinity, as in Hansen and Sargent (1988), with a sequential non-convexity, the elasticity of labor supply for overtime work is a function of overall participation rate, and the elasticity of labor supply for full-time work depends on the share of workers doing overtime.

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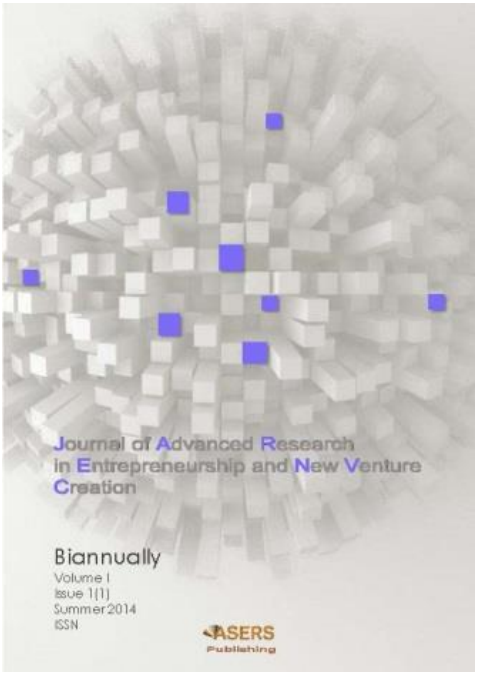

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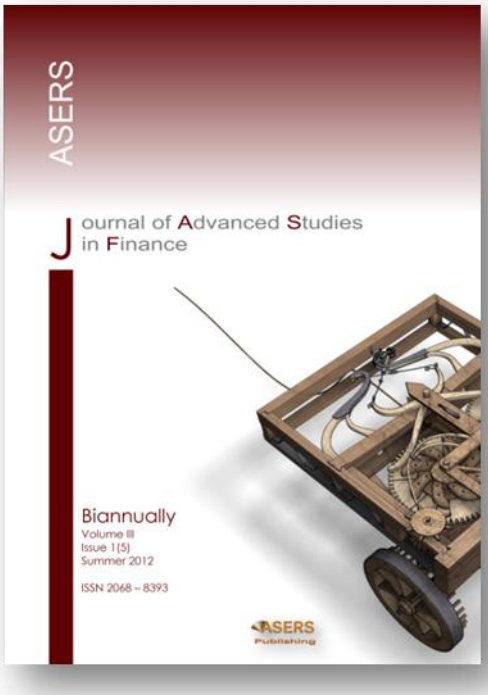

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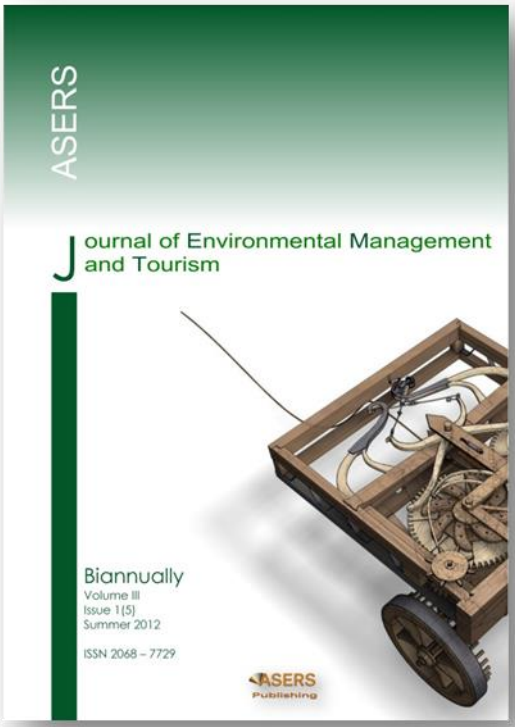

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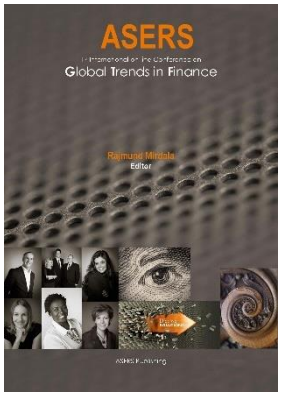

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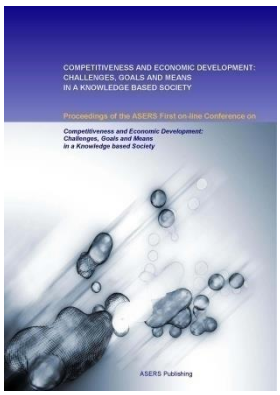

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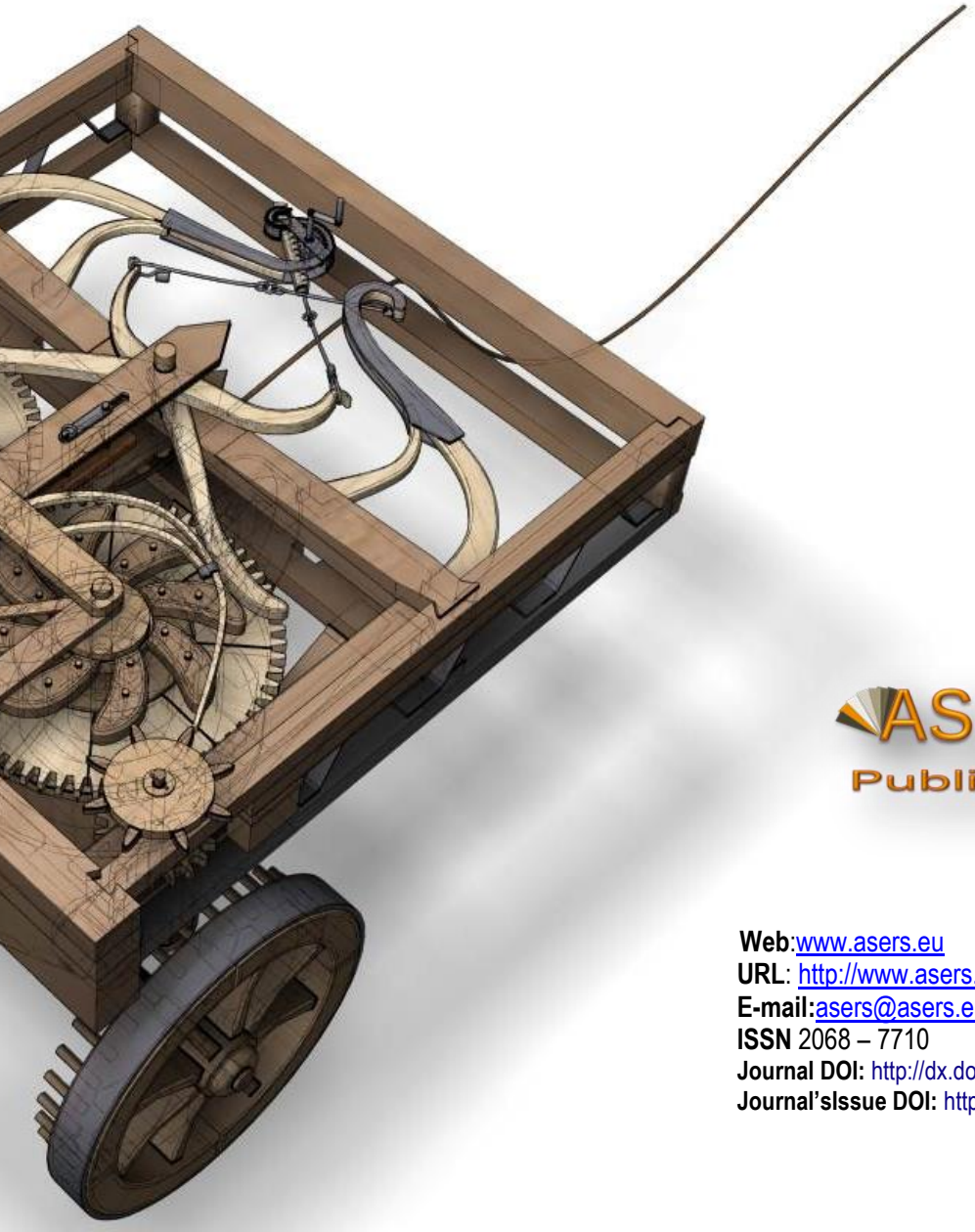

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