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ESSAY

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# HOW TO SOLVE THE MORAL DILEMMA OF HELPING A FALLEN OLD MAN - FROM AN ECONOMIC POINT OF VIEW

Li Fengsen\*

**Abstract:** *In recent years, a peculiar phenomenon has happened time and time again and aroused hot social discussions in China. It is the fact that when an old man (or woman) falls down on the street, most passers-by dare not to help him, or in other cases, when one of them does offer his (or her) help, he might be accused of having knocked the old man down. As a result, nowadays in China, most people will not help a fallen old man for fear of being falsely accused. From an economic point of view, this paper points out that this peculiar phenomenon, which I call it a moral dilemma of helping a fallen old man, not only is a moral issue, but also closely relates to the intrinsic defects within China's current institutions. In order to solve this moral dilemma, some improvement measures have to be taken not only in public moral education, but in the legal institutions, civil administration, health care system and public opinion guidance as well.*

**Keywords:** *economic man, moral dilemma, game theory, China, institutional economics*

**JEL Classification:** *D02, D64*

## 1. INTRODUCTION

First of all, let me ask you a question: will you help a fallen old man on the street? Your answer may be yes. But if I ask a Chinese this question today, I shall probably get an answer “no”. Why?

This is a real story which happened in Nanjing, China. On November 20, 2006, an old woman (her name is Xu Shoulan) was knocked down when she was waiting for a bus at a busy bus stop. Xu was seriously wounded. Peng Yu, a young man who just got off the bus and saw Xu lying on the street, helped her stand up and sent her to the nearby hospital. To all people's surprise, at the hospital, Xu asserted that it was Peng who had knocked her down and he must be responsible

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for her injury. On September 4, 2007, a local court made the judgment that Peng should pay 40% of Xu's medical charges. What the judgment paper says is as follows: although neither Xu nor Peng was at fault, and neither side could provide solid evidence to prove what he or she said, it could be inferred by common sense that if Peng had not knocked Xu down, he should not have offered his help, let alone paid some of her bill. Since Peng had helped Xu and sent her to the hospital, the paper says, it could be concluded just by the logic of common sense that Peng must be the person who had knocked Xu down. Peng insisted on his innocence and appealed to a higher court. On March 15, 2008, the chief justice of Jiangsu High People's court said at a press conference that Xu and Peng had made a secret out-of-court settlement through the court's intermediation.

Although the Xu vs. Peng case itself had ended with a settlement, its influence and the hot social discussions it aroused become more and more widespread in China. What the public are concerned with is the principle by which the judgment was made more than the truth of the case. In this case, the local court didn't have enough evidence to make a clear guilty or not guilty judgment. Instead of making a judgment by the ordinary rule of the distribution of burden of proof, the local court made an ambiguous judgment by the logic of common sense. *The so-called common sense of the court* is that *no one* will help others. So, according to this logic, if a passer-by finds an old man lying on the street, his *normal* reaction should be pretending not to see it and passing by. If he does help the old man, then his reaction should be regarded as *abnormal* or suspicious, and he will be inferred to be responsible for the old man's falling down. But the so-called common sense of the court isn't common sense at all. It is indeed unreasonable and unpersuasive, and contradictory to the real common sense of life, especially when we pause to consider that there is a long Chinese tradition that people should regard helping others as a pleasure. Mr. Cheng, the only eye witness of the case, was even angrier than Peng at the court's judgment. "Who dare to do good in China after this case?!" Mr. Cheng shouted to the reporters.

After the Xu vs. Peng case, similar incidents have happened throughout China and been widely reported time and time again that an old man fell down on the street because he suddenly became ill or was knocked down by others. According to the final results, these incidents fall into three categories. The first category, which is also the bulk, is that all passers-by dare not to help the old man, such as Xiao

Yusheng in Shenzhen (December 15, 2010). The second category is that the old man is helped by some passers-by and he extends grateful thanks to them, such as Li Dezhi in Tianjin (September 1, 2011). The third category is that the old man is helped by a passer-by, but instead of feeling grateful, the old man claims that he is knocked down by the helper. In the third category, if both sides insisted on their claims but neither of them could provide enough evidence, the usual judgment of the court is that both sides share the medical charges, such as the Xu vs. Peng case and Peng Daoxiang in Zhengzhou (September 25, 2009). In other cases, the defendant provides unquestionable evidence to prove his innocence, but the complainant doesn't get any punishment for making a false accusation, such as Yin Hongbin in Jiangsu (August 26, 2011). News reports about such incidents have led to violent social discussions and debates. The prevailing public opinion is that nowadays doing good in China has become a risky choice. In September, 2011, an online poll organized by Public Welfare Times (a Chinese official newspaper) and Sohu (a popular Chinese Internet portal) shows that, of the 5138 answers to the question "Will you help a fallen old man on the street?", "definitely yes" accounts for 6.62% only, while "definitely no" 23.97%, "not help but call the police" 41.9% and "it all depends" 26.5%. A popular commentator of social affairs once made a sharp comment that, after the Xu vs. Peng case, the moral standards of the Chinese society had degenerated for at least 30 years.

In my opinion, the Xu vs. Peng case and other similar cases not only reflect the degeneration in the moral standards of the Chinese society, but more importantly, they show us that there exist some intrinsic defects within China's current institutions. Those defects are so severe that public moral education alone can't solve the moral dilemma of helping a fallen old man. And so, from an economic point of view, this paper tries to make a theoretical analysis of the dilemma, find out the intrinsic defects within China's related institutions, and put forward some policy suggestions so as to help the Chinese society solve the moral dilemma as soon as possible.

## 2. THEORETICAL ANALYSIS

### 2.1 Economic man vs. moral man

In conventional economics, a consumer or producer is usually hypothesized to be an economic man, that is, a man who always acts rationally and with complete knowledge, trying to maximize his personal utility. But on the other hand, the Chinese conventional morality says that a man of good virtue should be completely altruistic and always ready to help others, never taking into consideration or even at the cost of his own self-interest. The Chinese conventional morality is just like those systems which make virtue consist in benevolence. Dr. Francis Hutcheson observed that “proper benevolence is the most graceful and agreeable of all the affection... it appears to our natural sentiments to possess a merit superior to any other... whenever in any action, supposed to proceed from benevolent affections, some other motive had been discovered, our sense of the merit of this action was just so far diminished as this motive was believed to have influenced it... it was evident that virtue must consist in pure and disinterested benevolence alone.” (Adam Smith,1790). So upon all these accounts, many Chinese people come to the conclusion that if someone wonders if his self-interest is in danger when he hesitates to help a fallen old man, he must be of impure virtue.

We have to admit that the economic man hypothesis and the moral man hypothesis are somewhat mutually contradictory. But the problem is that a man is always an entity of economic man and moral man, living in the economic and moral environment simultaneously. When an incident such as helping a fallen old man, has something to do with someone’s value orientation and personal utility (especially his economic interest) at the same time but in opposite directions, which choice should he make, the value-oriented one or the utility-oriented one? This question relates to humanity and morality, different people may have different answers. But for most of the public, their actual behaviors in the daily life have revealed their answers clearly. Can we then draw the inference that most of the public are of impure virtue or immorality? Probably not. Just as Adam Smith pointed out in the masterpiece of the *Wealth of Nations*, the main driving force of every individual’s economic behavior is self-love and to get his own gain, and “by pursuing his own interest he frequently promotes that of the society”. (Adam

Smith,1789) Adam Smith also observed in the Theory of Moral Sentiments that, “regard to our own private happiness and interest, too, appear upon many occasions very laudable principles of action... If we could really believe, however, of any man, that, was it not from a regard to his family and friends, he would not take that proper care of his health, his life, or his fortune, to which self-preservation alone ought to be sufficient to prompt him, it would undoubtedly be a failing... which renders a person rather the object of pity than of contempt or hatred... Benevolence may, perhaps, be the sole principle of action in the Deity... (but) so imperfect a creature as man, the support of whose existence requires so many things external to him, must often act from many other motives.” (Adam Smith,1790). Therefore, as far as I’m concerned, although pure and disinterested benevolence is very virtuous and noble, it isn’t so realistic and feasible. For most of the public, virtue should be something mixture of noble altruism and reasonable egoism, less virtuous and noble but more realistic and feasible than pure and disinterested benevolence.

Based on the above analysis, it is my view that, in order to solve the moral dilemma of helping a fallen old man, better public moral education alone is far from enough, the key point is to design reasonable institutions which coordinate people’s egoism in economic issues and altruism in moral issues so as to make the public realize that helping a fallen old man is not only noble and virtuous, but also in line with their personal interest. Otherwise, in absence of effective protection of their self-interest, most passers-by would choose to be bystanders, of which criticism on moral grounds is meaningless and unfair, because we have no reason to expect every member of our society to be Mahasattva who killed himself to feed a starving tiger.

## **2.2 Model specification**

Suppose that all the members of the society fall into three categories: good man, ordinary man and bad man, with the probability of  $p_1$ ,  $p_2$  and  $1-p_1-p_2$  respectively. A good man is one who will offer his help if he finds someone else lying on the street, and will extend his gratitude to others for their help if he himself falls down on the street and is helped by others. An ordinary man does not help, but he feels grateful when he is helped by others. A bad man not only does not help, but also makes a false accusation when helped by others. (See table 1)

**Table 1** Choices and reactions if A finds B lying on the street

	<b>Good B</b>	<b>Ordinary B</b>	<b>Bad B</b>
<b>Good A</b>	Help, thank	Help, thank	Help, accuse
<b>Ordinary A</b>	Not help,—	Not help,—	Not help,—
<b>Bad A</b>	Not help,—	Not help,—	Not help,—

Suppose someday A sees B falling down and lying on the street. A doesn't know which category of man to which B belongs, so A has two choices: help or not help. If A chooses to help B, A faces two possibilities: A gets grateful thanks from B or he gets a false accusation. If B is a good man or ordinary man, he expresses his thanks, so A gets a positive utility of  $G_1$  (A might get some material award or spiritual award) and B suffers a small loss of  $-L_1$  (B might have to pay some basic medical expense). But if B is a bad man, he makes a false accusation against A. If A wins the lawsuit (the probability is  $q$ ), he suffers a loss of  $-G_2$  of lawsuit cost and spiritual hurt, and B suffers the dual losses of  $-L_1$  and  $-L_2$  ( $-L_2$  is the punishment for making a false accusation). If A loses the lawsuit (the probability is  $1-q$ ), he not only suffers the loss of  $-G_2$ , but also has to compensate for B's loss, and so B suffers no loss at all. On the other hand, if A chooses not to help B, he gets neither gain nor loss, while B suffers a large loss of  $-(L_1+L_3)$  (suppose  $L_3>L_2$ ). (See table 2)

**Table 2** Choices and consequences if A finds B lying on the street

	Good B ( $p_1$ )	Ordinary B ( $p_2$ )	Bad B ( $1-p_1-p_2$ )	
Good A	$G_1, -L_1$	$G_1, -L_1$	Win ( $q$ ) *	$-G_2, -L_1-L_2$
			Lose ( $1-q$ ) *	$-G_2, -L_1, 0$
Ordinary A	$0, -L_1-L_3$	$0, -L_1-L_3$	$0, -L_1-L_3$	
Bad A	$0, -L_1-L_3$	$0, -L_1-L_3$	$0, -L_1-L_3$	

\* "win or lose" is from the point of view of the helper (the good man), same in table 3.

Just as the English saying goes that it is the unforeseen that always happens, everyone may have a good luck or a bad luck someday. Suppose every member of the society has the same probability of falling down and lying on the street,<sup>1</sup> and also has the same probability of facing the dilemma of helping a fallen passer-by. So today's A might be tomorrow's B, and today's B might be tomorrow's A. From the point of view of the whole society, helping a fallen passer-by is indeed helping

<sup>1</sup> Of course, a young man has a much lower probability of falling down than an old man, but still it is a justifiable assumption in consideration of the fact that a young man probably have elderly parents or grandparents and that a young man must become an old man in some time.

oneself. Suppose both A and B are economic men, they have the following characteristics: (1) personal utility maximization is their primary objective. The value orientation of A and B is that one should help others when and only when doing so is favorable (at least not unfavorable) to his personal utility. (2) Both A and B make their individual estimations of the parameters in table 2, but their estimations might be different from each other. (3) Both A and B believe that their behaviors and criteria are in line with the average of the whole society. Since every member believes that he is in line with the average of the whole society, A is actually a reflection of B, and vice versa. When A or B decides what to do when he sees a passer-by lying on the street or when he himself is helped by others, he is playing a game with himself, the purpose of which is to find the best strategy so as to ensure personal utility maximization. From table 2, it is easy to derive a symmetrical payoff matrix (see table 3).

**Table 3** *The payoff matrix of game between A and B*

	Good B ( $p_1$ )		Ordinary B ( $p_2$ )	Bad B ( $1-p_1-p_2$ )	
	$G_1-L_1, G_1-L_1$			$G_1-L_1-L_3, -L_1$	win ( $q$ )
Good A ( $p_1$ )	$G_1-L_1, G_1-L_1$		$G_1-L_1-L_3, -L_1$	lose ( $1-q$ )	$-G_2-2L_1-L_3, 0$
Ordinary A ( $p_2$ )	$-L_1, G_1-L_1-L_3$		$-L_1-L_3, -L_1-L_3$	$-L_1-L_3, -L_1-L_3$	
Bad A ( $1-p_1-p_2$ )	win ( $q$ )	$-L_1-L_2, -G_2-L_1-L_3$	$-L_1-L_3, -L_1-L_3$	$-L_1-L_3, -L_1-L_3$	
	lose ( $1-q$ )	$0, -G_2-2L_1-L_3$			

It is shown clearly in table 3 that (help, help) is the best payoff which leads to overall utility maximization while (Not help, Not help) is the worst payoff which results in overall utility minimization. Only group (good man, good man) can ensure the best payoff of (help, help), while groups (ordinary man, ordinary man), (ordinary man, bad man) and (bad man, bad man) all result in the worst payoff of (Not help, Not help). As a result, in order to maximize the overall utility of the society, we should encourage every member of the society to be a good man rather than an ordinary man, let alone a bad man.

As A and B are economic men with personal utility maximization as their primary objective, they compare the utilities of being a good man, an ordinary man

and a bad man, and then choose to be that category which brings them the biggest utility. Let  $EU_g$  be the expected utility of being a good man,  $EU_o$  an ordinary man and  $EU_b$  a bad man. Let  $\Delta EU = \min(EU_g - EU_o, EU_g - EU_b)$ . When  $\Delta EU \geq 0$ , the expected utility of being a good man is bigger than that of being an ordinary man or a bad man, I'll say that there exists "good man advantage". Otherwise, when  $\Delta EU < 0$ , there exists "good man disadvantage", so A or B chooses not to be a good man.

The function representations of  $EU_g$ ,  $EU_o$ ,  $EU_b$  are as follows:

$$EU_g = p_1(G - L_1) + p_2(G - L_1 - L_3) - (1 - p_1 - p_2)[q(G_2 + L_1 + L_3) + (1 - q)(G_2 + 2L_1 + L_3)]$$

$$EU_o = -p_1 \cdot L_1 - (1 - p_1)(L_1 + L_3)$$

$$EU_b = -p_1 \cdot q(L_1 + L_2) - (1 - p_1)(L_1 + L_3)$$

### 3. STATIC AND DYNAMIC ANALYSES OF THE MODEL

#### 3.1 Static analysis of the model

To study the impact of each parameter's variation on the expected utilities and people's decision making, I'll make a brief static analysis of the model. Firstly, take the partial derivatives of  $EU_g$ ,  $EU_o$  and  $EU_b$  with respect to each parameter respectively. The partial derivatives show the marginal impact of each parameter on the expected utilities. Secondly, compare the partial derivatives of  $EU_g$ ,  $EU_o$  and  $EU_b$  with respect to the same parameter, and then decide the sign (positive or negative) of  $\Delta EU$ . Thirdly, analyze what A or B will do according to the sign of  $\Delta EU$ .

Take  $p_1$  as an example:

$$\therefore \partial EU_g / \partial p_1 = G + G_2 + (1 - q)L_1 + L_3 > 0;$$

$$\partial EU_o / \partial p_1 = L_3 > 0;$$

$$\partial EU_b / \partial p_1 = -q(L_1 + L_2) + L_1 + L_3 > 0 \quad (\because 0 \leq q \leq 1, L_2 < L_3).$$

$$\therefore \partial EU_g / \partial p_1 - \partial EU_o / \partial p_1 = G + G_2 + (1 - q)L_1 > 0,$$

$$\partial EU_g / \partial p_1 - \partial EU_b / \partial p_1 = G + G_2 + qL_2 > 0,$$

$$\therefore \partial(\Delta EU) / \partial p_1 = \min(G + G_2 + (1 - q)L_1, G + G_2 + qL_2) > 0 \circ$$

Therefore, as  $p_1$  increases, all of  $EU_g$ ,  $EU_o$ ,  $EU_b$  increase, and  $EU_g$  has the largest increment, so both  $EU_g- EU_o$  and  $EU_g- EU_b$  are positive, and  $\Delta EU$  is positive. The other parameters can be analyzed in the same way. (See table 4)

**Table 4** Analysis of the influencing factors of expected utilities

factor	$EU_g$	$EU_o$	$EU_b$	$EU_g- EU_o$	$EU_g- EU_b$	$\Delta EU$
$G_1+$	+	0	0	+	+	+
$G_2+$	-	0	0	-	-	-
$L_1+$	-	-	0	-	-	-
$L_2+$	0	0	-	0	+	+/0
$L_3+$	-	-	-	0	0	0
$q+$	+	0	-	+	+	+
$p_1+$	+	+	+	+	+	+
$p_2+$	+	0	0	+	+	+

Now we can make a brief static analysis of the impacts of some parameters:

(1) The marginal impact of  $G_1$  shows that the more material or spiritual award the helper receives, i.e., the larger the potential reward of helping others is, the more dominant “good man advantage” becomes, which induces more people to be good men. Viewed in this light, it is reasonable and effective to confer those who do good some material or spiritual awards, because that makes “good man advantage” more dominant.

(2) The marginal impact of  $G_2$  shows that the larger the loss of lawsuit cost and spiritual hurt the helper suffers when he is falsely accused, i.e., the larger the potential cost of helping others is, the more dominant “good man disadvantage” becomes, which induces more people not to be good men. From this point of view, the “risk fund for helping a fallen old man” set up by the Chinahaoren (literally means Chinese good men) website and the “special assistance fund for helping others for just causes” set up by a charity organization in Jiangsu province are a good start for the whole society. Of course, the judicial assistance could be more effective and available if it is offered by governmental organizations instead of NGOs. Moreover, it is worth particularly emphasizing that the spiritual hurt the helper suffers when he is falsely accused is a very important cost, though often ignored by most of the public. This is especially true for the juvenile helpers, because the spiritual hurt could be so severe for their immature minds that they could hardly recover from it. Wang Xin, a middle school student in Chongqing province, is just such a victim. Although a local court had dismissed the case

brought by the old man Wang helped, he was hurt emotionally so badly that his temperament changed a lot and his study performance plummeted in a very short time, according to the report of the Chongqing Evening in November 14, 2010.

(3) The marginal impact of  $L_1$  shows that the more expensive basic medical charges are, the more dominant “good man disadvantage” becomes. It seems to be a reasonable presumption that some old men make false accusations against their helpers because they are afraid of being unable to pay their hospital bills, apart from the possibility that their moral values might be of low standards. It should not be a surprise for us to find out that almost all the old men who made accusations against their helpers belong to the low-income group.  $L_1$  could be regarded as the potential benefit of making a false accusation, since the old man’s medical expense will be transferred, at least partially, to the helper once the helper loses the lawsuit. On this account, I believe that the repeated recurrence of incidents like the Xu vs. Peng case can be attributed, to some extent, to the fast increase of medical charges in recent years and the low standard and limited coverage of China’s health care system.

(4) The impact of  $L_2$  shows that the more severe the punishment for making a false accusation is, the more dominant “good man advantage” becomes (it remains unchanged if  $EU_o > EU_b$ ).  $L_2$  could be regarded as the opposite of  $L_1$ , i.e., the potential risk of making a false accusation. If the old man doesn’t get any punishment for making a false accusation, as is shown in the Yin Hongbin case, the frame-up can be viewed as an investment with a risk-free return of  $L_1$ . In this respect, Singapore provides a good example for China. In Singapore the law says that if a man is helped by others and makes a false accusation later, he must make personal apology to the helpers and face a fine of one to three times his medical expense or even a criminal charge of frame-up in some serious case.

(5) The impact of  $q$  shows that the larger the probability of the good man winning the case is, the more dominant “good man advantage” becomes. In judicial practices, the distribution of burden of proof and the principles of judgment play central role in the final judgment. Specifically, if the burden of proof is borne by the complainant, the probability of the good man winning the case would be large. Conversely, if the burden is shifted to the defendant, the probability would be small. This happens because in most cases there are always some plausible reasons on both sides, but neither of them can provide evidence strong enough to support himself.

The probability of the good man winning the case would be large if the judgment is made in compliance with the ordinary distribution of burden of proof, while it would be small if the judgment is made by the logic of the so-called common sense of the court.

(6) The impact of  $p_1$  and  $p_2$  shows that the higher the probability of good man is or the lower bad man is,<sup>2</sup> the more dominant “good man advantage” becomes, which leads to more people choose to be good men. In other words, there is a positive feedback loop of “more good men (or less bad men) → even more good men”.

### 3.2 Dynamic analysis of the model

In the static analysis, we study the impact of each parameter’s variation on the expected utilities while keeping other parameters constant. But in reality all the parameters interact with each other, in which two positive feedback loops play central role. One feedback loop is “more good men → even more good men”, and the other “more non-good men → even more non-good men”, which will be discussed later in this paper. To make the following discussions simple, I’ll just say that A is “above (or below) the critical point of good man” if  $\Delta EU_A > 0$  (or  $\Delta EU_A < 0$ ), which means that A gets more (or less) utility from being a good man than being a non-good man. And I’ll say that “A breaks the critical point of good man upwards/downwards” if a negative/positive  $\Delta EU_A$  becomes a positive/negative one, which means that A changes from a non-good/good man to a good/non-good man.

Take the Xu. vs. Peng case as an example. Before the case, it didn’t seem to be a problem whether or not we should help a fallen old man, for most people thought that such a question had a self-evident answer and therefore wasn’t worthy of any further discussion. We can say that the Chinese society was then in a relatively stable state. (Of course that doesn’t mean that every person would choose to be a good man in such a state, since the estimates of parameters and expected utilities vary from person to person.) Maybe the Xu vs. Peng case isn’t the very first one of its kind, but it is the first one that had been widely covered by the mainstream news media and had attracted wide public attention. The transmission

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<sup>2</sup> As  $p_1$  increases and  $p_2$  remains unchanged, the probability of good man increases and that of bad man decreases. As  $p_2$  increases and  $p_1$  remains unchanged, the probability of good man remains unchanged and that of bad man decreases.

mechanism by which the Xu vs. Peng case spread its influence can be analyzed as follows:

**Step 1:** After the occurrence and wide media coverage of the case, most people alter their estimations of some parameters and the expected utilities. Before the occurrence of the case, it was general knowledge that in most cases you wouldn't get a false accusation if you help a fallen old man, and in case you did get one, the court would make a favorable judgment for you unless the old man could provide solid evidence to support his allegation. But after the occurrence of the case, the knowledge came to be that you would probably get a false accusation if you help a fallen old man, and in case you did get one, the court would make an unfavorable judgment against you unless you could provide solid evidence to prove your innocence. As a result, the estimate for  $G_2$  increases while those for  $p_1$ ,  $p_2$  and  $q$  decrease, which lead to changes in the expected utilities.

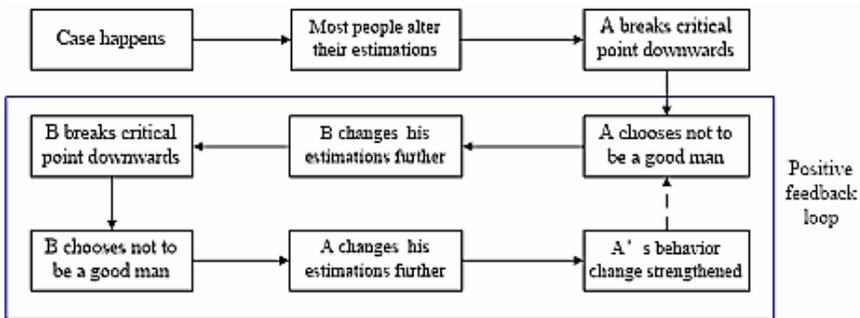
**Step 2:** Due to those changes in step 1, some people (let them be A) who used to be above the critical point of good man break the point downwards. That is to say, A changes his choice from being a helper to being an onlooker, if he finds someone lying on the street.

**Step 3:** A's behavior change is observed by other people (let them be B) who remains above the critical point in step 2, which leads to further alteration in B's estimations of some parameters, which in turn leads to B's breaking the critical point downwards. The tragedy of Zheng, an 83-year-old retiree in Fujian province, is such a case in the real life that reflects the above process. On December 29, 2010, Zheng suddenly had a heart attack and lied on the street. There were several people nearby, they looked at the old man but none of them offered their help. Several minutes later, two young ladies passed by. Just when the ladies wanted to help the old man, they got a "goodwill reminder" from other onlookers, and after much hesitation, they got cold feet and left. Poor Zheng lied on the street until death, surrounded by several onlookers. In this case, the two ladies used to be above the critical point of good man, but the "goodwill reminder" induced them to change their estimations of some parameters such as  $q$ ,  $G_2$  or  $L_1$ , which in turn led to their breaking the critical point downwards. In fact, the repeated reports of fallen old men lying on the street without anyone helping them have, objectively to some extent, induced more people to break the critical point downwards, because with intrinsic propensity to follow a herd mentality, people are always subject to the

subtle influence of the mainstream ideology and the surrounding people and environment. Therefore, there is another positive feedback loop of “more non-good men → even more non-good men”, apart from that of “more good men → even more good men”.

**Step 4:** B’s behavior change is observed by A, which leads to further alteration in A’s estimations of some parameters, which in turn makes A’s “good man disadvantage” more dominant. In other words, A’s behavior change in step 2 is strengthened by B’s behavior change in step 3.

The whole process can be simply described as “A not to be a good man → B not to a good man → A more determined not to be a good man”. (See figure 1)



**Figure 1** Transmission Mechanism of the Influence of the Xu vs. Peng Case

The two positive feedback loops discussed above play central role not only in the transmission mechanism of the moral dilemma, but also in the transition of the society from one state to another. Suppose the society is in a relatively stable state at the beginning, then something happens which causes most people to alter their estimations. The change magnitudes may vary from person to person, but they are in the same direction. Due to the two positive feedback loops, some people’s behavior change (their breaking the critical point downwards or upwards) may lead to similar chain reactions of others, which in turn provide positive feedbacks to the former. Then the whole society gradually reaches a new state of relative stability. All these have been shown quite clearly by the very fact that after the Xu vs. Peng case, there are more and more news reports throughout China about no one daring to a fallen old men.

#### 4. CONCLUSIONS AND SUGGESTIONS

Based on the above analysis, I come to the conclusion that the moral dilemma of helping a fallen old man not only is a moral issue, but also closely relates to China's current legal institutions, civil administration, health care system and media coverage. Since there is a self-reinforcement and self-stabilization mechanism in the dilemma, if we don't take necessary measures without delay, the wide spreading of the dilemma might lead to the worst payoff of (Not help, Not help) becoming a new stable state of the Chinese society. If that situation really happens, it will not only be a moral tragedy, but also put everyone at risk because nobody will help you when you are in need.

Since the moral dilemma of helping a fallen old man relates to both people's value orientations and their economic interests, multiple measures should be taken promptly in order to induce more people to break the critical point upwards, so that the course of the Chinese society could be changed from the vicious circle of "more non-good men → even more non-good men" to the virtuous cycle of "more good men → even more good men". It is a social problem worthy of our serious considerations of how to encourage more people to do good and how to prevent good men from shedding both bloods and tears. Personally I think the following measures should be taken:

(1) Strengthen and improve the traditional public moral educations. Public moral educations alone are not enough, but they are indispensable to the improvement of moral standards of the whole society. We should strengthen and improve our traditional practices in the regard. For example, in addition to the usual practice of telling people that doing good is a traditional virtue of the Chinese nationality, we could also tell them that helping others is in essence helping themselves. If you don't help others in trouble, why do you expect others to help you when you yourself are in trouble? We should get free from the constraints of the traditional ideology that virtue must consist in pure and disinterested benevolence. Virtue, as I understand it, is something mixture of noble altruism and reasonable egoism.

(2) Provide those who do good with more material and spiritual rewards and other benefits. Apart from conferring honorary titles and spiritual rewards, we should provide more material rewards and other kinds of benefits, such as prizes, scholarships, financial aids, relief funds, priorities in education and employment,

etc. In short, we should take measures to increase the potential benefits of doing good.

**(3)** Begin the legislation of China's Good Samaritan law as soon as possible. Good Samaritan laws are laws that offer legal protection to people who give reasonable assistance to those who are injured, ill, in peril, or otherwise incapacitated. The protection is intended to reduce bystanders' hesitation to assist, for fear of being sued or prosecuted for unintentional injury or wrongful death. So far there is not yet a Good Samaritan law in China, and that is part of the reason why so many Chinese people hesitate to help a fallen old man. Moreover, relevant government agencies or authorities should provide legal and civil assistances whenever necessary, especially to the juvenile helpers. In short, we should take measures to decrease the potential costs of doing good.

**(4)** Punish those who make false accusations. Frame-ups should not be something with potential gains but without any potential risk. We should punish those who make false accusations, such as order them to make personal apologies to the victims, or to pay a fine of some amount of money. In this way we could increase the potential costs of doing bad.

**(5)** Accelerate the reform of China's health care system so as to improve the coverage and standard of medical security. If everyone is able to pay his own medical bill, then the possibility will fall dramatically that a fallen old man might make a false accusation against his helper.

**(6)** Change the principles by which the judgments are made. In cases like the Xu vs. Peng case, the burden of proof should be borne by the complainants instead of the defendants. The principle of shifting burden of proof should not be abused. Although the judicial interpretations of evidences in civil lawsuits released by the Supreme People's Court in April 2002 say that the complainant needn't provide evidence to prove a natural law or theorem, or something which can be inferred by common sense, the court should not regard the controversial idea of human nature being evil as common sense, let alone use it as a principle to make judgments.

**(7)** Provide appropriate guidance on public opinion and media coverage. Various news media, especially the Internet, have played active role in the wide spreading of the influence of the Xu vs. Peng case. And the reluctance of the parties and the authorities to disclose the very truth of the case have contributed greatly in arousing hot social discussions afterwards. In order to solve the moral

dilemma, the authorities should provide appropriate guidance on public opinion and encourage various new media to make more news reports of people doing good. (Of course I don't mean that the authorities should intervene in the freedom of the press.) Whenever possible, relevant parties and the authorities should disclose the truths to the public in a clear way so as to stop the spreading of the rumors.

The above suggestions are put forward directly to the moral dilemma of helping a fallen old man. But if we broaden our horizon and make analyses under similar frameworks, we'll find that there are many other phenomena in China just like the moral dilemma of helping a fallen old, such as most car drivers don't give way to an ambulance<sup>3</sup>, and most people dare not to impeach or disclose the criminals or corrupt officials out of fear of reprisals. In order to solve these and other similar dilemmas, better public moral educations or legal educations alone are not enough. What is needed most is the further improvement of relevant institutions which will coordinate people's personal interests and the overall interest of the society so as to help the Chinese people solve the "prisoner's dilemma" as soon as possible.

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<sup>3</sup> A typical case happened in Beijing in December 7, 2012. A bicycle driver was seriously wounded in a traffic accident, he died on the way to the nearby hospital because the traffic was very busy and most drivers didn't give way to the ambulance. An online poll shows that more than 50% of Chinese car drivers admit that they won't give way to an ambulance. There are many things the Chinese drivers have to worry about if they decide to give way to an ambulance, such as whether or not they can enjoy impunity if they break the traffic rules, or in the event of a collision with others, whether or not the loss will be covered by their traffic insurances. So far there is no Chinese law or act which makes clear rules for these questions.



# SHADOW BANKING AND REPO MARKETS IN EUROPE AND THE UNITED STATES: A COMPARATIVE ANALYSIS

Silviu Ursu\*

**Abstract:** *Shadow banking became a highly debated topic in the aftermath of the global financial crisis and a major concern for regulators given its global size, estimated at about a quarter of the total financial system. As one of the intertwined pillars in the definition of shadow banking, referring to the main activities outside the regular banking system that provide funding to non-bank entities according to the Financial Stability Board Report (2011) and the European Commission Green Paper (2012), repurchase transactions (“repo”), along with securitization and securities lending, came under a greater regulatory scrutiny in both the United States and European Union.*

*This paper provides a comparative analysis of the main instruments, players and arrangements of the US and euro area repo markets, two important and dynamic markets in the global financial system during the past half-century. Special focus is given to the impact of the financial market turmoil that began in August 2007 and also to the challenges emerging from the inclusion of repo in the current regulatory work on shadow banking, especially those related to the possible introduction of macro-prudential requirements and the improvement of the repo markets infrastructure.*

**Keywords:** *Repo, Shadow Banking, Financial Intermediaries, Regulation*

**JEL Classification:** *G21, C67, G01*

## 1. WHAT IS SHADOW BANKING?

### 1.1. Defining shadow banking

“Shadow banking” is a recent term that describes a major part of the financial system.

Although highly used in the academic literature and the debate on the financial system reform following the Great Financial Crisis, the concept is still

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imprecise. Even if half a decade passed since it was first coined<sup>1</sup> (McCulley, 2007), a myriad of definitions and diverging characterizations of what shadow banking truly subsumes is still in place.

Among the first attempts to describe shadow banking and propose a working definition are those of Pozsar et al (2010) and Financial Crisis Inquiry Commission (2010). In a seminal paper, Pozsar et al (2010) define shadow banks as “financial intermediaries that conduct maturity, credit, and liquidity transformation without access to central bank liquidity or public sector credit guarantees. Examples of shadow banks include finance companies, asset-backed commercial paper (ABCP) conduits, limited-purpose finance companies, structured investment vehicles, credit hedge funds, money market mutual funds, securities lenders, and government-sponsored entities”. In addition, the report of the Financial Crisis Inquiry Commission (2010) attributes to shadow banking a larger perimeter, including entities such as investment banks or hedge funds: “bank-like financial activities that are conducted outside the traditional commercial banking system, many of which unregulated or lightly regulated [...] Within this broad definition are investment banks, finance companies, money market funds, hedge funds, special purpose entities, and other vehicles that aggregate and hold financial assets.”

By contrast, another stream in the academic literature suggests that, although the concept “shadow banking“ may provide an image of an uncharted and mysterious part of financial system, in fact, it is just “an unfortunately pejorative term which has been applied, since the financial crisis, to *market finance*. It is defined, for regulatory purposes, as traditional banking activity conducted by non-banks” (ICMA,2012a). Market-based financing exploits specialization and comparative advantage, and therefore is complementary to *institutional finance* intermediated by traditional (commercial) banks.

Given the official concern about the systemic risk posed by the shadow banking system, related to regulatory arbitrage, interconnectedness, lack of transparency, over-leverage and complexity, an international effort to strengthen its regulation and oversight was put in place in November 2010 at the G20 Seoul Summit. The first comprehensive definition formulated by the Financial Stability

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<sup>1</sup> Although Paul McCulley introduced the term at the 2007 Jackson Hole Symposium, it was Rajan (2005) whom attempted first to identify what constitutes shadow banking and its vulnerabilities, without using this specific term.

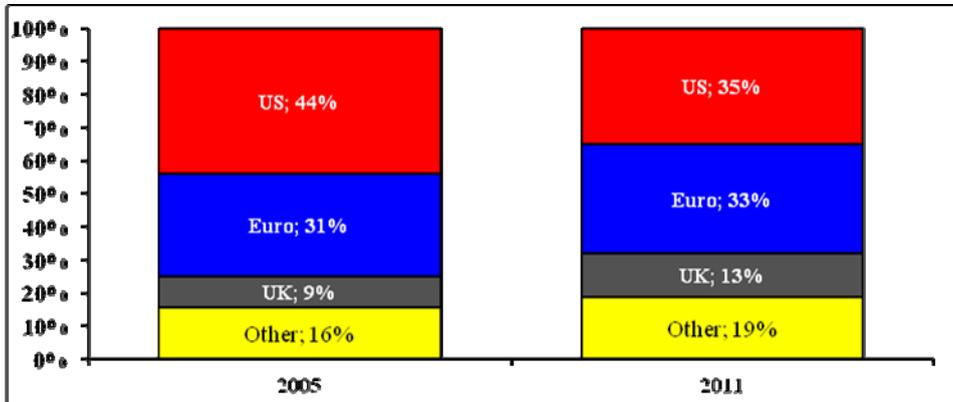
Board (2011) describes broadly the shadow banking system as the “system of credit intermediation that involves entities and activities outside the regular banking system“. Although this operating definition reduces the scope of the term “shadow banks”, from “non-banks performing bank-like functions” to “non-banks performing credit intermediation”, putting together divergent institutions, instruments, and markets into the same bucket may impede the adequate understanding and monitoring of an important part of the financial system. According to Claessens et al. (2012) a “narrower focus may be more useful for policy analysis”.

### **1.2. Sizing shadow banking**

The absence of a commonly accepted working definition is also responsible for diverging estimates in the measurement of the shadow banking system. The differences in methodology and institutional coverage explain why its size varies considerably in recent papers. For example, Pozsar and Singh (2011) measure liabilities and put the size of the U.S. shadow banking sector at \$18 trillion in 2010, whilst the Financial Stability Board (2012a) focuses on the assets of other financial intermediaries and gives an estimate of \$24 trillion. Deloitte (2012) provides a more conservative measure of \$10 trillion, but its Shadow Banking Index is constructed on a narrower list of entities and activities, excluding finance companies, non-money market mutual funds and other non-banking functions comprised by the FSB definition.

Despite the lack of convergence on the definition and the structure of the shadow banking, it is generally agreed that this part of the financial system has experienced a tremendous growth during the past decade that poses greater systemic risk than traditional banking. The most recent report on Global Shadow Banking Monitoring (FSB,2012c) indicates a “macro-mapping” measure, as proxied by “Other Financial Intermediaries”, about half the size of banking system assets and equivalent to 111% of the aggregated GDP. Shadow banking grew rapidly before the crisis, from \$26 trillion in 2002 to \$62 trillion in 2007. After a slight decline in 2008, it had continued to increase after the crisis (2008-2011), reaching \$67 trillion in 2011. The composition among countries is, however, uneven. Across the jurisdictions monitored, United States, euro area and United

Kingdom account for more than 80% of the assets of non-bank financial intermediaries (figure 1).



**Figure 1** Structure of the Shadow Banking System

Source: FSB (2012c)

Due to a multitude of historical reasons, the United States have a very developed non-bank sector, reflected by assets of \$23 trillion in 2011, the highest figure in the cross-jurisdiction analysis of non-bank financial intermediaries. However, as shown in figure 1, its share in the global shadow banking system has declined from 44% in 2005 to 35% in 2011. This was mirrored by increases in the euro area, the U.K., and other developed and emerging markets. Therefore, shadow banking should not be viewed anymore as mainly relevant for the United States and trivial for other countries with more bank-based systems, but as a major concern for most economies, given its complexity and increasing importance within the global financial system.

## 2. OVERVIEW OF REPO AND REPO MARKETS

### 2.1. Characteristics and structure

*Repo* is the common term for repurchase or sale-and-repurchase agreement<sup>2</sup>. In comparison to an outright sale, a repo involves an initial transfer of securities

<sup>2</sup> The term is used sometimes to imply also *sell/buy-backs*. These are similar to repurchase agreements, but may be also found in undocumented form and also exhibit some operational particularities. Some markets use predominantly sell/buy-backs and not repurchase agreements (ICMA,2013a:9).

from a seller versus cash transferred by a buyer, at the same time with an agreement for the seller to repurchase the same or similar securities at an agreed upon price, at a future date.

Repo is one of the main instruments in the securities financing markets. Its usage is typically driven by the need to borrow and lend cash<sup>3</sup>. Traditionally, the selling side of the market (cash-takers) has included intermediaries or leveraged investors. On the other side of the market, central banks, international financial institutions, money market mutual funds (MMFs), commercial banks and other non-bank financial institutions seeking secure investments, have been usually among the cash-providers.

As recently assessed by FSB (2012a), the repo market can be divided into two segments: inter-dealer repo and repo financing<sup>4</sup>. The first segment comprises government bond repo transactions amongst banks and broker-dealers and serves mainly in the financing of long positions via general collateral repos or the borrowing of specific securities via special repos. The second segment includes repo transactions determined primarily by the short-term financing needs of banks and broker-dealers, but also by the desire of “cash-rich” entities to hold “money-like” investments.

Additionally, another structuring of the market can be made in terms of its bilateral and tri-party segments. The latter is characterized by the outsourcing of post-trade processing, in terms of collateral selection, payment and settlement, and management during the life of transaction, to a third-party agent, usually a custodian bank.

Repo markets play a crucial role for the efficient functioning of almost all financial markets. A wide range of their functions can be highlighted (ICMA,2013a:5-7): providing an efficient source of money market funding and a secure home for liquid investment; broadening and stabilizing the money market; facilitating central bank operations; hedging primary debt issuance; ensuring liquidity in the secondary debt market; hedging and pricing derivatives; fostering price discovery; preventing settlement failures and market “squeezes”; permitting

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<sup>3</sup> Securities loan transactions, the other instrument in securities financing markets, are mainly determined by the need to borrow and lend securities.

<sup>4</sup> A securities lending market and a leveraged investment fund financing and securities borrowing market are the other two inter-linked segments that add up to create a complete image of the securities financing markets (FSB,2012a).

faster settlement times; allowing more efficient collateral management and more efficient employment of capital.

The origins of repo markets can be traced a century ago with the first developed domestic market created in the United States to facilitate the Federal Reserve's open market operations. Notwithstanding, the modern US repo market developed only sixty years later driven by securities firms that lacked access to funding from retail or interbank deposits. The 1980s signal also the start of the globalization of repo markets, with the importation of repos into Europe by US investment banks to support derivatives trading.

## **2.2. Europe versus United States: a different “repo” story?**

There is general consensus that US and euro area repo markets are the largest in the world. Sizing each repo market is, however, a difficult task, due to the absence of comprehensive data sources and the requirement for further adjustments that can lead to significant double counting<sup>5</sup>. The most recent figures estimated are of EUR 5.5 trillion for the European repo market and EUR 4 trillion for the US (ICMA,2013a:7).

European repo market is, as discussed before, largely a creation of US securities firms that imported the home model during the globalization process that occurred in the 1980s. Notwithstanding, although repurchase agreements still perform the same functions across both US and euro area repo markets, some notable differences can be observed in terms of structure, participants, instruments and operations (*table 1*).

Repos have been traditionally instruments used for short-term financing and this is still a feature of the market in the United States, with overnight repos as the main instruments. However, the European repo markets have been characterized traditionally by a longer average maturity and by the constant lengthening of the maturities, which accelerated in the aftermath of the recent financial crisis.

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<sup>5</sup> A widely cited figure in the literature for the size of total repo market activity (US) is the estimate of \$10 trillion advanced by Gorton and Metrick (2010b). More recent research (Copeland et al, 2012)) argues that this estimate suffers from double counting of repos and reverse repo transactions, and, considering the existing data for 2012, is should be at least halved. For Euro area, another estimate (Bakk-Simon et al, 2012) puts the repo trading at EUR 6.2 trillion, although this counts both lending and borrowing positions.

In both markets, the most commonly used type of collateral is a government bond. However, there is a clear distinction between these bonds according to their markets of origin, with government bond collateral from emerging markets included in credit repo, along with other private sector assets.

**Table 1** Comparison of European and US repo markets

Feature	Europe	United States
Structure	Mostly bilateral (about 90%) Tri-party agents normally used for <i>credit repo</i>	Mostly tri-party (about 2/3) Tri-party repo focused on Agency and Treasury debt
(Typical) Maturity	Evenly split between <i>short-dated repos</i> (one month or less; overnight repos - 20%) and <i>term repos</i> (one year or longer -10%)	Predominantly short-term (mainly overnight)
Type of collateral	Government bonds - 80% of EU-originated repo collateral	Treasury securities - about 2/3 of the repo market (much of the remaining is government-guaranteed Agency debt and MBS)
Bankruptcy / insolvency treatment	Legal title to collateral transferred from seller to buyer by means of an outright sale	US Treasury and Agency Securities given as collateral exempted from certain provisions of the US Bankruptcy Code, in particular, the automatic stay on enforcement of collateral in the event of insolvency
Re-hypothecation	First used by US prime brokers and formally introduced in 2003 No regulatory limit (usually similar practice as in the US)	Amount of a client's assets that a prime broker may re-hypothecate to the equivalent of 140% of the client's liability to the prime broker
Clearing and settlement infrastructure	Fragmented Significant proportion of outstanding repos by value (30%) and repo turnover (40%) cleared by central clearing counterparties (CCPs) and central securities depositories (CSDs)	Integrated General collateral (GC) repurchase agreements cleared by only two clearing banks
Regulation	Existing: EU Financial Collateral Directive, Short Selling Regulation and (indirectly) regulations of market users Expected: European Market Infrastructure Regulation (EMIR), the Markets in Financial Instruments Directive (MiFID), the CSD Regulation, FSB's regulations	Existing: Federal Reserve Regulation T and SEC Rule 15c3-3 Expected: FSB's regulations

<b>Feature</b>	<b>Europe</b>	<b>United States</b>
Data sources (main)	ICMA's Semi-annual European Repo Market Survey (since 2001) ECB's annual Euro Money Market Survey	Data from primary dealers by the Federal Reserve Bank of New York and the tri-party repo systems operated by the custodian banks Data from money market mutual funds (form N-MFP) Data from Depository Trust & Clearing Corporation (DTCC)

Sources: FSB (2012c), ECB (2013), ICMA (2013a)

Moreover, the crisis produced a differentiation between European core and peripheral issuers, with the further effect of a fragmentation in Eurozone general collateral repo market. The “flight to quality” and the pricing in secured money markets of different euro area countries that followed the crisis made the US repo collateral “even more homogenous compared to the diversity of fixed-income collateral across the 17 euro area countries” (ECB,2013:122).

Inter-dealer repo markets are closely linked in both US and euro area to the monetary policy operations of Federal Reserve, and European Central Bank, respectively. As a consequence, a significant amount of government bond repos are centrally cleared in the US and euro area. According to the 2011 ECB's Euro Money Market Survey, about half of repo transactions are cleared through CCPs. Although government bonds provide the bulk of collateral in both inter-dealer markets, in the US, non-government instruments are also used to back a large part of repos transactions between banks and broker-dealers. However, if before the crisis, private level ABS and CDOs were among the types of collateral used for this purpose, nowadays, the transactions mainly reside on US Agency Mortgage-Backed Securities and debentures.

The most notable difference between European and US repo markets consists of the importance attributed to the tri-party segment. FSB (2012a:34) suggests that tri-party repo activity may account for 65%-80% of the total US repo market.

The US tri-party repo market is predominantly part of the repo-financing segment. US tri-party repos are more likely to be financed by non-bank institutions, especially money market funds and securities that are responsible for at least half of the investment in this market (Copeland, Martin and Walker, 2011). Tri-party collateral in the United States repo market includes mostly US treasury bonds and Agency MBS and debentures. By contrast, tri-party repos in euro area account only

for a minor share of the market and are used for the management of private bonds and equity. Most repo transactions in the euro take place in the interbank markets.

Moreover, whilst euro area repo transactions are cleared by central counterparties such as CCPs and CSDs, in the United States, there is greater reliance on the clearing bank infrastructure (ECB,2013:126). Only two custodian banks (Bank of New York Mellon and JP Morgan) provide the settlement and collateral management services<sup>6</sup>.

Additionally, the US traditional practice of unwinding term repos each morning and re-arranging them in the afternoon, to allow for collateral substitution and price fluctuations adjustment, differs from the direct substitution and margining used in Europe.

### 3. REPO AS A TYPE OF “SHADOW BANKING”

Despite their importance<sup>7</sup> and long existence, repo markets have not regularly benefited from an extensive analysis, as usually the case for other traditional segments of financial markets (e.g. stocks, bonds, or derivatives). Earlier research on repo markets is mainly on the field of asset pricing (Duffie, 1996), whilst the typical approach in the regular textbook on financial markets and institutions is to discuss repos briefly in the chapter dedicated to money markets (Valdez and Molyneux, 2013).

Nevertheless, the coverage of repo markets has changed significantly in the aftermath of the recent financial crisis. A growing body of the academic literature on the causes, consequences and policy responses of the Global Financial Crisis focuses on the role played by repo markets. The main topics in these studies include the procyclicality of margins and haircuts and its negative effects on financial markets (Gorton and Metrick (2010a, 2010b); Adrian and Shin (2010); Copeland, Martin and Walker (2011)), the re-hypothecation and the re-use of collateral in the financial system (Singh and Aitken (2010); Singh (2011); Pozsar

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<sup>6</sup> This can allow for a better measurement of the market size, given that the total amount of collateral reported by these tri-party agents is not subject to double counting, but can also create concerns about systemic risk.

<sup>7</sup> Beside their functions, the importance of repo markets is also suggested by their dimension. Despite the lack of a precise figure due to unavailability of comparable data, a recent estimation of ICMA Centre at Reading University puts the size of the global repo market in the order of EUR 15-20 trillion (ICMA,2013b:7).

and Singh (2011)) or the use of central counterparties (Biais, Heider and Hoerova (2012)).

Moreover, repos are included in the ample debate on the regulation of shadow banking. Although a widely accepted definition of shadow banking is not yet settled, almost all of the attempts up-to-date include repos and repo markets among its constituents.

Gorton and Metrick (2010b) mention that besides familiar institutions and more “esoteric” instruments, shadow banking includes in its broadest definition, “rather old contracts, such as sale and repurchase agreements (“repo”)”. Pozsar et al (2010) include repo, along with ABCP, asset-backed securities and collateralized debt obligations in the “wide range and securitization and secured funding techniques” that allow shadow banks to be “interconnected along a vertically integrated, long intermediation chain, which intermediates credit”. At the same time, in the Green Paper on Shadow Banking, European Commission (2012) focuses its analysis on two intertwined pillars of shadow banking – entities and activities, of which the latter includes securities lending and repo.

More recently, the Workstream on Securities Lending and Repos at the Financial Stability Board, suggests that, besides the important benefits for financial intermediaries and monetary refinancing operations, use of repos “can lead to “bank-like” activities, such as creating “money-like” liabilities, carrying out maturity / liquidity transformation, and obtaining leverage, including short-term financing of longer-term assets, some of which may run the risk of becoming illiquid or losing value” (FSB,2012b:2). These financial stability risks in repo markets can be further divided into “pure shadow banking risks” and “risks that span banking and shadow banking”. If the first refer to the use of repo to create short-term, money-like liabilities, facilitating credit growth and maturity/liquidity transformation outside the banking system, the latter encompasses, according to the FSB (2012b), the tendency of secured financing to increase the pro-cyclicality of system leverage, the risk of a fire sale of collateral securities, the re-hypothecation of unencumbered assets, the interconnectedness arising from chains of transactions involving the re-use of collateral or inadequate collateral valuation practices.

#### 4. ADDRESSING SHADOW BANKING RISKS IN REPO MARKETS

The concern about risks in the repo markets following the global financial crisis sparked a vivid debate on various policy options to improve financial stability.

Recommendations to address shadow banking risks in repo markets can be grouped into three main categories related to: (a) regulation; (b) structure; (c) transparency.

The first set of options includes the introduction of a framework for numerical floors on haircuts and the set up of minimum regulatory standards for methodologies used to calculate collateral haircuts.

The regulatory debate on the role of margins and haircuts in the build-up of excessive leverage and the requirement for a minimum mandatory haircut has the origin in empirical papers of Gorton and Metrick (2010a, 2010b). They provide evidence for the dramatic increase of interdealer repo haircuts during the financial crisis from 0% to in excess of 50%. The procyclicality of haircuts has been confirmed by Adrian and Shin (2010), but questioned by other empirical papers. Copeland, Martin and Walker (2011) find that practices differ substantially in bilateral and tri-party repos, with a significant change in haircuts and funding only in the bilateral repo market. Moreover, Krishnamurthy, Nagel and Orlov (2012) consider that “much of the discussion of the repo market has run ahead of our measurement of the repo”, suggesting that Gorton and Metrick’s data included only structured securities (ABS, MBS, CDO, and CLO), and therefore has only marginal relevance for the repo markets. As discussed earlier, most collateral in the US repo markets comes from government bonds (as is also the case in Europe) and agency MBS, for which no increase in the haircuts was documented. In Europe, a paper that uses the results of ICMA’s surveys for 2007 and 2009 (ICMA,2012b) quantifies an impact of haircut changes on the value of collateral of less than 3% and attributes the deleveraging seen over the same period to factors other than the increasing of haircuts, specifically to a reduction in credit and maturity or to a narrowing in the range of eligible collateral.

Supporting a strong case for a numerical floor on haircuts is affected by the lack of detailed information on repo, collateral and haircuts before and during the crisis. That also impeded the development of a consistent body of empirical evidence for most jurisdictions. The body of empirical literature is still limited

when compared to theoretical papers and, in most cases, is based on evidence from the US market.

Considering the important differences between the US and European repo markets highlighted before, extrapolating events from a specific part of a domestic credit repo market with the purpose of designing a global agenda for the repo markets regulation might have adverse consequences for the liquidity and proper functioning of markets.

Therefore, recent policy recommendations (FSB,2012b) to set numerical floors on haircuts at a high level or a back-stop level should be carefully assessed so to reduce all possible unintended consequences. There is no certainty that the issue of procyclicality would be solved by a stable haircut, since other factors can have a more significant impact on the availability or contraction of credit during the phases of the cycle. Moreover, implementing such numerical floors can incur difficulties and further costs that outweigh their benefits.

We believe in the necessity of a thorough analysis in terms of type of collateral, involved counterparties, nature of transaction, and implementation at firm or market level, weighting the costs and benefits of each approach.

Introducing minimum regulatory standards for methodologies used for the calculation of collateral haircuts could be a better option. Using longer data sets for the market prices of collateral that covers at least one stress period (or, if not possible, data on proxy assets) and capturing other risks besides the price risk might help firms to set haircuts that deal more adequately with procyclicality.

A second set of recommendations is related to the structural features of repo markets, and more specifically to the use of clearing houses.

During the recent financial crisis, central clearing counterparties (CCPs) from Eurozone helped to preserve access of peripheral countries to the repo market. By contrast, the bankruptcy of Lehman Brothers determined a sharp decrease in the US cleared repos. This highlighted weaknesses in the US repo infrastructure, due to the reliance on only two clearing banks and to their practice of unwinding all repos (overnight and term) and settling new repos on a daily basis. Concerns about the systemic risk posed by the intra-day exposures of the two custodian banks pushed a reform of the US tri-party market towards the European model.

Following the crisis, the regulators supported the migration of most financial activities to CCPs. As in other markets where it is used (most securities and derivatives), central clearing can bring important benefits such as reduction of risk exposure and of balance sheets through multilateral netting, operational efficiencies, and, overall, a more robust collateral and default management processes (FSB,2012b). However, these advantages should be pondered against several drawbacks such as the possibility to become a source of systemic risk, the greater use of a limited range of risk management methodologies or the reliance only on standardized instruments, with less room for customization.

Hence, a clear distinction should be made between market segments, instruments and participants. CCPs appear more suited to the inter-dealer repo market, where dealers often have offsetting trades among themselves. In the repo financing market, the cost and effort of margining might deter the potential end-users, particularly the smaller firms. Central clearing is also difficult in the case of repos of private collateral assets. The lower liquidity of such securities can affect the efficient valuation and management by CCPs.

We consider that the wider use of central clearing counterparties should become the standard mainly for inter-dealer repos against government bonds, whilst for the repo financing segment, a specific set-up should be decided after balancing the costs and benefits in each particular market.

Last but not least, addressing financial stability risks in repo markets could be better achieved by increased transparency.

Much of the criticism towards the repo markets has been related to its relative opacity when compared to similar parts of the financial system, although, as showed in table 1, there was no shortage of sources on repo data in both European and US markets before the outburst of the financial crisis. In addition to surveys and data collected by central banks, banks and other institutions usually published the outstanding value of their repos on their reporting dates.

However, comprehensive and detailed data for all segments of the repo market was not available at domestic level. This affected the ability of regulators to fully understand the market as a whole and the relative importance of its different segments (Copeland et al., 2012). Furthermore, the lack of standardized and highly granular data makes the comparability across national markets difficult and can impede the efforts to reduce the systemic risk at global level.

Consequently, the improvement of data collection on repo exposures, especially for systemically important financial institutions at global level (G-SIFIs), was found as one of the most urgent tasks in the aftermath of the global financial crisis. Besides initiatives such as FSB Data-Gap Group to collect data globally for all linkages between G-SIFIs, there is a need for other collection mechanisms addressed specifically to repo markets. Since these markets operate regularly at currency level, an approach aimed at domestic level should be used, with further cross-country harmonization to facilitate comparability.

Of all the different approaches to data collection, we find the trade repositories to offer the best outcome relative to their costs. Although trade repositories incur the highest implementation costs, most recent initiatives for repo data collection support this approach to surveys and regulatory reports. Trade repositories provide more timely and frequent information and are particularly useful in jurisdictions with a diverse set of participants or assets financed in the market, such as those of the US and euro area.

## 5. CONCLUSION

Analyzing shadow banking is not an easy endeavor, given the still persistent confusion about the exact meaning of this relatively recent term. Further association with repo markets does not facilitate this attempt. In fact this increases its difficulty, provided that the repurchase agreement is not basically a shadow banking instrument, but a well established instrument in financial markets since 1918, used by central banks, dealers and other regulated financial institutions, and not only by the so-called “shadow banks”.

Disagreements in defining shadow banking and placing repo markets within its perimeter make inconsistent, double or over-regulation quite probable.

Regardless, the experience from the recent financial crisis brought a wide consensus about shadow banking opacity and systemic risks in repo markets. Therefore, it is highly important to address these issues given their potential impact on global financial stability. Options might include the introduction of regulatory standards to reduce the haircuts procyclicality, measures to improve the repo market infrastructure, with respect to the wider implementation of CCPs, and an enhancement in the collection of granular data harmonized across jurisdictions.

Nevertheless, although a uniform response at global level is recommended, significant differences between euro area and US should also attract a customized approach to deal with the specific features of each domestic market, and within, of each market segment. A global policy of one-size-fits-all should therefore be accompanied by a thorough analysis at local level, particularly where the pros and cons are more broadly balanced.

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# RESEARCH PAPER

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## **IMPACT OF REAL EXCHANGE RATES ON EXPORTS OF AGRICULTURAL COMMODITIES: EVIDENCE FROM INDIA**

Vikas Gautam\*, Suresh K G\*\*, Aviral Kumar Tiwari\*\*\*

***Abstract:** This study attempts to analyze the effect of volatility in the real exchange rate of Indian Rupee with US Dollar, UK Pound, Euro and Japanese Yen on India's real exports of agricultural commodities such as Tea, Coffee, Cereals and Rice to Euro area, USA, UK and Japan for the period 2002-2009 using panel data analysis. The real exports of Coffee, Tea, Cereals, and Rice of India to Euro Area, USA, UK and Japan were taken from the COMTRADE Data base of United Nations. The real GDP index of the respective trading partners of India and their CPI is collected from the "OECD stat" data base of OECD. Monthly nominal exchange rate of Indian rupee with Euro, US Dollar, UK pound and Japanese were collected from the "Business Beacon" database provided by Centre for monitoring Indian Economy (CMIE). The results indicate that the exports of Tea and Coffee are affected by the real exchange rate volatility whereas the exports of Cereals and Rice are affected by real exchange rate.*

***Keywords:** Real exchange rate, Real exchange rate volatility, Agricultural exports, India*

***JEL Classification:** F31, F14, F41*

### **1. INTRODUCTION**

Since Independence, India has made a remarkable progress in agriculture in terms of production, yield and area under cultivation (Rao, Sreenivasa Rao and Srivastava, 2011). It has already undergone a Green Revolution (food grains), White Revolution (milk), Yellow Revolution (oilseeds) and a Blue Revolution (aquaculture). Today, India is one of the largest producers of milk, fruits, cashew nuts, coconuts and tea in the world. It is also well known for the production of wheat, vegetables, sugar, fish, tobacco and rice. Certain types of agriculture such as

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horticulture, organic farming, floriculture, genetic engineering, packaging and food processing have the potential to see a surge in revenues through exports.

Over the past few years, the government has given special importance for the development of agriculture by creating vital infrastructure such as cold storage, refrigerated transportation, packaging, processing and quality control. If India wishes to increase the production and export potential of agricultural commodities, it is essential to improve these facilities and export networks to a large extent. In recent years, the Central Government has been offering different fiscal incentives for creating or bettering storage facilities in rural areas. It also provides financial assistance to the State Governments for acquiring food grains at fair prices and distributing these food grains at subsidized rates, especially to families with annual income below the poverty line. The special efforts by the government to encourage export of food grains in recent years through grant of World Trade Organization (WTO), compatible subsidies has led India to become one of the leading exporters of food grains in the international market. (Source: [http://india.gov.in/citizen/agriculture/import\\_export.php](http://india.gov.in/citizen/agriculture/import_export.php))

Despite the internal measures of the government, the liberalization measures in the external sector started in 1991 have also created a congenial environment for the exports of agricultural commodities. In the external sector the government has either reduced or abolished the barriers to exports and imports in 1991 and in 1993-94 India has shifted from the fixed exchange rate system to the market determined exchange rate system (Goyal, 2010). These reforms in the external sector made the foreign markets easily accessible to Indian products.

With the opportunities provided by the reforms in the external sector, the market determined exchange rate system creates uncertainty or volatility in the foreign exchange market (KG and Sreejesh, 2011). It is in the background, we are trying to analyze the effect of real exchange rate of Indian rupee with four major currencies such as US Dollar, Euro, UK Pound and Japanese Yen and the volatility in the real exchange rate on the real exports of Cereals, Rice, Coffee and Tea to Euro area, USA, UK and Japan for the period 2002-2009. To the best of our knowledge this is the first study analyzing the effect of four major real exchange rates on the major agriculture products exports from India.

The rest of the paper is organised as followed a brief review of the current literature is given in section 2, followed by the empirical methodology used in the

present study in section 3, section 4 provides the details about the data and variables, section 5 describes the results and discussion and section 6 includes conclusion of the study.

## **2. THE LITERATURE REVIEW**

In the theoretical literature, elasticity approach postulates that the devaluation or depreciation of the domestic currency will increase the exports or decreases the imports of the domestic country by decreasing the price of exports or increasing the price of imports. Reciprocally the exports will fall or imports will increase in response to an appreciation or revaluation of domestic currency. Existing literature also depicts the presence of a lagged impact of devaluation or depreciation on trade balance, popularly known as the J curve effect. The empirical studies in Indian context relating to devaluation and its possible effect on trade balance are; Bahmani-Oskooee, (1985), Baluswar, Thomson and Upadhaya, (1996), Himarious, (1985), Singh (2004), Arora, A., Bahmani-Oskooee, M. and Goswami, (2003). The volatility in the exchange rate means the risk in the foreign exchange market and this is expected to be negatively related to the exports of the country. But theoretical literature also depicts the positive relation between exports and exchange rate volatility.

Relating to the effect of exchange rate on exports or imports, Mookerjee (1997), Baluswar, Thomson and Upadhaya (1996), and Sarkar (1994) observed that there is no long run relation (co integration) between exchange rate and exports of India. But Nag and Upadhaya (1994) stated that exchange rate and exports performance of India is cointegrated 1985 onwards and exchange rate matters in Indian situation.

Studies by Sarkar (1997) also could not find any significant relationship between exchange rate and export performance of India. For the post reform period, Presty (2008) and Eckaus (2008) stated that exchange rate is an important factor in explaining the exports performance of India. Recently KG and Nagi Reddy (2010) after analyzing the effect of different types of effective exchange rates have observed that exchange rate is not a factor determining the exports of India.

The effect of exchange rate volatility on trade is also widely examined in Indian context. Dholakia and Saradhi (2000) found that export quantity is sensitive

to exchange rate but found that exchange rate volatility is not affecting the exports of India. Singh (2004) also found that the exchange rate volatility is not affecting the trade balance of India for the period 1975 to 1996.

Dash, Aruna Kumar; Narasimhan (2005) observed that India's import volume is also sensitive to exchange rate risk. Bahmani-Oskooee, and Mitra (2008) has observed that at disaggregate level 40% of the commodities traded between India and USA has been affected by the exchange rate risk. One of the interesting finding is the presence of positive relation between trade and exchange rate risk at disaggregate commodity levels. Recently KG and Sreejesh (2011) also found that the volatility in the real exchange rate of Indian Rupee with Euro is positively affecting the exports of India to Euro Area. They also found a significant negative relationship between the exports to UK and volatility in real exchange rate of Indian rupee with Pound sterling.

### 3. RESEARCH METHODOLOGY

As mentioned in the previous section the main objective of the study is to analyze effect of volatility in real exchange rate of rupee with US dollar, Pound Sterling and Euro on the bilateral real exports of India with USA, UK and Euro area (15 countries). There are basically three types of panel data models namely, a pooled Ordinary Least Square (OLS) regression, panel model with random effects and panel model with fixed effects. Following Ekanayake et al., (2010); Choudhury, (2005); Klaassen, (2004); Arize, (1998); Pozo, (1992); Asseery and Peel, (1991); Kenen and Rodrik, (1986); Goutor, (1985), the present study specifies, in the form of pooled OLS regression, the following standard real export demand function for India's bilateral exports to country  $i$ :

$$\ln X_{jit} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln RE_{it} + \beta_3 \ln V_{it} + \varepsilon_{jit} \quad (1)$$

Where  $X_{jit}$  is the export volume of  $j$ th commodity  $a$  to  $i$ th country at time period  $t$ , and  $GDP_{it}$  is the  $i$ th country's GDP during period  $t$ ,  $RE_{it}$  is the real exchange rate of Indian rupee with  $i$ th country's currency at  $t$  and  $V_{it}$  is standard deviation of the 12 month real exchange rate as a measure of real exchange rate volatility for time  $t$ .

However, while using a pooled OLS regression, countries' unobservable individual effects are not controlled. Therefore, according to Bevan and Danbolt

(2004) and Tiwari and Kalita (2011), heterogeneity of the countries under consideration for analysis can influence measurements of the estimated parameters.

Further, using a panel data model with incorporation of individual effects has a number of benefits for example, among others; it allows us to account for individual heterogeneity. Indeed, Serrasqueiro and Nunes (2008) argued and Tiwari and Kalita (2011) mentioned that developing countries differ in terms of their colonial history, their political regimes, their ideologies and religious affiliations, their geographical locations and climatic conditions, not to mention a wide range of other country-specific variables. And if this heterogeneity is not taken into account it will inevitably bias the results, no matter how large the sample is. Therefore, by incorporating countries' unobservable individual effects in equation (1) the model to be estimated is as follows:

$$\ln X_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln RE_{it} + \beta_3 \ln V_{it} + w_{it} \quad (2)$$

Where,  $w_{it} = \mu_i + \varepsilon_{it}$ , with  $\mu_i$  being countries' unobservable individual effects. The difference between a pooled OLS regression and a model considering unobservable individual effects lies precisely in  $\mu_i$ . When we consider the random effect model the equation (2) will be same however in that case  $\mu_i$  is presumed to be having the property of zero mean, independent of individual observation error term  $\varepsilon_{it}$ , has constant variances  $\sigma_\varepsilon^2$ , and independent of the explanatory variables.

However, there may be correlation between countries' unobservable individual effects and the export volume. If there is no correlation between countries' unobservable individual effects and the export volume, the most appropriate way of carrying out analysis is using a panel model of random effects. On the contrary, if there is correlation between countries' individual effects and the export volume, the most appropriate way of carrying out analysis is using a panel model of fixed effects.

To test for the possible existence of correlation, we use the Hausman test. Hausman test examines the null hypothesis of non-existence of correlation between unobservable individual effects and the export volume, against the alternative hypothesis of existence of correlation. If the null hypothesis is not rejected we can conclude that correlation is not relevant and therefore a panel model of random

effects being the most correct way of carrying out the analysis of the relationship between the export volume and its determinants. On the contrary, if the null hypothesis is rejected we can conclude that correlation is relevant and therefore a panel model of fixed effects being the most appropriate way to carrying out analysis of the relationship between the export volume its determinants.

Further, we have analyzed the model in which two-way error components are present. Therefore, by expanding the equation 2 to incorporate two-way error component model; the equation becomes as follows:

$$\ln X_{jit} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln RE_{it} + \beta_3 \ln V_{it} + u_{it} \quad (3)$$

Where  $u_{it} = w_{it} + \lambda_t = \mu_i + \lambda_t + \varepsilon_{it}$ ,  $\mu_i$  denotes the unobservable individual effect,  $\lambda_t$  denotes the unobservable time effect and  $\varepsilon_{it}$  is the remainder stochastic disturbance term. Note that  $\lambda_t$  is individual-invariant and it accounts for any time-specific effect that is not included in the regression. For example, it could account for strike year effects that disrupt production; oil embargo effects that disrupt the supply of oil and affect its price; Surgeon General reports on the ill-effects of smoking, or government laws restricting smoking in public places, all of which could affect consumption behaviour. If  $\mu_i$  and  $\lambda_t$  are assumed to be fixed parameters to be estimated and the remainder disturbance stochastic with  $\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2)$ , then equation 3 represents a two-way fixed effect error component model<sup>1</sup>.

#### 4. DATA AND VARIABLES

The study uses the India's real bilateral exports of Tea, Coffee, Rice, Cereals to USA, UK, and Japan and Euro area, the real GDP indices of the respective trading partners, bilateral real exchange rate of rupee with US dollar, Japanese

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<sup>1</sup> In case of time-fixed effect model  $\lambda_t$  is a time-varying intercept that captures all of the variables that affect dependent variable and vary over time but are constant cross-sectionally and opposite holds in case of time-random effect model.

Yen, pound sterling and Euro, real GDP index of the three trading partners and a measure of exchange rate volatility.

Monthly nominal exchange rate of Indian rupee with Euro, US Dollar, UK pound and Japanese Yen is multiplied by the ratio of the price indices of India with the respective trading partners to get the real exchange rate. The price index of India is proxied by the Whole sale price index (WPI) of India representing the cost of production of the producers in India and the price index of  $i$ th country has been proxied by the consumer price index of that country which represents the price faced by the Indian exporter in  $i$ th country. We have used the standard Deviation of the monthly real exchange rate in a year as a measure of real exchange rate volatility.

The real exports of Coffee, Tea, Cereals, and rice of India to Euro Area, USA, UK and Japan were taken from the COMTRADE Data base of United Nations. The real GDP index of the respective trading partners of India and their CPI is collected from the “OECD stat” data base of OECD. Monthly nominal exchange rate of Indian rupee with Euro, US Dollar, UK pound and Japanese were collected from the “Business Beacon” database provided by Centre for monitoring Indian Economy (CMIE).

## 5. RESULTS AND DISCUSSION

As shown in the Appendix table 1 and 2, the significant F-statistics indicates that we can reject the null hypothesis that the independent variables do not explain the changes in real exports and can conclude that the independent variables taken in this study have enough explanatory power in the model. The Hausman test (in case of one way effect) for Tea is significant and in all other cases it is insignificant implying that in case of Tea random effect model is better and for other commodities fixed effect model is better way of estimation. However, when we perform Hausman test for two way-effect model, we found that for all commodities it is insignificant. Therefore, for this kind of situation we conducted a model which is a combination of fixed and random effect model. And we found that F-test for fixed effect in such model is significant, thereby mixed effect model is appropriate way for Coffee and Tea.

In case of Cereals we found that weather we adopt one-way effect model (by considering fixed or random effect) or two-way effect model (two-way random

effect or one-way random and another-way fixed i.e., mixed effect) exchange rate and GDP are the important determinant of exports of Cereals of India. However, in case of Rice we found that, in over all analysis, only GDP is the important determinant for exports of Rice and effect of exchange rate or its volatility is insignificant for both the commodities i.e., Cereals and Rice.

Further, in case of Coffee we found that, interestingly, exchange rate and its volatility has significant impact. Impact of exchange rate is positive on exports of Coffee while impact of volatility of exchange rate has negative and significant impact on exports of Coffee. In case of Tea, we found that GDP, exchange rate and exchange rate volatility all have significant impact on the exports of Tea. Impact of exchange rate and its volatility is positive while, surprisingly, impact of GDP is negative though evidence is very weak as coefficient associated with GDP is significant at 10% level of significance.

## 6. CONCLUSIONS

We have analyzed the effect of real exchange rate volatility of Indian rupee with Euro, US Dollar, UK pound and Japanese Yen on India's agricultural exports to Euro Area, UK, USA and Japan for the period 2002 to 2009. For this we have used a panel data fixed effect analysis and the results indicate that Real exchange rate and GDP are the important determinants of cereals exports while GDP is the only determining factor for Rice exports of India, where as for tea and coffee the exports determinants are real exchange rate and real exchange rate volatility.

The findings of our study are different from the recent studies performed in this area. Among the four commodity exports considered, we found that real exchange rate is significantly influencing the exports of cereals, tea and coffee and for coffee and tea exchange rate volatility is also playing a significant role. The result is interesting since most of the studies performed in the area are of aggregate in nature; considering the effect of exchange rate on total exports (Mookerjee, 1997; Baluswar, Thomson and Upadhaya, 1996; Sarkar, (1994); Suresh and Reddy, 2010).

The aforementioned studies found no effect of real exchange rate on the exports performance of India. The results of the current study indicates that the results of these studies might be because of aggregation problem of these studies and suggest that disaggregate level studies are required to analyse the effect of

exchange rate and its volatility in Indian context. This argument is supported by the fact that while using dis-aggregate level data, Bahmani-Oskooee, and Mitra (2008) found that 40% of the commodity exports were affected by the exchange rate movements.

The findings of the study have important policy implications too. The movements of exchange rate of Indian rupee with major global currencies are affecting the agricultural commodities such as cereals, tea and coffee. Among these, tea and coffee are plantation crops and the results showing that the exchange rate can significantly affect the exports of these crops and prices in the domestic markets. This necessitates government policy intervention to make the production of these sectors competitive to face the challenges in international markets.

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APPENDICES

Appendix 1 - Table 1

<b>Panel data Models: Dependent variable CEREALS</b>					
<b>Independent variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
	<b>OLS</b>	<b>FE</b>	<b>RE</b>	<b>Two way RE</b>	<b>PE and CS fixed</b>
Exchange rate volatility	4.33(4.82)	4.87(5.16)	4.33(5.03)	3.912048 (4.833527)	-7.696779 (5.762031)
Exchange rate	0.74*** (0.07)	0.697*** (0.12)	0.74*** (0.07)	0.745450*** (0.070401)	-2.674387 (1.823429)
GDP	7.38** (2.88)	6.73** (3.20)	7.38** (3.01)	7.357610** (3.009091)	-39.32585** (16.33537)
Constant	-27.39* (13.46)	-24.28 (14.60)	-27.35* (14.06)	-27.22543* (14.04214)	202.3763** (80.22033)
R <sup>2</sup>	0.87	0.87	0.871057	0.873886	0.937130
F-test	63.05***	28.98***	63.05009***	64.67368***	20.63881***
Hausman test			0.645463 [0.8860]	14.850952 [0.0019]	
Fixed effect (F-test)		0.215154 [0.8849]			1.891696 [0.1149]
Countries included					
Total panel observations					
<b>Panel data Models: Dependent variable RICE</b>					
<b>Independent variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
	<b>OLS</b>	<b>FE</b>	<b>RE</b>	<b>Two way RE</b>	<b>RE and FE</b>
Exchange rate volatility	-1.50(4.66)	-0.64(4.99)	-1.50(4.87)	-1.41(4.66)	-6.24(5.67)
Exchange rate	1.22(0.06)	1.59(0.47)**	1.22*** (0.07)	1.22*** (16.56)	-1.74 (1.79)
GDP	2.83(2.79)	2.73(3.09)	2.83(2.91)	2.76(2.80)	-46.75*** (16.08)
Constant	-0.32(13.03)	1.91(14.11)	-0.32(13.59)	0.016(13.03)	241.38*** (78.99)
R <sup>2</sup>	0.94	0.94	0.94	0.93	0.97
F-test	155.67***	71.61***	155.67***	126.38***	47.12***
Hausman test			0.718[0.86]	15.84[0.00]#	1.76[0.14]
Fixed effect(F-test)		0.23[0.86]			
Countries included					
Total panel observations					
Notes: 1. The Hausman test has $\chi^2$ distribution and tests the null hypothesis that unobservable individual effects are not correlated with the explanatory variables, against the null hypothesis of correlation between unobservable individual effects and the explanatory variables.					
2. The Wald test has $\chi^2$ distribution and tests the null hypothesis of insignificance as a whole of the parameters of the explanatory variables, against the alternative hypothesis of significance as a whole of the parameters of the explanatory variables.					
3. The F test has normal distribution N(0,1) and tests the null hypothesis of insignificance as a whole of the estimated parameters, against the alternative hypothesis of significance as a whole of the estimated parameters.					
4. ***, **, and *denote significance at 1, 5 and 10 % level of significance respectively.					
5. EF, CS, SD denotes fixed-effect, cross-section and standard deviation respectively.					
6. [----] denotes results are not computed.					
7. @ denotes that model is estimated with Panel EGLS (Cross-section SUR) method.					
8. # denotes Cross-section and period random effect.					

Panel data Models: Dependent variable CEREALS					
Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
	OLS	FE	RE	Two way RE	PE and CS fixed
Source: Author's calculation					

Appendix 2 - Table 2

Panel data Models: Dependent variable COFFEE					
Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
	OLS	FE	RE	Two way RE	PE and CS fixed
Exchange rate volatility	-3.76(12.27)	-10.01*** (2.36)	-3.76 (2.30)	-5.547907 (10.70933)	-5.341779 (3.125176)
Exchange rate	0.27(0.17)	1.23** (0.45)	0.277635 (0.033837)	0.242264 (0.176714)	0.270842 (0.988980)
GDP	12.57*(7.34)	1.51(1.46)	-12.57459 (1.381032)	-9.968763 (6.453434)	13.44802 (8.859880)
Constant	73.96*** (34.25)	26.54*** (6.68)	73.96437 (6.442789)	61.88288** (30.10284)	-48.27987 (43.50942)
R <sup>2</sup>	0.126524	0.972416	0.126524	0.116240	0.980654
F-test	1.351950	146.8846***	1.351950	1.227598	70.18641***
Hausman test			1.351950	0.000000 (1.0000)	
Fixed effect(F-test)		255.545909 (0.0000)			79.470199 (0.0000)
Panel data Models: Dependent variable TEA					
Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
	OLS	FE	RE	Two way RE	PE and CS fixed
Exchange rate volatility	6.789503 (5.514742)	3.97*** (1.09)	6.78** (3.01)	6.952280 (5.656698)	5.740245 (4.086108)
Exchange rate	0.523158*** (0.080847)	-0.37(0.85)	0.52*** (0.04)	0.531475*** (0.082007)	0.019255 (1.293073)
GDP	-3.552471 (3.299748)	0.45(1.91)	-3.55* (1.80)	-4.274814 (3.682134)	12.13817 (11.58412)
Constant	31.44866 (15.39398)	15.25* (8.73)	31.44*** (8.41)	34.81436* (17.18816)	-40.83516 (56.88774)
R <sup>2</sup>	0.626986	0.900484	0.626986	0.632993	0.930056
F-test	15.68810	37.70276***	15.68810***	16.09763***	18.41142***
Hausman test			68.707175 [0.0000]	0.000000# [1.0000000]	
Fixed effect (F-test)		22.902392 [0.0000]			7.799448 [0.0001]
Notes: 1. The Hausman test has $\chi^2$ distribution and tests the null hypothesis that unobservable individual effects are not correlated with the explanatory variables, against the null hypothesis of correlation between unobservable individual effects and the explanatory variables.					
2. The Wald test has $\chi^2$ distribution and tests the null hypothesis of insignificance as a whole of the parameters of the explanatory variables, against the alternative hypothesis of significance as a whole of the parameters of the explanatory variables.					
3. The F test has normal distribution N(0,1) and tests the null hypothesis of insignificance as a whole of the estimated parameters, against the alternative hypothesis of significance as a whole of the estimated parameters.					
4. ***, **, and *denote significance at 1, 5 and 10 % level of significance respectively.					
5. EF, CS, SD denotes fixed-effect, cross-section and standard deviation respectively.					
6. [----] denotes results are not computed.					
7. @ denotes that model is estimated with Panel EGLS (Cross-section SUR) method.					

<b>Panel data Models: Dependent variable COFFEE</b>					
<b>Independent variables</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>
	<b>OLS</b>	<b>FE</b>	<b>RE</b>	<b>Two way RE</b>	<b>PE and CS fixed</b>
8. # denotes Cross-section and period random effect.					
Source: Author's calculation					



## CHALLENGES FOR ADOPTING INFLATION TARGETING REGIME IN EGYPT

Ibrahim L. Awad\*

**Abstract:** *This study intends to investigate challenges facing the CBE for adopting IT regime. Through exploiting the experience of Czech Republic, Poland, and Brazil in the early days of their adopting IT the study underscores the following challenges; (i) A more active role to be played by the CBE is needed to convince decision-making circuits inside the government for the adoption of IT. (ii) The CBE should be factually independent. (iii) Coordination between monetary policy and fiscal policy should be established so that the inflation target given to the CBE is determined to ensure the government's solvency. (iv) A satisfactory level of knowledge has to be acquired by the CBE concerning the following issues; the degree of the exchange rate pass-through effect, the level of real exchange rate, and both timing and effect of monetary transmission mechanisms. (v) Several questions are still unfulfilled concerning many issues (e.g. the measurement of price level that will be targeted, the design of the model that fits the Egyptian economy, variables included in the reaction function of the CBE, the reaction of the CBE to different shocks). (vi) Some institutional arrangements are urgently needed both to implement a household survey of inflation expectations and to improve and update the Egyptian statistics.*

**Keywords:** *Monetary policy, Inflation targeting regime, Adopting inflation targeting in Egypt*

**JEL Classification:** *E31, E58, E61*

### 1. INTRODUCTION

The outbreak of the 25<sup>th</sup> January Revolution in Egypt in 2011 and the security instability followed it casted dark shadows on tourism, travel, and national investment, which drove down employment and production rates. As a result, real GDP growth at constant prices receded to 1.8 percent in 2010/2011 compared with 5.1 percent in the previous fiscal year. The decline in GDP growth intensified in Q3 (Jan./March 2011), where GDP at constant prices recorded to a negative 4.2

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percent (against a positive 5.4 percent) due to the spillovers of the Revolution. The decline in the real growth was accompanied by an increase in the headline CPI inflation from 10.1 percent in June 2010 to 11.8 percent in June 2011. Moreover, during the fiscal year 2010/2011 the value of the Egyptian pound declined by 4.6 percent. As explained by The Central Bank of Egypt (CBE), the decline in the current account balance including tourism receipts, and negative values recorded by FDI, resulted in a plummet in the net international reserves of the CBE from US\$ 36 billion at the end of December 2010 to US\$ 18 billion at the end of December 2011<sup>1</sup>.

The reaction of CBE to these dramatic developments in inflation and real GDP growth (CBE, Annual report 2010/2011) is that; "monetary policy continued to be supportive of economic growth, and in line with the overriding objective of the monetary policy (price stability). The monetary policy committee (MPC)'s decisions were tuned to this objective, keeping the overnight deposit and lending rates broadly unchanged at 8.25 percent and 9.75 percent, respectively, and the discount rate at 8.5 percent"<sup>2</sup>.

Indeed, Egypt, according to the IMF survey (Batini, et al., 2006, PP. 7-8), is counted as one of the prospective candidates to adopt IT in the near future. The CBE announced on several occasions its intention to adopt IT once the fundamental prerequisites are met (IMF, 2007 and CBE, 2005). Moreover, the CBE (2007) stated that they are applying implicit inflation targets, which will be announced once the CBE completes building up its inflation-targeting framework in coordination with the IMF<sup>3</sup>. To date, the CBE did not announce a precise inflation target, and did not disclose information about prerequisites of IT that have been achieved and that which are still unfulfilled.

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<sup>1</sup> For more details on the developments of other macroeconomic variables followed the 25<sup>th</sup> revolution, see; CBE, Annual report 2010/2011.

<sup>2</sup> In March 2011, the MPC practiced repos to pump funds into the banking system. In November 2011, the MPC raised the overnight deposit rate by 100 basis points, the overnight lending rate by 50 basis points, and the discount rate by 100 basis points. Thus the deposit rate raised to 9.25 percent, the lending rate raised to 10.25 percent, and the discount rate raised to 9.5 percent.

<sup>3</sup> This statement by the CBE was in the context of its response to the critique of Morgan Stanley report, published on March 28, 2007, about the overriding of the government, specifically the prime minister, on the decision making process inside the CBE. Recently, the CBE mentioned that it is currently passing a transitional period until a full-fledged IT will be implemented (see CBE, FAQ, available on; <http://www.cbe.org.eg/Monetary-Policy/FrameWork.htm>)

This paper set out to explore prerequisites of IT that have been accomplished by the CBE, and that which are still unfulfilled. The paper exploits the experience of some emerging market economies, i.e. Czech Republic, Poland, and Brazil (CPB), to draw lessons that might be helpful for the case of Egypt. Thus, the study considers the availability of prerequisites of IT in Egypt compared with CPB in the early days of their adopting IT. Given political intention to adopt IT, the study presumes that a country will apply IT once prerequisites of IT have been satisfied.

This paper is organized as follows: Section 2 discusses prerequisites for a successful full-fledged IT. Section 3 draws lessons from the experience of CPB. Section 4 considers the availability of prerequisites of IT in Egypt compared with CPB. Section 5 concludes.

## 2. PREREQUISITES FOR A SUCCESSFUL IT

Generally speaking, there is no standard definition of IT<sup>4</sup>. However, we can think of IT as a way of reforming monetary policy through anchoring individuals' expectations about inflation around an announced target of inflation.

In the literature, there are considerable debates about prerequisites/preconditions that a country has to meet before adopting IT. These debates reflect the fact that there is no generally agreed set of preconditions.

Preconditions that are frequently desired by most economists (Khan, 2003, P.10; Truman, 2003, P. 49; Batini, et al. 2006, P. 18 and Jonas and Mishkin, 2003, P. 6) include: (i) A commitment to price stability as a primary goal of monetary policy. (ii) CB has to have legal independence. (iii) Macroeconomic stability has to exist. (v) Monetary policy has to be transparent and the CB has to be accountable. (vi) Absence of fiscal dominance. (vii) Institutional elements include; measuring monetary transmission mechanisms, forecasting inflation and coordination between monetary and fiscal policy.

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<sup>4</sup> The definitions of IT in the literature differ; see, for example, Debelle et al. (1998, p. 2), Svensson (1998, p. 13), Batini et al. (2005, p. 161), Bernanke and Woodford (2005, p. 1) and King (2005, p. 13). The disagreement among economists is not only about an exact definition of IT but also about classifying some countries into inflation targeters and non-inflation targeters during transitional periods. In practice, some countries began with "partial" IT rather than "full-fledged" IT, e.g. Chile, Colombia, Israel, Peru and Mexico. Consequently, classifying such countries as inflation targeters or non-inflation targeters during a transitional period is likely to involve subjective choices. See: Truman (2003, 6), Masson et al. (1998, 35), Schmidt-Hebbel and Tapia (2002), and Mishkin and Schmidt-Hebbel (2001).

Nevertheless, there is no agreement among economists regarding the question of ‘what are prerequisites that have to be met before the adoption of IT in the emerging market economies?’ Eichengreen, et al. (1999) argue that emerging market economies are severely lacking technical capabilities and central bank autonomy. Consequently, these countries will be better off with a conventional monetary policy framework; e.g. targeting the exchange rate or targeting monetary aggregates. Carare et al. (2002) think that the absence of some of preconditions should not preclude the adoption of IT, especially when policies are being introduced to establish them in the short or medium-term. Truman (2003) thinks of preconditions as a part of “full-fledged” inflation targeting that may follow a transitional period, i.e. it is not condition that a country satisfies all prerequisites during the transitional period of IT. Assessing the role of “preconditions” for adopting IT, Batini, et al. (2006, P. 176) found that no inflation-targeting central bank had all “preconditions” in place prior to the adoption of IT.

In the light of this, one may ask ‘which of preconditions has to be met in advance and which of these can be delayed to be fulfilled in the short-term’? There is no objective criterion. Jonas and Mishkin (2003, 6) think that it is not possible to say whether a country has met these requirements or not, it is more a question of the degree to which these preconditions are met to make inflation targeting feasible. A country may not need to adopt IT if it could satisfy the aforementioned list of preconditions under the other monetary policy regimes. Financial crises and the search for a new nominal anchor for monetary policy led many countries to switch their monetary policy regimes to the IT, e.g. Sweden, United Kingdom, Czech Republic and Brazil.

Three basic elements that are frequently demanded in the vast majority of literature as prerequisites for a successful IT regime are: factual (*de facto*) independence of the CB, Commitment to price stability as a primary goal of monetary policy and forecasting capabilities. In what follows, the study will shed lights on these elements.

## 2.1 Factual (de facto) independent of CB5

CB independence has to be *de facto* and not only *de jure*. Full legal independence of a CB (goal independent and instrument independent) is a controversial point among economists but factual instrument independence of a CB is an indispensable requirement as a precondition for a successful application of IT. A CB should be free to choose the appropriate tools and change them whenever it is necessary without any pressure from the government. In addition, a CB should have techniques and technicians to achieve its objective without substantial outside interference. That is, the government may formulate inflation targets and its tolerance intervals and the CB becomes responsible for achieving it. In the course of achieving inflation targets, a CB should not seek or take instructions from any other body. Therefore, the existence of government representatives in the monetary policy committee (MPC) as voting members must be prohibited. If not, then CB independence is not factual.

In addition, a contribution of monetary policy to a macroeconomic stability is conditional with a sound of fiscal position (Truman, 2003, P. 51). With fiscal dominance CB independence is not factual even though the CB possesses both legal instrument independence and non-existence of the government's representatives in the MPC. The existence of fiscal dominance will make it risky for any country to adopt IT<sup>6</sup>. The most visible version of fiscal dominance is the formal obligation of CB to finance budget deficit<sup>7</sup>.

Masson, et al. (1998), Debelle, et al. (1998) and Khan (2003) add another dimension that the shallowness of the capital market is also a common indication of fiscal dominance. Firstly, a weak financial system may prevent the CB to use the

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<sup>5</sup> Several studies stressed this point. See: Truman (2003, PP. 49-52), Masson, et al. (1998, P. 35), Batini, et al. (2006, P. 18), Debelle, et al. (1998 PP. 11-13), Fraga, et al. (2003, PP. 24-25), and Mishkin and Schmidt-Hebbel (2001, P. 5).

<sup>6</sup> Fiscal dominance is the situation in which monetary policy is dominated by the financial needs of the government. The connection between factual independence of the central bank and fiscal dominance is often presented as follows; if government does not have sufficient resources to finance its operations in the economy and requires systematically and significantly amounts of finance to meet its obligations, then a country's fiscal requirements are likely to dominate and determine the central bank's operations. In such case, the CB will not be able to achieve the target of inflation or keep it inside a determined path (Khan 2003).

<sup>7</sup> In a study about political pressure on CBs in the emerging market economies, Awad (2008) evaluated the *de facto* independent of CB in terms of the ability of CB to keep its target of money supply despite government's pressures for higher credit. He found that the CBE could not keep the target of money supply, and such failure refers to fiscal dominance.

interest rate freely to return inflation forecasts to the targeted path. This is because a fragile financial system is likely to be unable to afford an increase of nominal interest rates associated with the CB mopping up the liquidity that has been provided at the previous discount window. Secondly, the financial system is often a by-product of government schemes to extract revenues using various forms of financial repression (interest rate ceiling, high reserve requirements, selective interest rates, and compulsory placement of public debt). Because of its potential impact on the fiscal position, CB may resist an increase in the market interest rates to correct deviations of forecasted inflation from the target. A related argument is that if the cost of bailing out a weak banking system has a large fiscal burden, it may lead to fiscal dominance (Truman, 2003, P. 52). However, with reasonably effective monetary policy instruments, e.g. the overnight interest rate and the open market operations, the CB will be able to follow up its target more efficiently.

To sum up, factual independence of CB is based on three basic pillars; (i) Legal instrument independence of CB, (ii) Nonexistence of government representatives in the MPC as voting members, and (iii) Absences of fiscal dominance including no obligation for the CB to finance budget deficit, and domestic financial markets should have enough depth to absorb placements of public debt.

## **2.2 A commitment to price stability as a primary goal of monetary policy**

That is, the CB should not target any other variables, e.g. exchange rate. A monetary policy under the commitment to other targets will be confined by those targets and as a result, the monetary authority is more likely to fail in hitting the announced target of inflation. In addition, the public will have no assurance that the monetary authorities will give a priority to the inflation targets. Such a situation is likely to deteriorate individuals' expectations about the future path of inflation because of uncertainty about the credibility of the announced inflation target. Nevertheless, the CB should intervene to prevent undesirable effects coming from changes in other macroeconomic variables on the future path of inflation (Khan, 2003, 10), i.e. the CB should intervene to prevent the second round effects of changes in other macroeconomic variables on the rate of inflation.

A commitment to price stability requires some degree of accountability for the CB about realizing inflation targets. The lessons from international experience as indicated by Bernanke, et al. (1999, P.38, P.296) delivered two forms of accountability; comparing inflation outcomes with the determined targets or obligating the CB to provide the public with convincing rational for the policy choices that it makes. Given that inflation responds to policy after some lags and inflation targets are rarely hit exactly in the short run, second means become the appropriate alternative of maintaining accountability. Practically, many CBs prefer to be more transparent and credible to the public by announcing the escape clauses, i.e. the exceptions from the obligation to fulfill the inflation target. This explains why accountability of CBs is less formalized in practice and why a transparent monetary policy is so important not only as a device to tie down individuals expectations around an announced inflation target but also as a means for accountability of CBs to the public.

To sum up, a commitment to price stability requires two basic elements; (i) The CB should not target any other variables other than inflation rate and (ii) CB should be transparent to the public about the exemptions of its inflation target. Such a transparency is a practical device to make the CB accountable to the public for achieving the inflation target.

### **2.3 Forecasting capabilities**

Because of the time lag between a change of monetary policy instruments and its effect on the inflation rate, IT has to be pursued in a forward-looking manner. That is, the adjustment of monetary policy instruments has to be established on a systematic assessment of the future path of inflation. Consequently, adopting IT in the form of announcing some targets for inflation to be hit in the future and the way will be used to achieve it requires that some arrangements have to be available in advance. These arrangements include (Debelle, et al., 1998, PP. 3-4): (i) A model for inflation forecasting and inflation projections, (ii) The CB has to have a clear idea about monetary transmission mechanisms, and (iii) An inclusive and updated database on different economic variables has to be in place.

### 3. LESSONS FROM THE EXPERIENCE OF SOME EMERGING MARKET ECONOMIES

The experience of Czech Republic, Poland, and Brazil (CPB) under IT has been considered. The study focused on the following dimensions: (i) The factors standing behind the decision of adopting IT in each country. (ii) The level of CB independence and whether there is a legal obligation for the CB to finance budget deficit. (iii) The commitment to price stability as a primary goal of monetary policy, price index used to formulate and gauge inflation targets, and the reaction of CB to supply-side shocks. (iv) The level of knowledge of the CB regarding inflation forecasting and monetary transmission mechanisms<sup>8</sup>.

Different lessons can be drawn from the experience of the CPB under IT:

**3.1 These countries were seriously keen on, and willing to achieving the goal of price stability:** the real intention to achieve price stability represented the stimulus behind adopting IT in these countries. Because such intention was real, it was swiftly translated into tangible steps on the ground. From Brazils experience, when the BCB and the government became convinced with the adoption of IT as a means to achieve price stability, both preparation and implementation of IT had been accomplished during a very limited time, i.e. during the period from March to June of the year 1999.

**3.2 IT is adopted to serve as a new nominal anchor for monetary policy:** After floating their currencies, CPB found that the IT regime is the only viable option to achieve the goal of price stability upon forward-looking bases. A monetary policy regime without an explicit nominal anchor, just do it strategy, was not an appropriate alternative to tie down individuals' expectations about the future path of inflation especially as CBs in these countries did not have a track record of credibility during that time. In addition, a monetary targeting regime was not also an appropriate alternative especially after liberalizing capital flows and financial markets, which undermined the relationship between money supply and price level. Moreover, managing monetary policy under targeting foreign exchange rate regime no longer represents a suitable option.

Why did CPB float the FX rate? Indeed, CPB were forced to float their currencies in order not to lose an influential part of their foreign reserves on the

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<sup>8</sup> Details on the above dimensions of the study are available upon request.

aftermath of economic crises. The decision of floatation came on the backdrop of speculative attacks on domestic currency triggered by both the Asian crisis and external imbalances of current accounts. The imbalances of current accounts emerged because of pegging the FX rate in conjunction with high domestic inflation, thereby real appreciation occurred.

**3.3 IT is problematic if pass-through effect is high:** A problematic issue here is that, while the CB has to be credible regarding the announced inflation target a devaluation of domestic currency causes actual inflation to deviate from the target when the pass-through effect is high. To maintain credibility, the CB has to determine in advance escape clauses for its targets. As mentioned, the Czech National Bank (CNB) announced escape clauses pertaining to the FX rate after targeting CPI-inflation. Conversely, the Brazil Central Bank (BCB) did not announce escape clauses but used a wide tolerance interval for its inflation target. Because of the high pass-through effect, the BCB continued targeting the FX rate implicitly in an asymmetric way, i.e. fighting devaluation and tolerating revaluation.

**3.4 Missing inflation targets was generally because of forecast's flaws:** despite escape clauses were defined explicitly in the case of the CNB and implicitly in the case of the National Bank of Poland (NBP), CBs in both countries missed inflation targets several times. In its assessment of ten years of IT, the CNB concluded that forecast flaws were responsible for missing most of its targets. Although the NBP was less transparent regarding the real reasons behind missing inflation targets, it applied similar steps to the CNB by improving its ability for forecasting through building up more sophisticated models and improving its knowledge about monetary transmission mechanisms.

**3.5 CB independence is factual.** According to the aforementioned criterion about factual independence of the CB, CBs in CPB possess legal instrument independence, absence of governments' representatives in the MPC as voting members, and absence of fiscal dominance in the form of no obligation for the CB to finance budget deficit.

**3.6 Factual independence of the CB was not, mostly granted by the government but proposed by CBs.** CBs, especially in Czech Republic and Brazil, were the initiators to propose IT to the government. Perhaps the CNB did not spend much effort to convince the government for the adoption of IT because the

government was mainly motivated by the accession to the EU but the BCB played an active role to convince the government for the adoption of IT.

**3.7 CBs in CPB did not possess all prerequisites for IT in the early days of adopting IT.** As mentioned, CBs in CPB were factually independent and they were serious about achieving price stability. Nevertheless, some of them practiced intervention in the FX market at least during the first stages of adopting IT, e.g. the CNB and BCBs. Besides, forecasting capabilities including sophisticated models for both inflation forecasting and inflation projection and the knowledge about both timing and effect of monetary transmission mechanisms were not satisfactory in the first stages of adopting IT.

#### **4. THE AVAILABILITY OF PREREQUISITES OF IT IN EGYPT COMPARED WITH CPB**

This section utilizes the experience of CPB by comparing the current position of Egypt to these countries in their early days of adopting IT. Such a comparison might be helpful in assessing whether Egypt has the capacity to apply IT. In addition, through this comparison the study may detect factors that Egypt has to take into account in the course of transforming monetary policy regime to a full-fledged IT.

As a criterion of the capacity to adopt IT, the study focuses on the availability of preconditions of IT in Egypt. As mentioned, three preconditions are frequently demanded for a successful application of IT; factual independence of the CB, commitment to price stability as a primary goal of monetary policy, and Forecasting capabilities. The study presumes that the political intention of the government of Egypt is supportive to the adoption of IT as a means of achieving the goal of price stability once prerequisites of IT have been accomplished.

##### **4.1 Factual independence of the CB**

As mentioned, factual independence of a CB hinges on three basic pillars; (i) Having legal instrument independence, (ii) Non-existence of the government's representatives as voting members in the MPC, and (iii) Absence of fiscal dominance, including no obligation for the CB to finance the budget deficit and domestic financial markets should have enough depth to absorb placements of

public debt. We may explore factual independence of the CBE by considering the availability of the above elements and compare it to CPB.

**4.1.1 Legal instrument independence of the CBE:** similar to CPB, the new law of the CBE, the banking sector, and the money (henceforth the new legislation) determined the primary objective of monetary policy to be achieving both price stability and banking system soundness within the context of the general economic policy of the state<sup>9</sup>. The CBE sets, in agreement with the government, objectives of monetary policy through a coordinating council formed by a decree of the president of the Republic<sup>10</sup>.

The governor of the CBE is appointed by a decree of the president of the Republic upon his/her nomination by the prime minister for a renewable term of four years. The resignation of the governor is accepted by a decree of the president of the Republic.

Like CBs in CPB, the CBE possesses instrument independence where the board of directors or MPC is the authority responsible for realizing the objectives of monetary policy through implementing monetary, credit and banking policies. Particularly, MPC determines instruments of monetary policy to be used, the structure of credit and discount rates and both regulatory and supervisory standards of banking system.

**4.1.2 The government's representatives in the MPC:** unlike to CPB, the MPC of the CBE includes the government's representatives as voting members. According to law no. 88 of 2003, the MPC of the CBE consists of fifteen members. They are; the governor of the CBE and his two deputy governors, the chairman of capital market authority, three members representing the ministries of finance, planning and foreign trade and eight experts in monetary, financial, banking, legal and economic affairs designated by the president of the republic for a renewable term of four years.

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<sup>9</sup> Law No. 88 of the year 2003 amended by law No. 162 of the year 2004 and Law No. 93 of the year 2005 is known as the new law of the CB, the banking sector, and the money. Available at: <http://www.cbe.org.eg/public/Banking%20Laws/Law%2088,%20amendments,%2013-7-2005.pdf>

<sup>10</sup> According to the presidential decree No. 7 for 2005, the coordinating council of monetary Policy (CCMP) is responsible for determining the targets of monetary policy in a way that realizes price stability and banking system soundness within the general economic policy of the state. It is headed by the prime minister, formed of 12 members; 6 of whom are independent from the private sector and international organizations, 3 from the CBE (the governor and the two deputies) and 3 ministers from the government (ministers of finance, planning, and investment).

Recently, law no. 125 issued on 8 Oct., 2011, intended to amend certain provisions of law no. 88 of 2003 including the MPC's members. The new board comprised nine members, instead of fifteen. They are; the CBE governor and his two deputy governors, the chairman of the Egyptian financial supervisory authority, a representative of the ministry of finance, and four members with expertise in financial, economic, and legal matters.

Although these changes represent an important step in the right direction it is not sufficient to prevent conflict of interests of the MPC's members. The exclusion of the two members representing the ministries of planning and foreign trade can prevent conflict between price stability objective and FX rate and real growth objectives. But, maintaining a representative member of the ministry of finance inside the MPC is, still, a source of conflict between price stability objective and government's needs to finance budget deficit, especially with the obligation of the CBE to finance budget deficit.

**4.1.3 The obligation of CB to finance budget deficit:** Unlike to CBs in CPB, the CBE has to extend finance to the government upon its request to cover a seasonal deficit in the general budget with an amount not exceeding 10 % of the average revenues of the state budget during the three previous years. The term of such financing is three months renewable for other similar periods, with a maximum of twelve months. The conditions concerning this financing are determined upon an agreement between the ministry of finance and the CBE.

Comparing the current economic performance in Egypt to its counterparts in CPB during the periods preceding the adoption of IT may sheds light on the competence of Egypt to apply IT. Theoretically, high real GDP growth is expected to be negatively associated with the adoption of IT. Since high GDP growth reflects a success of macroeconomic policies, there is little incentive for the authority to adopt IT. Similarly, large GDP variability is associated with dissatisfaction with economic policy and hence gives more incentive for adopting IT. In addition, the higher the rate of both inflation and its variability the more likely that a country will adopt IT (Hu, 2003, PP. 10-11).

**Table 1** *Some indicators about macroeconomic performance in Egypt and CPB*

Country	Time of adopting IT	CPI annual inflation			The rate of growth of GDP		
		M	S	V	M	S	V
Czech Republic (1995-1997)	December 1997	8.8	0.31	0.35	3.2	3.57	1.12
Poland (1995-1998)	March 1999	18.63	7.07	0.379	6.3	0.96	0.15
Brazil (1995-1998)	End of June 1999	22.96	29.16	1.27	2.48	1.87	0.75
Egypt (1995-1998)		7.85	5.45	0.694	4.78	0.61	0.128
Egypt (2007-2011)		12.14	3.6	0.29	5.17	2.2	0.42
CZ (2007-2011)		2.73	2.14	0.78	3.3*	3.88	2.27
Poland (2007-2011)		3.5	0.89	0.25	4.35	1.88	0.43
Brazil (2007-2011)		5.17	1.1	0.21	4.2	3.09	0.73

M = Mean, S= Standard deviation, V= Coefficient of variation (S/M)

\*After excluding the extreme negative value of real GDP growth in 2009 (-4.69) which can be attributed to world economic crises.

**Source:** Collected and calculated by the author from the World Bank, World Development Indicators

Table 1 exhibits inflation and real GDP growth in both Egypt and CPB. During the period 1995-1998 the rate of inflation in Egypt was lower than that of CPB but it has been deteriorated during the period 2007-2011 by hitting two digits (12.14) and recording higher level than that of CPB. Despite of this, the level of inflation in Egypt in the last periods is still lower than its counterparts in Poland and Brazil in the start of their adoption of IT. In addition, the coefficient of variation of inflation in Egypt during the last period (0.29) is better than that of CPB during the period 1995-1998.

Concerning the rate of growth of real GDP, both the level and the coefficient of variation of real GDP growth in Egypt in the period 2007-2011 exhibit a better shape than that of CPB in the start of adopting IT.

**Table 2** *Some indicators about financial depth and symptoms of fiscal dominance*

Country	Time of adopting IT	Cash surplus/ deficit (% of GDP)			Claims on government (annual growth as % of M2)			Financial depth = M2 / GDP (%)		
		M	S	V	M	S	V	M	S	V
Czech Republic (1995-1997)	December 1997	-1.33	0.57	0.43	-1.33	2.88	2.1	63	1	0.01
Poland (1995-1998)	March 1999	-	-	-	4.25	1.5	0.35	30.5	2.64	0.08
Brazil (1995-1998)	End of June 1999	-2 <sup>1</sup>	2.8	1.4	21.75	17.46	0.8	32.75	4.7	0.14
Egypt (1995-1998)		0 <sup>2</sup>	-	-	2.25	2.2	0.98	74	1.8	0.02

Country	Time of adopting IT	Cash surplus/ deficit (% of GDP)			Claims on government (annual growth as % of M2)			Financial depth = M2 / GDP (%)		
		M	S	V	M	S	V	M	S	V
Czech Republic (2007-2011)		-3.5	2.38	0.68	1.4	2.9	2.1	68.6	5.54	0.08
Poland(2007-2011)		-4	2	0.5	2.6	4.03	1.55	50.6	4	0.07
Brazil (2007-2011)		-2.33	1.5	0.65	3.4	2.88	0.84	62.8	4.8	0.07
Egypt(2007-2011)		-6.5	1.2	0.19	7	6.6	0.94	80.4	5.72	0.07

M = Mean, S= Standard deviation, V= Coefficient of variation (S/M)

<sup>1</sup> calculated for the periods 1997-1998. <sup>2</sup> calculated for the periods 1995-1997.

**Source:** Collected and calculated by the author from the World Bank, World Development Indicators.

Table 2 delivers another piece of information pertaining the financial depth and symptoms of fiscal dominance. Williamson and Mahar (1998) suggest that financial depth, measured by the M2/GDP ratio is a helpful indicator in assessing the financial system efficiency in mobilizing funds. In other words, with a high M2/GDP ratio the financial system can afford movements in nominal interest rates to mop up liquidity that has been provided at the previous discount window.

According to this indicator, as shown in Table 2, Egypt exhibits a better outlook than CPB even during the period 1995-1998<sup>11</sup>. Concerning claims on government and cash deficit of the general budget, both of them incorporated substantial increase in Egypt during the period 2007-2011 comparing to the period 1995-1998, and they came higher in Egypt than in the CPB, especially in the period 2007-2011. In addition, while claims on government were diminishing in both Poland and Brazil during the two periods, the opposite is true in Egypt.

Indeed, the main shortcoming in macroeconomic policy in Egypt is the performance of the general budget. Although the budget deficit in Egypt (% of GDP) was better than in Czech Republic and Brazil during the period 1995-1998 it has been exacerbated during the periods 2007-2011, as shown in Table 2<sup>12</sup>. The high budget deficit, coupled with both formal obligation of the CBE to finance the budget deficit and the existence of government's representatives in the MPC as

<sup>11</sup> This ratio should be interpreted cautiously. Otherwise, why is this ratio higher in Egypt than in CPB? One reason for this, as mentioned above, is that the CBE stands ready to finance the budget deficit via the issuing of new money. With high budget deficit and the contribution of the CBE in financing budget deficit, M2 goes up and hence M2/GDP ratio is higher.

<sup>12</sup> During the two fiscal years 2009/2010 and 2010/2011, the overall budget deficit to GDP (%) grew from 8.1 % to 9.5 %, respectively, and gross domestic public debt to GDP (%) inched up from 73.6 to 76.2, respectively (CBE, annual report 2010-2011).

voting members undermine the factual independence of CBE and cast skeptics on the competence of the CBE to achieve price stability.

To summarize, although new legislation determined the primary objective of monetary policy to be achieving the goal of price stability and granted the CBE legal instrument independence, the existence of the government's representatives in the MPC as voting members and the coercion of the CBE to extend finance to the government undermines factual independence of the CBE<sup>13</sup>. Moreover, although the comparison between Egypt and CPB came in favor of Egypt in some areas, the main shortcoming of macroeconomic policy in Egypt is the performance of the general budget including a high budget deficit and a significant contribution of the CBE in financing it.

#### **4.2 A commitment to price stability as a primary goal of monetary policy**

As mentioned, a commitment to price stability is based on two elements; (i) The CB should not target any other variable other than the rate of inflation and (ii) The CB should be transparent to the public regarding the exemptions of its target. We may explore the applicability of these two elements in the case of Egypt as follows:

**4.2.1 The CB should not target any other variable other than inflation rate:** IT can be problematic if CB possesses an implicit target for the FX rate. This point is supported by the experience of both Czech Republic and Brazil. When the CNB intervened in the FX market to fix the appreciation of domestic currency inflation targets were lost (Holub, 2004). In addition, despite adopting IT, the fears of a high pass-through effect led the BCB implicitly targeting the FX rate in an asymmetric way which in turn led the BCB to lose inflation targets.

By considering the experience of the CBE during the period of 1991-2003, Awad (2011)<sub>a</sub> thinks that the CBE adopted a dual-target policy (i.e. targeting the rate of growth of M2 and pegging the FX rate vis-à-vis the US dollar) because of the fears of a high pass-through effect<sup>14</sup>. Despite such a policy could bring the rate

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<sup>13</sup> One of the tough critiques of the CCMP came from a Morgan Stanley report about the overriding of the government, specifically the prime minister, on both CCMP and the MPC of the CBE (Cevik, 2007).

<sup>14</sup> The pass-through effect in Egypt is thought to be high. Rabanal, Pau (2005) estimated the exchange rate pass-through effect in Egypt to both the wholesale price index (WPI) and CPI during the period of the exit from pegging to floating FX rate, i.e. the period of 2000-2004. While the pass-through effect was higher to the WPI (from 30% to 60%) and statistically significant, it was low and not

of inflation down during the nineties decade, the rate of inflation revived once more when the CBE was forced to devalue domestic currency as of 2001 on the aftermath of economic shocks that occurred during the second half of the nineties decade. Al-Shawarby and Selim (2012) examine whether domestic inflation spikes in Egypt during the period 2001-2011 were primarily caused by external food price shocks. One conclusion of this study is that domestic inflation in Egypt in the short run is caused by external shocks. The pass-through to domestic food inflation in the short run is high and reaches to 29 % after six months and around two-thirds after a year.

However, Awad (2011)<sub>b</sub> considered the impact of recent innovations in monetary policy on the monetary transmission mechanism in Egypt especially during the periods as of 2005. One result of this study is that the CBE no longer intervene regularly in the FX market, and a sudden depreciation of domestic currency no longer significantly supports domestic economic growth and its impact on domestic price level has relaxed.

**4.2.2 The CB should announce escape clauses for its inflation targets:** most inflation targeters construct what's called 'core inflation measure'<sup>15</sup>. The logic behind the use of core inflation by CBs is explained by Bryan and Cecchetti (1994) as follows; the headline CPI inflation can incorporate a temporarily noise caused by sector-specific shocks, i.e. food and energy prices. Because these price changes do not constitute underlying monetary inflation, monetary authorities should avoid basing their decisions on them. One common solution to this problem is to measure the underlying or core component of inflation through excluding certain prices in the computation of the CPI based on the assumption that these are the ones with high variance noise component. Thus the existing CPI is reweighted by placing zero weights on the excluded components and the remaining weights are rescaled.

Like many other CBs, the CBE constructs its own core inflation measure through excluding the high volatile components from the headline CPI. The high volatile items that are excluded from the CPI include; (i) items with prices that are

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statistically significant for the CPI. The weak relationship between exchange rate shocks and the changes in the CPI is explained by the relatively large share of goods with administrated prices included in the CPI series that was used until July 2003 (roughly one third to one half of the CPI items).

<sup>15</sup> Literally, the term core inflation is used to indicate the long-run, or persistent, component of the measured price index, which is tied in some way to money growth.

regulated by the government, which, according to the CBE estimates, represent 19.4 % of the total CPI basket. (ii) Food items with prices that are inherently volatile since their supply largely depend on weather and harvest conditions, i.e. fruits and vegetables. They represent 8.8 percent of the CPI basket. Obviously, the core inflation measure used by the CBE removes the first round, or direct, effect of price movements in those items which are thought to be do not reflect the persistent, or underlying, monetary inflation pressures in the economy. According to the explanation by the CBE, the second-round effects that these items' price movements have on the other components of the CPI basket are part of the underlying inflation pressures in the economy and hence they are fully reacted by the CBE<sup>16</sup>.

From the experience of CPB, not all CBs announced escape clauses. While the BCB did not announce escape clauses, the CNB preferred to be more transparent to the public by explicitly announcing escape clauses whereas the NBP did not explicitly announce escape clauses but rather defined its stance in case of economic shocks have occurred.

Although the BCB did not announce escape clauses, it used a relatively wide range, 2-percentage point tolerance interval around the central target of inflation. In addition, the CNB did not announce escape clauses for its inflation targets in the early days of adopting IT because it was targeting the so-called net inflation during that time. The CNB announced escape clauses immediately after abstaining from targeting net inflation and announcing its intention to target headline CPI inflation in April 2001.

In the light of this, the CBE has many options to the escape clauses when it comes to the decision of implementing a full-fledged IT regime: (i) To target core inflation measure or to explicitly announce escape clauses, like the case of the Czech Republic. (ii) To determining the scale and duration of economic shocks that require an intervention by the CB, like the case of Poland. (iii) To use a wide range for inflation targets without announcing escape clauses, like the case Brazil.

### **4.3 Forecasting capabilities**

From the experience of CPB, inflation targets were missed several times. Upon the explanation of the CNB, the non-fulfillment of inflation forecasts,

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<sup>16</sup> See; <http://www.cbe.org.eg/Monetary-Policy/FrameWork.htm>

resulting from both supply-side shocks and imperfections in the forecasting system is the main element behind undershooting inflation targets.

As mentioned, forecasting capabilities require three basic elements; (i) A model for inflation forecasting and inflation projections, (ii) The CB has to have clear idea about timing and effect of monetary transmission mechanisms, and (iii) An inclusive and updated database on macroeconomic variables has to be in place.

Regarding the first and the second element, Egypt exhibits a better shape when the current state of knowledge that Egypt has is compared with its counterpart in the CPB in the start of their adoption of IT. So far, the main achievements that have been accomplished by the CBE are;<sup>17</sup> (i) Moving from a quantitative operational target (excess reserves) to a price target (overnight inter-bank rate), and launching a corridor system in June 2005 to reduce volatility in the overnight inter-bank rate. (ii) Issuing CBE instruments in August 2005 as the primary instruments for liquidity management through open market operations. (iii) Enhancing the role of monetary policy operations to absorb or inject liquidity in the market through a publicly announced auction schedule. (iv) Using a small open economy gap model with forward looking expectations and endogenous monetary policy response. The model's equations have clear micro-based motivation, derived from first order principles of rational agents. (v) Constructing the core inflation measure. (vi) Al-Mashat (2008) reported that the CBE employed a VAR model to estimate; the pass-through from FX rate to CPI and WPI inflation rates, potential GDP, and monetary transmission mechanisms. In addition, the CBE is carrying out near-term inflation forecasts for one quarter ahead.

However, these achievements do have some imperfections; (i) The CBE does not publish either the model used for inflation forecasting, or even inflation forecasts. (ii) The CBE does not have a household survey of inflation expectations. (iii) The estimates of pass-through effect, potential GDP, and monetary transmission mechanisms published by the CBE's staff need to be updated. (iv) A research has to be implemented on the targeted rate of inflation that will not cause an eruption of public debt. (v) A dynamic stochastic general equilibrium model has to be built.

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<sup>17</sup> See; <http://www.cbe.org.eg/Monetary-Policy/FrameWork.htm>

Regarding the third element, datasets are compiled in Egypt by different agencies, e.g. the central agency for public mobilization and statistics (CAPMAS), the ministry of planning (MOP), the CBE, and many other ministries, e.g. ministry of health and population, ministry of agriculture and land reclamation, etc. Because of limited coordination among these agencies and different standards, definitions, and methodologies used by them, inconsistencies and even contradictions appear in the Egyptian data. For example, different estimates of unemployment rate are produced by different agencies, e.g., MOP and CAPMAS. Also, vital statistics are collected by both CAPMAS and the ministry of health and population. In addition, produced data lack accuracy and do not fully satisfy users' needs concerning topics to be covered, frequency, format of data dissemination etc.

Using data quality assessment framework (DQAF), the IMF staff (2005) assessed the quality of data in Egypt. Their assessment included national accounts, price indices, government finance, money and balance of payment statistics. Despite several shortcomings in many areas, the most defects in the Egyptian data were found in the accuracy and reliability, the serviceability, and the accessibility of data. The defects in the accuracy and reliability of data were found in both national accounts and price indices prepared by the MOP and the CAPMAS successively. The defects in the serviceability of data are because of the dissemination of macroeconomic statistics does not fully meet the users' needs and there is no general oversight regarding the development and coordination of macroeconomic statistics. The defects in the accessibility of data include the difficulties in the availability of data equally and simultaneously among all interested parties.

In the light of this, Egypt has to improve and update its statistics to meet the international criteria, especially that used by the IMF under the DQAF.

## 5. CONCLUSIONS

By exploring the availability of prerequisites of IT, this study intends to investigate challenges facing the CBE for adopting IT regime. The study exploits the experience of some emerging market economies (Czech Republic, Poland, and Brazil) in the early days of their adopting IT to draw lessons that might be helpful for the case of Egypt. The study presumes that a country will apply IT once

prerequisites of IT have been accomplished, given political intention to adopt IT. The main conclusions of the study are as follows:

**Firstly**, unlike to CPB the CBE is not factually independent because of the existence of the government's representatives in the MPC as voting members and the coercion of the CBE to extend finance to the government. In addition, high budget deficit and significant contribution of the CBE in financing it represent the main shortcoming of macroeconomic policy in Egypt compared with CPB.

**Secondly**, when it comes to the decision of implementing a full-fledged IT regime, announcing escape clauses to the inflation target is not binding to the CBE as many other options are available, e.g. to target core inflation, to determining the scale and duration of economic shocks that require an intervention by the CBE, and to use a wide range for inflation targets.

**Thirdly**, the CBE is reticent and does not disclose enough information about its forecasting capabilities.

**Fourthly**, the Egyptian data incorporate many defects including the accuracy and reliability, the serviceability, and the accessibility.

In the light of this, challenges facing the CBE for adopting IT regime can be summarized as follows:

(i) The CBE should play an active role to convince decision-making circuits inside the government for the adoption of IT as a way of both reforming monetary policy and achieving the goal of price stability.

(ii) The CBE should be factually independent. Since factual independence of CBs is indispensable task for a successful application of IT, the MPC of the CBE should not incorporate government's representatives as voting members and the CBE should not be obliged to finance budget deficit<sup>18</sup>.

(iii) Coordination between monetary policy and fiscal policy should be established. Since determining the inflation target that has to be hit by the CBE in the medium to long-term is the responsibility of the CCMP, the inflation target should be determined upon projections of the long run price level, which ensure the

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<sup>18</sup> The existence of fiscal dominance makes it risky for any country to adopt IT. Consequently, financing the budget deficit by the CBE should be prohibited. In addition, the government should finance its operations in the economy using real resources without crowding the private sector in the credit market. Accordingly, the general budget of the state and perhaps both the role and size of the governmental sector in the economy have to be restructured to comply with the main function of the CBE.

government's solvency, i.e. the rate of inflation that will not cause an eruption of public debt. In this regard, intensive research studies are needed to tackle this issue.

(iv) Extensive studies under different small-scale models should be implemented to ensure a satisfactory understanding of the following issues; the degree of the exchange rate pass-through effect, the level of real exchange rate, both timing and effect of monetary transmission mechanisms. In addition, large-scale macroeconomic models are needed for the purpose of inflation projections under different scenarios of economic conditions.

(v) Several questions are still unfulfilled and need to be investigated openly by both academic researchers and the CBE's staff; Which measurement of price level that will be targeted?, i.e. CPI inflation or core inflation measure? What are variables that will be included in the objective function of the CBE? And what are relative weights that will be assigned to these variables? What is the model that fits the Egyptian economy? How would the CBE react to both supply shocks and asset-price bubbles? What is the equilibrium level of both real FX rate and property prices? How can the CBE detect deviations of both the actual real FX rate and actual property prices from their equilibrium levels in real time? Are the MPC members qualified enough to give adequate assessment of the risks of the forecasts and the associated decisions?

(vi) Some institutional arrangements are urgently needed both to implement a household survey of inflation expectations and to improve and update the Egyptian statistics in order to meet the international criteria, especially that used by the IMF under the DQAF.

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## OPTIMIZING BANK LIQUIDITY IN CENTRAL AND EASTERN EUROPE

Ionica Munteanu (Costache)\*

***Abstract:** This research paper responds to the current international concern in bank liquidity and offers a model for the optimization of the bank liquidity level, by identifying the marginal impact of the bank liquidity ratio on bank profitability. The non-linear relationship between these two variables is validated through the GMM procedure, on a panel of Eastern and Central European commercial banks over the period 2003-2010. The optimal level of bank liquidity resulted after getting the maximum condition for return on equity and return on assets, as measures of profitability, enhances the recent financial crisis effects.*

***Keywords:** bank liquidity, profitability, optimum, marginal impact, non-linear regression*

***JEL Classifications:** G21, G32*

### INTRODUCTION

The recent financial crisis has placed the optimal level of bank liquidity under the scrutiny of both world monetary authorities and bank managers in order to protect the global financial stability and bank profitability. Even if, recently, it had been proven that profitability should be sacrificed first in the pursuit of building confidence in turbulent times, the settled Basel III levels of liquidity were considered so restraining that came into discussion the concept of the „non-profit banking sector”. To improve financial regulation, in January 2013, the Basel Committee on Banking Supervision softened the rules on the „liquidity coverage ratio”. Under these circumstances, identifying the optimal level of liquidity that maximizes bank profits becomes the current first aim of all implied agents since the main scope of banking institutions will remain the profitability.

The liquidity-profitability trade-off has been widely discussed in the literature, considering the opportunity cost of holding liquid assets and the

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prevalent negative relationship between them (Molyneux and Thornton, 1992, Goddard *et al*, 2004). There is evidence (Bourke, 1989) that liquidity has also a positive impact on profitability and that the relationship takes the form of a downward-concave parabola (Bordeleau and Graham, 2010).

A recent study on the optimal bank liquidity in times of crisis (Acharya *et al*, 2010) shows that the hoarding of liquidity buffers for profitable investments, such as acquisitions of distressed assets at „fire sale” prices, is an important determinant of equilibrium levels of bank liquidity. That is, the expected impact of liquidity on profitability is established *ex ante* as positive, if certain criteria are met.

Enhancing the extended capital-return relationship, Berger (1995) empirically validates the positive influence of the capital on the return on equity. Consistent with the literature on market discipline in banking (Gilbert, 1990, Berger, 1991), Berger’s results suggest that more capital will decrease the funding costs to the extent that it more than offsets the cost of issuing additional capital. Moreover, since Morris and Shin (2010) argue that an increase in the liquidity ratio will decrease the probability of default, we assume that, at the end of the business cycle, the objective of avoiding bankruptcy replaces the profit maximization aim.

This research paper intends to deliver the optimal level of bank liquidity that will maximize bank profits on the base of the non-linear relationship between liquidity and profitability and through the use of instrumental variables. Therefore, we continue with the description of the empirical framework applied in this research in Section 2; we analyze the results in Section 3 and we expose conclusions and directions for further research in the final section.

## **DATA AND METHODOLOGY**

The dependent variables, measured as Return of Average Equity (ROAE) and Return of Average Assets (ROAA), are regressed against a non-linear expression of relative liquid assets (Liquid Assets over Total Assets ratio) and a set of control variables. We control for other variables influencing profitability, considering the literature on the determinants of bank profitability (Demirguc-Kunt and Huizinga, 2000; McKillop *et al.*, 2002; Pasiouras and Kosmidou, 2007;

Athanasoglou et al, 2008; Kosmidou, 2008; Delis, Papanikolaou, 2009; Flamini et al, 2010) and the own study for the same sample of bank observations<sup>30</sup>.

The sample used consists of 119 commercial banks from 17 countries across Central and Eastern Europe over the 2003-2010 period. The source of the bank-specific variables is Fitch's BankScope database, which provides comprehensive annual financial information for banks in over 180 countries around the world and the statistics published by the World Bank for the external variables.

### THE MODEL

The equation below presents the empirical framework obtained using a panel two-step GMM (Generalized Method of Moments) procedure:

$$R_t = c + \alpha_1 \cdot Liquidity_t + \alpha_2 \cdot Liquidity_{t-1} + X \cdot \beta + \varepsilon$$

where:

$c$  – constant

$\alpha_{1,2}$  – estimated regression coefficients

$X \cdot \beta$  – the influence of the control variables on the return rate  $R$ , ROAE or

ROAA

$\varepsilon$  – a disturbance term

It is notable that the model includes also the lagged liquidity ratio (t-1), emphasizing the importance of the previously booked liquidity, since creditors will first consider it in adjusting their views on bank's credit risk.

The instrumental variables selected for the first measure of rentability, ROAE are the nonperforming loans ratio, measured as the percentage of the Impaired loans in Gross loans and the real GDP growth rate. In what regards

<sup>30</sup> The estimated determinants for ROAE and ROAA are available upon request

ROAA, the selection includes two more variables, the Lending interest rate on the interbank market and the lagged Tier 1 capital ratio.

## RESULTS

The results listed in the tables below follow the empirical framework listed previously.

**Table 1** Results for the dependent variable ROAE

Dependent variable: <b>ROAE</b>				
Method: Panel Generalized Method of Moments				
Period: 2003 2010				
Cross-sections included: 111				
Total panel observations: 670				
2SLS instrument weighting matrix				
Instrument specification: C Impaired loans, Real GDP growth				
<b>VARIABLE</b>	<b>COEFFICIENT</b>	<b>STD. ERROR</b>	<b>t-STATISTIC</b>	<b>PROB.</b>
C	36.52759	2.109709	15.99320	0.0000
Liquidity	<b>-9.718288</b>	0.746527	-11.84006	0.0000
Liquidity * Liquidity (-1)	<b>0.213009</b>	0.043056	5.019637	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.771354	Mean dependent var	5.166207	
Adjusted R-squared	0.721883	S.D. dependent var	34.29248	
S.E. of regression	18.08476	Sum squared resid	179882.2	
Durbin-Watson stat	1.507870	J-statistic	1.02E-26	

The results show the slightly positive and the negative impact of liquidity on both ROAE and ROAA, deciphering the non-linear relationship between the variables.

**Table 2** Results for the dependent variable ROAA

Dependent variable: <b>ROAA</b>				
Method: Panel Generalized Method of Moments				
Period: 2003 2010				

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Cross-sections included: 104

Total panel observations: 513

2SLS instrument weighting matrix

Instrument specification: C Impaired loans, Real GDP growth, Lending rate, Tier 1 capital (-1)

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.876274	0.132486	19.63944	0.0000
Liquidity	<b>-0.704557</b>	0.058559	-10.85079	0.0000
Liquidity*Liquidity(-1)	<b>0.019021</b>	0.008347	2.922943	0.0037

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Effects Specification

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Cross-section fixed (dummy variables)

Period fixed (dummy variables)

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R-squared	0.833524	Mean dependent var	0.703871
Adjusted R-squared	0.786910	S.D. dependent var	2.903745
S.E. of regression	1.340416	Sum squared resid	718.6857
Durbin-Watson stat	1.253415	J-statistic	14.20245

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Considering these results, it can be computed the optimal level of bank liquidity that will maximize bank ROAE and ROAA, by equalling the first derivative of the above equation to 0 (the maximum condition).

$$\partial ROAE_t \partial Liquidity_t = \alpha_1 + \alpha_2 \cdot Liquidity_t - 1 = 0$$

$$Liquidity_{t-1} = -\alpha_1 / \alpha_2$$

$$Liquidity_{t-1}^{optimum} = \frac{9,718288}{0,213009} = 45,6238\%$$

Based on the highlighted coefficients, the optimal level of bank liquidity at the moment  $t-1$  for banks in Eastern and Central Europe that will give the highest return on equity, should be around the value of 45,6238%. This value far exceeds the mean of the liquidity ratio of 3,544927%, emphasizing the crisis effects.

For maximizing ROAA we obtained a lower optimum of bank liquidity, of 37,041%.

$$\partial ROAA_t / \partial Liquidity_{t-1} = \alpha_1 + \alpha_2 \cdot Liquidity_{t-1} = 0$$

$$Liquidity_{t-1}^{optim} = -\alpha_1 / \alpha_2 = 0,7045570,019021 = 37,041\%$$

The recent financial crisis has proven that banks hold significant hidden liquidity risk in their balance sheets – assets that are liquid in normal times can quickly become illiquid when markets conditions deteriorate – and this result is consistent with the fact that the need for liquidity increases in turbulent times by a measure that should be object of further research.

### CONCLUSIONS AND FURTHER RESEARCH

This paper presents empirical evidence regarding the non-linear relationship between liquidity and profitability for a panel of Eastern and Central European banks, over the period of 2003 to 2010. The results are consistent with the idea that funding markets will reward banks for holding liquid assets by reducing the funding cost and the liquidity risk. When this benefit is outweighed by the opportunity cost of holding low-return assets, maintaining further liquid assets will diminish bank profits.

This research is particularly relevant for the current international context, when regulators are trying to devise new bank liquidity standards in order to ensure adequate stability for the overall financial system. The reduced bank profitability due to excessive liquidity holding will restrain the banking sector development and

the available credit for the real economy, dispersing negative externalities to population, a matter of concern for all the governments around the world.

We assume that our estimated result is a reduced-form profit-optimizing level and in the near future, we will focus on building an appropriate margin of variation for the optimal level of bank liquidity for groups of countries in the European Union, analyzing differently the crisis years, 2008-2010.

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# THE IMPACT OF THE CHANGES IN THE ROMANIAN ELECTRICITY MARKETS ON THE HOUSEHOLD CONSUMER

Alexandru Maxim\*

***Abstract:** Romania's electricity sector has undergone significant reforms as a result of the country's accession to the EU. The aim of this paper is to assess how the recent changes in the Romanian electricity markets are impacting the household consumer segment. We first provide a brief description of the various modifications observed within the industry over the last few years and then assess, from an energy marketing perspective, how they affect household consumers of electricity. The study is based on secondary research. We conclude that a new and more complex pricing mechanism has emerged and that household consumers have a constrained freedom on the liberalized market.*

***Keywords:** Electricity sector, Household consumers, Liberalization*

***JEL Classification:** M31, Q41*

## INTRODUCTION

Electricity generation capacity is so tightly connected to economic growth that the latter can be used as a proxy to estimate the future growth of the energy sector as a whole and the former can be used to indicate the overall level of development of a country or region (Breeze, 2005). This relationship tends to be universally valid, regardless of the structure of the economy (e.g. mostly agrarian or industrial), since the standard of living is correlated with domestic electricity consumption and this, in turn, represents a significant part of the electricity demand at the national level (Eurostat, 2013). Thus, studying the relationship between the electricity sector and household consumers is useful in understanding some of the

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underlying trends affecting economic growth and the improvement of living standards.

As with all major utilities, during the four and a half decades of communist rule, the electricity sector in Romania functioned as a state run monopoly. The status quo continued until 1998, when the first steps towards reforming the industry were taken. Most energy policies and reforms in Romania were implemented as a result of the country's negotiations to join the EU. Thus, the overall direction of the changes has been to open up the sector to private investors and to liberalize the electricity markets.

The complete liberalization of the industry follows the principles put forth by liberal economists such as Smith, Hayek and Schumpeter, and is generally intended to encourage innovation and, ultimately, benefit the consumers. However, a minimization of state influence over such a strategically significant sector can create security risks. In addition, certain electricity value chain components require prohibitively high investment costs, meaning that only a limited number of companies will be able to enter the market.

Percebois (2008) concludes that market liberalization and interconnections between national electricity grids within Europe has led to an overall increase of retail prices and argues that this may be partly due to the consolidation of European energy companies through mergers and acquisitions across the EU electricity market. Farré et al. (2010) argue that small and medium sized companies are finding it difficult to survive in the presence of large international enterprises. They conclude that the declining number of entities raises serious questions regarding the long term survival of a competitive electricity market in Europe.

Research papers reviewed by Pittman et al. (2008) assess various issues which may arise from applying the same EU model of energy regulation, as seen in the developed economies of Western Europe, in the developing economies of South East Europe. One of the issues discussed is the expected increase in electricity prices, which would be unpopular among household consumers and could even result in "fuel poverty". It is generally concluded that a "one size fits all" approach should be avoided. Instead, great care should be taken in tailoring country specific approaches to liberalization.

Academic research concerning the Romanian electricity sector is limited. The topic of liberalization, privatization and reorganization of certain state owned

energy companies has been addressed by several studies (Diaconu et al., 2009; Haar and Marinescu, 2011; Popovici, 2011). However, the assessment of Romanian household consumers from an energy marketing perspective seems to represent a gap in current research. This is likely due to the low incidence of supplier switching by residential customers up to date. However, it is likely that the combination of changes taking place in the Romanian electricity sector is going to generate more active household customer behavior in the years to come.

The aim of this paper is to assess the impact of the changes in the Romanian electricity markets on the household consumers from an energy marketing perspective. We will first provide a brief description of the various modifications observed within the industry over the last few years and then assess how they affect household consumers of electricity. The study is based on secondary research.

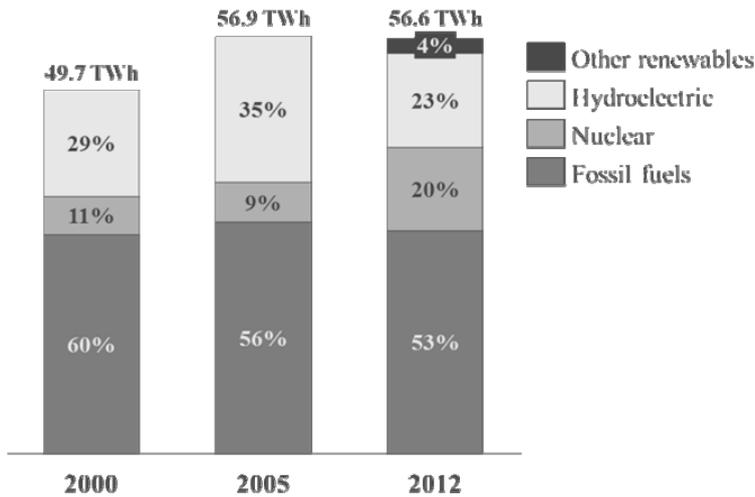
## **2. CHANGES IN THE ROMANIAN ELECTRICITY SECTOR**

Two distinct electricity markets exist in Romania: wholesale and retail. The core purpose of the wholesale market is to provide the context for large electricity transactions, most of which take place between generators, various intermediaries and suppliers. It also includes transactions concerned with the balancing of the national grid and the sale of electricity to certain large scale industrial consumers. The retail market only includes transactions between suppliers and electricity end users, both industrial (commercial) and residential (households).

The aim of this research means that we will focus our analysis mainly on the retail market, looking at the energy mix, the legislative context and the suppliers.

### **2.1. The evolution of the energy mix**

The first change that we will address refers to the energy mix of the Romanian electricity sector. For the purpose of our study, the energy mix refers to the share of various energy sources that are used for electricity production at the national level. In other circumstances, the energy mix could also refer, for example, to the share of primary energy sources used for electricity, transportation and heating within a region.



**Figure 1** *The energy mix of the Romanian electricity sector*

Sources: calculations based on various data obtained from (ANRE, 2013f; EIA, 2013)

The electricity sector in Romania has evolved over the years to become less carbon intensive and more sustainable. The share of fossil fuels (coal, natural gas and oil) used for electricity generation has been constantly decreasing since 2000. The share of nuclear energy has doubled since the inauguration of the second reactor at the Cernavodă power plant in the second half of 2007. The production of electricity from hydroelectric units has averaged ~25% of the energy mix over the last decade, with fluctuations depending on factors such as drought or fossil fuel prices.

The most significant change in the Romanian energy mix from the perspective of household consumers is the rapid increase over the last few years in renewable energy production from sources other than hydroelectric (see Figure 1). This trend is relevant due to the higher generation cost associated with sources such as solar, wind and biomass. In addition to the rise in the production costs and, implicitly, the retail price of electricity, end users also have to support the costs of the green certificates issued to generators for the production of renewable energy.

It should be noted that small and micro hydroelectric projects also benefit from the green certificate system, but the vast majority of hydro generation capacity in Romania consists of large hydroelectric plants (above 10 MW).

## **2.2. The new legislative context**

As stated in the introduction, the Romanian legislative framework in the field of energy has been significantly revised in order to comply with the standards established at the EU level. There are three key changes that have already had or will soon have an impact on household consumers: industry liberalization, price deregulation and the implementation of support mechanisms for renewable energy.

The liberalization of the energy industry was the most significant reform that the sector has seen since the fall of communism. In 1998 and 2000, a series of laws and governmental decisions signaled the start of the liberalization process. Overall, the reform produced substantial changes within the production-supply value chain and also changed the way in which end users can interact with electricity retailers (ANRE, 2013f).

The first steps in implementing the reform involved the vertically integrated state run monopoly in the electricity sector. The company was first broken up into several companies which were no longer vertically integrated. Most of these entities later went through consolidations, reorganizations and even liquidations and several of them were fully or partially privatized.

The liberalization process also created a legal framework that allowed private investors to set up electricity generation or supply companies (both wholesale and retail). This led to a rapid increase in the number of sellers active on the Romanian electricity markets, a topic which we will discuss in more detail in section 2.3.

Finally, the most significant change from the perspective of the end users was that, starting with June 2007, any entity is allowed to establish an electricity supply contract with the retailer of their choice, as opposed to being a captive customer of a predetermined or default supplier. This process is called supplier switching and it creates new opportunities both for the sellers of electricity and the customers.

Price deregulation is a more recent development among Romanian energy policies and it directly impacts end users. Before it started being implemented, any consumer who had not switched suppliers (thus being served by their default supplier) would purchase electricity at a fixed tariff set by the National Authority for Energy Regulation (ANRE). In the case of households, starting with July 2013, this tariff will be gradually phased out and replaced by a market based tariff, which

is calculated using the average price at which suppliers purchase electricity on the market, to which several standardized costs are added, plus a 2.5% margin over the acquisition price (ANRE, 2012c). The same change also affects commercial and industrial customers, but in their case the phase out process began in September 2012 and will be completed much faster than for households.

Price deregulation is a complementary measure, meant to function in conjunction with the liberalization of the electricity industry. The primary purpose of this change is to create a more competitive market. Regulated tariffs can represent a barrier for supplier switching, due to the risk of market prices rising above the regulated price level. Having a market based tariff means that customers will be able to assess the efficiency of their own supplier and opt for a retailer who offers a more advantageous tariff. Because the new mechanism sets a fixed margin which is calculated based on their cost structure, deregulation also benefits suppliers through the reduction of financial risk (ANRE, 2013e).

The last legislative change which we will discuss is the implementation of a support mechanism for renewable energy, which is based on a tradable green certificate (TGC) system. The legislation which established this mechanism was drafted in 2008, but its implementation was postponed until close to 2012 (ANRE, 2013a) due to objections brought up by the European Commission regarding the potential overcompensation of beneficiaries (ANRE, 2012b).

The system works by awarding a specific number of TGCs to renewable energy generators for every unit of electricity produced and delivered into the grid. These certificates then have to be purchased by suppliers on the TGC market. The acquisition cost is then passed on to the end users. The market price of the TGCs was initially allowed to fluctuate between 27 EUR and 55 EUR. The upper and lower cap of the interval will be adjusted yearly using the Eurozone inflation rate (ANRE, 2012b).

The number of certificates and the time period during which they are awarded is illustrated in Table 1. However, according to a recent report published by ANRE, the number of certificates to be awarded to generators may be reduced by up to 50% in the case of solar energy and between 25% - 35% for small hydro and wind energy (ANRE, 2012b). This is due to estimated overcompensation in spite of the adjustments made according to the recommendations of the European Commission during the drafting stages of the legislation.

**Table 1** *The number of green certificates awarded to Romanian generators*

<i>RE source category</i>	<i>Unit type</i>	<i>TGCs awarded per MWh</i>	<i>Period (yrs.)</i>
<i>Hydroelectric (installed capacity <math>\leq 10</math> MW)</i>	new (operational after Jan-04)	3 TGCs	15
	restored/upgraded	2 TGCs	10
	other (operating before Jan-04)	0.5 TGCs	3
<i>Wind</i>	<i>new</i>	2 TGCs until 2017 1 TGC from 2018	15
	<i>reutilized</i>	2 TGCs until 2017 1 TGC from 2018	7
<i>Geothermal</i>	<i>new</i>	2 TGCs	15
<i>Biomass</i>	<i>new</i> (all types of bio waste)	2 TGCs	15
	<i>new</i> (from energy crops)	3 TGCs	15
	<i>high efficiency cogeneration</i>	1 extra TGC	15
<i>Fermentation gas (waste /water processing mud)</i>	<i>new</i>	1 TGC	15
<i>Solar</i>	<i>new</i>	6 TGCs	15

Adapted from: (ANRE, 2012b)

The significant impact of TGCs on the retail price of electricity was publicly acknowledged by the Romanian Government, who announced their intention to suspend ~50% of the TGC payments until the beginning of 2017 (Popescu, 2013). Although these measures are likely to discourage investors, they are also expected to limit the electricity price pressure on household consumers.

### **2.3. The diversification of suppliers**

The last change affecting the Romanian electricity markets that we will include in our assessment is the diversification of suppliers. As mentioned in section 2.2, liberalization had a significant impact on the Romanian electricity sector, especially with regard to the entities functioning on the wholesale and retail market. The breakup of the monopoly that RENEL (the vertically integrated state owned electricity utility) had over the industry was only the first stage of the reform. A series of laws and governmental decisions (which also have a normative power in Romania) have created an electricity sector which now also includes entities such as private start-up companies, subsidiaries of large international corporations and former state owned companies which have been partially or completely privatized or publicly listed.

Figure 2 is intended to briefly illustrate the evolution of the Romanian electricity sector from the monopoly which existed up to 1998 to its current structure. As one of the key requirements of liberalization was to eliminate vertical integration, the figure is split according to the four main components of the electricity value chain: generation (or production), transmission (high voltage transportation of electricity), distribution (medium and low voltage transportation of electricity) and supply (wholesale or retail selling of electricity).

	... - 1998	1998	2000	2001	2002	2003 - 2012	2013
<b>G E N E R A T I O N</b>	Regia Autonomă de Electricitate (RENEL)	Compania Națională de Electricitate (CONEL) Nuclearelectrică RAAN Other companies	Termoelectrică Hidroelectrică Nuclearelectrică RAAN Other companies	Termoelectrică Hidroelectrică Nuclearelectrică RAAN Other companies	CET Pitești CET Iași CET Brașov CET Suceava CET Timișoara Electrocentrale București Electrocentrale Turcomi Electrocentrale Rovinari Termoelectrică Hidroelectrică Nuclearelectrică RAAN Other companies	• restructurings • liquidations • privatizations • consolidations • changes in legislation	Termoelectrică Renewable energy generators: Enel Green, EDP Renewables, Tomis Team etc. Oil & gas companies: OMV Petrom, Lukoil CETs (and similar companies) Hidroelectrică Nuclearelectrică RAAN Other companies
<b>T R A N S M I S I O N</b>		Compania Națională de Electricitate (CONEL) Nuclearelectrică RAAN Other companies	Transelectrica	Transelectrica	Transelectrica		Transelectrica
<b>D I S T R I B U T I O N</b>		Electrică	Electrică	Electrică Moldova Electrică Dobrogea Electrică Banat Electrică Oltenia Electrică Muntenia S Electrică Muntenia N Electrică Transilvania N Electrică Transilvania S	Electrică Moldova Electrică Dobrogea Electrică Banat Electrică Oltenia Electrică Muntenia S Electrică Muntenia N Electrică Transilvania N Electrică Transilvania S		E.ON Moldova Distribuție ENEL Distribuție Dobrogea ENEL Distribuție Banat CEZ Distribuție ENEL Distribuție Muntenia FDEE Electrică Distribuție Muntenia N FDEE Electrică Distribuție Transilvania N FDEE Electrică Distribuție Transilvania S
<b>S U P P L Y</b>				Electrică Moldova Electrică Dobrogea Electrică Banat Electrică Oltenia Electrică Muntenia S Electrică Muntenia N Electrică Transilvania N Electrică Transilvania S	Electrică Moldova Electrică Dobrogea Electrică Banat Electrică Oltenia Electrică Muntenia S Electrică Muntenia N Electrică Transilvania N Electrică Transilvania S		Default suppliers (5 companies): CEZ Vinzarea, ENEL Energie, ENEL Energie Muntenia, E.ON Energie România, FDEE Electrică Furnizare Exclusively wholesale suppliers (~35 companies) Other suppliers (~35 companies)

Figure 2 The breakup of the state monopoly in the Romanian electricity sector

Sources: (Romanian Government, 1998; 2000; 2001; 2002a; 2002b; 2002c; ANRE, 2013f)

After going through some transitional stages, by 2002 the industry already had a structure similar to the one we see today: several generation companies grouped mainly around the type of fuel they used or the purpose they served (e.g. CETs produce electricity and municipal heating), a single state owned Transmission and System Operator which supervises all electricity transactions and

manages the national grid and eight distribution and supply companies split based on geographical coverage.

By 2013, several private generation companies had also become active on the market. Five of the distribution and supply companies had been privatized. Subsequently, all eight were split into sister entities which covered only one of the two components of the value chain, forming the five default suppliers.

By the end of 2012, the supply component attracted ~70 other private companies, some of which are owned by the international corporations involved in the privatization of the five distribution and supply companies mentioned above. This component of the value chain, with its relatively low investment costs and potential for high gains, now has the largest number of active entities.

The diversification of electricity sellers directly impacts end users by offering them a larger variety of options when choosing to switch suppliers. However, most of these entities will either prefer or will be obligated to serve only the larger commercial and industrial consumers and not residential customers. This issue will be discussed in more detail in section 3.2.

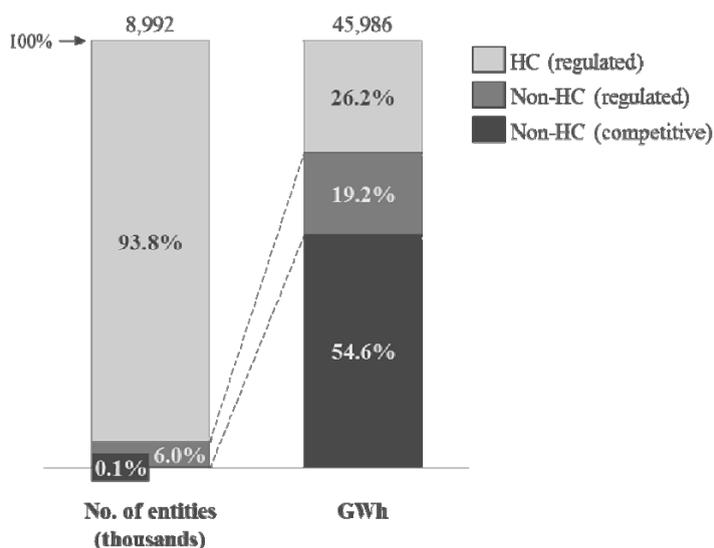
### **3. IMPACT ON THE HOUSEHOLD CONSUMERS**

After documenting and discussing the various changes through which both the Romanian electricity markets and the rest of the industry went, we will attempt to assess the impact that these modifications have or will have on the household consumers (HC). HCs are entities that purchase electricity for residential or domestic use, not for professional, commercial or industrial purposes. All other entities are called Non-household consumers (Non-HC).

#### **3.1. A new pricing paradigm**

The first and most visible impact of the documented market changes is the creation of a new and more complex pricing mechanism. Electricity is no longer being retailed at a price level set and occasionally updated by the ANRE. The cost of electricity paid by the end user now depends on a series of factors, such as market prices, the production of renewable energy and the direct negotiation with the retailer. We expect that the direct control that the regulator has over the market will gradually decrease over the following decade up to the point where we will see a fully liberalized retail market with the ANRE serving as its referee.

Regulated electricity tariffs will continue to be relevant for household consumers until the beginning of 2018, when they will have been phased out completely. For this reason, our discussion should take into consideration the number of HCs and Non-HCs who have switched suppliers and thus opted out of the regulated tariff.



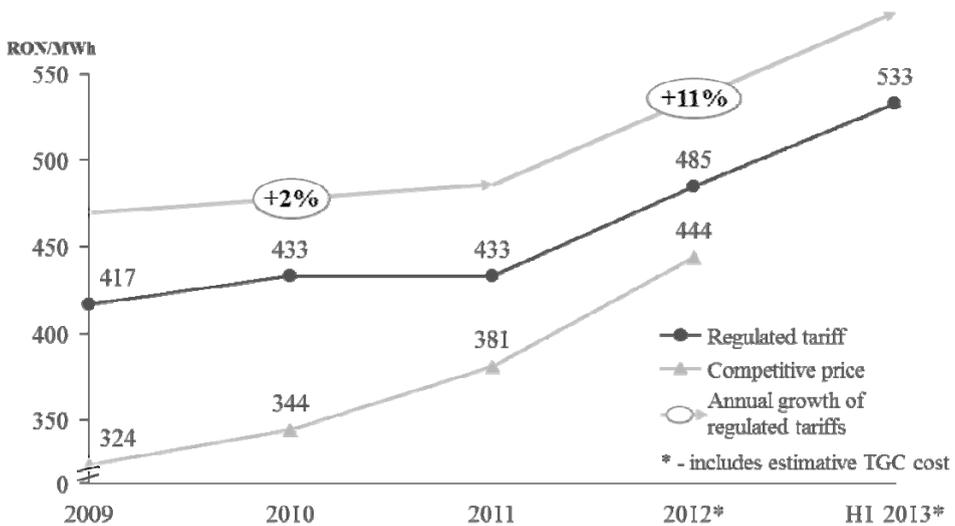
**Figure 3** Regulated tariffs and competitive prices on the retail electricity market

Source: calculations based on various data obtained from (ANRE, 2013d)

Figure 3 shows that, by the end of 2012, out of the approximately 8.4 million HCs, none had made a supplier switch and were still being sold electricity at regulated tariffs. Only a small percentage of the 0.6 million Non-HCs had switched suppliers and were now buying electricity at competitive pricing levels. However, considering the data illustrated in Figure 3, these Non-HCs, which represent 0.1% of all customers, generate nearly half of the entire retail electricity demand. This means that many of them are likely to be very large industrial customers that were highly interested in negotiating a better price for the electricity they used.

Given that none of the HCs had switched suppliers by the end of 2012 and that a large number of Non-HCs were in a similar position, regulated prices remain relevant for the vast majority (99.9%) of electricity consumers, particularly the HCs. Thus, we sought to assess the evolution of the regulated and competitive prices applicable to households over the last few years.

Given that no HCs are being sold electricity at competitive prices, our comparison uses the price of electricity purchased by small Non-HCs (<20 MWh/year) as a reference point. This category was deemed adequate, considering the estimated annual energy use of a household (OFGEM, 2011). The regulated tariff figure is calculated using the standard monotonous tariff for HCs that was in effect at the start of the year. For 2012 and 2013 we included the cost associated with the renewable energy support mechanism. This was calculated using the methodology and data provided by the regulator (ANRE, 2013g) and the electricity market operator (OPCOM, 2013).



**Figure 4** The evolution of regulated and competitive electricity prices (RON/MWh)

Sources: calculations based on various data obtained from (ANRE, 2013g; 2013b; 2013c; OPCOM, 2013)

Figure 4 shows that the TGC cost has led to a compound annual growth rate in regulated electricity tariffs of 11%, as opposed to the 2% observed during the period 2009 – 2011. If the cost of green energy were not included in the calculation, the increase would have been ~4% during 2011 – 2013. This translates to a significant impact of TGCs in the household electricity bills.

Over the next few years, as the amount of green electricity produced by Romanian generators increases, so will the overall cost of TGCs. Additional price pressure will result from the deregulation of gas prices and, as we come closer to the establishment of a Single European Energy Market (European Commission,

2013), the alignment tendency between Romanian and EU energy prices. The recently announced rejection of the Nabucco West project is likely to also influence electricity prices indirectly (OMV, 2013).

Thus, the medium to long term forecast shows a continuous increase in electricity prices. A trend in which electricity and gas bills will represent an increasing share of the household budget is likely to have a significant social impact, generating public frustration towards the government and, in some cases, civil unrest (Euronews, 2013). The Romanian Government seems to have taken preemptive actions against such events through planned adjustments of the green energy support mechanism (see section 2.2), planned informational campaigns regarding the liberalization and deregulation of the electricity market (ANRE, 2012a) and, based on personal observations, an increased frequency of public appearances and statements by the minister in charge of energy.

According to consumer behavior models in the field of energy, such as the one proposed by Gamble et al. (2009), the combination of price increases, informational campaigns and price variation among suppliers (as a result of deregulation), is expected to lead to an increase in supplier switching intention of household consumers. However, the fact that the switching intention exists does not necessarily mean that the HC is also able to act on it – an aspect that is discussed in section 3.2.

### **3.2. The constrained freedom of the liberalized electricity market**

Theoretically, the liberalization of the electricity markets, which was completed in 2007, means that all consumers are able to choose the retailer that supplies them with electricity. As seen in Figure 3, by the end of 2012 none of the 8.4 million HCs in Romania had switched electricity suppliers. There is no official statement from the ANRE or the Government that attempts to explain this situation. However, secondary data regarding the Romanian electricity sector and the results of research conducted in other European countries do provide some insights into why HCs seem to lack freedom in the liberalized market.

One issue raised by Salmela and Varho (2006) and von der Fehr and Hansen (2010) is that the limited availability of information, especially with regard to tariff comparison across suppliers acts as a barrier for supplier switching. In addition, the supplier switching procedure is somewhat cumbersome and many HCs are likely

not aware of it (ANRE, 2009; 2011). The bureaucracy involved in switching suppliers may also mean that those HCs who are aware of the procedure, may not be willing to pursue it. These issues could be mitigated through information campaigns and the implementation of a tariff normalization or comparison system.

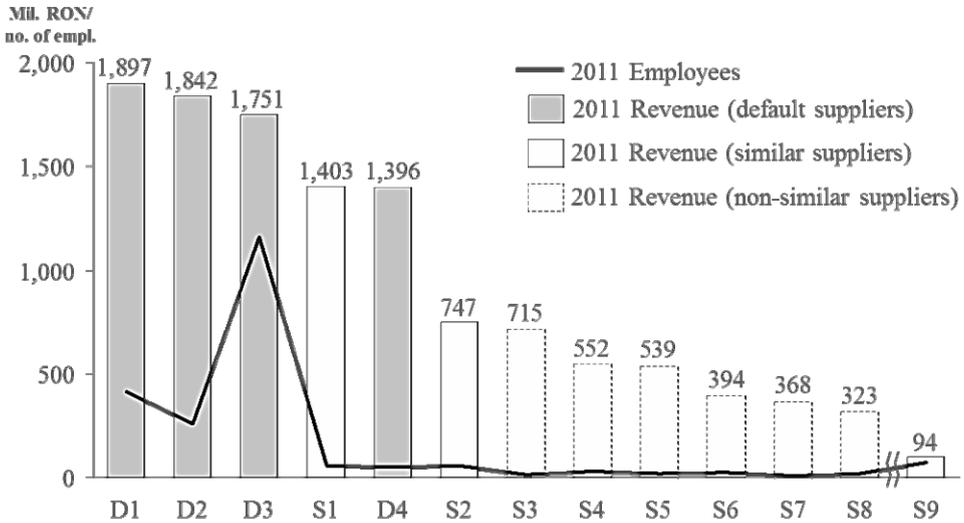
The more complex issues regarding HC freedom on the market are related to the practical realities of the industry. The regulations regarding the activity of electricity suppliers state that these companies are obligated to read the meters of all customers on a regular basis and report the registered consumption to the distribution companies. However, not all suppliers may have the resources to perform such activities across large numbers of HCs or wide geographical areas.

In order to gain a sense of how the 35 competitive retailers compare to the default electricity suppliers, we performed an assessment of their revenue and number of employees in the year 2011. The revenue is expected to give us a sense of the scale of the company, while the number of employees would suggest the logistical and administrative capacity of the business. The default suppliers will be used as a benchmark for the competitive retailers. The analysis looked at all companies that were primarily classified as retail suppliers of electricity (e.g. large industrial companies that are involved primarily in metallurgy or the supply of natural gas, but also act as electricity suppliers, were excluded from the analysis) – this means that one of the five default suppliers was not included in the analysis because its primary stated activity is the supply of natural gas.

Figure 5 illustrates the top 12 electricity retailers in Romania sorted based on their 2011 revenue. Only supplier S1 had a revenue level comparable to that of default suppliers D1 – D4. S1, S2 and S9 were the only entities that had an employee figure similar to that of D4. Based on this information, we hypothesize that only three retailers out of the 35 currently active on the market could have the capability to compete with the default suppliers in the HC segment.

Figure 3 shows that, on average, Non-HCs purchase over 40 times more electricity than HCs. This means that, even if more retailers would be able to compete with the default suppliers in the HC segment, they would likely not be interested to extend their portfolio with a very large number of low profitability customers. Such a drastic increase in the number of clients would have a significant effect on the company's administrative costs. This would ultimately lead to an increase in sales price to keep up profitability. But the higher prices may cause

customers to opt for a different supplier and the company would stand to lose more than it gained.



**Figure 5** Comparison of the default and competitive suppliers of electricity

Source: calculations based on various data obtained from (Ministry of Public Finances, 2013)

The prospect of attracting HCs from different regions of the country may also prove unappealing for large entities such as the default suppliers. This is also due to an increase in administrative and logistical costs (e.g. renting offices and hiring customer support personnel in several new cities, revision or expansion of ERP systems, increased logistical costs due to a wider geographical coverage).

We conclude that the legislative changes regarding the Romanian electricity sector only offer complete freedom of choice to HCs at a theoretical level. The reality on the market shows that, in the future, the main competition in the HC segment will likely be among the five already established default suppliers. If we take into consideration the fact that the same international company has a majority stake in two of them and that another one remains state owned, we expect that the true competition on the HC segment may consist of only three entities. As suggested by Percebois (2008) and Farré et al. (2010) this would reduce the competitiveness of the market and lead to price increases specific to oligopolies.

#### 4. CONCLUSION

This research represents a first attempt to strategically assess the household consumer segment of the Romanian retail electricity market from an energy marketing perspective. Considering that we did not find any similar work during our secondary research and literature review, this study is one of the few or even the first to address the topic of Romanian household consumers in the liberalized market. Given that some of the market changes discussed in the paper have occurred only recently, we believe that this is an emerging research topic that will gain more interest as household consumers will become more active on the retail market.

Our findings can be useful from the perspective of the suppliers, the Government and the consumers. Suppliers can use this type of research to harmonize their own strategies with those used by successful retailers in liberalized markets other than Romania. Governmental decision makers can use the findings in order to create energy policies which are based on the EU guidelines, but are more compatible with the specific context of the Romanian market. Consumers can also benefit from such research by gaining a better understanding of the market mechanisms and of their supplier switching options.

The findings of the research would be better supported and could also be expanded if the study included primary data from interviews with household consumers and representatives of the default and the largest non-default retail suppliers. However, such an approach may be unrealistic, given that the research addresses future business strategies, the details of which are confidential, especially in the context of a market with a relatively low number of competitors.

The potential marketing strategies of the electricity suppliers can constitute a subject of interest for new studies. However, our future research on this topic will also aim to provide a more in-depth understanding of the motivations and the behavior of household consumers.

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