

# Choosing the exchange rate regime—a case for intermediate regimes for emerging and developing economies<sup>1</sup>

*Michał Jurek*<sup>2</sup>

**Abstract:** The main objective of the paper is to verify the vanishing interim regime hypothesis (so-called bipolar view) and to analyse factors that may influence the probability of use of intermediate exchange rate regimes, especially in emerging and developing economies. In order to accomplish the research objectives the evolution of exchange rate regimes is presented with the special consideration of decisions of IMF member states in this respect. Next a logistic regression model that estimates the probability of use of an intermediate regime is applied. The results achieved allow a challenge to the vanishing interim regime hypothesis. Empirical observations support this hypothesis only in advanced countries and not in their emerging and developing peers.

**Keywords:** bipolar view, exchange rate regimes, monetary policy, vanishing interim regime hypothesis.

**JEL classification:** E42, E52, F31.

## Introduction

Since the seventies the interdependence of the world economy has grown to an unprecedented extent (Frieden, 2015). As yield differentials have stimulated an increase in capital flows, sustaining restrictions on such flows has become very problematic because of their diminishing effectiveness (Eichengreen, 2004). This has induced some economists to insist that interim exchange rate regimes do not fit changing macroeconomic circumstances anymore being not compatible with macroeconomic circumstances due to problems with speculative attacks, fading credibility and proneness to currency crises (Calvo & Mishkin, 2003; Spahn, 2001). Only corner solutions—hard pegs and floating regimes—

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<sup>1</sup> Article received 6 March 2018, accepted 24 September 2018.

<sup>2</sup> Poznań University of Economics and Business, Faculty of Economics, Department of Money and Banking, al. Niepodległości 10, 61-875 Poznań, Poland, [michal.jurek@ue.poznan.pl](mailto:michal.jurek@ue.poznan.pl).

should remain as a policy option (Frankel, 1999). This point of view appears to be the core of the bipolar view (Eichengreen & Razo-Garcia, 2006; Fischer, 2001) which is presented thoroughly in Jurek (2011).

The outburst of the global financial crisis challenged the popularity of this view. The possibility of choosing an intermediate solution even under the circumstances of perfect capital mobility is in dispute once again. According to Frankel (2009, p. 14), one of pronounced critics of the bipolar view is that many countries continue to maintain the vast range of solutions between floating and rigid institutional pegs and it is uncommon to hear that intermediate regimes are a bad choice. Ghosh and Ostry (2009) go even further by proving that intermediate regimes represent the balance between pegs and free floats and are associated with faster per capita output growth. Esaka (2010) and Combes and Swo (2016) criticise the bipolar view underlining the fact that it does not strictly hold in the sense that intermediate regimes are significantly more prone to currency crises than corner regimes. Therefore monetary authorities in emerging and developing economies often try to smooth exchange rate path without an official commitment to maintain the official central exchange rate (Ötoker-Robe & Vávra, 2007), or claim to have a pegged exchange rate while carrying out frequent changes in the official exchange rate (Alesina & Wagner, 2006; Genberg & Swoboda, 2005). As noted by Klein and Shambaugh (2015), especially in emerging and developing economies, a moderate amount of exchange rate flexibility allows for some degree of monetary autonomy without the need to accept floating regime. On the other hand hard pegging requires a rapid accumulation of reserves, if “peggers” belong to emerging and developing economies (Obstfeld, Shambaugh & Taylor, 2010).

Going beyond the simple “intermediate vs corner regimes” dispute, Obstfeld and Taylor (2017) notice that while floating exchange rates have helped mitigate policymakers’ domestic challenges, it is not necessarily a good solution for the international system as a whole. This refers especially to free floating regimes that give the opportunity to launch competitive currency depreciations, making the achievement of financial stability more difficult for all.

There are proponents of the bipolar view however. Fischer (2008, p. 370) indicates that the general shift toward bipolarity is continuing, but at a reduced pace. According to Eichengreen (2008) the advanced economies have already abandoned the unstable middle and emerging and developing economies are going to do so by introducing flexible arrangements because of the growing popularity of inflation targeting. Explaining this behaviour Angkinand, Chin and Willett (2009) argue that the centre of the variety of exchange rate regimes is the most crisis prone.

Taking into consideration this dispute as presented this paper attempts to verify the bipolar view. Another target is the analysis of factors that may influence the probability of the use of intermediate and corner regimes, especially in emerging and developing economies.

The paper is organized as follows. The first section presents the approach to the classification of existing exchange rate regimes and the logistic analysis. The second section focuses on the evolution of exchange rate regimes of IMF member states using the de facto classification of exchange rate regimes. The third section tests the vanishing interim regime hypothesis by applying the logistic analysis. The last section concludes.

## **1. The approach to analysis of exchange rate regimes**

This paper uses data published in IMF Annual Reports on de facto exchange rate policies. In the de facto classification different exchange rate regimes are distinguished. They can be divided into two types and ten categories (Habermeyer, Kokenyne, Veyrune & Anderson, 2009, p. 11-14):

- 1) corner regimes (fixed corner):
  - a) exchange arrangement with no separate legal tender: adopting such an arrangement implies the complete surrender of the monetary authorities' control over domestic monetary policy,
  - b) currency board arrangement: a currency board arrangement is a monetary arrangement based on an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfilment of its legal obligation,
- 2) interim regimes:
  - a) conventional peg arrangement: the country formally (de jure) pegs its currency at a fixed rate to another currency or a basket of currencies, the country authorities stand ready to maintain the fixed parity through direct or indirect intervention, there is no commitment to irrevocably keep the parity, the exchange rate may fluctuate within narrow margins of less than  $\pm 1\%$  around a central rate—or the maximum and minimum value of the spot market exchange rate must remain within a narrow margin of 2%—for at least six months,
  - b) stabilised arrangement: requires that the exchange rate remains stable as a result of official action, but the classification does not imply a policy commitment on the part of the country authorities, entails a spot market exchange rate that remains within a margin of 2% for six months or more,
  - c) crawling peg: the currency is adjusted in small amounts at a fixed rate or in response to changes in selected quantitative indicators,
  - d) crawl-like arrangement: the exchange rate must remain within a narrow margin of 2% relative to a statistically identified trend for six months or more, an arrangement is considered crawl-like with an annualized rate of change of at least 1%, provided that the exchange rate appreciates or depreciates in a sufficiently monotonic and continuous manner,

- e) pegged exchange rate within horizontal bands: the value of the currency is maintained within certain margins of fluctuation of at least  $\pm 1\%$  around a fixed central rate, or the margin between the maximum and minimum value of the exchange rate exceeds 2%,
  - f) other managed arrangement: this category is a residual and is used when the exchange rate arrangement does not meet the criteria for any of the other categories,
- 3) interim regimes (floating corner):
- a) floating: exchange rate is largely market determined, without an ascertainable or predictable path for the rate, intervention can be implemented in order to moderate the rate of change and prevent undue fluctuations in the exchange rate,
  - b) free floating: intervention occurs only exceptionally and is limited to at most three instances in the previous six months, each lasting no more than three business days.

It has to be underlined that effective January 1, 2007, exchange arrangements of the countries that belong to a monetary or currency union in which the members of the union share the same legal tender are classified under the arrangement governing the joint currency. Other amendments were introduced to the IMF classification of exchange rate regimes in 2009. Since then a distinction has been drawn between *de facto* floating arrangements and non market-determined arrangements. The non-floating *de facto* arrangements have been divided into “stabilized” and “crawl-like” arrangements to emphasize that they do not necessarily entail a policy commitment. The “floating” category has been redefined by identifying a subset as “free floating”. A new category—“other managed arrangement”—has been introduced for countries in which the *de facto* and the *de jure* arrangement differ and which exhibit frequent or irregular changes in policies (Habermeier et al. 2009). In order to provide comparability of the classification in the whole period under consideration it is necessary to implement appropriate changes to the classification for years 1999–2006 as well. The evolution of exchange rate regimes in IMF member countries is presented thoroughly in the section 3.

In attempting to identify IMF members’ choices between corner and intermediate regimes, a model is used:

$$y_i = \beta_0 + \sum_{j=1} \beta_j X_{ij} + \varepsilon_i \quad (1)$$

In the equation (1)  $i$  numbers cases,  $j$  numbers independent variables,  $\beta$  are unknown structural coefficients that determine strength and direction of the influence of independent variables on dependent variable, and  $\varepsilon_i$  is random error for the  $i$ -th case.  $Y$  is a binary variable that takes on values 1, if in the  $i$ -th case an intermediate regime is used and 0, if in the  $i$ -th case a corner regime is used. The model (1) can be rewritten in terms of the odds of an event occur-

ring. Logistic transformation allows the rewriting of the equation (1) in terms of the log of the odds:

$$\ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \sum_{j=1} \beta_j X_{ij} + \varepsilon_i \quad (2)$$

The dependent variable is supposed to be influenced by several independent macroeconomic variables:

- GDP* – year-on-year changes of constant price GDP (%),
- S-I GAP* – saving-investment gap (% of GDP),
- INF* – inflation rate, average consumer prices (%),
- DEBT* – general government gross debt (% of GDP),
- CA* – current account balance (% of GDP).

The model also uses as a variable the Chinn-Ito KAOPEN index introduced by Chinn and Ito (2006, 2008) that measures the degree of capital account openness. KAOPEN is the first standardized principal component of the variables that indicate the presence of multiple exchange rates, restrictions on current account transactions, on capital account transactions and the requirement of the surrender of export proceeds. The Chinn-Ito index can be normalized between zero and one. The higher the value of index within this range, the more country is open to cross-border capital transactions.

Next, in trying to reveal the differences between the probability of the use of intermediate and corner solutions in advanced economies and in their emerging and developing peers, a dummy variable *TYPE* is introduced. It takes on the value of 1, if the *i*-th case belongs to the group of emerging and developing economies, and 0—if it belongs to advanced economies, according to the IMF classification (for details see Annex).

In order to estimate the model, the World Economic Outlook Database, exchange rate regimes classification from IMF Annual Reports, and KAOPEN values, published by Chinn and Ito, are used. The elimination of cases for which data appeared to be unavailable yielded a database of 2504 different cases. The result of the estimation is presented in the section 4.

## 2. Evolution of exchange rate regimes in IMF member countries in 1998-2014

The exchange rate policy of the IMF members has undergone many changes since 1998. While observing Tables 1–2 and Figure 1 a sharp decrease in the floating corner can be observed. On the other hand, after an initial decline, the popularity of intermediate regimes grew after 2004. As a result, while 81 countries used intermediate regimes in 1998, in 2014 their number equalled 100 (Table 1). The growth is even more obvious if only emerging and developing economies are taken into consideration (Table 2).

**Table 1. Exchange rate regimes of IMF members in 1998-2014**

| No.  | Exchange rate regime   | 1998          | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|--|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|  |  | all countries |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (1)  | exchange arrangement with no separate legal tender                 | 6             | 6    | 7    | 8    | 9    | 9    | 9    | 9    | 9    | 10   | 10   | 10   | 12   | 13   | 13   | 13   | 13   |
| (2)  | currency board arrangement   | 14            | 14   | 14   | 14   | 13   | 13   | 13   | 13   | 13   | 13   | 13   | 13   | 13   | 12   | 12   | 12   | 11   |
| (3)  | conventional peg arrangement + stabilised arrangement <sup>a</sup> | 58            | 59   | 58   | 55   | 56   | 55   | 56   | 63   | 70   | 68   | 55   | 68   | 66   | 59   | 64   | 65   | 66   |
| (4)  | pegged exchange rate within horizontal bands                       | 8             | 6    | 6    | 5    | 5    | 4    | 5    | 6    | 5    | 3    | 4    | 2    | 1    | 1    | 1    | 1    | 1    |
| (5)  | crawling peg + crawl-like arrangement <sup>b</sup>                 | 6             | 5    | 4    | 4    | 5    | 5    | 5    | 5    | 6    | 8    | 6    | 5    | 15   | 15   | 17   | 17   | 23   |
| (6)  | other managed arrangement <sup>c</sup>                             | 9             | 7    | 5    | 6    | 5    | 5    | 1    | 0    | 1    | 2    | 21   | 21   | 17   | 24   | 19   | 18   | 10   |
| (7)  | floating <sup>d</sup>  | 25            | 27   | 33   | 42   | 46   | 49   | 52   | 53   | 48   | 44   | 46   | 38   | 36   | 35   | 35   | 36   | 37   |
| (8)  | free floating <sup>e</sup>   | 59            | 61   | 59   | 52   | 48   | 47   | 46   | 38   | 35   | 40   | 33   | 30   | 30   | 31   | 30   | 29   | 30   |
| Intermediate regimes (3) + (4) + (5) + (6) |  | 81            | 77   | 73   | 70   | 71   | 69   | 67   | 74   | 82   | 81   | 86   | 96   | 99   | 99   | 101  | 101  | 100  |
| Corner regimes – hard corner (1) + (2)     |  | 20            | 20   | 21   | 22   | 22   | 22   | 22   | 22   | 23   | 23   | 23   | 25   | 25   | 25   | 25   | 25   | 24   |
| Corner regimes – floating corner (7) + (8) |  | 84            | 88   | 92   | 94   | 94   | 96   | 98   | 91   | 83   | 84   | 79   | 68   | 66   | 66   | 65   | 65   | 67   |
| Overall                                    |  | 185           | 185  | 186  | 186  | 187  | 187  | 187  | 187  | 188  | 188  | 188  | 189  | 190  | 190  | 191  | 191  | 191  |

<sup>a</sup> before 2008: other conventional peg arrangement, <sup>b</sup> before 2008: *crawling peg*, <sup>c</sup> before 2008: crawling band, <sup>d</sup> before 2008: managed floating with no pre-determined path for the exchange rate, <sup>e</sup> before 2008: independently floating.

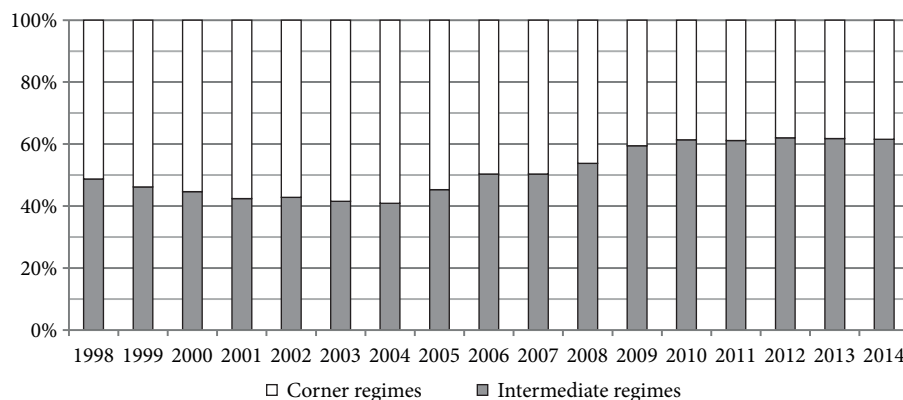
Source: based on IMF (1999-2015).

**Table 2. Exchange rate regimes of the emerging and developing IMF members in 1998-2014**

| No.  | Exchange rate regime   | 1998          | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|--|---------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|  |  | all countries |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (1)  | exchange arrangement with no separate legal tender                 | 5             | 5    | 6    | 7    | 8    | 8    | 8    | 8    | 9    | 9    | 9    | 11   | 12   | 12   | 12   | 12   | 12   |
| (2)  | currency board arrangement   | 13            | 13   | 13   | 13   | 12   | 12   | 12   | 12   | 12   | 12   | 12   | 12   | 11   | 11   | 11   | 11   | 10   |
| (3)  | conventional peg arrangement + stabilised arrangement <sup>a</sup> | 58            | 59   | 58   | 55   | 56   | 55   | 56   | 63   | 70   | 67   | 54   | 67   | 65   | 58   | 63   | 63   | 63   |
| (4)  | pegged exchange rate within horizontal bands                       | 5             | 3    | 5    | 3    | 3    | 2    | 3    | 4    | 3    | 3    | 4    | 2    | 1    | 1    | 1    | 1    | 1    |
| (5)  | crawling peg + crawl-like arrangement <sup>b</sup>                 | 6             | 5    | 4    | 4    | 5    | 5    | 5    | 5    | 6    | 8    | 6    | 5    | 15   | 15   | 16   | 16   | 22   |
| (6)  | other managed arrangement <sup>c</sup>                             | 8             | 6    | 4    | 5    | 4    | 4    | 1    | 0    | 1    | 2    | 21   | 20   | 16   | 22   | 18   | 17   | 10   |
| (7)  | floating <sup>d</sup>  | 23            | 25   | 31   | 41   | 45   | 48   | 51   | 52   | 47   | 43   | 44   | 35   | 34   | 34   | 33   | 33   | 34   |
| (8)  | free floating <sup>e</sup>   | 40            | 42   | 38   | 30   | 26   | 25   | 23   | 15   | 11   | 15   | 8    | 6    | 4    | 4    | 4    | 4    | 4    |
| Intermediate regimes (3) + (4) + (5) + (6) |  | 77            | 73   | 71   | 67   | 68   | 66   | 65   | 72   | 80   | 80   | 85   | 94   | 97   | 96   | 98   | 97   | 96   |
| Corner regimes – hard corner (1) + (2)     |  | 18            | 18   | 19   | 20   | 20   | 20   | 20   | 20   | 21   | 21   | 21   | 23   | 23   | 23   | 23   | 23   | 22   |
| Corner regimes – floating corner (7) + (8) |  | 63            | 67   | 69   | 71   | 71   | 73   | 74   | 67   | 58   | 58   | 52   | 41   | 38   | 38   | 37   | 37   | 38   |
| Overall                                    |  | 158           | 158  | 159  | 158  | 159  | 159  | 159  | 159  | 159  | 159  | 158  | 158  | 158  | 157  | 158  | 157  | 156  |

<sup>a</sup> before 2008: other conventional peg arrangement, <sup>b</sup> before 2008: *crawling peg*, <sup>c</sup> before 2008: crawling band, <sup>d</sup> before 2008: managed floating with no pre-determined path for the exchange rate, <sup>e</sup> before 2008: independently floating.

Source: based on IMF (1999-2015).



**Figure 1. The structure of the exchange rate regimes in emerging and developing economies in 1998–2014**

The analysis of the data allows the observation that intermediate regimes are still a policy choice, but almost exclusively in emerging and developing economies with the exception of one advanced economy (Denmark). Moreover, whereas the share of intermediate regimes in the overall number of exchange rate regimes used by emerging and developing economies fluctuated within the range of 41–42% in the beginning of the twentieth century, it soared rapidly to more than 60% after 2009 (Figure 1).

The data presented do not support the view that emerging and developing economies that use intermediate regimes are more prone to change the rules of exchange rate regimes than their peers with corner regimes. Although, as follows from the Table 3, in almost all countries that implemented hard pegs these regimes remained unchanged during the 17 years analysed, a floating corner was not that stable. A conventional peg arrangement (3) achieved better results in this respect than floating (7) and free floating (8) regimes.

**Table 3. Exchange rate regimes' duration in emerging and developing economies in 1998–2014 (in years)**

| Exchange rate regimes <sup>a</sup> | (1)   | (2)   | (3)   | (4)  | (5)  | (6)  | (7)   | (8)  |
|------------------------------------|-------|-------|-------|------|------|------|-------|------|
| First quartile                     | 8.25  | 17.00 | 4.00  | 1.00 | 1.00 | 1.00 | 6.00  | 2.50 |
| Median                             | 16.00 | 17.00 | 10.00 | 2.00 | 3.00 | 2.00 | 7.00  | 4.00 |
| Third quartile                     | 17.00 | 17.00 | 17.00 | 3.00 | 5.00 | 4.75 | 10.75 | 8.00 |
| Mode                               | 17.00 | 17.00 | 17.00 | 2.00 | 1.00 | 1.00 | 7.00  | 2.00 |
| Average                            | 13.08 | 15.54 | 10.29 | 2.94 | 4.20 | 3.22 | 7.93  | 5.45 |

<sup>a</sup> exchange rate regimes as in Tables 1–2.



As follows from Table 3 at least half the countries with a conventional peg arrangement (3) used it for 10 years, and the average duration calculated for this exchange rate regime exceeded 10 years. At the same time the median of the duration calculated in emerging and developing economies in 1998–2014 in case of floating regime (7) equalled 7 years and in case of free floating regime (8)–only 4 years. It may be noticed that the higher the level of fixity, the higher the exchange rate regime durability.

**Table 4. Matrix of changes of exchange rate regimes in 1998–2014**

| All countries                     |     |     |     |     |     |     |     |     |                 |
|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|
| Exchange rate regime <sup>a</sup> | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | Relinquish-ment |
| (1)                               | –   |     |     |     |     |     |     |     | 0               |
| (2)                               |     | –   |     |     |     |     | 1   | 2   | 3               |
| (3)                               | 1   |     | –   | 6   | 25  | 20  | 27  | 3   | 82              |
| (4)                               |     |     | 5   | –   | 1   |     | 5   | 6   | 17              |
| (5)                               |     |     | 14  |     | –   | 6   | 4   | 2   | 26              |
| (6)                               | 1   |     | 26  | 2   | 8   | –   | 7   | 5   | 49              |
| (7)                               |     |     | 39  | 2   | 8   | 22  | –   | 15  | 86              |
| (8)                               | 1   |     | 4   |     | 1   | 2   | 55  | –   | 63              |
| Implemen-tation                   | 3   | 0   | 88  | 10  | 43  | 50  | 99  | 33  | 326             |
| Emerging and developing economies |     |     |     |     |     |     |     |     |                 |
| Exchange rate regime              | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | Relinquish-ment |
| (1)                               | –   |     |     |     |     |     |     |     | 0               |
| (2)                               |     | –   |     |     |     |     | 1   |     | 1               |
| (3)                               | 1   |     | –   | 6   | 25  | 20  | 27  | 2   | 81              |
| (4)                               |     |     | 4   | –   | 1   |     | 5   | 2   | 12              |
| (5)                               |     |     | 13  |     | –   | 6   | 4   | 2   | 25              |
| (6)                               | 1   |     | 25  | 2   | 6   | –   | 7   | 4   | 45              |
| (7)                               |     |     | 39  | 2   | 8   | 21  | –   | 12  | 82              |
| (8)                               | 1   |     | 4   |     | 1   |     | 50  | –   | 56              |
| Implemen-tation                   | 3   | 0   | 85  | 10  | 41  | 47  | 94  | 22  | 302             |

<sup>a</sup> exchange rate regimes as in Tables 1–2.

Moreover, results obtained for both conventional peggers (3) and floaters (7)—which appeared to be the most popular solutions among emerging and developing economies—exceeded the respective outcomes estimated for free floaters (8). It supports the view that the increase in flexibility of the exchange rate regime increases the inclination to change the rules of the exchange rate regime. Hence intermediate regimes that remain close to a fixed corner are more stable than those similar to floating regimes.

Changes in the classification of the exchange rate regimes of the IMF members presented in Table 4 allow the formulation of similar conclusions. These changes reflect relinquishments of a particular exchange rate regime in favour of a different one that better fits the economic circumstances.

It can be noticed that in the years analysed IMF members changed exchange rate regimes 326 times. The highest number of relinquishments refers to a floating regime (8) and conventional peg arrangement (3). Rejected exchange rate regimes were replaced mostly by a floating regime (7) and conventional peg arrangement (3). These phenomena were observed mostly in emerging and developing economies (Table 4).

Table 4 confirms that monetary authorities in these countries in 82 cases abandoned a floating regime (7), in 81 cases—from a conventional peg arrangement (3), and in 56 cases—from a free floating regime (8). It is worth noticing, however, that the monetary authorities abandoned a conventional peg regime (3) and from a floating regime (7) less frequently compared with the number of cases in which these regimes were implemented (94 and 85, respectively). As a result a deep fall in number was observed only in case of a free floating regime (8). Moreover, although during the analysed period emerging and developing economies rejected intermediate regimes 163 times, they implemented them 183 times.

To sum up, the analysis of the data presented does not support the bipolar view, as the disappearance of intermediate regimes is not observed. On the contrary—there is an opposite tendency as emerging and developing countries often abandon free floating regimes. Considering this it can be hardly assumed that the disappearance of intermediate regimes will speed up in the foreseeable future. The next section confirms this view.

### **3. Testing the bipolar view: results of the logistic analysis**

From a policy perspective it may be desired to achieve both internal and external balance, understood as the combination of price stability, current account equilibrium and exchange rate stability. According to the literature it is easier to achieve price stability under corner pegs as under hard pegs the exchange rate commitment increases the credibility of the anti-inflationary policy (Corden, 1994) and under free floating regimes monetary authorities

may neglect exchange rate behaviour focusing solely on the stabilization of the price level (Mussa et al., 2000). Next, according to the theoretical foundations of exchange rate regime choices, hard pegs and pure floating regimes should be accompanied with lower external imbalance compared to soft pegs or managed floats. Pure floating regimes allow the restoration of the current account imbalance due to nominal exchange rate movements. Hard pegs make it impossible to maintain continual current account deficits as in the end foreign official reserves may dwindle, especially if a sudden stop in inflows of foreign capital occurs. The result is devaluation or exit from a hard peg (Eichengreen 2004; Gandolfo 2004; Visser 2004). It should be noticed, however, that the use of a particular exchange rate regime for a prolonged period might also affect the result of the current account balance.

Table 5 contains estimated coefficients and related standard errors (in parenthesis) for the logistic regression model that predicts the probability of the use of corner and intermediate solutions, where  $y_i$  takes value of 1 if in the  $i$ -th case intermediate regime is used.

The ability to predict the use of an intermediate regime is presented in Table 6. Figure 2 presents the receiver operating characteristic curve and the area under this curve. It is worth noting that this area reaches 0.8, proving the good ability of the estimated model to classify correctly different cases in which intermediate regimes are used and cases in which corner regimes are implemented. However, the model only partially fits the empirical data as Nagelkerke's  $R^2$  accounts for 0.3768. Next, the odds ratio accounts for 5.95, meaning that according to the classification constructed on the basis of the model the odds of the use of an intermediate regime in an economy in which such a regime is implemented is almost six times higher than the representative odds calculated for an economy which performs under a corner regime. Based on the analysis

Table 5. Parameter estimates for the logistic regression models

| Variables | B       | Standard error | Confidence interval (95%) |             | Significance |
|-----------|---------|----------------|---------------------------|-------------|--------------|
|           |         |                | lower bound               | upper bound |              |
| intercept | -1.6843 | 0.3984         | -2.4652                   | -0.9035     | 0.0000       |
| TYPE      | 2.7571  | 0.3669         | -3.4762                   | -2.0379     | 0.0000       |
| GDP       | -0.0200 | 0.0097         | -0.0391                   | -0.0010     | 0.0393       |
| S-I GAP   | 0.0775  | 0.0082         | 0.0614                    | 0.0935      | 0.0000       |
| INF       | -0.0300 | 0.0064         | -0.0425                   | -0.0176     | 0.0000       |
| DEBT      | -0.0054 | 0.0013         | -0.0079                   | -0.0029     | 0.0000       |
| CA        | 0.0822  | 0.0100         | 0.0626                    | 0.1018      | 0.0000       |
| KAOPEN    | -0.0149 | 0.0014         | -0.0176                   | -0.0121     | 0.0000       |

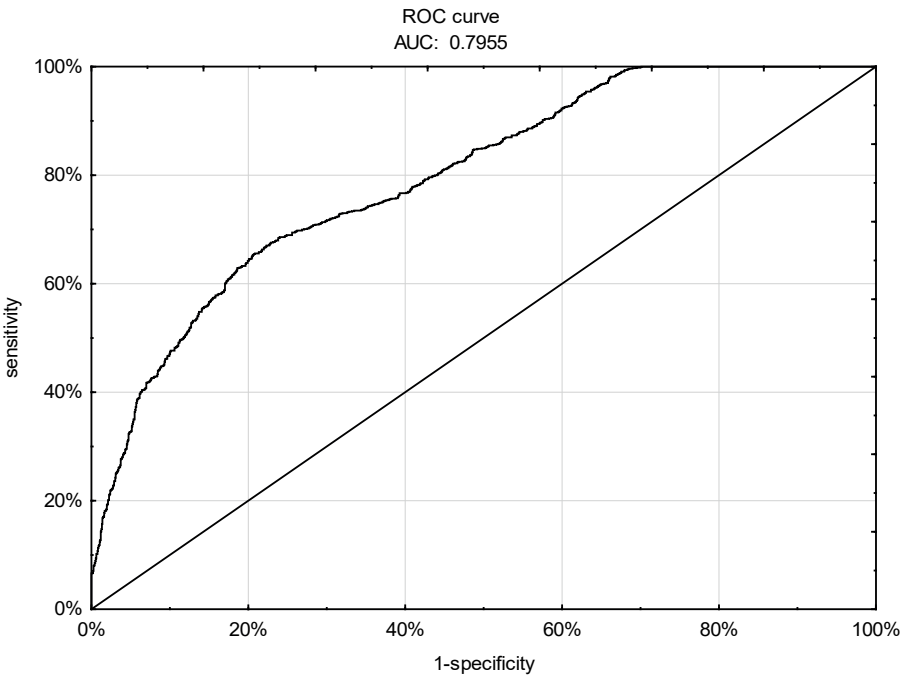


Figure 2. Receiver Operating Characteristic curve

Table 6. Classification table

| Observed            | Predicted |      | Percent correct |
|---------------------|-----------|------|-----------------|
| Intermediate regime | 775       | 314  | 71.17           |
| Corner regime       | 415       | 1000 | 70.67           |

of the countries concerned a ranking is created, the upper and lower parts of which are presented in Table 7.

As presented in Table 5 in the estimated model GDP growth, inflation rate, relationship of the general government gross debt to GDP and the level of the KAOPEN index negatively influence the odds' ratio. On the contrary disequilibrium in the current account positively influences the probability values as well as the saving-investment gap.

The results achieved support the view that emerging and developing economies are more inclined towards the use of intermediate regimes as the parameter estimated for the modulus of the current account balance as a percentage of the GDP is positive and the one estimated for the KAOPEN index is negative. As follows from the literature corner regimes should be associated with a smaller current account imbalance. A floating exchange rate should protect the economy from imbalance accumulation and preserving external balance

**Table 7. The highest and the lowest probability of the use of the intermediate regime**

| No.  | Country                          | Year | $P_i$  | TYPE | GDP   | $S-I$ GAP | INF    | DEBT   | CA    | KAOPEN |
|------|----------------------------------|------|--------|------|-------|-----------|--------|--------|-------|--------|
| 1    | Kuwait                           | 2006 | 0.9992 | 1    | 7.52  | 48.56     | 3.09   | 10.57  | 44.62 | 69.70  |
| 2    | Kuwait                           | 2012 | 0.9991 | 1    | 7.86  | 45.86     | 3.20   | 6.79   | 45.46 | 69.70  |
| 3    | Kuwait                           | 2011 | 0.9985 | 1    | 10.93 | 43.60     | 4.91   | 8.55   | 42.94 | 69.70  |
| 4    | Kuwait                           | 2013 | 0.9984 | 1    | 0.37  | 41.56     | 2.70   | 6.50   | 39.90 | 69.70  |
| 5    | Kuwait                           | 2008 | 0.9981 | 1    | 2.48  | 40.87     | 6.30   | 9.57   | 40.87 | 69.70  |
| 6    | Kuwait                           | 2000 | 0.9973 | 1    | 4.69  | 38.90     | 1.57   | 35.43  | 38.89 | 69.70  |
| 7    | Kuwait                           | 2005 | 0.9970 | 1    | 10.08 | 40.37     | 4.12   | 14.14  | 37.21 | 69.70  |
| 8    | Kuwait                           | 2007 | 0.9962 | 1    | 5.99  | 36.79     | 5.47   | 11.83  | 36.79 | 69.70  |
| 9    | Kuwait                           | 2014 | 0.9948 | 1    | 0.62  | 33.88     | 2.94   | 7.49   | 33.33 | 69.70  |
| 10   | Trinidad and Tobago              | 2006 | 0.9946 | 1    | 13.21 | 39.58     | 8.38   | 31.86  | 39.58 | 100.00 |
| 11   | Azerbaijan                       | 2008 | 0.9939 | 1    | 10.80 | 35.48     | 20.8   | 7.29   | 35.48 | 50.96  |
| 12   | Kuwait                           | 2010 | 0.9938 | 1    | -2.37 | 33.17     | 4.50   | 11.34  | 31.81 | 69.70  |
| 13   | Azerbaijan                       | 2010 | 0.9910 | 1    | 4.96  | 28.04     | 5.67   | 12.52  | 28.04 | 34.66  |
| 14   | Equatorial Guinea                | 2006 | 0.9891 | 1    | -3.16 | 19.36     | 4.47   | 1.20   | 27.44 | 16.48  |
| 15   | Azerbaijan                       | 2011 | 0.9878 | 1    | 0.09  | 26.45     | 7.87   | 11.43  | 26.45 | 40.72  |
| ...  | ...                              | ...  | ...    | ...  | ...   | ...       | ...    | ...    | ...   | ...    |
| 2490 | Greece                           | 2003 | 0.0013 | 0    | 5.80  | -8.45     | 3.45   | 101.46 | 8.45  | 100.00 |
| 2491 | Greece                           | 2012 | 0.0013 | 0    | -7.30 | -3.83     | 1.04   | 159.57 | 3.83  | 100.00 |
| 2492 | Greece                           | 2002 | 0.0013 | 0    | 3.92  | -6.83     | 3.92   | 104.86 | 6.83  | 100.00 |
| 2493 | Greece                           | 2010 | 0.0012 | 0    | -5.48 | -11.38    | 4.70   | 146.25 | 11.38 | 100.00 |
| 2494 | Greece                           | 2011 | 0.0012 | 0    | -9.13 | -10.01    | 3.12   | 172.10 | 10.01 | 100.00 |
| 2495 | Greece                           | 2013 | 0.0011 | 0    | -3.20 | -2.05     | -0.85  | 177.68 | 2.04  | 100.00 |
| 2496 | Japan                            | 2011 | 0.0011 | 0    | -0.45 | 2.20      | -0.27  | 231.63 | 2.20  | 100.00 |
| 2497 | Greece                           | 2014 | 0.0010 | 0    | 0.65  | -2.11     | -1.39  | 180.06 | 2.11  | 100.00 |
| 2498 | Japan                            | 2010 | 0.0008 | 0    | 4.71  | 4.02      | -0.72  | 215.82 | 4.02  | 100.00 |
| 2499 | Japan                            | 2011 | 0.0008 | 0    | -0.45 | 2.20      | -0.27  | 231.63 | 2.20  | 100.00 |
| 2500 | Japan                            | 2012 | 0.0007 | 0    | 1.74  | 1.00      | -0.06  | 238.02 | 1.00  | 100.00 |
| 2501 | The Gambia                       | 2014 | 0.0004 | 1    | -0.22 | -10.95    | 6.25   | 101.14 | 10.95 | 100.00 |
| 2502 | Angola                           | 2000 | 0.0003 | 1    | 3.06  | 8.66      | 325.03 | 104.54 | 8.72  | 16.48  |
| 2503 | The Gambia                       | 2013 | 0.0003 | 1    | 4.79  | -10.20    | 5.22   | 83.32  | 10.20 | 100.00 |
| 2504 | Democratic Republic of the Congo | 2001 | 0.0000 | 1    | -2.10 | -2.51     | 357.28 | 181.62 | 2.95  | 22.54  |

appears to be one of preconditions of an effective functioning of a hard peg as mounting imbalances can trigger speculative attack. Similarly the higher the financial integration, the harder it is to control capital flows, so it can be expected that the rising integration would negatively affect the odds ratio.

Not surprisingly the saving-investment gap influences positively the odds ratio; while at the same time this ratio is negatively influenced by the ratio of public debt to a country's GDP. This confirms the well-known Lucas paradox according to which capital does not flow from advanced economies to emerging and developing ones despite the fact that the latter allow the achievement of higher rates of return on invested capital (Lucas 1990). As sovereign risk and information asymmetry is usually smaller in advanced economies they are able to attract foreign capital. This in turn eases the burden on the fiscal policy allowing for the financing of budgetary needs. This may lead eventually to the growth of public debt.

On the other hand the negative influence of the inflation rate on the odds ratio challenges the common view that corner regimes favour inflation rate reduction. According to the literature, while using floating regimes monetary authorities concentrate fully on the inflation rate, ignoring exchange rate variability. By contrast the implementation of hard pegs increases the anti-inflationary credibility of the monetary authorities because a stable exchange rate serves as a nominal anchor, allowing the achievement of a sustainable reduction in the rate of inflation. However an indication of the estimated parameter for the inflation variable shows that in many cases the corner regime does not insulate the economy from a high inflation rate.

Analysis of the estimated model leads to one more conclusion. As follows from Table 5 the variable *TYPE* appears to be statistically significant. Statistical significance of this variable can be interpreted as the proof of the existence of factors positively influencing the probability of the use of intermediate regimes in emerging and developing economies, such as institutional fundamentals, production structures and macroeconomic stabilization policies.

The ranking presented in Table 7 confirms that countries characterized by a relatively high and positive saving-investment gap, modest inflation rate and public debt, but also a relatively high deficit or surplus in current account in terms of GDP, are classified high in the ranking. A vast majority of these countries maintains some restrictions on capital flows. On the contrary, cases from the bottom of the ranking, in which the probability of the use of an intermediate regime is low, can be distinguished by a negative saving-investment gap, relatively low pace of economic growth, balanced situation in the current account and high level of inflation rate or high ratio of public debt to GDP.

## **Conclusions and discussion**

The empirical observations challenge the view that the distinctive feature of intermediate regimes is instability. The data show that within the group of emerging and developing economies these regimes are distinguished by higher stability than in free floating regime. The results of the logistic analysis also do not support the bipolar view, confirming that emerging and developing countries do not shy away from intermediate regimes. On the contrary they often exhibit “fear of pegging” and “fear of floating.”

This reluctance to reject intermediate regimes may result from the fact that the implementation of a hard peg requires obeying very tough rules concerning money supply. On the other hand the extensive institutional and operational requirements needed to support floating as well as difficulties in assessing the right time to let the currency float discourage the implementation of free floating regimes.

Evidently no option can be ruled out a priori as monetary authorities are constantly making trade-offs between exchange rate stability and other policy objectives. Hence these trade-offs are ruled out under corner solutions and floating regimes do not fully insulate economies from economic crises. It is not surprising that emerging and developing economies are reluctant to reject intermediate regimes. The bipolar view becomes then much less appealing, especially while confronted with the empirical observation that, in fact, intermediate regimes do not disappear.

## **Annex**

In the IMF World Economic Outlook (1999-2015) IMF member states are divided into:

### **Advanced economies:**

Austria, Australia, Belgium, Canada, Cyprus (since 2001), Czech Republic (since 2009), Denmark, Estonia (since 2010), Finland, France, Germany, Greece, Ireland, Island, Israel, Italy, Japan, Korea, Latvia (since 2013), Lithuania (since 2014), Luxemburg, Malta (since 2008), the Netherlands, New Zealand, Norway, Portugal, San Marino, Singapore, Slovakia (since 2011), Slovenia (since 2007), Spain, Sweden, Switzerland, United Kingdom, United States.

### **Emerging and developing economies:**

#### **Central and Eastern Europe:**

Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus (until 2001), Czech Republic (until 2009), Estonia (until 2010), Hungary, Kosovo (since

2009), Latvia (until 2013), Lithuania (until 2014), Macedonia, Malta (until 2008), Montenegro, Poland, Romania, Serbia, Slovakia (until 2011), Slovenia (until 2007), Turkey.

#### **Africa:**

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Côte d'Ivoire, Djibouti, Eritrea, Ethiopia, Gabon, the Gambia, Ghana, Guinea, Guinea Bissau, Equatorial Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Morocco, Mauretania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, South Sudan (since 2012), Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe.

#### **Asia:**

Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, China, Fiji, India, Indonesia, Kiribati, Laos, Malaysia, Maldives, Marshall Islands, Micronesia, Myanmar, Nepal, Pakistan, Palau, Papua New Guinea, the Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu (since 2010), Vanuatu, Vietnam.

#### **Commonwealth of Independent States and Mongolia:**

Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kirgizia, Moldavia, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

#### **Middle East:**

Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen.

#### **Western Hemisphere:**

Antigua and Barbuda, Argentina, Aruba, Barbados, the Bahamas, Belize, Brazil, Bolivia, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guyana, Guatemala, Haiti, Honduras, Jamaica, Mexico, the Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Saint Christopher (Kitts) and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela.

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