Abstract

This study examines stock market reactions to announcements of information technology investments in Poland, an emerging market and transition economy. Based on 68 announcements by companies traded at the Warsaw Stock Exchange in the period 2002 to 2009, our study confirms some previously published results, but also shows that specific characteristics of announcements play a more important role than has been commonly assumed. Our results indicate that investors in Poland react more positively if systems are acquired from global rather than local vendors. Announcements about completed projects are more positively received than announcements about planned or in-progress projects. Furthermore, announcements in Polish, targeted at existing shareholders, are more likely to be received positively than similar announcements released in English, targeting global investors.

Keywords: Event studies, information technology, investments, Poland, transition economies.

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Information Technology Investment Announcements and Market Value in Transition Economies: Evidence from Warsaw Stock Exchange

INTRODUCTION

For most public companies in today’s challenging business environment, the performance of their stocks is seen as an important proxy measure of their business success. If a company’s stocks are seen as outperforming the competition, it is usually much easier for the particular company to obtain additional capital for expansion. In contrast, underperforming stocks may ruin the trust in a particular company and make it difficult to secure any needed financing.

Access to private capital is particularly important for companies in transition economies. Frequently, these companies developed out of previously state-owned enterprises, underwent privatization and substantial restructuring, and are on the way to claim their position in the global market. For many of these companies, the stock market is the major source of capital [20].

In spite of the vital importance of capital markets for companies in transition economies, to our knowledge, there is not a single published study that examined the impact of information technology (IT) investment announcements on stock performance in transition economies, other than China. In many of these economies, IT has been used as an important tool to support restructuring efforts from a centrally planned to a market-oriented economy [30; 37]. For example in Poland, after 1989, the privatization and restructuring process of formerly state-owned companies was heavily accompanied by IT investments [17]. Many of these system implementations proved to be more costly than typical in mature economies [39] and their payoffs more uncertain. Overall, there is a scarcity of studies in the field of economics of IT that examine the relationship between IT and firm performance in transition
economies [35]. It may be reasonably expected that such studies on IT in transition economies may produce different results from what has been uncovered by similar studies conducted in highly developed economies.

Thus, the objective of this paper is fill in some of this gap and to contribute to the knowledge base in economics of IT by uncovering market reactions to IT investments using data from the Warsaw Stock Exchange (WSE) in Poland, a transition economy.

The remainder of this paper is structured as follows. After providing some contextual background, we introduce the Roztocki and Weistroffer [36] explanatory model, which serves as the underlying basis for establishing our research hypotheses. Then in the following section, we describe our research methodology, data collection method, and data analysis. Subsequently, we present and discuss our findings. We conclude our paper by discussing the contribution and limitations of our study, and point to opportunities for future research.

**RESEARCH BACKGROUND**

**Information Technology in Transition Economies**

The term transition (or transitional) economies refers to countries that recently transitioned or are in the process of transitioning from centrally controlled to market driven economies, especially the countries of the former Eastern Bloc and countries that originated from the break-up of the Soviet Union [30; 31].

During the cold war, partly because of the Coordinating Committee for Multilateral Export Controls (CoCom) embargo, the IT industry in the Eastern Bloc countries lagged eight to twelve years behind technology in the western countries [23]. Political and economic reforms, together with the cessation of the CoCom embargo, led to turbulence in the IT industry, as many local, large companies with obsolete technology found themselves unable to compete in the global market [13]. On the other hand, a large
number of small IT firms emerged in these transition economies, as newly inspired entrepreneurs embraced the opportunities offered by the free market [40].

Although the literature on IT in transition economies is highly fragmented and focused on a relatively small set of countries, it appears that the communist past still influences much of the current use of IT in many of these economies; presenting both unique obstacles and exceptional opportunities. For example, a study on electronic commerce in Serbia [43] reports that past, strong governmental control over the telecommunication industry highly affects its current diffusion. A different study on IT-supported organizational learning in Slovenia [3; 16] reports that the studied company highly benefited in its IT initiatives from a high level of worker participation, typical in communist and post-communist countries. Also, in contrast to typical IT managers in Western countries, IT managers in transition economies seem to focus more on technical than non-technical issues [8]. Overall, the results from many comparative studies seem to support substantial differences in IT management in transition economies as compared to developed countries, such as the USA [7].

Some cross-country studies investigating payoffs from information and communication technologies in transitional economies [37; 38] suggest not only differences in comparison to developed countries, but also large differences among the various transition economies themselves.

**Information Technology in Poland**

The transition from a central planning system to a free market economy began in 1989, after Poland abolished communist rule. At that time the Polish economy was dominated by large, state-owned companies with only a marginal private sector. IT in most companies was used primarily for reporting purposes and not for profitability calculation [40]. The ensuing privatization process was accompanied by heavy investments in IT systems more suitable for a market driven economy [17]. At this time, IT
started to be widely used for linking Polish suppliers with international companies, often competing over price, such as in the case of IKEA, a large furniture retailer [2].

In spite of the fact that transformation in Poland started two decades ago, the published literature confirms many similarities in the use of IT to that in developed economies, but also points to some substantial differences. A study conducted in the USA and Poland reports that Polish programmers share the same dress code as their American colleagues [18]. Also similar to Americans, Polish programmers rather prefer to work for small, less bureaucratic companies. However, another study, conducted in southern Poland, indicates problems with the IT infrastructure not common in Western countries, while reporting fewer implementation problems than in developed countries arising from conflicts among team members [41]. A study that examined the difficulties experienced during the process of implementing large enterprise systems in Poland [39] also reported a different set of implementation problems as compared to earlier studies in developed economies. A different study examining e-business capacity in Polish firms [26] reported a high level of human capital, exceeding the availability of human capital in many developed countries, but inadequate infrastructure, which seems to be one of the major factors hindering competitiveness. Another factor which may make IT management in Poland distinct from developed, mature economies are fast changing laws and regulations highly affecting implementation projects [27].

**Transition Economies and Stock Market Reaction to Investments in Information Technology**

According to our knowledge, before this current study, there was not a single published event study that specifically investigated stock market reaction to IT investments in countries of the former European Eastern Bloc. Event studies in other emerging economies are also rare. One published study compared
stock market reaction to IT investments in China to similar investments in the USA [24]. The results of that study suggest that financial markets in China react differently from those in the USA, and that on average the stock market reaction is more positive than in the USA. Two other studies investigated stock market reaction to e-commerce initiatives in Taiwan [5; 22]. Both studies reported positive stock market reactions.

Frequently, stock markets in transition economies are considered “young” by global investors, even though some have rich histories, but were closed during communist rule and then reopened in the transition process. For example, the WSE in Poland was first established in 1817, but closed in 1939 and stayed closed under communist rule [44]. Since the WSE reopened on April 16, 1991, the number of companies traded has grown steadily from only five at the first session to 375 in August 2009, reaching a capitalization of more than 684 billion zloty (approximately 230 billion US dollars) [11]. Along with the Wiener Börse in Austria, the WSE is often considered a major source of capital for companies located in the transition economies of Central and Eastern Europe. The steady growth in the number of listed companies at the WSE underscores one of the major differences between capital markets in transition economies as compared to the mature capital markets, where growth rates in the number of listed companies and overall capitalization are rather modest. Recent empirical tests suggest [9] that WSE is relatively efficient, and thus satisfies the requirements for conducting event studies.

Based on the results from the few existing event studies on IT investments in emerging economies, the unique dynamics in IT markets and the existing differences in IT management, as well as the literature on financial markets in transition economies [20], the results for IT investments in transition economies and stock market reactions will likely be very different from those reported in studies conducted in the USA, dealing with much larger, more mature financial markets.
EXPLANATORY MODEL AND HYPOTHESES DEVELOPMENT

Explanatory Model for Stock Market Reaction

Although, the number of event studies in the field of IT research is growing steadily [29; 33], the stock market reaction, or lack thereof, to IT investment announcements is still not understood well. This lack of understanding is evidenced not only in often contradictory results, but also by an absence of a widely accepted theory to explain stock market reactions to IT investments.

Recently Roztocki and Weistroffer [36] proposed an explanatory model based on a meta-analysis of twenty-three event studies in IT research. This model, illustrated in Figure 1, postulates that the stock market reaction to IT investments is determined by a number of influential factors that can be grouped in five major categories: company characteristics, type of IT investments, vendor characteristics, economic conditions, and announcements characteristic.

Figure 1. Explanatory model (adapted from Roztocki and Weistroffer, 2009d)
Research Hypotheses

The Roztocki and Weistroffer [36] explanatory model was used as the theoretical basis for establishing the research hypotheses because it provides the most complete list available of explanatory variables. Such variables are useful in understanding and interpreting the patterns in empirical observations [42; 45], namely stock market reaction to investments in IT.

In highly developed and mature economies, large vendors with established records seem to make the IT investments more attractive to market investors. The past reputation of the large vendors appears to help establish trust, and the stock market reaction is more likely to be positive, as compared to IT investments using smaller vendors with shorter track records [14; 28]. Although in transition economies, such as Poland, small, local vendors may possess better knowledge of the intricacies of the local market, and are more flexible in offering customized solutions than subsidiaries of global, large vendors, these small companies may lack the resources needed for implementing large and risky IT projects. For this reason the following hypothesis is proposed:

H1: The stock market will react more positively to IT investment announcements when the system is acquired from a global, large vendor, as compared to a small, local vendor.

Earlier event studies, using data mainly from the USA, looked at which, if any, specific company characteristics are important factors in determining stock market reactions [4; 6; 10; 14; 15; 28]. Several event studies examined various company characteristics, such as industry, size, financial health, and industry leadership. However, many of these factors appear to not have any substantial impact on stock market reactions [36]. One factor that was found to be influential is the security beta [34]. It is likely that systematic company risk, measured by beta, is also an important factor in emerging economies such as Poland. Thus we postulate:
H2: The stock market will react more positively to announcements of IT investments when the investments are by companies with high beta factor, as compared to similar announcements by companies with low beta factor.

Results of several event studies conducted with data from the USA suggest that stock market conditions are highly influential on the stock market reaction. In essence, bull market conditions benefit positive market reactions to IT investments, whereas in bear markets the reactions to similar IT investments are likely to be less positive [34]. We expect that this also holds true in transition economies and hypothesize:

H3: The stock market will react more positively to IT investment announcements conducted during a bull market, as compared with similar investments under declining market or bear market conditions.

Further, building on the invest type category from the Roztocki and Weistroffer [36] model, it may be reasonably assumed that the status of the IT investment is an influential factor. In other words, it is likely that the stock market differentiates between investments planned for the future and investments already in progress or completed. The status of IT investments may be a particularly crucial factor in transition economies as many IT projects tend to be more expensive than in developed economies [39]. Thus we hypothesize:

H4: The stock market will react more positively to announcements of completed IT investments or projects already in progress, than to announcements of future planned projects.
Past event studies suggest that financial markets respond more positively when the announcement is released by the investing company as compared to announcements released by vendors [25]. In the context of transition economies, we believe that announcement language and focused targeting of existing investors, as opposed to new investors, will have a positive effect on the stock market reaction. Therefore, we postulate:

H5: There will be a difference in stock market reaction, when the investment is announced in Polish and targeted at existing shareholders, as compared to announcements made in English and targeting global prospective investors.

**METHODOLOGY**

**Data Collection**

The announcements were collected by using several databases, such as Emerging Markets Information Service (EMIS) and Lexis-Nexis. Our announcement search was focused on IT investments conducted by companies traded at the WSE. In the context of this research, we used the definition of IT investments suggested by Roztocki and Weistroffer [36], which expands the traditional definition proposed by Bacon [1] beyond expenses on hardware and software. Thus, in line with Roztocki and Weistroffer [36], we consider as IT investments “any large, non-routine expenses for implementing new technology or aimed at making better use out of existing technology.”

Although, our search was not restricted to specific languages used in the source, we were only able to identify announcements in English and Polish. Some announcements that we did identify were excluded from the final sample because stock data was not available or other relevant news, such as profit disclosures, was released during the event window. Overall, we were able to collect 68 usable announcements.
Data Analysis Procedure

In our data analysis, we decided to use a 250-day estimation period, ranging 270 to 20 days before the date of the given announcement. This relatively long estimation period was chosen to lessen the effects of possible seasonal stock price movements and the possibility of some stocks not being traded on some business days.

Overall, our analysis was similar to procedures used in earlier event studies. The stock market reaction was assessed using standard procedures for calculating abnormal returns (AR) based on the market model. Standardized abnormal returns (SAR) were calculated by dividing AR by the standard error of the estimate from the market model. Cumulative standard abnormal returns (CSAR) were calculated by summing the SAR for individual days in the event windows. The hypotheses were then tested by calculating the average CSARs for particular sub-samples and testing this average for significance in four event windows. In addition to the two short event windows (two and three days) used in most previous event studies in IT research, we also used two longer event windows: a twenty-six day and a twenty-one day event window. As a proxy for market returns we used the Warsaw Stock Exchange Index (WIG). For more information about the procedure, see for example [32].

RESULTS

Sample Description

As mentioned earlier, we were able to use 68 announcements released in the 2002–2009 period. Table 1 depicts the distribution of the announcements by year and industry sector.
<table>
<thead>
<tr>
<th>Year</th>
<th>Manufacturing</th>
<th>Finance</th>
<th>Communication</th>
<th>Service</th>
<th>Retailing</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
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<tr>
<td>2003</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2004</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2005</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>2006</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>2007</td>
<td>11</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>2008</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>2009</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>7</td>
<td>68</td>
</tr>
</tbody>
</table>

Table 1. Sample Characteristics

Univariate Analysis

To test our research hypotheses using univariate analysis methods, the full sample was divided into several sub-samples. Accordingly, to test the hypothesis about the effect of vendor characteristics (H1), the announcements in our sample were examined for information about the vendors of the acquired systems. If the system was purchased from Oracle or SAP, the vendor was classified as global, and if the system was acquired from Asseco, Comarch, Digitland, or Procom, the vendor was classified as local.

To test our second hypothesis (H2), the full sample was again divided in two subsamples, with one subsample including all companies with beta factor of 0.9 and higher, and the second subsample including all companies with beta factor lower than 0.9.

During the time period from January 2, 2002 until July 6, 2007 the average stock prices measured by WIG increased from 13,995 points to 67,569 points, an increase of approximately 383 percent. Consequently, all announcements released in this time period were classified as “bull market” announcements. Then from its peak on July 6, 2007, the WIG decreased to 39,986 points on December 31, 2009, a decrease of approximately 41 percent. We divided this time of decreasing stock prices into two periods: “declining market” from July 6, 2007 to January 7, 2008 (decline of 20 percent) and “bear
market” from January 8, 2008 to December 31, 2009. Thus, the “bear market” encompassed time when stock prices in Warsaw declined from its peak by 20 percent or more. The three resulting sub-samples were used to test our third hypothesis (H3).

To test our fourth hypothesis (H4), the full sample was again divided into two subsamples: announcements about completed IT projects and announcements about planned or in-progress IT projects.

Finally, to test our fifth hypothesis (H5), the full sample was divided into two subsamples according to the language used in the announcement, i.e. Polish or English. If an announcement was released in Polish and English simultaneously, it was not included for testing of this hypothesis.

As summarized in Table 2, the reaction to IT investments for the full sample is insignificant.

Regarding hypothesis 1, for global vendors the data shows a statistically significant positive reaction for three out of the four event windows used. In contrast, for smaller, local vendors no significant reaction is observed. Thus, hypothesis 1 appears to be supported.

Regarding hypothesis 2, for companies with beta factor below 0.9 there is no significant reaction. For companies with beta factor 0.9 or above, the stock market reaction is also statistically insignificant. Therefore, hypothesis 2 is not supported.

Regarding hypothesis 3, for bull markets, the stock market reaction is positive but significant only in one of the event windows used, while the reaction is mixed for declining markets, and no significant reaction is observed for bear markets. This does not give full support for hypothesis 3.

In regard to hypothesis 4, financial markets seem to react differently based on the status of IT investments. Announcements about completed IT projects are more positively received than announcements about planned or in-progress IT projects. However, the statistical significance of this
positive reaction is limited to the [-20, 5] and [-15, 5] event windows, giving only partial support for our hypothesis.

Hypothesis 5 seems to be supported, as on average, announcements in Polish result in positive stock market reaction (significant for two of the event windows used), while reactions to similar announcements in English are negative but not significant.

Table 2 shows the results of our univariate analysis for our subsamples.

<table>
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</thead>
<tbody>
<tr>
<td>Full Sample</td>
<td>62</td>
<td>0.05</td>
<td>0.36</td>
<td>63</td>
<td>0.09</td>
<td>0.73</td>
<td>68</td>
<td>0.08</td>
<td>0.68</td>
<td>68</td>
<td>0.03</td>
<td>0.29</td>
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<td>Breakdown by Vendor</td>
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<tr>
<td>Local</td>
<td>26</td>
<td>-0.20</td>
<td>-1.04</td>
<td>26</td>
<td>-0.21</td>
<td>-1.09</td>
<td>27</td>
<td>0.07</td>
<td>0.39</td>
<td>27</td>
<td>0.09</td>
<td>1.29</td>
</tr>
<tr>
<td>Global</td>
<td>16</td>
<td>0.66</td>
<td>2.64***</td>
<td>17</td>
<td>0.55</td>
<td>2.29**</td>
<td>19</td>
<td>0.57</td>
<td>2.48***</td>
<td>19</td>
<td>0.36</td>
<td>1.58</td>
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<tr>
<td>Breakdown by Company</td>
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<tr>
<td>Beta below 0.9</td>
<td>26</td>
<td>0.01</td>
<td>0.06</td>
<td>27</td>
<td>0.00</td>
<td>-0.02</td>
<td>32</td>
<td>0.05</td>
<td>0.29</td>
<td>32</td>
<td>0.09</td>
<td>0.51</td>
</tr>
<tr>
<td>Beta 0.9 or above</td>
<td>36</td>
<td>0.07</td>
<td>0.42</td>
<td>36</td>
<td>0.16</td>
<td>0.97</td>
<td>36</td>
<td>0.11</td>
<td>0.66</td>
<td>36</td>
<td>-0.01</td>
<td>-0.09</td>
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<tr>
<td>Breakdown by Market Conditions</td>
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<tr>
<td>Bull Market</td>
<td>19</td>
<td>0.43</td>
<td>1.86*</td>
<td>20</td>
<td>0.25</td>
<td>1.12</td>
<td>23</td>
<td>0.20</td>
<td>0.95</td>
<td>23</td>
<td>0.00</td>
<td>0.01</td>
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<tr>
<td>Declining Market</td>
<td>12</td>
<td>0.37</td>
<td>1.29</td>
<td>12</td>
<td>0.61</td>
<td>2.10**</td>
<td>12</td>
<td>-0.32</td>
<td>-1.12</td>
<td>12</td>
<td>-0.49</td>
<td>-1.68*</td>
</tr>
<tr>
<td>Bear Market</td>
<td>24</td>
<td>-0.29</td>
<td>-1.43</td>
<td>24</td>
<td>-0.18</td>
<td>-0.90</td>
<td>25</td>
<td>0.18</td>
<td>0.92</td>
<td>25</td>
<td>0.27</td>
<td>1.34</td>
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<tr>
<td>Breakdown by Investment Status</td>
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<td></td>
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<tr>
<td>In-Progress/Future</td>
<td>43</td>
<td>-0.25</td>
<td>-1.64</td>
<td>44</td>
<td>-0.19</td>
<td>-1.29</td>
<td>46</td>
<td>0.09</td>
<td>0.62</td>
<td>46</td>
<td>0.08</td>
<td>0.51</td>
</tr>
<tr>
<td>Completed</td>
<td>17</td>
<td>0.58</td>
<td>2.40***</td>
<td>17</td>
<td>0.62</td>
<td>2.56**</td>
<td>19</td>
<td>0.01</td>
<td>0.02</td>
<td>19</td>
<td>-0.07</td>
<td>-0.32</td>
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<tr>
<td>Breakdown by Announcement Language</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Polish</td>
<td>31</td>
<td>0.36</td>
<td>2.02***</td>
<td>31</td>
<td>0.41</td>
<td>2.27**</td>
<td>35</td>
<td>0.24</td>
<td>1.39</td>
<td>35</td>
<td>0.13</td>
<td>0.75</td>
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<tr>
<td>English</td>
<td>28</td>
<td>-0.26</td>
<td>-1.36</td>
<td>29</td>
<td>-0.18</td>
<td>-0.99</td>
<td>30</td>
<td>-0.08</td>
<td>-0.44</td>
<td>30</td>
<td>-0.11</td>
<td>-0.59</td>
</tr>
</tbody>
</table>

* Significant at 10 percent **Significant at 5 percent ***Significant at 1 percent

Table 2. Summary of results for subsamples

Multivariate Analysis

To examine possible joint effects of our explanatory variables, we also conducted a multivariate analysis by building and testing several regression models. Table 3 summarizes dependent and independent variables in our models, while Table 4 depicts selected regression models.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Type</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>CSAR</td>
<td>Dependent</td>
<td>Cumulative standard abnormal returns for (-20,5) event windows</td>
</tr>
<tr>
<td>Global</td>
<td>Independent</td>
<td>1 if system was acquired from a global vendor (Oracle or SAP); 0 otherwise</td>
</tr>
<tr>
<td>Highbeta</td>
<td>Independent</td>
<td>1 for all companies with beta factor of 0.9 and higher; 0 otherwise</td>
</tr>
<tr>
<td>Bull</td>
<td>Independent</td>
<td>1 for all announcements from January 2, 2002 until July 6, 2007; 0 otherwise</td>
</tr>
<tr>
<td>Completed</td>
<td>Independent</td>
<td>1 for all announcements about completed investments; 0 otherwise</td>
</tr>
<tr>
<td>Polish</td>
<td>Independent</td>
<td>1 for all announcements in Polish; 0 otherwise</td>
</tr>
</tbody>
</table>

Table 3. Dependent and independent variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
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<tr>
<td>Intercept</td>
<td>-0.7201</td>
<td>-2.483**</td>
<td>-0.6146</td>
<td>-0.3735</td>
<td>-0.3231</td>
</tr>
<tr>
<td></td>
<td>t-statistics</td>
<td>2.985***</td>
<td>-1.804*</td>
<td>-1.989*</td>
<td>-1.190</td>
</tr>
<tr>
<td>Global</td>
<td>0.9356</td>
<td>2.733***</td>
<td>0.9432</td>
<td>3.250***</td>
<td>0.4319</td>
</tr>
<tr>
<td></td>
<td>t-statistics</td>
<td>2.985***</td>
<td>1.507</td>
<td>3.906***</td>
<td></td>
</tr>
<tr>
<td>Highbeta</td>
<td>0.1700</td>
<td>0.603</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bull</td>
<td>0.4249</td>
<td>1.505</td>
<td>0.4661</td>
<td>1.751*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>t-statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed</td>
<td>0.6074</td>
<td>1.874</td>
<td>0.5939</td>
<td>2.959***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>t-statistics</td>
<td></td>
<td>1.870*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polish</td>
<td>0.0436</td>
<td>0.136</td>
<td></td>
<td>0.5645</td>
<td>1.968*</td>
</tr>
</tbody>
</table>

* Significant at 10 percent  **Significant at 5 percent  ***Significant at 1 percent

Table 4. Multivariate analyses

Regarding hypothesis 1 for global vendors, the data shows a statistically significant positive reaction for three out of the four models. Thus, in addition to univariate analysis described in the previous section, hypothesis 1 seems also to be supported by the multivariate analysis.

Regarding hypothesis 2 for companies with beta factor 0.9 or above, the stock market reaction in this analysis is statistically insignificant. Consequently, hypothesis 2 is again not supported.

Regarding hypothesis 3 for bull markets, the stock market reaction is significant only in one of the models. And again, this does not give full support for hypothesis 3.

In regard to hypothesis 4, financial markets seem to take into account the status of IT investments. The reactions to announcements about completed IT projects are more positively received, than announcements about planned or in-progress IT projects. Similar to univariate analysis, this provides a partial support for Hypothesis 4.
Hypothesis 5 seems to be supported. As shown in our model 5, the announcements in Polish are likely to result in positive stock market reaction.

Summary of Results

Table 5 depicts a summary of the hypotheses supported or not supported.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Supported</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Significant, positive stock price reaction for global vendors, but not for local vendors.</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>Stock price reaction for companies with low or high beta is not significant.</td>
</tr>
<tr>
<td>3</td>
<td>Partially</td>
<td>Significant positive stock price reaction during bull markets, but only in one event window. Mixed reaction during declining markets. No significant reaction during bear markets.</td>
</tr>
<tr>
<td>4</td>
<td>Partially</td>
<td>Significant stock price reaction for announcements of completed projects, but not for planned projects. The evidence is, however, limited to only two event windows.</td>
</tr>
<tr>
<td>5</td>
<td>Partially</td>
<td>Announcements in Polish are more likely to result in positive stock market reaction. The evidence is, however, limited to only two event windows.</td>
</tr>
</tbody>
</table>

Table 5. Overview of results

DISCUSSION

Does buying information systems from global vendors pay off?

The results from event studies on IT investments conducted on data from the USA suggest that doing business with leading IT providers is preferred by investors and is reflected in a more positive stock market reaction [14; 28]. This more favorable stock market reaction has been explained with longer track records and thus greater, perceived experience and knowledge [19].

Similarly, in our study using WSE data, stock market reaction is more positive when the system is acquired from a global vendor such as SAP or Oracle, rather than from a local, Polish vendor. In contrast to the global vendors Oracle and SAP that started implementing large systems in the 1970s, Polish vendors started their business activities in the 1990s. Thus, it seems that these two decades of
experience play a role, and that Polish vendors are still in the process of building their reputation and perhaps need to focus more on marketing and brand building.

It is also possible that, even though, based on our data, the investments under consideration are comparable in size and type, investors perceive that IT projects conducted by global vendors are larger scale and have a higher impact on the bottom line of investing companies.

**Is systematic security risk (security beta) irrelevant?**

Our results suggest that there is no significant difference in the stock market reaction of companies with low beta as compared with companies with high beta. This is different from studies reported from the USA, which found the security beta to be influential [34].

It is quite possible that in the ever-changing and less predictable business environment of transition economies, investors pay less attention to measures reflecting past stock fluctuations, such as security beta. Moreover, the relatively volatile regulatory environment in transition economies may affect particular firms differently, thus prompting investors active in these markets to use different criteria for justifying their stock engagements.

**Bull market, bear market, no big difference?**

Our results suggest only a marginal difference in stock market reaction when the investment was announced during bull or bear market conditions. More specifically, a significant positive stock price reaction during bull markets was observed only in one event window and in one model. A mixed reaction was observed during declining markets, while no significant reaction was detected during bear markets. This is different from the results reported by similar event studies conducted with data from the USA, where overall positive reactions were observed when the IT investments were announced during bull markets [34].
In contrast to the studies using data from the USA [34], our results suggest that investors active in the Polish capital market hardly change their behavior during periods when stock prices increase or when stock prices decrease. One explanation may be that these investors seek more long-term investments and are less concerned with short-term declines. As many transition economies are predicted to grow fast over the next decades, investors may feel that the long-term stock market trend may follow the positive economic growth. In fact, a study conducted in Poland suggests that all three of the biggest crashes experienced at the WSE were followed by relatively fast recoveries [12].

**Are announcements about planned, future investments ignored?**

In our study we differentiated according to the status of the IT investments announced. It seems that investors react more positively when a company in Poland announces a completion of an IT project. In contrast, announcements of planned or in-progress IT projects are less likely to receive a positive reaction. One possible explanation is that investors do not trust that planned IT project will succeed and positively affect firm performance. Thus again, the somewhat uncertain business environment in transition economies [21] may be a factor.

**Does the language of the announcement matter?**

A comparison of our results with the three previous event studies about IT investments in emerging economies [5; 22; 24] shows some similarities but also substantial differences. For example, in contrast to the three studies (one in Mainland China, two in Taiwan), which reported positive reaction for the full sample, the reaction for our full sample was, though positive, statistically insignificant. None of the three studies reports the language of the announcements. It is not clear if the announcements used in the three studies were in Chinese or English, or both, or maybe in a different language. In our study we
differentiated between announcements in English and Polish. If we had used only announcements released in Polish, the reaction in our study would also be significantly positive in two event windows. Though the so-called “Good Practices on Corporate Governance” rule for WSE-listed companies requires the companies to have all their investor-related documents in English, in practice compliance to this rule is limited. This is not very surprising as the WSE exchange is a local, medium sized stock exchange. Only recently did WSE start to also trade stocks of foreign companies, but mostly from Central and Eastern Europe. As a result we may expect a slow change related to language use. In our sample, only three announcements were released simultaneously in both English and Polish.

LIMITATIONS AND FUTURE WORK

Although our sample size of 68 announcements compares favorably to the sample sizes in the few other published studies of stock market reaction in emerging economies (Cheng et al. [5] used 32 announcements and Meng and Lee [24] used 65 announcements for China), we believe that a larger sample size will definitely benefit this kind of research. Consequently, future research projects may expand our sample by including announcements released in Poland from 2010 as they become available. In addition, some future event studies may validate our results by looking at data from other transition economies with established stock markets, such as the Prague Stock Exchange in the Czech Republic and the Budapest Stock Exchange in Hungary.

Moreover, in addition to basically replicating event studies from the USA with stock data from various transitional countries, subsequent event studies may include additional variables more specific to these economies. For example, it may be interesting to look at previous ownership of companies and compare the stock market reaction to investments by companies that emerged from privatization of state-owned enterprises to those by companies that were funded thru private capital from the outset.
CONTRIBUTIONS AND CONCLUSIONS

In this work, we examined stock market reactions to IT investment announcements in transition economies using data from WSE in Poland. Although subject to limitations, we believe that our work makes a significant contribution to the existing knowledge in economics of IT in several respects. For one, this is perhaps the first attempt to conduct an event study in a transition economy, other than China. Secondly, we found several differences between our results and results from studies conducted with data from the USA, a large and mature economy, thus justifying further research promising unique and unexpected results in transition economies. Thirdly, our research can benefit business managers in transition economies that are looking at acquiring capital thru stock markets, by providing them with a little extra information on the likely effects of IT investment announcements on market value of their companies, limited as it may be.

To conclude, given the growing importance of transition economies, combined with the scarcity of research in the field of IT in transition economies, we are hopeful that more authors will follow our path and that this work will help open up new avenues for their own research endeavors.

REFERENCES


naz=Informacje%20i%20statystyki.


