

The global financial crisis and monetary policy responses in emerging market economies

Marek A. Dąbrowski¹, Sławomir Śmiech², Monika Papież³

Abstract

The aim of the paper is to investigate the role of the option of neutralization of external shocks chosen by monetary authorities in mitigating the impact of the global financial crisis in emerging market economies. The analysis is divided into two parts: in the first one country were classified according to their policy of mitigating the crisis. The division was conducted using classic techniques (agglomeration) as well as partitioning methods, k-means clustering and partitioning around medoids. Next canonical discriminate functions were estimated, which allowed interpreting the partitioning with reference to the tools used to mitigate the results of external shocks. The second part of the paper investigates the diversity of the groups obtained with regards to the costs of the crisis (slowing down the pace of the economic growth). Taking into account non-Gaussian settings, we decided to use quantile regression, which provide in addition, more complete picture of relationship between the covariates and the distribution of the GDP growth.

Keywords: Global financial crisis, Emerging market economies, Monetary policy, Exchange rate regime, Quantile regressions

JEL Classification: C21, E52, F31, F41

AMS Classification: 91B76

1. Introduction

The global financial crisis has entailed large economic and social costs but at the same time provided a unique opportunity (in a sense of a natural experiment) to investigate the effectiveness of monetary policy options adopted by emerging market economies in order to accommodate adverse external shocks. These economies were different not only in their relative crisis resilience, but also in the policy option chosen to neutralize the impact of crisis⁴. The purpose of the article is to look at policy options adopted by monetary authorities in emerging market countries and to investigate their role in making the global financial crisis milder for their economies. The existing studies devoted to the role of monetary factors in shaping the relative crisis resilience have been focused on the type of exchange rate regime

¹ Cracow University of Economics, Department of Macroeconomics, Rakowicka 27, 31-510 Cracow, Poland, marek.dabrowski@uek.krakow.pl

² Cracow University of Economics, Department of Statistics, Rakowicka 27, 31-510 Cracow, Poland, smiechs@uek.krakow.pl

³ Cracow University of Economics, Department of Statistics, Rakowicka 27, 31-510 Cracow, Poland, papiezm@uek.krakow.pl

⁴ For a comprehensive study of emerging markets resilience during the global financial crisis Didier et al. [5].

and not on the policy options actually adopted (e.g. Berkmen et al. [3], Blanchard et al. [4], Tsangarides [15]).⁵ As such they were based on a strict interpretation of the so-called trilemma (e.g. Aizenman et al. [1], Obstfeld et al. [12], Obstfeld et al. [13]), which states that it is impossible to maintain the stability of exchange rate, pursue autonomous monetary policy and retain free movement of capital at the same time. Frankel [6] pointed, however, that even if there are no capital controls monetary authorities can accommodate external shocks partly with international reserves and partly with changes in the exchange rate. Thus, monetary authorities can retain some control over monetary policy and at the same time limit exchange rate fluctuations. Moreover, as shown by Lahiri et al. [11] on theoretical ground the usefulness of exchange rate fluctuations in absorbing shocks hitting the economy is an empirical issue.

Our empirical strategy consisted of two complementary steps. Firstly, we looked for similarities in monetary authorities' responses to the global financial crisis. The goal was to identify similar emerging market economies in terms of monetary policy tools used to accommodate external shocks. This stage of analysis was a missing link between theoretical considerations and empirical research, and it was meant to serve as a substitute for the commonly used exchange rate regimes classification. Secondly, we looked for differences in the economic growth performance during the most intense phase of the crisis between the groups of emerging market economies. This stage was more in line with the existing empirical literature, however, our approach was focused more on the effectiveness of alternative policy options oriented at crisis mitigation rather than on a sophisticated comparison between countries that pegged their currencies with those that floated.

2. Methodology

Statistical methods of unsupervised classification (hierarchical and division methods i.e. k-means method and partitioning among medoids) were used to identify the actual monetary policy options for crisis mitigation. The groups of countries obtained were expected to include economies that adopted similar monetary policy options. The final classification of objects is, therefore, the result of the comparison of the results of respective grouping algorithms.

To evaluate the effectiveness of policy options for crisis mitigation the magnitude of the unexpected decline in the GDP growth is used. Statistical inference about relations was carried out within a framework of quantile regression analysis proposed by Koenker and Basset [10].

⁵ For a recent survey on the causes and consequences of exchange rate regimes see Rose [14]. The role of macroeconomic policies and exchange rate regime in the "sudden stop" episodes over 1980-2003 were investigated by Hutchison et al. [7].

3. Data and empirical results

Our sample covered 45 emerging market economies. In all our specifications the growth performance is measured as a difference between forecast and actual GDP growth in 2009, hereafter referred to as a GDP forecast error (GDP_FE) or unexpected growth performance. It is supposed to measure macroeconomic effects of the first phase of the crisis in emerging market economies. Three policy tools were used to extract policy options from the actual behaviour of monetary authorities: interest rate spread (SPREAD), exchange rate (E_RATE) and international reserves (excluding gold) (RESERVES). As additional controlling variable for unexpected GDP growth performance in emerging market economies in 2009 we adopted export volume (EXPORT), short term external debt (DEBT), current account (CA), net domestic credit (CREDIT), index of exchange market pressure (EMP) (Klassen and Jager [9]) and a set of dummies for de facto exchange rate arrangements (IMF classification [8]) (hard peg arrangement (*H_PEG*), soft peg arrangement (*S_PEG*), managed floating (*M_FLOAT*) and freely floating (*FLOAT*)).

The objective of the first part of the analysis was to uncover the similarities between countries with respect to monetary policy tools used in order to mitigate the effects of the crisis. Groups were identified by comparing three variables: nominal effective exchange rate, interest rate spread, and international reserves. Groups of countries were determined with the use of hierarchical methods (Ward linkage, Euclidean distance), the k-means method and partitioning around medoids (PAM) method. All of them yielded very similar structures of groups of countries under the assumption that five groups are to be identified.

	GROUP 1	GROUP 2	GROUP 3	GROUP 4	GROUP 5
GDP_FE	9.34	9.83	6.48	5.20	3.92
EMP	16.30	33.67	25.53	53.06	-1.42
SPREAD	7.12	0.96	1.80	3.05	0.33
E_RATE	103.99	99.13	81.41	82.46	100.77
RESERVES	88.37	73.96	97.17	74.67	101.32

Table 1 Mean across country groups.

A distinctive feature of the first group of countries (Argentina, Armenia, Bolivia, Croatia, Moldova, Russia, Uruguay, and Venezuela) was a relative increase of interest rate spread, a small depletion of international reserves and simultaneous stability of an exchange rate.

Countries in the second group (Bosnia & Herzegovina, Bulgaria, Cyprus, Estonia, Georgia, Latvia, Lithuania, Macedonia, Malaysia, Morocco, Malta, Peru, and Slovenia) used their international reserves to make the adjustment to external shocks less costly in terms of output.

The third group (Brazil, Chile, Colombia, Czech Republic, Hungary, Mexico, Philippines, Turkey, and South Africa) included countries with independent float and one managed floater. One can intuitively expect them to allow for depreciation of their currencies and this intuition turns out to be correct. At the same time, they were reluctant to use their international reserves. Using the result from Aizenman and Sun [2], one can conclude that monetary authorities in these countries revealed the “fear of losing international reserves”, which was stronger than the “fear of floating”.

A common feature of countries in the fourth group (India, Indonesia, Korea, Pakistan, Poland, Romania, and Serbia) was the policy of reserves depletion *and* depreciation of domestic currency (Table 1). This group was dominated by economies under managed float, but it also contained two independent floaters (Korea and Poland).

The last group (Algeria, China, Egypt, Hong Kong, Israel, Singapore, Thailand, and Tunisia) identified comprised of economies that experienced relatively weak external shocks. The exchange market pressure index was by a wide margin the lowest for this group with its median value close to zero and small variability (Table 1). Monetary authorities in these countries were not forced to accommodate adverse external shocks with monetary policy tools and the GDP growth loss was on average the lowest in this group (Table 1).

The magnitude of unexpected GDP growth loss was used to evaluate the effectiveness of the identified monetary policy options for crisis mitigation. To that end, alternative versions of quantile regression of the form given by equation (1) were constructed. Such a regression allows to recover the complete picture of conditional distribution of dependent variable for every quantile and is robust to skewed tails and deviations from normality:

$$\ln GDP_FE_j = \beta_0 + \beta_{Ctrl} CTR_j + \beta_2 EMP_j + \beta_{Reg} REG_j + \beta_{Group} GROUP_j + \varepsilon_j \quad (1)$$

where GDP_FE_j stands for the GDP forecast error for country j , CTR_j is a vector of control variables (EXPORT, DEBT, CA, CREDIT) for country j , EMP_j is an exchange market pressure index for country j , REG_j is a vector of dummies for de facto exchange rate regimes for country j , and $GROUP_j$ is a vector of dummies for groups for country j .

Our basic specification in Table 2 includes four control variables only and a constant (column 1). Exports and current account balance are both correctly signed and statistically significant. Thus, higher exposure to foreign trade and greater dependence on foreign capital (more negative current account) result in a greater unexpected loss in economic growth. The other two controls are wrongly signed and insignificant. It is slightly surprising in a case of short-term external debt-to-GDP ratio that was statistically significant in other studies (e.g. Berkmen et al. [3], Blanchard et al. [4]). It is probably because both current account balance and short-term external debt measure at least to some extent a similar thing, namely external vulnerability. Moreover, though Berkmen et al. [3] did not include current account in their preferred specification, they admitted that “the current account balance is statistically significant even when the exchange rate regime or net open position in foreign assets is controlled for, implying that while leverage was the crucial financial linkage, the degree of external imbalances was important”. The third reason is that we adopted a different estimation technique. The variability of net domestic credit among countries seems to have negligible effect, both statistically and economically, on their growth performance.

Specification	Regression1	Regression2	Regression3	Regression4	Regression5
C	1.327***	1.285***	1.802***	0.194	0.224
EXPORT	0.013***	0.014***	0.010**	0.013***	0.015***
DEBT	-0.002	-0.002	0.0002	-0.001	-0.003
CA	-0.047***	-0.047***	-0.048***	-0.039***	-0.038***
CREDIT	-0.004	-0.005	-0.011***	-0.004	-0.007***
EMP		0.002	0.005	0.013**	0.022***
H_PEG			0.395		-0.094
S_PEG			-0.675**		-0.904**
M_FLOAT			-0.326		-0.316
GROUP_1				1.284***	1.740***
GROUP_2				0.924***	1.027***
GROUP_3				0.909***	0.836***
GROUP_5				0.623	1.110**
Pseudo R ²	0.285	0.286	0.333	0.392	0.481

Quantile regression standard errors are based on bootstrap with 1000 replications. * indicate statistical significance at 10%; ** indicate significance at 5% and *** indicate significance at 1%.

Table 2 Quantile-regression results (for median).

Adding exchange market pressure index to the regression does not change the results significantly (column 2). Though the EMP had a positive impact on unexpected growth decline as expected, the effect was very weak.

The results of a regression that includes dummies for de facto exchange rate regime are presented in column 3. The relevant parameters should be interpreted in terms of a difference between a given exchange rate regime and a free floating which is treated as a reference regime. The effect of exchange rate regime on GDP growth performance during the crisis seems to be quite weak for countries in the sample. Performance of economies with managed float or hard peg did not diverge from that of floaters at any conventionally adopted statistical significance levels. Only for countries under soft peg the growth decline was relatively weaker, although from the economic point of view this advantage was not large. Its magnitude can be illustrated with the following experiment⁶: were Poland under a soft peg arrangement, instead of a free float, at the time of the crisis, then *ceteris paribus* economic growth would be greater by 1.4 percentage point. It is interesting to observe that our general conclusion that the relation between exchange rate regime and growth performance is relatively weak is in accordance with the empirical literature (see e.g. Berkmen et al. [3]).

Regression with dummies for groups of countries identified in the previous step of our empirical strategy looks more interesting (column 4). The fourth group is treated as a reference group. Differences with respect to that group are significant both statistically and economically, and the only exceptions are the fourth and fifth groups. Again, to illustrate the differences between groups one can carry out a familiar experiment of moving Poland from the reference group to other groups and check for the effects. Therefore, were Poland shifted to the group of countries that allowed for an increase in the interest rate spread, the GDP growth would fall 7.4 percentage points. If the “target group” was either countries that used their international reserves or countries that depreciated their currencies, the economic growth would deteriorate by ca. 4 percentage points. The differences between other groups, however, were not statistically significant at 5 per cent level, which leaves some room for exchange rate regimes as explanatory variables.

A more thorough picture of monetary policy options for crisis mitigation used by emerging market economies can be recovered from the regression that includes both exchange rate regimes and groups of countries (column 5). Two key conclusions can be drawn from the regression like this. First, no set of variables makes information conveyed by the other

⁶ The results of an analysis of that type should not be interpreted in terms of a forecast.

statistically insignificant. A plausible interpretation is that information on exchange rate regime is complementary to and not substitutionary for information on groups of countries identified.

Second, while economic significance of coefficients for dummies for exchange rate regimes remained essentially unchanged, coefficients that reflect differences between groups increased (the only exception is the coefficient for the third group, which virtually did not change). In other words, the inclusion of information on exchange rate regimes contributed to an enhancement of differences between groups. For example, if Poland was to be moved to a group of countries with higher interest rate spread, then *ceteris paribus* the GDP growth would collapse by 13.7 percentage points. If the “target group” was countries that either lose international reserves or depreciated their currencies, the growth loss would be 5.1 or 3.7 percentage points respectively. The difference between the fourth and fifth group was statistically significant: if Poland was moved to the fifth group, its growth would be lower by about 6 percentage points. Moreover, the differences between other groups turned out to be more palpable: out of a total of ten pairs of groups five were statistically different at 5 per cent level and one at 10 per cent level⁷. This result comes mainly from the pairs including the first group: for regressions excluding exchange rate regime dummies this group was not different from other groups (except for the fourth group), and, after including these dummies, the identity of the first group became sharper.

4. Conclusions

Our empirical findings make us even more sceptical about the hypothesis that exchange rate regimes, in and of themselves, fully predetermine monetary policy in the face of an external shock. Though this hypothesis hardly finds any advocates dealing with theoretical grounds, it has crept into numerous empirical researches. We depart from that line of empirical research and propose a more discerning approach that is based on an analysis of monetary policy tools used in order to accommodate external shocks.

Two main conclusions are as follows. First, as predicted by macroeconomic theory, we found out that monetary authorities in countries under fixed exchange rates were more reluctant to allow for depreciation of their currencies when the crisis hit than monetary authorities of floaters. There was, however, no clear (statistical) difference in the growth performance during the most intense phase of the crisis between countries at the opposite

⁷ Again detailed regression results are not presented here because of space constraint but are available upon request from the authors.

poles of exchange rate regime spectrum. Thus, second, it is not enough to look at exchange rate regimes when making comparisons between economies' resilience to external shocks. Countries should be rather allocated to a given category according to the policy option used to mitigate the crisis. We constructed five such groups. After controlling for the size of a shock and external vulnerability, the option of depreciation *cum* international reserve depletion turned out to outperform the other policy options, i.e. either depreciation or reserve depletion, and, especially, the rise in the interest rate spread, which was the most costly line of defence.

References

- [1] Aizenman, J., Chinn, M.D., Ito, H., 2010. The emerging global financial architecture: Tracing and evaluating new patterns of the trilemma configuration. *Journal of International Money and Finance* 29, 615-641.
- [2] Aizenman, J., Sun, Y., 2012. The financial crisis and sizable international reserves depletion: from 'fear of floating' to the 'fear of losing international reserves'? *International Review of Economics and Finance* 24, 250-269.
- [3] Berkmen, S.P., Gelos, G., Rennhack, R., Walsh, J.P., 2012. The global financial crisis: Explaining cross-country differences in the output impact. *Journal of International Money and Finance* 31, 42-59.
- [4] Blanchard, O., Faruquee, H., Das, M., 2010. The initial impact of the crisis on emerging market countries. *Brookings Papers on Economic Activity*, Spring, 263-323.
- [5] Didier, T., Hevia, C., Schmukler, S.L., 2012. How resilient and countercyclical were emerging economies during the global financial crisis? *Journal of International Money and Finance* 31, 2052-2077.
- [6] Frenkel, J.A., 1999. No single currency regime is right for all countries at all times. *Essays in International Finance* No. 215.
- [7] Hutchison, M.M., Noy, I., Wang, L., 2010. Fiscal and monetary policies and the cost of sudden stops, *Journal of International Money and Finance* 29, 973-987.
- [8] IMF, 2009. De facto classification of exchange rate regimes and monetary policy frameworks as of April 30, 2008.
- [9] Klassen, F., Jager, H., 2011. Definition-consistent measurement of the exchange market pressure. *Journal of International Money and Finance* 30, 74-95.
- [10] Koenker, R., Basset, Jr., G., 1978. Quantile regression. *Econometrica* 46, 33-50.
- [11] Lahiri, A., Végh, C.A., 2007. Output costs, currency crises, and interest rate defence of a peg. *Economic Journal* 117, 216-239.
- [12] Obstfeld, M., Shambaugh, J.C., Taylor, A.M., 2010. Financial stability, trilemma, and international reserves. *American Economic Journal: Macroeconomics* 2 (2), 57-94.
- [13] Obstfeld, M., Shambaugh, J.C., Taylor, A.M., 2005. The trilemma in history: Tradeoffs among exchange rates, monetary policies, and capital mobility. *Review of Economics and Statistics* 87 (3), 423-438.
- [14] Rose, A.K., 2011. Exchange Rate Regimes in the Modern Era: Fixed, Floating, and Flaky. *Journal of Economic Literature* 49 (3), 652-672.
- [15] Tsangarides, C.G., 2012. Crisis and recovery: role of the exchange rate regime in emerging market countries. *Journal of Macroeconomics* 34, 470-488.