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Performance of Textile and Apparel Companies Listed on the Warsaw Stock Exchange

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Abstract
The article presents the performance of textile and apparel companies listed on the Polish stock exchange from the market perspective based on a sample of financial data. The data are used to compute systematic risk measures (betas) for two different time intervals, to evaluate the risk of an equally weighted portfolio made up of the selected companies and to compare the portfolio's Sharpe ratio with the broad market index and small companies' index. To compare the selected companies' stocks with the whole economy and non-public companies, DuPont analysis is employed. The research results indicate that the listed textile and apparel companies outperform non-public companies in terms of fundamental financial results as well as capital market investment results. The risk of individual stocks is usually relatively low. Also the portfolio of the selected companies has been found to have better investment properties compared with the general market and small stocks index in all years of analysis.

Key words: *textile industry, apparel industry, stock market, performance, DuPont analysis, beta estimation.*

Introduction

The worldwide development of textile and apparel (T&A) industries has been marked in recent decades by intensive structural adjustments resulting in the relocation of production processes to developing countries. The process led to the industries' increased participation in international trade flows and an increasingly strong export position of new production leaders "which, again, led to major changes in the regional distribution of exports and imports of textile and apparel products" [5]. In the last decade of the 20th century it also coincided with the transformation of the economic system in all Eastern and Central European countries, which affected all types of economic activity. Poland's trading environment changed radically with the country's integration with the European market, the elimination of customs barriers, and greater market freedom. In this new environment, "the relatively high production costs and rather unappealing clothing designs brought about the collapse of domestic manufacturers of textile and clothing in the 1990s" [11]. At the same time, though, new clothing companies capable of confronting the challenges of a free market were established. These evolutionary processes and the successful restructuring of some organisations formed under the communist regime caused that in 2015 2,107 clothing companies and 749 textile companies employing more than 9 workers were registered in Poland. Even though some companies have become well-known brands, with much of their production (particularly the manufacture of apparel) having been relocated to other countries, mostly Asian, the development of textile and apparel industries in Poland was not as successful as their steadily increasing output seemed to promise. Between 2005 and 2015 the total value of Polish made textile products increased from PLN 8,022 m to 13,080 m (by 63%), a substantial change as compared with the clothing products, the value of which only rose from PLN 9687.1m to 1,0003.6 m (3%). Both sectors' share of the total industrial output in Poland decreased from 1.1% to 1.0% (textiles) and from 1.3 to 0.8% (apparel) [24].

The transformation of the T&A industries in Poland after 1989 was not all about technology and competition, because in addition to several other major changes, it also involved the creation of a capital market with the Warsaw Stock Exchange (WSE) as its financial center. The WSE provided companies with an opportunity to raise capital, which was used by relatively few T&A companies. A consequence of the limited presence of T&A companies in the capital market is a scarcity of studies analysing their performance. The main purpose of this paper is therefore to fill that gap by presenting the performance of WSE-listed T&A companies from 2002 to 2017. An insight into the companies' stock performance and financial conditions (market and financial performance) is also provided.

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Textile and apparel companies and the capital market

Literature on relations between capital market development and the T&A industries is scarce. After World War II, the capital market in Poland was only reactivated with the economic transformation in the early 1990s. Being only slightly more than 25 years old, it is still relatively young compared with the mature, highly developed domestic and international capital markets. Thus, as an initial basis for our discussion about how the capital market may impact the development of the industries analyzed, let us look at other countries where capital markets were already in place when the T&A industries started to grow. The fact that most studies on this subject focus on the textile industry implies that the role of the capital market as a factor contributing to the development of the textile industry may be somewhat ambiguous.

Haber [12] contrasted Brazilian, Mexican and US experiences to examine how capital market development and industrial structure influenced each other during the early stages of industrialisation. His conclusion is that the constraints on the formation of credit intermediaries in Latin America resulted in greater concentrations of cotton textile industries in Mexico and Brazil than in the United States. Haber's analysis also suggests that there is a clear association between how a country finances industrial development and the evolution of the industrial structure, and that the maturation of capital markets has a significant effect on the latter. In Brazil and the US, concentration levels of the textile industry decreased as the barrier to entry created by unequal access to finance was reduced. In Mexico, capital markets developed until they were stifled by the Porfiriato regime's restrictive policies and the revolution of 1910, meaning that the level of concentration barely declined at all from 1890 to 1930. Haber [12] also shows that relatively low barriers to capital market development in a country stimulate the development of its textile industry. In 1850, Brazil had 8 textile mills employing 424 workers and Mexico 42 with 10,816 workers. By 1930, the numbers rose to 354 mills (128,613 workers) and 145 mills (39,525 workers), respectively. Hence the growth of the textile industry in Brazil, where the barriers for capital market development were lower, turned out to be much higher. This shows that the capital market can have a rather positive influence on industrial development.

Table 1. Largest domestically-owned clothing companies in 2013. ***Source:*** *[11].*

Ranked	Company	Sales, PLN, million	Sales growth rate 2012/2013, %	Net result, PLN, million	Assets, PLN, million	ROE, %
74	LPP SA GK, Gdańsk	4,11.302	127.7	432,859	2,491.570	28.92
614	Redan SA GK, Łódź	468.315	106.4	3,357	203.292	6.45
725	Vistula Group SA GK, Kraków	397.677	100.5	45,061	625.932	10.99
1234	Gino Rossi SA GK, Słupsk	218.501	104.5	2,025	185.670	2.92
1290	KAN sp. z o.o., Łódź	205.248	96.9	8,007	154.664	10.17
1738	Monnari Trade SA GK, Łódź	145.552	110.4	17,017	102.005	19.23
	Total	5,551.595				

Higgins and Toms [13] sought to determine why cotton textile manufacturing declined in the 20th c. in Lancashire, one of the English counties where it was born during the Industrial Revolution. Having examined three important aspects of this phenomenon, i.e. capital ownership, capital structure and capital market, Higgins and Toms [13] came up with a new explanation. Its centerpiece is that ownership of the industry and the redistribution of ownership claims during booms and slumps imposed pressures and constraints on decisions makers. The domination of the financial constraints arising from the capital market over the strategic questions of re-equipment and modernisation precipitated the collapse of the industry. The monetary conditions and changes in the world demand, although obviously important, were beyond the control of the typical entrepreneur. It is therefore appropriate to concentrate discussions on the above-mentioned financial aspects of industry decline.

It is difficult to find in the literature deep analysis of the capital market's influence on the development of the apparel industry. It is frequently posited, however, that investing in apparel manufacturers, particularly in the retail apparel industry, has always been risky and tough [26], one of the main reasons being the volatility of fashion trends. This actually means that the financial performance of apparel companies depends not only on the economic environment but also on consumers' tastes. which sometimes cannot be explained in terms of rationality. Nevertheless all major players in the global apparel market, such as H&M, Nike, Zara, Uniqlo, Adidas, Levi's and many others, are publicly-traded organizations, although for the reasons mentioned above the performance of their stock is different and fluctuates, even in the same market segment. For instance, in the sportswear segment in 2016, Nike and Under Armour were some of the worst-performing fashion and clothing stocks: their share prices dropped by 17% and 22%, respectively. In the same year, Adidas and Lululemon started their impressive transitions with stock price increases of 56% and 28%, respectively [20]. Similar differences are observed for apparel companies operating in other market segments.

In Poland, the bulk of the largest apparel manufacturers are listed on the WSE. ***Table 1*** shows data for the 6 domestically-owned apparel companies that were the largest in 2013. It is worth mentioning that the stocks of almost all of them (i.e. LPP, Redan, Vistula, Gino Rossi, Monnari Trade, excluding KAN) were quoted on the WSE in 2017.

According to the mainstream of capital market theory, efficient capital market risk and return should be positively correlated, i.e. riskier stock or riskier portfolios should offer a higher rate of returns (particularly if so called systematic risk is taken into consideration). Such conclusion might be drawn from several theoretical models such as: the Capital Asset Pricing Model (CAPM) (introduced independently by Treynor [27, 28], Sharpe [25], Lintner [18] and Mossin [21]), Fama-French model [10], Carhart [4] model and Pastor-Stambaugh [22] model. One of the goals of our research is to check whether a portfolio consisting of T&A stocks follows that rule. Many researchers have conducted research on the impact of firms' financial performance on stock returns, taking evidence from different countries' stock exchanges. (e.g. Basu [2], Anwaar [1] Hobarth [14], Menaje [19], Jatoi et. al [14] Umar and Musa [29], Irungu [15], Estrada [8]). Some of these researchers found a significant positive impact, while others found

Table 2. *Basic description of companies analyzed.* ***Source:*** *created by the authors based on Notoria SA and GPW SA data.*

Ticker	Name of the company	Sector classification
BTM	BYTOM SA	Retail sale of clothing
CCC	CCC SA	Retail sale of footwear and leather goods
CDL	CDRL SA	Wholesale clothing and footwear
EAH	ESOTIQ&HENDERSON SA	Retail sale of textiles
GRI	GINO ROSSI SA	Retail sale of footwear and leather goods
HRP	HARPER HYGIENICS SA	Production of finished textile products
LPP	LPP SA	Retail sale of clothing in specialised stores
LBW	LUBAWA SA	Production of finished textile products
MON	MONNARI TRADE SA	Retail sale of clothing
NVT	NOVITA SA	Manufacture of nonwovens and articles of nonwovens, excluding apparel
PMA	PRIMA MODA SA	Retail sale of footwear and leather goods
PRC	PRÓCHNIK SA	Retail sale of clothing
PRT	PROTEKTOR SA	Manufacture of footwear
RDN	REDAN SA	Wholesale clothing and footwear
SFG	SILVANO GROUP AS	Production of underwear
SOL	SOLAR COMPANY SA	Retail sale of clothing
TXM	TXM SA	Retail sale of clothing
VST	VISTULA SA	Retail sale of clothing
WOJ	WITTCHEN SA	Retail sale of footwear and leather goods
WTN	WOJAS SA	Manufacture of footwear

a significant negative impact, and some found that the impact of firms' performance on stock returns is insignificant. That is why in the paper we also presented the financial performance of Polish T&A companies against the backdrop of Polish industry.

In the sections below, the research methodology and data are presented, as well as the results of analysis into the risk and return on T&A stocks and the financial conditions of public T&A companies. The goal of the research is to compare the performance of public T&A companies quoted on the Warsaw Stock Exchange against that of the capital market and the economy as a whole. The main hypothesis being tested is the following: listed T&A companies are an attractive investment option for WSE investors.

Methodology

In the first step, we selected a set of WSE-listed companies based on their industry and selected stock engaged in textile or apparel (T&A) production. Then we estimated the risk of T&A companies' stocks, a major determinant of activity, focusing on the systematic risk and characteristics of T&A stocks from the point of view of their risk and sensitivity to market variations. For all selected stocks the beta coefficients (β) were calculated, which show a specific investment's volatility with respect to the market as a whole. It is generally assumed that a beta of less than 1 indicates that the investment is less volatile than the market, and a beta of greater than 1 means that the investment is more volatile than the market. There is a wealth of literature dealing with various problems in the estimation of beta as the most common measure of risk in financial markets, of which only two major ones will be considered in this paper, namely the selection of stock return interval used for beta estimation (associated with an "intervalling effect") and of the estimation method itself (most notably related to heteroscedasticity and ARCH effects)[1)]. We estimated the beta coefficients of all selected T&A stocks based on daily and monthly intervals. In the third step, the performance of the sampled companies' stocks was estimated. To this end, we created one equally weighted portfolio made up of T&A stocks and calculated the returns from it as well as a modified Sharpe ratio for the period 1 Dec. 2002 – 1 Oct. 2017 and its two sub-periods: 1 Dec. 2002 – 1 June 2007 and 1 June 2007 – 1 Oct. 2017 (respectively preceding and following the financial crisis). The Sharpe ratio measures portfolio performance taking account of both return and risk – rate of return and standard deviation. In this study, because of negative portfolio returns in some sub-periods, the modified Sharpe measure was used as recommended. Lastly, using DuPont analysis and data from companies' financial statements, the textile industry and the whole manufacturing industry in Poland were compared in terms of performance. DuPont analysis is frequently used in studies as a tool enabling the comparison of companies operating in the same or different industries (e.g. Curtis et al. [7]). In this study, DuPont analysis was specifically employed to determine if textile manufacturers are economically more efficient than the manufacturing industry at large. The manufacturing industry was defined as per section C – Manufacturing – of the Polish Classification of Business Activity[2)] (pol. PKD 2007). DuPont analysis was carried out simply by dividing the return on equity (ROE) for components describing the company's efficiency in three main areas, namely the management of costs and sales (profitability), asset management (asset efficiency) and debt management (financial leverage). The formula we used is the following;

$$ROE = \frac{NI}{S} * \frac{S}{A} * \frac{A}{E}, \qquad (1)$$

where:
NI – net income, S – sales, A – total assets, E – equity, $ROE = NI/E$.

Equation (1) was applied to the manufacturing industry as a whole and separately to the T&A manufacturers.

Data

Of the 893 companies listed on the Warsaw Stock Exchange (WSE) for both stock markets (i.e. the Main Market and Catalyst) and available in the Notoria database, we selected for analysis 20 companies that were included in the WIG-Odzież index (WIG-Clothing), besides four, which produce cosmetics, jewelry and sports equipment, as of the end of November 2017, plus 1 producer of nonwovens. One of the sampled companies (Próchnik) had been listed on the WSE since its onset, meaning that 318 monthly rates of return (from April 1991 to October 2017) were available on it. The time series of rates of returns for the other companies had different lengths, ranging from only 10 months to as many as 289. The selected companies are presented in ***Table 2***.

Systematic risk measure estimation

According to the theory of finance, the average beta value for the market is 1. Stock with β > 1 are riskier than the market, thus they are sometimes called aggressive stocks, whereas stocks with β < 1 are less risky than the market, and hence they are known as defensive stock. Most stocks in ***Table 3*** are therefore defensive stocks. The theory also holds that in an efficient capital market defensive stocks are likely to have expected rates of return below the market's average return. In estimating betas, special attention has to be given to the selection of an appropriate estimation method (one of the key issues is to weigh heteroscedasticity and ARCH effects against the Ordinary Last Squares (OLS) method) and of the interval over which stock returns will be calculated (known as the "intervalling effect" dilemma). In this study, we estimated beta coefficients for all selected T&A stocks over the 2 most common intervals: daily and monthly. Whenever the ARCH Lagrange multiplier test showed heteroscedasticity to be present, we applied ARCH methodology and the beta was estimated using the appropriate GARCH[3)] model. We also carried out Q-statistic tests for autocorrelation, which was removed when identified by applying appropriately structured AR and/or MA terms. We used the following ARCH model to calculate beta parameters [3]:

$$r_t^{stock} = \alpha + \beta \cdot r_t^{index} + \xi_t, \quad (2)$$

$$\xi_t = \vartheta_t \sqrt{h_t}\,, \quad (3)$$

$$h_t = \gamma_0 + \sum_{s=1}^{S} \gamma_s \xi_{t-s}^2 \quad (4)$$

where α and β are the model's structural parameters, $\vartheta_t : \text{IID}(0,1)$, S > 0, $\gamma_0 > 0$, and $\gamma_0 \geq 0$. We also assumed $\xi_t : \text{IID}(0,\sigma_\xi^2)$, the non-autocorrelation of the error term and no covariance between the error term and the explanatory variable. Variables r_t^{stock} and r_t^{index} represent returns on stocks and the market index, respectively. The order and type of ARCH model are determined by the specification of the conditional variance function, h_t, in (4). The most commonly applied modification of ARCH models is Bollerslev's GARCH(S,Q) [3], with h_t written as:

$$h_t = \gamma_0 + \sum_{s=1}^{S} \gamma_s \xi_{t-s}^2 + \sum_{q=1}^{Q} \phi_q h_{t-q} \quad (5)$$

where S > 0, $Q \geq 0$, $\gamma_0 > 0$, $\gamma_s \geq 0$ and $\varphi_q \geq 0$.

Table 3. *Estimates of daily and monthly betas (market model).* ***Remarks:*** ****, **, * – denotes, respectively, statistical significance with p-value 0.01, 0.05, 0.10.*

	Daily		Monthly	
Company code	**Beta value**	**Estimation**	**Beta value**	**Estimation**
BTM	0.67***	ARCH	0.59***	OLS
CCC	0.60***	ARCH	0.78**	OLS
CDL	0.28***	ARCH	0.10***	OLS
EAH	0.11	ARCH	-0.02	OLS
GRI	0.63***	ARCH	1.19***	OLS
HRP	0.20***	ARCH	1.11***	OLS
LBW	0.88***	ARCH	0.83***	OLS
LPP	0.51***	ARCH	0.87***	OLS
MON	0.82***	ARCH	1.03***	OLS
NVT	0.63***	ARCH	0.72***	OLS
PMA	0.35***	ARCH	1.24***	OLS
PRC	0.74***	ARCH	1.04***	OLS
PRT	0.44***	ARCH	0.88***	OLS
RDN	0.69***	ARCH	0.77***	OLS
SFG	0.39***	ARCH	0.51***	OLS
SOL	0.76***	ARCH	1.06**	OLS
TXM	0.17	ARCH	1.40	OLS
VST	0.67***	ARCH	0.72***	ARCH
WOJ	0.31***	ARCH	0.61***	OLS
WTN	0.12	OLS	1.08**	OLS
No. of ARCH estimations		19	No. of ARCH estimations	1
No. of OLS estimations		1	No. of OLS estimations	19

When neither heteroscedasticity nor ARCH effects were present, β was estimated from ***Equation (2)*** using the simple OLS method[4)] and the longest time series available for both intervals. In ***Table 3***, the daily and monthly betas for all 24 stocks in the sample are presented. Most of the results are highly significant, and a comparison shows that the daily and monthly betas are also fairly different from each other. It is worth noting that heteroscedasticity caused by the much higher clustering of the variance in the daily rates of returns provides a strong argument supporting the use of ARCH models for estimating betas. Most of the ARCH effects are not observed when the monthly data are analysed.

The numbers in ***Table 3*** offer three main conclusions. Firstly most stocks in the sample have betas < 1, therefore they are defensive. The situation changes, however, when stocks are considered with respect to the length of the return interval. According to the daily betas, all stocks are still defensive, while the monthly betas, higher for most stocks, show that only 14 stocks are defensive. Theoretically in an efficient capital market the rate of return expected of defensive stock is lower than the market average (the market rate of return), although the so called 'small firm effect' may disturb such a relation; also β may not be a significant factor influencing stock valuation.

Secondly the number of ARCH effects increases as the return interval is shortened. In the case of daily intervals, heteroscedasticity was present in almost all models analyzed (19 estimates were obtained from the ARCH models and only 1 from the models with OLS). As far as monthly intervals are concerned, the situation was reversed, in that almost all estimates were obtained using OLS and only one from the ARCH model. An explanation of this result may lie in the relatively low market capitalisation and low liquidity of T&A companies' stocks in the sample, all of which are outside WIG-20, the WSE stock index made up of the largest and most liquid companies.

Investment results in portfolio of T&A stocks

In this section, we use available data to determine the profitability of T&A companies' stocks as an investment option in the Polish capital market. To this end, an equally weighted portfolio is composed of the selected stocks, and the portfolio return over the period December 2002-October 2017 is calculated.

Figures 1, 2 and ***3*** depict the performance of the T&A portfolio and stock market in-

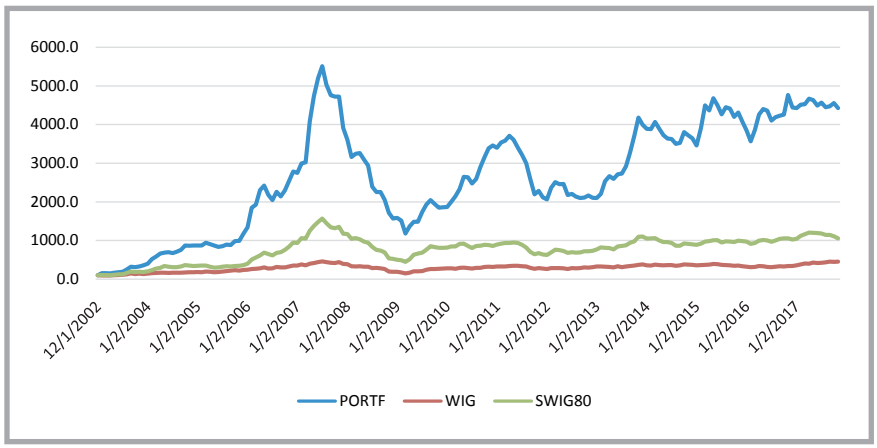

Figure 1. *Equally weighted portfolio of textile and apparel companies' stocks – performance from December 2002 to October 2017.* ***Source:*** *authors' calculations.*

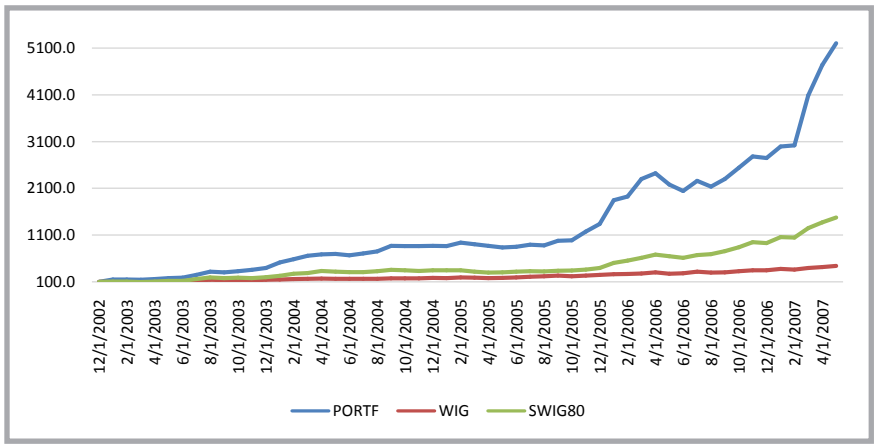

Figure 2. *Equally weighted portfolio of textile and apparel companies' stocks – performance from December 2002 to June 2007.* ***Source:*** *authors' calculations.*

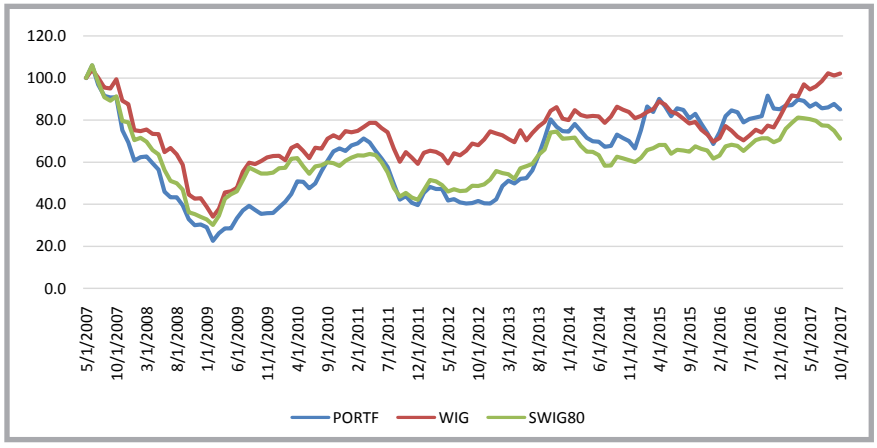

Figure 3. *Equally weighted portfolio of textile and apparel companies' stocks – performance from June 2007 to October 2017.* ***Source:*** *authors' calculations.*

dices (standardized to 100 at the start of the period of analysis) for the entire sample period and two sub-periods roughly covering the pre- and post-crisis years, respectively. The graphs clearly show that the T&A portfolio outperformed the sWIG80 index in all cases, particularly in the first sub-period (before the crisis), even accounting for risk. The WIG index underperformed the T&A portfolio in the entire period analysed and in the first sub-period; however, it outperformed the portfolio in the second period. Yet it is worth mentioning that the systematic risk of the T&A portfolio measured by the beta coefficient was higher than 1 (i.e. higher than the beta for the WIG index) in the entire period analyzed ($\beta = 1.03$) and in the first sub-period ($\beta = 1.05$), but lower than 1 ($\beta = 0.90$) in the second sub-period. It means that one of the main capital market theory statements, according to which portfolios (less) riskier than the market portfolio should offer higher (lower) return than the market return, was generally confirmed in that research. As mentioned earlier, one of the portfolio performance measures which incorporates risk and return is the Sharpe ratio. ***Table 4*** presents values of the Sharpe ratio, i.e. the volatility-adjusted performance measure, modified for negative returns [16].

$$S = d/(S_d)^{\left\{\frac{d}{|d|}\right\}},$$

where d is the mean monthly difference between the portfolio return (monthly) and risk-free return (monthly), and S_d is the standard deviation of monthly differences between the portfolio return and risk-free return. As a risk-free rate for the Polish capital market, the rate of return on T-bills was adopted. Its monthly values were calculated with the following formula: $\sqrt[12]{1+R_{ft}}-1$ (where R_{ft} is the risk-free annual return obtained for every month). The source of the risk-free rate data is the Polish Ministry of Finance. Because T-bills were not quoted after 2012, we used yields on 10-year government bonds to make up for the missing data.

The modified Sharpe ratios in ***Table 4*** are higher for the T&A portfolio than

Table 4. *Modified Sharpe ratio (monthly rates).* ***Source:*** *authors' calculations.* ***Notes:*** *The modified Sharpe ratio (S) was calculated using Israelsen's formula [16].*

	Jun 2007-Oct 2017			Dec 2002-Jun 2007			Dec 2002 – Oct 2017		
	WIG	sWIG80	PORTF	WIG	sWIG80	PORTF	WIG	sWIG80	PORTF
Average excess return	-0.08%	-0.34%	-0.09%	2.36%	4.89%	7.66%	0.65%	1.21%	2.20%
Standard deviation	5.73%	5.95%	7.40%	5.71%	8.56%	12.19%	5.83%	7.23%	9.75%
Modified Sharpe ratio	-0.00004	-0.00021	-0.00007	0.414	0.572	0.628	0.111	0.167	0.226

for both WIG and sWIG80 indices in the whole period analysed and in the sub-period 2002-2007. The *small firm bias* may explain the relatively better returns comparing to other, broad market indices; but it is important to note that in our sample the T&A portfolio also outperformed the sWIG80 index of small stocks.

Financial conditions of listed T&A companies

Finally DuPont analysis was performed for data from companies' financial statements to compare the performance of the textile industry with that of the entire manufacturing industry in Poland, i.e. to determine if textile manufacturers are economically more efficient than the manufacturing industry at large. As manufacturing industry we applied the classification provided in Section C – Manufacturing – of the Polish Classification of Business Activity. The analysis was carried out by dividing the return on equity (ROE) for components describing a company's efficiency into three main areas, namely the management of costs and sales (profitability), asset management (asset efficiency) and debt management (financial leverage).

From the numbers in ***Table 5***, it follows that in most years public companies included in the WIG-Odzież index performed relatively better than the manufacturing industry as a whole (Manufacturing, Apparel Manufacturing and Textile Manufacturing) as their higher average ROE shows. They also dominated in the two key areas of efficiency, namely the management of costs and sales (as measured by NI/S) and asset management (according to S/A). At the same time, their capital structure is comparable with that of the whole economy. The data on WSE-listed manufactures of apparel lead to similar conclusions. As regards publicly-traded textile manufactures, their results are below those for the whole economy. However, textile manufacturers represent only a fraction of the sample and thus do not change the general positive picture of companies included in the WIG-Odzież Index.

Table 5. *DuPont analysis.* ***Notes:*** $ROE = \frac{NI}{S} * \frac{S}{A} * \frac{A}{E}$, *where: NI – net income, S – sales, A – total assets, E – equity, ROE = NI/E.* ***Source:*** *calculated by the authors based on the EFFECT database. WIG-odzież includes all constituents at the end of November 2017. Ratios for each sub-sample are calculated by use of aggregated data for all of sub-sample constituents.*

Ratio	2016	2015	2014	2013	2012	2011	2010	2009	Average 2009-2016
MANUFACTURING – the whole economy									
ROE	13.10%	11.80%	9.40%	11.10%	10.90%	12.10%	–	10.90%	11.33%
NI/S	6.20%	5.60%	4.30%	4.90%	4.50%	4.90%	5.10%	4.90%	5.05%
S/A	1.11	1.13	1.15	1.18	1.23	1.2	1.14	1.12	1.16
A/E	1.91	1.87	1.9	1.91	1.96	2.05	–	1.98	1.94
MANUFACTURE OF TEXTILES – the whole economy									
ROE	15.20%	11.90%	11.70%	13.70%	10.20%	9.00%	–	2.70%	10.63%
NI/S	6.20%	4.80%	4.70%	5.90%	4.20%	4.10%	4.10%	1.30%	4.41%
S/A	1.4	1.43	1.37	1.34	1.3	1.18	1.1	1.09	1.28
A/E	1.74	1.73	1.82	1.75	1.88	1.86	–	1.97	1.82
MANUFACTURE OF APPAREL – the whole economy									
ROE	10.50%	11.60%	12.60%	11.80%	9.60%	10.00%	–	6.90%	10.43%
NI/S	5.60%	6.50%	6.90%	6.40%	5.10%	5.60%	5.40%	3.80%	5.66%
S/A	1.16	1.12	1.13	1.15	1.11	1.05	0.95	0.97	1.08
A/E	1.63	1.6	1.6	1.62	1.69	1.69	–	1.86	1.67
PUBLICLY LISTED TEXTILE MANUFACTURERS									
ROE	6.2%	3.4%	13.4%	6.1%	6.1%	15.6%	9.3%	17.5%	9.73%
NI/S	4.2%	2.4%	9.0%	3.8%	3.9%	9.2%	4.2%	9.0%	5.71%
S/A	0.81	0.75	0.77	0.84	0.88	0.88	1.04	0.84	0.85
A/E	1.83	1.94	1.92	1.94	1.80	1.94	2.13	2.30	1.98
PUBLICLY LISTED APPAREL MANUFACTURERS									
ROE	12.3%	16.1%	14.6%	15.9%	19.7%	24.8%	18.7%	-2.6%	14.95%
NI/S	7.0%	8.6%	7.2%	7.6%	8.9%	12.1%	9.1%	-1.2%	7.40%
S/A	1.21	1.24	1.41	1.51	1.47	1.24	1.33	1.38	1.35
A/E	1.46	1.52	1.45	1.39	1.51	1.66	1.55	1.59	1.52
WIG-ODZIEŻ INDEX CONSTITUENTS									
ROE	11.4%	15.7%	25.1%	19.5%	16.5%	19.1%	19.4%	-1.0%	15.72%
NI/S	4.6%	6.5%	10.1%	7.6%	6.5%	8.0%	7.6%	-0.3%	6.32%
S/A	1.36	1.30	1.35	1.44	1.38	1.24	1.28	1.29	1.33
A/E	1.83	1.85	1.84	1.79	1.84	1.94	1.99	2.21	1.91

Conclusions

From 2002 to 2017 the stocks of Polish T&A companies were an attractive investment option. This conclusion has been drawn following the assessment of the stocks' risk and returns using the broad market indices ratio, and is also based on the evaluation of the financial condition of T&A companies vis-à-vis the financial conditions of other Polish companies. However, our findings are not contradictive to the basic capital market theory, according to which risk and return are positively correlated. The systematic risk of the T&A portfolio measured by the beta coefficient was higher in the entire period analysed and in the first sub-period but lower in the second sub-period than the systematic risk of the market portfolio represented by the WIG-index. The T&A portfolio return followed that pattern, i.e. it was higher in the entire period and in first sub-period than the market portfolio return. However, in the second sub-period. the T&A portfolio return was negative and lower than both the market portfolio return and risk free rate. The same is true as to the T&A portfolio performance measured by a risk-adjusted measure such as the modified Sharpe ratio. Therefore one ought to be careful when proposing to invest in T&A stocks, although such an investment was attractive in the long, 15 year period in the past. It is also worth mentioning that the portfolio of T&A stocks outperformed the index of small companies over the period of analysis as well as in both sub-periods. The findings give some guidance on how more complex trading strategies involving T&A stocks should be constructed, and they open up space for further research based on longer time periods which could offer more conclusive results.

As shown by the DuPont analysis, which concerns financial performance, T&A companies outperformed non-public manufacturing companies on the whole, as well as manufacturers of textiles and apparel. The comparatively better financial conditions of listed T&A companies than those of other companies (even if the WSE-listed textile companies did not perform well in the

period of analysis) seem to imply that participation in the capital market helps large apparel companies in Poland to improve their performance. In any case, due to the relatively low number of T&A listed companies, such a conclusion cannot be formulated unambiguously, and the issue should be the subject of further research.

The financial performance analysis presented above concerns the second sub-period. As was shown, despite T&A companies' financial performance being better than that of the market, the T&A portfolio was a less attractive investment than the WIG-index in that period. This raises a question concerning the relation between companies' financial performance and their stock returns.

Estrada [8] explains that although financial ratios such as Earnings per Share (EPS) may have a significant, positive impact on stock prices, sometimes one can observe a negative correlation between the EPS growth and stock price growth. That means that companies which significantly improve their financial conditions may suffer from low return of their stocks. According to Estrada's view, the main reason for such a result is the issue called "blinded by growth". It occurs when at the beginning of the period analysed, investors pay too much for a company's growth opportunities, and later stock prices may drop even if the company significantly improves its financial performance. Our research does not allow us to definitely confirm such a view, but it shows the validity of that issue in the case of Polish T&A companies and creates incentive for future research.
The econometric part of the study provides two important findings: 1) the beta estimates of the selected T&A stocks are affected by the intervalling effect, and 2) the prevalence of heteroscedasticity in the models using short return intervals implies that ARCH models are appropriate for estimating betas.

The main limitations of this study are naturally related to the small sample of listed T&A stocks, which requires the research conclusions to be interpreted with great caution. The period analysed is too short for formulating definite conclusions concerning the impact of the capital market on T&A industry development in Poland. As was presented in section 2, such an impact in other countries was recognised only after more than 15 years. Also the methods which we used in our analysis allow to draw only preliminary conclusions, and further research on the relations between the risk, return and financial performance of T&A stocks should be conducted for better exploration of Polish textile and apparel companies' performance.

Editorial notes:

1) Existing evidence from various markets shows that betas are sensitive to the length of the return interval. For example, Cohen et al. [5] demonstrated that for low-liquidity and high-liquidity stocks the beta respectively increases and decreases as the interval is lengthened.

2) Therefore we included the following sections from no. 10 to 32: manufacture of food products, manufacture of beverages, manufacture of tobacco products, manufacture of textiles, manufacture of wearing apparel, manufacture of leather and related products, manufacture of products of wood, cork, straw and wicker, manufacture of paper and paper products, printing and reproduction of recorded media, manufacture of coke and refined petroleum products, manufacture of chemicals and chemical products, manufacture of pharmaceutical products, manufacture of rubber and plastic products, manufacture of other non-metallic mineral products, manufacture of basic metals, manufacture of metal products, manufacture of computer, electronic and optical products, manufacture of electrical equipment, manufacture of machinery and equipment, manufacture of motor vehicles, trailers and semi-trailers, manufacture of other electrical equipment, manufacture of furniture, other manufacture.

3) If heteroscedasticity is present and the estimation method is OLS, the estimators of the models' parameters are still unbiased but not efficient. This leads to serious estimation errors (in the magnitude of the estimator as well as quite often in sign). In practice, in such cases the beta parameter will be either overestimated or underestimated; hence its value will be not properly estimated. In ARCH type models the correct estimates are obtained by using the information about the variance of the error term, contained in the h_t function, and correcting the estimates that are biased when the standard OLS procedure is used.

4) If heteroscedasticity is present and the estimation method is OLS, the estimators of the models" parameters are still unbiased but not efficient. This leads to serious estimation errors (in the magnitude of the estimator as well as quite often in sign). In practice, in such cases the beta parameter will be either overestimated or underestimated; hence its value will be not properly estimated. In ARCH type models the correct estimates are obtained by using the information about the variance of the error term, contained in the ht function, and correcting the estimates that are biased when the standard OLS procedure is used.

References

1. Anwaar M. Impact of Firms' Performance on Stock Returns (Evidence from Listed Companies of FTSE-100 Index London, UK). *Global Journal of Management and Business Research: D Accounting and Auditing* 2016; 16(1): 30-39.
2. Basu S. Investment performance of common in relation to their price earnings ratios: A test of the efficient market hypothesis. *The Journal of Finance* 1977; (3): 663-82.
3. Bollerslev T. Generalized Autoregressive Conditional Heteroscedasticity. *Journal of Econometrics* 1986; 31(3): 307-327.
4. Carhart M. On Persistence in Mutual Fund Performance. *The Journal of Finance* 1997; 52: 57-82.
5. Cohen K, Hawawini G, Maier S, Schwartz R, Whitcomb D. Implications of Microstructure Theory for Empirical Research on Stock Price Behavior. *Journal of Finance* 1980; 35(2): 249-257.
6. Corovic E, Jovanovic P, Ristic L. Current Trends on the World Textile Market and the Competitiveness of the Serbian Textile Industry. *FIBRES & TEXTILES in Eastern Europe* 2013; 21, 5(101): 8-12.
7. Curtis A, Lewis-Western M, Toynbee S. Historical cost measurement and the use of DuPont analysis by market participants. *Review of Accounting Studies* 2015; 20(3): 1210-1245.
8. Estrada J. Blinded by growth. *Journal of Applied Corporate Finance* 2012; 24(3).
9. Fama E, French K. *Common risk factors in the returns on stocks and bonds. Journal of Financial Economics* 1993; 33(1): 3-56.
10. Fama E, French K. The Cross-Section of Expected Stock Returns. *The Journal of Finance* 1992; 47(2): 427-465.
11. Grandys E, Grandys A. Clothing Trade in Poland in the Years 2009-2013 and Prospects for its Growth. *FIBRES & TEXTILES in Eastern Europe* 2015; 23, 5(113): 13-17. Nr DOI: 10.5604/12303666.1161750.
12. Haber S. Industrial Concentration and the Capital Markets: A Comparative Study of Brazil, Mexico, and the United States, 1830-1930. *The Journal of Economic History* 1991; 51(3): 559-580.
13. Higgins D, Toms S. Capital Ownership, Capital Structure and Capital Markets: Financial Constraints and the Decline of the Lancashire Cotton Textile Industry 1880-1965. *Journal of Industrial History* 2001; 4(1): 48-64.
14. Hobarth L. Modeling the relationship between financial indicators and company performance – An empirical study for us listed companies. France: Dissertation Vienna University of Economics and Business Administration. 2006.

15. Irungu P. Effect of Financial Performance Indicators on Market Price of Shares in Commercial Banks of Kenya. *IJMBS* 2013; 3(3).
16. Israelsen C. Refinement of the Sharpe Ratio and Information Ratio. *Journal of Asset Management* 2005; 5(6): 423-427.
17. Jatoi M, Shabir G ,Hamad N, Iqbal N, Muhammad K. A Regresional Impact of Earning per Share on Market Value of Share: A case study Cement Industry of Pakistan. *International Journal of Academic Research in Accounting Finance and Management Sciences* 2014; 4(4): 221-227.
18. Lintner J. *The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. Review of Economics and Statistics* 1965; 47(1): 13-37.
19. Menaje P. Impact of Selected Financial Variables on Share Prices of Publicly Listed Firms in the Philippines. *American International Journal of Contemporary Research* 2012; 2(9): 98-104.
20. McNew B. Best fashion stocks of 2017. The Motley Fool, LCC 23.12.2016 (accessed 20.12.2017). Available from https://www.fool.com/investing/2016/12/23/best-fashion-stocks-of-2017.aspx.
21. Mossin J. *Equilibrium in a Capital Asset Market. Econometrica.* 1966; 34(4): 768-783.
22. Pastor L, Stambaugh R. Liquidity risk and expected stock returns. *The Journal of Political Economy* 2003; 111(3): 642-685.
23. Pomykalski P. Assessing the Impact of the Current Financial and Economic Downturn on the Textile and Apparel Industry in Poland. *FIBRES & TEXTILES in Eastern Europe* 2013; 21, 5(101): 13-18.
24. Rocznik Statystyki Przemysłu 2016. Warszawa: GUS; 2017.
25. Sharpe W. *Capital asset prices: A theory of market equilibrium under conditions of risk. Journal of Finance* 1964; 19(3): 425-442.
26. Shmidt S. 5 Top Apparel Industry Trends in 2017. Market Research Blog. 26.06.2017 (accessed 03.11.2017). Available from https://blog.marketresearch.com/5-top-apparel-industry-trends-in-2017.
27. Treynor J. *Market Value, Time, and Risk. 1961. Unpublished manuscript.*
28. Treynor J. Toward a Theory of Market Value of Risky Assets. Unpublished manuscript. A final version was published in 1999, in Asset Pricing and Portfolio Performance: Models, Strategy and Performance Metrics. Robert A. Korajczyk (editor) London: Risk Books.
29. Umar M, Musa T. Stock Prices and Firm Earning per Share in Nigeria. *Jorind* 2013; 11(2): 187-192.

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