







the US stock market, FOREX, and commodity markets as well as in the Russian stock market; in particular, fractional integration techniques suggest that the lowest orders of integration occur on Mondays.

Possible explanations for the weekend effect are: the psychology of investors who Friday (Rystrom and Benson, 1989); the closing of speculative positions on Fridays and the establishing of new short positions on Mondays by traders (Kazemi et al., 2013 and Chen and Singal, 2003), and the trading patterns of institutional investors (Sias and Starks, 1995). Another possible reason is that over the weekend market participants have more time to analyse price movements and, as a result, on Mondays a larger number of trades takes place. Alternatively, this might be due to deferred payments during the weekend, which create an extra incentive for the purchase of securities on Fridays, leading to higher prices on that day.

Evidence that the weekend effect has become less important over the years has been reported by Fortune (1998, 1999), Schwert (2003), and Olson et al. (2011). Further, Caporale et al. (2014) show that this anomaly cannot be exploited to make abnormal profits (and therefore it is not inconsistent with the EMH) by taking a trading robot approach.

### **3. Data and methodology**

We use daily data for UX index futures. The sample covers the period from May 2010(the first available observation) to the end of December 2014. The data source is the Ukrainian Exchange (<http://www.ux.ua/en/>).

To examine whether there is a weekend effect we use the following techniques:

average analysis

-tests

regression analysis with dummy variables

fractional integration tests

Average analysis provides preliminary evidence on whether there are differences between returns on different days of the week.  $\chi^2$ -tests are carried out for the null hypothesis that returns on all days of the week belong to the same population; a rejection of the null implies a statistical anomaly in the price behaviour on a specific day of the week. Given the size of our dataset, it is legitimate to argue that normality holds on the basis of the Central Limit Theorems (see Mendenhall, Beaver and Beaver, 2003), and therefore these are valid statistical tests. As a further check for normality, we also apply the Shapiro-Wilk test to the UX index futures values for the period 2014 (Table 1) and calculate the critical value of the distribution. These confirm that the data are normally distributed and therefore  $\chi^2$ -tests are valid, since their critical values do not exceed those of the chi-square distribution.

**Table 1: “Normality” test of the UX index futures data**

---

| Parameters | Values |
|------------|--------|
|------------|--------|

where  $\bar{r}_1$  = mean of the population of returns on the day whose effects are being tested;

$\bar{r}_2$  = mean of the population of all returns except the observations on the day whose effects are being tested;

$s_1$  = standard deviation of the population of returns on the day whose effects are being tested;

$s_2$  = standard deviation of the population of all returns except the observations on the day whose effects are being tested;

$N_1$  = size of the population of returns on the day whose effects are being tested;

$N_2$  = size of the population of all returns except the observations on the day whose effects are being tested;<sup>1</sup>

The test is carried out at the 95% confidence level, and the degrees of freedom are  $N_1 + N_2 - 2$  (N being equal to  $N_1 + N_2$ ).

Returns are compute



We use the following procedure to simulate the trading process. First we compute the percentage result of the deal:

$$R = \frac{P_c - P_o}{P_o} \quad (5)$$

where  $P_o$  opening price

$P_c$  closing price

Then this difference is converted into Ukrainian hryvnas (UAH).

$$R_{UAH} = R \cdot P_o \cdot V \quad (6)$$

where  $R_{UAH}$  is result of the deal in UAH.

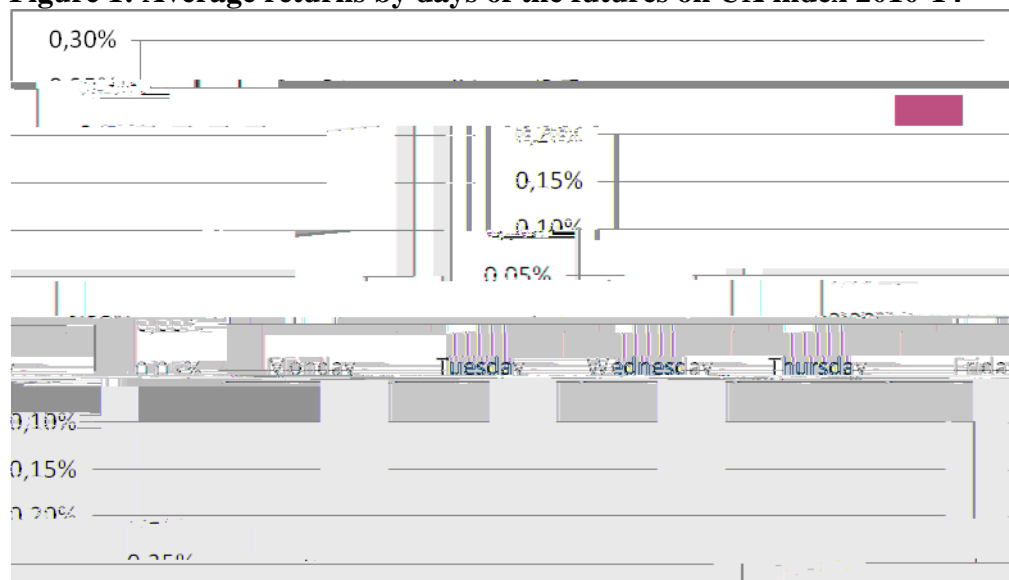
The sum of results from each deal in UAH is the total financial result of trading.

A strategy resulting in a number of profitable trades  $> 50\%$  and positive total profits is defined as indicating an exploitable market anomaly.

#### 4. Empirical results

We start with some simple average analysis. The results are displayed in Figure 1.

**Figure 1: Average returns by days of the futures on UX index 2010-14**



As can be seen, the biggest positive returns occur on Fridays. Returns are also positive on Mondays, but negative on the other days of the week. Therefore, there is preliminary





**Table 3: Parameters of the multiply regression with dummy variables of daily returns for different days of the week for the futures on the UX index during 2010-2014**

|           | Value   | Standarderror | t       | Pr>  t | Lowerbound<br>(95%) | Upperbound<br>(95%) |
|-----------|---------|---------------|---------|--------|---------------------|---------------------|
| Intercept | -0.0017 | 0.0014        | -1.2174 | 0.2237 | -0.0045             | 0.0011              |
| Monday    | -0.0009 |               |         |        |                     |                     |



We simulate trading future contracts on the UX index with a trading deposit of 500 UAH. The marginal requirements on these future contracts are 214 UAH per contract, therefore 500 UAH is a sufficient deposit to trade with 1 future contract and cover possible draw downs which may occur during trading.

The trading results for the different strategies are presented in Table 5. The dynamics of the equity of the trading deposit for different strategies during 2010-2014 is shown in Figure 3.

**Table 5: Trading results for different strategies for the period 2010-2014**

| Strategy     | Number of trades | Number of successful trades | % of successful trades | Financial result, UAH | Financial result, % | Annual financial result, % |
|--------------|------------------|-----------------------------|------------------------|-----------------------|---------------------|----------------------------|
| Friday close | 231              | 118                         | 51.1%                  | 586                   | 117.2%              | 26.0%                      |
| Monday open  | 231              | 123                         | 53.2%                  | 582                   | 116.4%              | 25.9%                      |
| Monday close | 231              | 121                         | 52.4%                  | 484                   | 96.9%               | 21.5%                      |

**of the equity of the trading account for different strategies during 2010-2014**



All three strategies appear to be profitable. The strategy is the least profitable and most volatile. The other and , produce



## References

Agrawal, A.

Robinson, P.M., 1995, Gaussian semi-parametric estimation of long range dependence, *Annals of Statistics* 23, 1630-1661.

Rogalski, R. J., 1984, New findings regarding day-of-the-week returns overTm(o)-9(ve)4(r)]TJEtTBT8

## Appendix A

Results of the regression analysis for daily returns on different days of the week for the futures on the UX index during 2010-2014

**Table A.1: Goodness of fit statistics:**

|                         |        |
|-------------------------|--------|
| Observations            | 995    |
| Sumofweights            | 995    |
| DF                      | 990    |
| R2                      | 0.0080 |
| Adjusted R <sup>2</sup> | 0.0040 |
| MSE                     | 0.0004 |
| RMSE                    | 0.0201 |
| DW                      | 1.8447 |

**Table A.2: Analysis of variance:**

| Source | DF | Sumofsquares | Meansquares | F      | Pr> F  |
|--------|----|--------------|-------------|--------|--------|
| Model  | 4  | 0.0032       | 0.0008      | 1.9956 | 0.0931 |