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An investigation to the daily exchange rate Euro/Albanian Lekë during the period 03 January 2013 – 12 September 2014

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Abstract

The main purpose of the study is to test the fair game hypothesis as well as the foreign exchange market efficiency for daily exchange rate process Euro/Albanian Lekë over the period 03 January 2013 – 12 September 2014 in Albanian currency market. The results of this study include:

1. The daily exchange rate data Euro/Albanian Lekë during the period 03 January 2013 – 12 September 2014 contradict the Kolmogorov's Central Limit Theorem at 99.99% level of confidence.
2. The fair game hypothesis is rejected for the daily exchange rate process Euro/Albanian Lekë over the specified period at 99.99% level of confidence.
3. The Albanian foreign exchange market was inefficient regarding to the relative exchange in the daily exchange rate Euro/Albanian Lekë during the period 03 January 2013 – 12 September 2014 at 99.99% level of confidence

These finding are shocking.

Keywords: exchanger rate, Euro, Albanian Lekë, fair game, foreign exchange market efficiency.

1. Introduction

The efficient market hypothesis relies on the efficient exploitation of information by economic actors. Foreign exchange market efficiency as well as fair game exchange rateprocess are important considerations for all currency market participants. Fama (1984) states that a foreign exchange market is efficient if fully reflect all available information. A weaker-form efficient market, proposed by Jensen (1978), states that a foreign exchange market is efficient if the marginal benefit of information is greater than the marginal cost of collecting information. The role of foreign exchange market is to ensure that information is available to all participants. There are three types of currency market efficiency: weak form efficiency, semi-strong form efficiency, and strong form efficiency. Weak form efficiency requires that exchange rates move randomly, at least in the short term. Semi-strong efficiency and strong efficiency both refer to the disclosure of information. Semi-string efficiency requires that exchange rates reflect all published information; strong form efficiency requires that exchange rate reflect all public and private information (or inside , hidden information). The strong form of the efficient market hypothesis encompasses both semi-strong and weak forms of the efficiency. Especially, foreign exchange market efficiency implies zero serial correlation in exchange rate changes (fluctuations). If exchange rates were influenced by private (inside, hidden) information, then currency market participants would feel that the exchange market is unfair, as they would lose profits to other participants who had such information, see Madura and Fox (2007), p 84. The efficient market hypothesis, also referred as **"informational efficiency"**, asserts that currency market is **"informationally efficient"**, see Hallwood and MacDonald (1994). The efficient market hypothesis requires that currency market participants have rational expectations, and there is no transaction cost that averts them from buying or selling assets, see Giannellis and Papadopoulos (2009). Robert Lucas Jr. (1975) interpreted the rational expectations hypothesis as an assumption that available information is optimally utilized by every participant in forming expectations. Lucas supposed that individual agents or firms develop their forecasts by minimizing the square mean of the forecast error, conditional on the information available to them.

Foreign exchange market may or may not be efficient and some participants may or may not be rational. Either situation is acceptable to most of academics or practitioners. Testing for

exchange market efficiency is a complicated problem. Whether or not a foreign exchange market is efficient has been extensively investigated, using different econometric techniques. Grossman and Stiglitz (1980), and Slezak (2003) argue that perfect informationally efficient markets are impossible because if markets are perfectly efficient then the profit from trading on information would be equal to zero, while the cost of gathering and trading on information is positive. Fama (1984) investigates the efficiency in nine currencies against US dollar and shows the efficient market hypothesis is rejected, because of a time-dependent risk premium. Hakkio and Rush (1989) test the efficiency hypothesis for the UK pound and the Deutsche mark. They find a consistency with efficient market hypothesis. Wu and Chen (1998) test the foreign exchange market efficiency for nine OECD countries and they find the support of the efficiency. Zivot (2000) tests the foreign exchange market efficiency for British pound, Japanese yen, and Canadian dollar against US dollar. He strongly rejects the efficiency hypothesis in all exchange rates, at 96% level of confidence. Aroskar, Sarkar, and Swanson (2004) investigate the impact of the European financial market crisis on foreign exchange market hypothesis during pre-crisis, crisis, and post-crisis periods. They show that foreign exchange market inefficiency is strong in specific periods. Lee and Sodoikhuu (2012) report the acceptance of the weak-form efficient market hypothesis for foreign exchange markets in Japan, South Korea, and Philippines, but the rejection in Taiwan. In conclusion, several studies provide mixed evidence in efficient market hypothesis. Some tests may have low power because the exchange rates can follow several complicated types of stochastic processes.

There might be three reasons why the currency markets are inefficient (Azad, 2009). First, the exchange rates in these markets do not quickly adjust to new information. Second, the exchange rates in these markets are not set at the equilibrium (Bayes-Nash-Harsanyi equilibrium) level, see Smith, Jefferis, and Ryoo (2002). Third the emergence of a parallel black market, due to the existence of exchange rate controls, and divergence between the equilibrium exchange rate and the official exchange rate, see Diamandis, Kouretas, and Zarangas (2007). If a foreign exchange market is inefficient, a mathematical model that best predicts the exchange rate movements can be developed. Therefore, an inefficient foreignexchange market provides opportunities for profitable foreign exchange transactions (Madura and Fox, 2007). Further, in an inefficient currency market the Monetary Authority (Central Bank) can approximate the optimal strategy to influence exchange rates, to reduce the exchange rate validity, and to evaluate the

consequences of economic policies. Participants in the inefficient foreign exchange market can devise and use various trading rules or techniques to make abnormal profits from transactions.

Different methods and data frequencies can be used to investigate the efficiency of foreign exchange markets. In this paper we use the Levich's method (1989) to test the informational efficiency hypothesis for the Euro against Albanian Lekë during the period 03 January 2013 – 12 September 2014 in Albania's currency market.

Let us describe the exchange rate arrangements in Albania:

Currency : Albanian lekë,
Exchange rate structure : Unitary,
Classification : Free floating,
Monetary authority : Bank of Albania,

see IMF Annual Report on Exchange Arrangement and Exchange Restrictions, 2011. The Bank of Albania calculates and announces the daily exchange rates for US dollar, euro, and other major currencies. Albanian Government transactions are conducted rarely at exchange rates.

Exchange tax : No
Exchange subsidy : No
Forward exchange market : No

The rest of the paper is organized as follows: Section 2 contains the mathematical models, Section 3 provides the investigation of daily exchange rateeuro / Albanian lekë; Section 4 concludes the paper.

2. Mathematical Models

Historically, there exists a very close link between efficient market hypothesis and martingales. Nominal and real exchange rates are well approximated by a discrete martingale. Academic economists have accumulated a mountain of evidence in the last twenty years to the effect that the mean exchange rates at the 1 or 3 month horizons follow a martingale. The forecast of exchange rates has never been significantly better that the martingale, see Meese and Rogoff (1983), Frankel (1993), Frankel and Rose (1995), MacDonald (1999), etc. Let us briefly explain the concept "discrete martingale". Consider a complete probability space (Ω, F, P) equipped with an increasing family $\{ F_t \}$, $t \in N$, of sub – σ algebras of F, called a filtration. In other words, $(\Omega,$

F, P, F_t), t ∈ N, denotes a filtered probability space. A real valued stochastic process X(t), integrable and adapted to { F_t } is said to be a discrete martingale if the conditional expectation satisfies the condition

E[X(t) | F_s] = X(s), P – a.s.,∀ s, t ∈ N and s ≤ t.

Of course, the filtration {F_t } is very important in this definition. When we want to stress this fact, we will speak of F_t – martingale. Any stochastic process X(t) is adapted to its natural filtration. F_t^0 = σ (X(s), s ≤ t), and { F_t^0 } is the minimal filtration to which X(t) is adapted. In other words, { F_t^0 } is the minimal σ - algebra containing all sets of the form { w ∈ Ω | x(1) ∈ B_1, X(2) ∈ B_2, …, X(t) ∈ B_t}, where B_1, B_2, …, B_t⊂ R are arbitrary Borel sets. To say that X(t) is adapted to {F_t} is to say that F_t^0 ⊂ F_t , ∀ t ∈ N. Heuristically speaking , the σ- algebra F_t^0 is the collection of all random events which may occur before or at the time t. in other words, F_t^0 is the set of all possible pasts up to time t. One often thinks of F_t^0 as the history of the stochastic process X(t) up to time t, or as the information set available at time t. Note that F_t^0 is complete: all sets of P-measure zero are included in F_t^0; F_s^0 ⊂ F_t^0 for s <t, and F_t^0 ⊂ F, ∀ t ∈ N.

We need the following statements:

Theorem 1

If a stochastic process X(t) is F_t^0 – martingale, then E[X(t)] = constant, ∀ t ∈ N.

Theorem 2

If a stochastic process is not F_t^0 – martingale, then it is not also F_t – martingale.

Definition (according to Jerome L. Stein and N.N. Vorobiev).

A stochastic process with discrete time X(t), t ∈ N, is said to be a fair game if the process Z(t) = X(t+1) – X(t), t ∈ N, admits normal distribution with expectation zero , for all t ∈ N:

Z(t) ~N ($\mu_t = 0$, σ_t^2), see Gihman and Skorohod (1974 - 1979), Revuz and Yor (1991), Lipster and Shiryaev (1996), Shiryaev (2002), and Stein(2012) for an advanced treatement of martingale and fair game processes. The Kolmogorv – Smirnov test, like the Chi-squared test, can be used for any probability distribution. The Kolmogorov – Smirnov – Lilliefors test, however, is a supremum distance test specifically designed to test normal distribution. The Shapiro – Wilk test for normality compares a random sample against the normal distribution.

The Shapiro – Wilk test is of regression type and exhibits sensitivity to non-normality over a wide range of alternative distributions. The Shapiro – Wilk test is also sensitive to both skewness (asymmetry) and kurtosis (excess of the probability density function). The Shapiro – Wilk test provides a generally more accurate measure of non-normality that Kolmogorov – Smirnov – Lilliefors test, Cramer- Von Mises test, Durbin test, Chi-squared test, or b_1 test, see Hogg (2009), Field (2009). The Shapiro – Wilk test seems great: in one easy procedure it tells us whether a given random sample is selected from a normal population.

3. Investigation of the daily exchange rate euro / Albanian lekë

We are primarily concerned on the day-to-day fluctuations in the spot exchange rate

$$x(t) = s(t+1) - s(t), \quad t \in N, \qquad (1)$$

where s(t) denotes the exchange rate at time t .

A contemporary method for testing foreign exchange market efficiency is tocompute the probability of various trading strategies. One popular technique for generating buy and sell signals is the filter rule. A x percent filter rule leads the following strategy: "Buy a currency wherever it rises by x percent above its most recent trough; sell the currency fails x percent below its most recent peak". This filter rule was used by E. Fama in American currency market to test speculative profits. Consider a filter rule

$$\varepsilon(t) = \begin{cases} -1, & for\ a\ buy\ decision\ at\ time\ t, \\ 1, & for\ a\ sell\ decision\ at\ time\ t, \end{cases}$$

and accumulated wealth W (t) resulting from the $\{\varepsilon(t)\}$ strategy :

$W(t) = W(t-1) + \varepsilon(t)\ E[x(t)], \quad t \geq 2,$

$W(1) = x(1)$

It is obvious that

$E[W(t) \mid F^0_{t-1}] = W(t-1) + \varepsilon(t)\ E[x(t)]$

and

$x(t) = \varepsilon(t)\ [W(t) - W(t-1)], \quad t \geq 2.$

If s(t) is a martingale, then $E[x(t)]=0$ and $E[W(t) \mid F^0_{t-1}] = W(t-1), \quad t \geq 2.$

Hence, every filter rule $\varepsilon(t)$ converts the martingale s(t) into the martingale W(t).

If W(t) is a martingale, then no filter rule $\varepsilon\ (t)$ will be profitable in average. If W(t) is not a martingale, then there exist filter rules which will be profitable in average.

We use the following concept of the **foreign exchange market efficiency**, introduced by Levich (1989). This concept corresponds to the weak efficiency .

Definition

The foreign exchange market is **efficient** if s(t) follows a **fair game** process. In other words, the foreign exchange market is efficient if x(t) follows a normal distribution with expectation equal to zero. The **normal distribution** of the day-to-day fluctuations in spot exchange rate provides the participants equal chance to profit in foreign exchange market. If the foreign exchange market is **efficient** (in Levich's sense), then x(t) follows no pattern that might be exploited to **produce** profits. The data set consists of daily nominal exchange rate, quoted in term of Albanian lekë, for euro during the 03 January 2013 – 12September 2014 in Albanian's exchange market. The data source is **Bank of Albania (http://wwwbankofalbania.org).**We develop a statistical analysis of the daily changes in the spot exchange ratex(t) as well as of the relative daily changes in the spot exchange rate

$$r(t) = \frac{s(t+1) - s(t)}{s(t)} \quad (2)$$

Table 1 lists summary statistics for the s(t). We use SPSS (version 2009), see Field (2009)

Table 1. Statistical parameters for s(t) during the period 03 January 2013 – 12 September 2014

Sample size	n = 429
Sample mean	140.1791
95% confidence interval for mean	140.132; 140.2263
Median	140.17
Variance	0.247
Standard deviation	0.49692

Coefficient of variation	0.00354
Maximum	141.57
Minimum	138.94
Range	2.63
Interquartile range	0.56
Skewness	0.359
Kurtosis	0.313

Test the hypothesis

H_0 : The daily nominal exchange rate euro / Albanian lekë over the period 03 January 2013 – 12September 2014 follow a normal distribution.

H_1 : The daily nominal exchange rate euro /Albanian lekë over the specified period follow a non normal distribution.

We apply Kolmogorov – Smirnov – Lilliefors test as well as Shapiro – Wilk test for normality. The observed value of the KSL test is 0.070 and the observed value of the SW test is 0.982.

Decision Rule

Reject the null hypothesis H_0 at the confidence level 99.99%.

In other words, the daily exchange rate data Euro/Albanian Lekë during the period 03 January 2013 – 12 September 2014 contradict the Kolmogorov's Central Limit Theorem at 99.99% level of confidence.

Let us consider the day-to-day fluctuations in the nominal exchange rate, denoted by x(t), quoted in terms of Albanian Lekë, for Euro during the period 03 January 2013 – 12 September 2014 in Albania's exchange market. Table 2 lists the summary statistics for x(t). We use SPSS (version 2009), see Field (2009).

Table 2. Statistical parameters for x(t) during the period 03 January 2013 – 12 September 2014

Sample size	n = 428
Sample mean	-0.001262
95% confidence interval for mean	-0.011991; 0.0094675
Median	-0.01
Variance	0.013
Standard deviation	0.1129291

Coefficient of variation	-89.4842
Maximum	0.78
Minimum	-0.43
Range	1.21
Interquartile range	0.09
Skewness	1.249
Kurtosis	9.26

Test the hypothesis

H_0: The successive differences of the daily exchange rate Euro/Abanian Lekë during the period 03 January 2013 – 12 September 2014 follow a normal distribution.

H_1: The successive differences of the daily exchange rate Euro/Albanian Lekë during the specified period follow a non-normal distribution.

We apply Kolmogorov – Smirnov – Lilliefors test as well as Shapiro – Wilk test for normality. The observed value of the KSL test is 0.131 and the observed value of the SW test is 0.884.

Decision Rule

Reject the null hypothesis H_0 at the confidence level 99.99%. In other words, the fair game hypothesis (in the sense of Stein – Fama – Vorobiev) for the daily exchange rate process Euro/Albanian Lekë over the specified period is rejected at 99.99% level of confidence.

Now, we consider the relative daily changes in the nominal exchange rate, denoted by **r(t),** quoted in terms of Albanian Lekë, for Euro during the period 03 January 2013 – 12 September 2014 in Albania's exchange market. Table 3 lists summary statistics for the **r(t)**.We use SPSS (version 2009), see Field (2009).

Table 3. Statistical parameters for r(t) during the period 03 January 2013 – 12 September 2014

Sample size	n = 428
Sample mean	-0.000009
95% confidence interval for mean	-0.000085; 0.0000678
Median	-0.000071

Variance	0.000
Standard deviation	0.00081
Coefficient of variation	-90
Maximum	0.0056
Minimum	-0.0031
Range	0.0087
Interquartile range	0.00064
Skewness	1.249
Kurtosis	9.246

Test the hypothesis

H_0 : The relative daily changes **r(t)** in the nominal exchange rate euro / Albanian lekë over the period 03 January 2013 – 12 September 2014follow a normal distribution.

H_1 : The relative daily changes **r(t)** in the nominal exchange rate euro / Albanian lekë over the specified period follow a non-normal distribution.

We use KSL as well as SW test for normality. The observed value of the KSL test is 0.130 and the observed value of the SW test is 0.885.

Decision Rule

At the confidence level 99.99%, reject the null hypothesis H_0 . That is, the Albanian foreign exchange market was inefficient in the Levich's sense regarding to the relative changes in the daily nominal exchange rate euro / Albanian lekë during the period 03 January 2013 – 12 September 2014.

4. Conclusion

The main objective of the study is to test the fair game hypothesis and the efficient foreign exchange market hypothesis in the Levich's sense for the daily exchange rate process euro / Albanian lekë during the time period 03 January 2013 – 12 September 2014in Albania's exchange market. There is a contradiction between the fundamental regularities of the contemporary float exchange rate theory and our findings. Although it is hard to distinguish the

nominal exchange rate process from a martingale, we showed that the martingale model for the nominal exchange rate euro / Albanian lekë is inconsistent with the data set over the specified periods.

An important problem is the severity of rejection of the efficient currency market hypothesis, because the Albania's foreign exchange market is inefficient at the 99.99% level of confidence.

We reject the fair game hypothesis regarding to the daily nominal exchange rate processeuro / Albanian lekë during the specified periods in Albania's market, at the confidence level 99.99%.

A substantial evidence leads us to reject the F_t^0 – martingale model of the daily exchange rate process euro / Albanian lekë during the specified periods.

According to Theorem 2, the daily exchange rate process euro / Albanian lekë has not also been F_t – martingale during the specified periods.

We make the conjecturethat there might be two reasons why the Albania's currency market is inefficient. **First**, the existence of speculative activities and the emergence of a parallel black exchange market. **Second**, the euro / Albanian lekë daily exchange rate is not set at the Bayes – Nash – Harsanyi equilibrium level for the game with incomplete information. Therefore, there is a difference between the equilibrium level for euro / Albanian lekë daily exchange rate and corresponding daily exchange rate reported by the Bank of Albania.

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Appendix

Table 4Daily exchange rate euro / Albanian lekë, 03 January 2013 – 12September 2014

12.09.2014	140,15	14.08.2014	139,25	15.07.2014	140,18	16.06.2014	140,19
11.09.2014	140,25	13.08.2014	138,94	14.07.2014	140,2	13.06.2014	140,21
10.09.2014	140,31	12.08.2014	139,05	11.07.2014	140,22	12.06.2014	140,13
09.09.2014	140,29	11.08.2014	139,35	10.07.2014	140,21	11.06.2014	140,12
08.09.2014	140,05	08.08.2014	139,48	09.07.2014	140,21	10.06.2014	140,1
05.09.2014	139,65	07.08.2014	139,65	08.07.2014	140,23	09.06.2014	140,17
04.09.2014	139,64	06.08.2014	139,45	07.07.2014	140,27	06.06.2014	140,12
03.09.2014	139,53	05.08.2014	139,17	04.07.2014	140,31	05.06.2014	139,96
02.09.2014	139,45	04.08.2014	139,15	03.07.2014	140,3	04.06.2014	139,88
01.09.2014	139,44	01.08.2014	139,14	02.07.2014	140,29	03.06.2014	139,88
29.08.2014	139,44	31.07.2014	139,02	01.07.2014	140,27	02.06.2014	139,87
28.08.2014	139,39	30.07.2014	139,03	30.06.2014	140,26	30.05.2014	139,86
27.08.2014	139,32	29.07.2014	139,13	27.06.2014	140,23	29.05.2014	139,91
26.08.2014	139,32	25.07.2014	139,42	26.06.2014	140,23	28.05.2014	139,9
25.08.2014	139,33	24.07.2014	139,41	25.06.2014	140,22	27.05.2014	139,92
22.08.2014	139,36	23.07.2014	139,51	24.06.2014	140,2	26.05.2014	139,82
21.08.2014	139,4	22.07.2014	139,66	23.06.2014	140,17	23.05.2014	139,82
20.08.2014	139,44	21.07.2014	139,91	20.06.2014	140,24	22.05.2014	139,88
19.08.2014	139,37	18.07.2014	140,04	19.06.2014	140,23	21.05.2014	139,98
18.08.2014	139,28	17.07.2014	140,1	18.06.2014	140,2	20.05.2014	139,97
15.08.2014	139,25	16.07.2014	140,14	17.06.2014	140,17	19.05.2014	139,97

Table 4 continued

16.05.2014	140,02	16.04.2014	140,09	18.03.2014	140,42	14.02.2014	140,39
15.05.2014	140,01	15.04.2014	140,1	17.03.2014	140,44	13.02.2014	140,33
14.05.2014	140,05	14.04.2014	140,14	13.03.2014	140,48	12.02.2014	140,34
13.05.2014	140,08	11.04.2014	140,15	12.03.2014	140,34	11.02.2014	140,38
12.05.2014	140,09	10.04.2014	140,08	11.03.2014	140,33	10.02.2014	140,33
09.05.2014	140,12	09.04.2014	139,96	10.03.2014	140,31	07.02.2014	140,31
08.05.2014	140,09	08.04.2014	139,98	07.03.2014	140,27	06.02.2014	140,27
07.05.2014	140,09	07.04.2014	139,89	06.03.2014	140,04	05.02.2014	140,16
06.05.2014	140,07	04.04.2014	139,82	05.03.2014	140,04	04.02.2014	140,27
05.05.2014	140,02	03.04.2014	139,87	04.03.2014	140,02	03.02.2014	140,26
02.05.2014	140,07	02.04.2014	139,83	03.03.2014	140,1	31.01.2014	140,44
30.04.2014	140,08	01.04.2014	140,05	28.02.2014	140,14	30.01.2014	140,45
29.04.2014	140,07	31.03.2014	140,27	27.02.2014	140,17	29.01.2014	140,55
28.04.2014	140,03	28.03.2014	140,35	26.02.2014	140,22	28.01.2014	140,57
25.04.2014	139,98	27.03.2014	140,35	25.02.2014	140,28	27.01.2014	140,53
24.04.2014	139,99	26.03.2014	140,36	24.02.2014	140,37	24.01.2014	140,5
23.04.2014	140,02	25.03.2014	140,35	21.02.2014	140,41	23.01.2014	140,51
22.04.2014	139,95	24.03.2014	140,32	20.02.2014	140,45	22.01.2014	140,52
21.04.2014	139,94	21.03.2014	140,31	19.02.2014	140,49	21.01.2014	140,56
18.04.2014	140,01	20.03.2014	140,36	18.02.2014	140,49	20.01.2014	140,68
17.04.2014	140,09	19.03.2014	140,43	17.02.2014	140,43	17.01.2014	140,72

Table 4 continued

16.01.2014	140,76	13.12.2013	140,47	12.11.2013	139,94	11.10.2013	141,3
15.01.2014	140,69	12.12.2013	140,45	11.11.2013	139,9	10.10.2013	141,45
14.01.2014	140,67	11.12.2013	140,5	08.11.2013	139,89	09.10.2013	141,48
13.01.2014	140,66	10.12.2013	140,38	07.11.2013	140,01	08.10.2013	141,5
10.01.2014	140,67	09.12.2013	140,29	06.11.2013	140,02	07.10.2013	141,52
09.01.2014	140,66	06.12.2013	140,25	05.11.2013	140,02	04.10.2013	141,57
08.01.2014	140,57	05.12.2013	140,21	04.11.2013	140,03	03.10.2013	141,5
07.01.2014	140,31	04.12.2013	140,27	01.11.2013	140,05	02.10.2013	141,4
06.01.2014	140,18	03.12.2013	140,27	31.10.2013	140,11	01.10.2013	141,4
03.01.2014	140,11	02.12.2013	140,26	30.10.2013	140,24	30.09.2013	141,37
31.12.2013	140,2	27.11.2013	140,25	29.10.2013	140,21	27.09.2013	141,37
30.12.2013	140,01	26.11.2013	140,22	28.10.2013	140,39	26.09.2013	141,29
27.12.2013	139,93	25.11.2013	140,16	25.10.2013	140,47	25.09.2013	141,08
26.12.2013	139,64	22.11.2013	140,13	24.10.2013	140,66	24.09.2013	141,04
24.12.2013	139,53	21.11.2013	140,23	23.10.2013	140,75	23.09.2013	141,04
23.12.2013	139,73	20.11.2013	140,28	22.10.2013	140,55	20.09.2013	140,95
20.12.2013	140,09	19.11.2013	140,24	21.10.2013	140,64	19.09.2013	140,74
19.12.2013	140,3	18.11.2013	140,19	18.10.2013	140,42	18.09.2013	140,49
18.12.2013	140,46	15.11.2013	140,2	17.10.2013	139,99	17.09.2013	140,41
17.12.2013	140,53	14.11.2013	140,2	16.10.2013	140,14	16.09.2013	140,3
16.12.2013	140,54	13.11.2013	140,1	14.10.2013	140,92	13.09.2013	140,21

Table 4 continued

12.09.2013	140,14	14.08.2013	139,8	15.07.2013	140,3	14.06.2013	141,44
11.09.2013	140,14	13.08.2013	139,72	12.07.2013	140,37	13.06.2013	141,21
10.09.2013	140,14	12.08.2013	139,66	11.07.2013	140,42	12.06.2013	141,09
09.09.2013	140,11	09.08.2013	139,81	10.07.2013	140,12	11.06.2013	141,03
06.09.2013	140,08	07.08.2013	139,92	09.07.2013	140,01	10.06.2013	140,91
05.09.2013	140,12	06.08.2013	139,82	08.07.2013	139,87	07.06.2013	140,89
04.09.2013	139,92	05.08.2013	139,69	05.07.2013	140,08	06.06.2013	140,77
03.09.2013	139,89	02.08.2013	140,03	04.07.2013	140,52	05.06.2013	140,72
02.09.2013	139,89	01.08.2013	140,08	03.07.2013	140,52	04.06.2013	140,6
30.08.2013	139,98	31.07.2013	140,2	02.07.2013	140,72	03.06.2013	140,55
29.08.2013	140,09	30.07.2013	140,18	01.07.2013	140,79	31.05.2013	140,45
28.08.2013	140,24	29.07.2013	140,18	28.06.2013	140,96	30.05.2013	140,52
27.08.2013	140,25	26.07.2013	140,26	27.06.2013	140,89	29.05.2013	140,77
26.08.2013	140,24	25.07.2013	140,2	26.06.2013	140,69	28.05.2013	140,98
23.08.2013	140,29	24.07.2013	140,27	25.06.2013	140,53	27.05.2013	141,01
22.08.2013	140,33	23.07.2013	140,24	24.06.2013	140,58	24.05.2013	141,06
21.08.2013	140,23	22.07.2013	140,35	21.06.2013	141,24	23.05.2013	141,08
20.08.2013	140,15	19.07.2013	140,38	20.06.2013	141,34	22.05.2013	141,12
19.08.2013	140,01	18.07.2013	140,42	19.06.2013	141,29	21.05.2013	141,07
16.08.2013	139,94	17.07.2013	140,41	18.06.2013	141,2	20.05.2013	141,14
15.08.2013	139,92	16.07.2013	140,37	17.06.2013	141,3	17.05.2013	141,29

Table 4 continued

16.05.2013	141,05	11.04.2013	140,17	06.03.2013	139,58	31.01.2013	139,58
15.05.2013	141,02	10.04.2013	140,15	05.03.2013	139,59	30.01.2013	139,56
14.05.2013	140,95	09.04.2013	140,05	04.03.2013	139,59	29.01.2013	139,54
13.05.2013	140,85	08.04.2013	140	01.03.2013	139,63	28.01.2013	139,52
10.05.2013	140,87	05.04.2013	139,91	28.02.2013	139,66	25.01.2013	139,41
09.05.2013	140,88	04.04.2013	139,92	27.02.2013	139,68	24.01.2013	139,4
08.05.2013	140,75	03.04.2013	139,9	26.02.2013	139,66	23.01.2013	139,45
07.05.2013	140,66	02.04.2013	139,88	25.02.2013	139,68	22.01.2013	139,52
06.05.2013	140,64	01.04.2013	139,88	22.02.2013	139,67	21.01.2013	139,54
03.05.2013	140,69	29.03.2013	139,91	21.02.2013	139,71	18.01.2013	139,31
02.05.2013	140,78	28.03.2013	139,87	20.02.2013	139,79	17.01.2013	139,24
30.04.2013	140,72	27.03.2013	139,88	19.02.2013	139,76	16.01.2013	139,24
29.04.2013	140,72	26.03.2013	139,86	18.02.2013	139,8	15.01.2013	139,35
26.04.2013	140,62	25.03.2013	139,91	15.02.2013	139,82	14.01.2013	139,45
25.04.2013	140,57	21.03.2013	140,03	14.02.2013	139,87	11.01.2013	139,5
24.04.2013	140,53	20.03.2013	139,95	13.02.2013	139,91	10.01.2013	139,55
23.04.2013	140,49	19.03.2013	139,93	12.02.2013	139,83	09.01.2013	139,71
22.04.2013	140,52	18.03.2013	139,84	11.02.2013	139,77	08.01.2013	139,68
19.04.2013	140,51	15.03.2013	139,83	08.02.2013	139,78	07.01.2013	139,55
18.04.2013	140,43	13.03.2013	139,84	07.02.2013	139,8	04.01.2013	139,55
17.04.2013	140,37	12.03.2013	139,71	06.02.2013	139,73	03.01.2013	139,61
16.04.2013	140,35	11.03.2013	139,68	05.02.2013	139,7		
15.04.2013	140,31	08.03.2013	139,63	04.02.2013	139,65		
12.04.2013	140,21	07.03.2013	139,59	01.02.2013	139,63		