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Valuation of unlisted direct investment equity and the impact on Finnish international investment position

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Mikael Kronholm

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VALUATION OF UNLISTED DIRECT INVESTMENT EQUITY AND THE IMPACT ON FINNISH INTERNATIONAL INVESTMENT POSITION

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Abstract

This study examines the various means for valuing unlisted equity in the context of foreign direct investment (FDI) statistics. The objective is to contribute to the international efforts of improving market value estimates and the guidelines on how international direct investment activity should be measured. Moreover, this study explores the impacts that market approximation has on Finnish FDI figures and international investment position during 2005-2011.

This study is carried out by first analyzing how different valuation methods perform in an international context. Valuation models are tested with data taken from all listed companies of 27 European Union member states during 2005-2011. Finally, the models that are applicable in FDI valuation context and lead to lowest valuation errors are applied to the valuation of unlisted FDI in Finland.

The results suggest that when developing models for valuing unlisted direct investment equity, focus should be laid on price-to-book value methods. The results indicate as well that the current valuation practice, which is based on the book values of equity, generates lower direct investment positions when compared to market value approximations. Additionally, the results imply that Finland's overall external financial position might be strongly understated, when the valuation of unlisted direct investment equity is based on the book values.

Keywords Valuation, market value, multiple, direct investment, FDI, balance of payments, international investment position, macroeconomic statistical methodology

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Tiivistelmä

Tässä työssä on tarkoitus tutkia sitä, minkälaisin keinoin listaamattomia yrityksiä voisi arvostaa suorien sijoitusten tilastoinnissa osana maksutaseen laadintaa. Tutkimuksen tavoitteena on viedä sitä kansainvälistä keskustelua eteenpäin, jonka pyrkimyksenä on parantaa niin markkina-arvo estimaattien laatua kuin laajemmin suorien sijoitusten mittaamiseen liittyvää normistoakin. Lisäksi tutkimus analysoi, mitä vaikutuksia markkina-arvoihin siirtymisellä on suorien sijoitusten kantoihin ja ulkomaiseen varallisuusasemaan Suomessa vuosina 2005-2011.

Tutkimuksessa analysoidaan ensin sitä, kuinka hyvin erilaiset arvonmääritysmallit suoriutuvat kansainvälisessä kontekstissa. Tätä varten tutkimukseen on kerätty aineisto kaikista listayhtiöistä Euroopan Unionin 27:ssä jäsenvaltiossa vuosien 2005-2011 aikana. Lopuksi tutkimuksessa sovelletaan niitä malleja listaamattomien suorien sijoitusten arvonmääritykseen, jotka johtavat alhaisimpiin ennustevirheisiin ja soveltuvat osaksi maksutaseen laadintaa.

Tulokset osoittavat, että huomio tulisi kiinnittää oman pääoman kirjanpitoarvoihin perustuviin P/B arvonmääritysmenetelmiin, kun kehitetään malleja listaamattomien suorien sijoitusten arvonmääritykseen. Lisäksi tutkimuksessa havaitaan, että tämän hetkinen kirjanpitoarvoihin perustuva arvonmäärityskäytäntö johtaa alhaisempiin suorien sijoitusten kantoihin kuin mihin markkina-arvoestimaatteja käyttämällä päädyttäisiin. Listaamattomien suorien sijoitusten arvostaminen kirjanpitoarvoihin johtaa lisäksi Suomen ulkomaisen nettovarallisuusaseman merkittävään aliarvostamiseen.

Avainsanat Arvonmääritys, markkina-arvo, arvostuskerroin, suora sijoitus, FDI, maksutase, ulkomainen varallisuusasema, makrotalouden tilastomenetelmä

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Even though I would not have accomplished without the support of several people, all the work regarding this study was conducted by me and me only. The views expressed in this paper are truly mine and do not necessarily reflect the views of the Bank of Finland. More significant, any errors found in this paper are my own.

Helsinki, December 9, 2013
Mikael Kronholm

TABLE OF CONTENTS

List of Tables

List of Figures

1 INTRODUCTION

1.1 Background

The authoritative sources regarding foreign direct investment (FDI) statistics, The IMF and the OECD, recommend valuing all direct investment transactions and positions to their market value (IMF, 2008; OECD, 2008). While this is fairly easily conducted for equity transactions and positions involving companies where the equity securities are regularly traded in the markets, the valuation is not as straightforward when it comes to unlisted (or unquoted) equity. In the latter case the market values cannot be directly observed and therefore have to be estimated.

Despite the recommendations of IMF and OECD, the current practice in most countries regarding the unlisted direct investment equity is to value it by using a standardized book value measure "own funds at book value" (OFBV, see section 3.5.6). According to the European Working Group on Unquoted Shares (Eurostat, 2009, p. 55): *"The measurement of the values of unquoted shares is one of the most difficult issues related to the elaboration of financial accounts. This is mainly due to the difficulty in finding a reliable method for the valuation. However, the issue is very relevant, as unquoted shares in many countries are far more important than quoted shares."*

While it is recognized that market price is the appropriate concept for both listed and unlisted equity, the international community has (in recognition of the practical estimation challenges for unlisted equity) adopted a more flexible approach. A short list of acceptable approaches has been proposed for the valuation of unlisted equity. There is however as yet only little experience in applying them (Simard & Boulay, 2006). Thus, one of the important objectives also is to find a common practice for valuing unlisted equity and to achieve the important statistical objective of international comparability, including bilateral symmetry. It is well acknowledged that the current situation with different country practices decreases international comparability. It also increases the risk that statistical data is misleading and leads to flawed IIP analysis and policy recommendations. Thus, steps should be taken to increase the cross-country harmonization in valuation principles in the future. (IMF, 2008.)

Foreign direct investment and international investment position statistics are widely used by analysts and policy makers for measuring the degree of global economic integration as well as the attractiveness and competitiveness of markets. Driven by technological change, globalization and liberalization of markets, the importance of international direct investment has grown remarkably. Subsequently, the need for meaningful and reliable interpretation of investment trends has grown as well. Therefore, it is important to improve the guidelines on how foreign direct investment activity should be measured. (OECD, 2008.)

1.2 Statement of the Research Problem

Motivated by the current state of valuing unlisted direct investments at book value, despite the recommendations of the IMF and the OECD, the objective of this thesis is to analyze the various means for valuing unlisted equity in FDI context and to contribute to the international effort to improving market value estimates. Moreover, I will study the impact that a market approximation might have on Finnish international investment position statistics. Briefly, the research question can be stated as:

> *How should unlisted direct investment equity be valued and what kind of impact would the recommended valuation method have on Finnish international investment position?*

The context of unlisted foreign direct investment sets significant limits on the applicability of the valuation models. The main constraint that IIP compilers have is data availability. Thus, the recommended methods should be based on publicly available information rather than subjective assumptions. In addition, the accounting variables that can be included to valuation models are limited to ones that are already collected from companies for IIP or balance of payment purposes. Second, the valuation method should be as simple as possible so that compilers worldwide are able to conduct the valuation in a uniform way and thereby minimize bilateral asymmetries. Third, the valuation process should not be overly time-consuming to conduct but instead it should be easily transferable to FDI calculation systems. In spite of these constraints the valuation method should provide reliable market value equivalents and robust results on aggregate level.

1.3 Data and Methodology

The study is carried out by first analyzing how well different valuation methods perform in an international context before applying them to the valuation of unlisted foreign direct investments in Finland. Valuation models are tested with data taken from all listed companies of 27 European Union member states during 2005-2011. Data is retrieved mainly from Bureau van Dijk's Orbis database and the final sample in the valuation accuracy study includes 32 247 firm year observations. These observations are divided into two sub-samples. Valuation models are calculated using 80% of the company observations each year and the remaining share of 20% of observations are used to calculate out-of-sample valuation errors. I analyze the valuation accuracy of the market value predictions with three different valuation error measures. The median and the mean absolute valuation errors are used to measure company-specific valuation errors. The weighted valuation error of the aggregates is used to measure the impact of aggregation process to the valuation accuracy of the models. Finally, the models that are applicable to FDI valuation and lead to lowest valuation errors are applied to the valuation of unlisted FDI in Finland.

1.4 Results

The findings indicate that when industry-wide differences as well as country-related factors are taken into account in peer group selection, a single-factor P/B multiple is most accurate valuation multiple. The performance of the P/B multiple was more accurate than any of the two-factor models tested in this study. Furthermore, the single-factor P/B multiple performed well even when it was compared to more complex multi-factor models if the company-specific valuation errors were studied. However, when the focus was moved to the accuracy of the aggregates, it was shown that the aggregation process significantly improves the performance of multi-factor models. This might imply that the use of multi-factor models is reasonable in FDI valuation context.

Moreover, the impact of the valuation models to the unlisted FDI in Finland was analyzed. It was shown that moving from the book value measure OFBV to market value approximations leads to higher direct investment positions. An exception for this was year 2008, a year of financial turmoil, when the market value approximations resulted in lower positions. The results imply as well that Finland's overall external financial position might be strongly understated, when the valuation of unlisted direct investment equity is based on the book values. However, the results also remind that the choice of valuation method can have a significant impact on countries' FDI figures as well as on international investment positions.

1.5 Implications

The results imply that focus should be on P/B valuation models when developing models for the valuation of unlisted direct investment equity. However, more research is needed on how P/B valuation should be conducted in practice. As the collection of data and the estimation of valuation models is a very time-consuming process, I recommend that the work should be conducted by one specific institution (e.g. OECD, IMF or Eurostat) in a centralized manner. This would also decrease the risk of bilateral asymmetries as every country would use the same data and valuation models.

1.6 Structure of the Study

The remainder of this study is structured as follows. Chapter 2 provides definitions of the key concepts of this study. Chapter 3 continues with outlining the empirical studies related to firm valuation and discussing the issues that affect particularly the valuation of unlisted equity. In Chapter 4 the theoretical foundations of valuation models, especially regarding the valuation multiples are provided. Chapter 5 describes the research design and chapter 6 provides the results for the valuation accuracy part of the study. The valuation models are finally applied to the Finnish IIP in chapter 7. Lastly, chapter 8 concludes this study and gives proposals for future research.

2 DEFINITION OF KEY CONCEPTS

2.1 Foreign Direct Investment (FDI)

The compilation of Foreign Direct Investment (FDI) statistics is mainly based on international standards set by the OECD and IMF. The 4th edition of the OECD's *Benchmark Definition of Foreign Direct Investment* (OECD 2008, hereafter the BD4) states that reliable FDI statistics are essential for policy makers faced with the challenges of attracting and making the most of international investment. Therefore, the BD4 aims to provide a comprehensive set of rules to improve statistical measures of foreign direct investment and setting the world standard for direct investment statistics. Their goal is to have internationally harmonized, timely and reliable statistics that are essential when assessing the trends and developments of the FDI activity and assisting policy makers in dealing with the challenges of global markets. Regular analysis of direct investment trends and developments is an integral part of most macro-economic and cross-border financial analysis. Due to the significant increase in cross-border capital movements and globalization in recent decades, the importance of such analysis has grown remarkably. (OECD, 2008.)

According to the benchmark definition (OECD, 2008) direct investment refers to a category of cross-border investment made by a resident in one economy (*the direct investor*) with the objective of establishing a lasting interest in an enterprise (*the direct investment enterprise)* that is resident of another economy. The lasting interest is evidenced when the direct investor owns at least 10% of the voting power of the direct investment enterprise. This allows the direct investor to have a significant degree of influence or control on the management of the direct investment enterprise. The motivation to significantly influence or control an enterprise is the underlying factor that differentiates direct investment from cross-border portfolio investments. For the latter, the investor's focus is mostly on earnings resulting from the acquisition and sales of shares without expecting to control or influence the management of the assets underlying these investments. (OECD, 2008.)

Direct investment enterprises are corporations (incorporated enterprises), which may either be subsidiaries (which over 50% of the voting power is held) or associates (in which between 10% and 50% of voting power is held). Direct investment enterprises can also be quasi-corporations (unincorporated enterprises) operating separately from their owners such as branches (effectively 100% owned by their respective parents). In practice the direct investment relationships may be complex and bear little or no relationship to management structures. As the legal structures of related enterprises can consist of many enterprises linked through complex ownership chains, there is a generalized methodology for identifying and determining the extent and type of direct investment relationships, The Framework for Direct Investment Relationships. This framework allows compilers to determine the population of direct investors and direct investment enterprises to be included in FDI statistics. (OECD, 2008.)

FDI statistics include direct investment positions (equity and debt), direct investment income flows (distributed earnings, reinvested earnings, interest income) and direct investment financial flows (equity and debt). Market value is the preferred conceptual basis to measure both direct investment positions and transactions (flows). FDI transactions (FDI financial flows and FDI income flows) provide information for FDI activity within a given time period while FDI positions data indicate the levels of investment at a given point in time. Thus, direct investment includes inward and outward financial transactions and positions between directly and indirectly owned incorporated and unincorporated enterprises. (OECD, 2008.)

The statistics are presented on aggregate basis in terms of assets and liabilities and also, separately, on directional (both for inward/outward FDI) basis with a geographical and industry breakdown. This allows the analysis of recent economic developments, the measurement of the attractiveness of the reporting economy within the global market and the competitiveness of the economic agents. For instance, an increase in inward investments by foreign direct investors implies additional capital injected into the economy (the domestic market), and is likely to have an impact on the economy's performance. On the other hand, the size of outward investment transactions indicates the extent of penetration of the resident direct investor in other markets. Direct investment is one of the five functional categories of the financial account of the balance of payments and the corresponding international investment position statements. (OECD, 2008.)

2.2 International Investment Position (IIP)

The IMF *Balance of Payment and International Investment Position Manual* (IMF, 2008; hereafter BPM6) states that the international investment position (IIP) is a statistical statement that shows at a point in time the value and composition of

(a) Financial assets of residents of an economy that are claims on nonresidents and gold bullion held as reserve assets, and
(b) Liabilities of residents of an economy to non-residents.

The IIP covers the subset of financial assets and liabilities that have an international character. In most cases, the international character of a financial asset or liability arises because, of the two parties, one is a resident and the other is a nonresident. The gold bullion component of monetary gold is the only case of a financial asset with no counterpart liability. The difference between an economy's external financial assets and liabilities is the economy's net IIP, which represents either a net claim on or a net liability to the rest of the world. The IIP relates to a point in time, usually at the beginning of the period (opening value) or end of the period (closing value). (IMF, 2008.)

The international investment position of Finland for the year 2011 is depicted in table 1. It should be noted that the direct investment figures below are based on the directional principle, i.e. the direct investment figures are in net terms. For example, the FDI figure on the asset side does not only contain investments by Finnish direct investors in direct investment enterprises abroad but has been offset by certain reverse investment transactions by foreign direct investment enterprises in their direct investors in Finland. More important, the share of unlisted equity capital is the main component of direct investment. Therefore, the need for market value approximation for unlisted equity can be easily argued. As stated by Damgaard et al. (2009), moving from the book value measure OFBV to market value approximations can have a substantial effect on FDI figures as well as on IIP statistics.

Table 1: International investment position of Finland by functional investment categories 2011, EUR million

	Assets	Liabilitities	Net
Direct Investment	103 297	66 016	37 281
Equity capital	95 438	55 031	
Unlisted	*86 187*	*52 334*	
Publicly listed	*9 251*	*2 697*	
Other capital	7 859	10 985	
Portfolio Investment	208 560	216 449	-7 889
Shares	86 143	54 925	
Bonds and notes	119 204	138 394	
Money market instruments	3 213	23 13	
Loans and deposits	176 438	195 941	-19 503
Trade credits	5 996	6 257	- 261
Other debt liabilities	9 760	11 010	-125
Financial derivatives	184 524	176 731	7 793
Reserve assets	7 991		
Total	696 566	672 404	24 162

Note: the figures are based on the directional principle, which is described in BPM 6 (paragraphs 6.42-6.43)

3 LITERATURE REVIEW

3.1 Valuation of Equity

Equity valuation is a primary application of finance and accounting theory. There are two alternative approaches that are generally used when estimating equity value: direct (or fundamental) valuation and relative valuation. First, fundamental valuation involves discounting expected values of fundamentals such as (free) cash flows, dividends or (abnormal) earnings. Common examples are the dividend discount model (DDM), the discounted cash flow (DCF) model and the residual income model (RIM). The second is relative (or market-based) valuation, in which the objective is to value an asset, based upon how similar assets are currently priced by the market. This is usually done with price multiples, i.e. by multiplying a firm's fundamental by the average price-to-fundamental ratio for a group of similar companies (same industry, size, leverage, etc.). The average multiple is often calculated by using location measures (measures of the average ratio), such as the mean, median or harmonic mean. (Nissim, 2011.)

While the direct valuation models are theoretically well argued for equity valuation, they have some disadvantages that make them hard to apply in FDI valuation context. As the models require subjective company-specific multi-period forecasts of the future dividends, cash flows or abnormal earnings and discount rates, they are too time-consuming to conduct when dealing with a very large sample of unlisted FDI companies (Damgaard et al. 2009). The use of these models would also raise the problem of bilateral symmetries as it is difficult for compilers across countries to make the subjective assumptions in a uniform way. In addition, the compilers conducting the FDI and IIP statistics often don't have the necessary information needed to conduct proper company-specific estimates (Damgaard et al. 2009).

Consequently, practitioners regularly revert to valuations based on relative valuation methods, such as the price to earnings (P/E) and price to book (P/B) multiples, as a substitute to more complex valuation techniques (Lie & Lie, 2002). Based on how the market values comparable firms within the same industry, practitioners can quickly come up with estimations of a target firm's equity value. As companies are not typically identical in real capital markets, relative valuations have to rely mostly on similar companies whose market prices have to be "adjusted" to yield the value of the target company. This adjustment is often done by considering the relation of certain financial or non-financial key figures, in which the two companies differ. Single-factor and multi-factor comparable company valuation is typically distinguished depending on the amount of key variables included in the valuation model (Meitner, 2006, p. 23). As relative valuation always refers to the market values of comparables, the method represents an indirect, market-based valuation approach (Schreiner, 2006, p. 1).

3.2 Multiple Valuation

When it comes to relative valuation, the single-factor models, i.e. the multiple valuation method, is by far the dominating approach in practice and academic research (Meitner, 2006, p. 23). The underlying concept behind the approach is the law of one price, which states that in an efficient market, similar assets should trade at similar prices (Esty, 2000). In the context of business valuation this means that equal companies should have the same value (Meitner, 2006, p. 23). According to Nissim (2011), multiple valuation is based on two important assumptions: 1) value is proportional to the fundamental used (e.g. earnings, revenue, cash flow, book value) and 2) a similar proportionality holds for comparable firms, that is, firms from the same industry and/or with similar characteristics (e.g. size, leverage, expected growth). Nissim (2011) also reminds that these assumptions are at best a reasonable approximation, and the valuation precision depends on the extent to which 1) the fundamental captures value-relevant information, 2) comparable firms are indeed comparable, and 3) the stock prices of the comparable firms are close to their intrinsic ("true") values. As multiples reflect the market mood, the estimates of firm value can result in values that are too high, when the market is over valuing comparable firms, or too low, when it is under valuing these firms (Damodaran, 2010, p. 68). This can cause distortion from the intrinsic value, which is based on a firm's capacity to generate cash flows in the future. However, in relative valuation it is often assumed that while markets may make mistakes on individual stocks, they are correct on average (Damodaran, 2010, p. 85).

Accounting-based market multiples are easily the most common method in valuation (Bhojraj & Lee, 2001; Demirakos et al. 2004). In practice, multiples are widely used in investment bankers' fairness opinions and analysts' reports (DeAngelo, 1990). They are also widely present in valuations associated with leveraged buyout transactions, initial public offerings (IPOs), seasoned equity offerings and other merger, and acquisition activities (Bhojraj & Lee, 2001). Hence, multiples provide an important basis for investment and transaction decisions of various types of investors including corporate executives, hedge funds, institutional investors, private equity firms, and also private investors (Schreiner, 2006, p. III).

Nissim (2011) explains the popularity of price multiple valuation by its clear advantages over direct valuation. He states that valuation using multiples is simple and easy to implement, uses market information directly, and values a company relative to its peers. Damgaard et al. (2009) add that the multiple-based valuation makes the assessment process less demanding in terms of data needs and can be completed faster and with fewer assumptions than complex valuation techniques in FDI context. In addition, when considering the findings that multiples generally approximate market values reasonably well (Schreiner, 2006) and produce valuations that are similar to the DCF model valuations in terms of accuracy (Kaplan & Ruback, 1995), the use of multiples in FDI valuation context can be easily argued.

Unfortunately, in practice, using multiples is not as simple as it appears. According to Schreiner (2006, p. 3), the selection of value drivers, which are "truly" relevant, and the identification of a peer group consisting of "truly" comparable firms involve several problems. Schreiner (2006, p. 48) reminds that comparable firms are often hard to identify or do not always exist at all. Damodaran (2010, p. 67) warns that the strengths of relative valuation are also its weaknesses. The ease with which a relative valuation can be performed, pulling together a multiple and a group of comparable firms, can also result in inconsistent estimates where key variables such as risk, growth or cash flow potential are ignored.

3.3 Empirical Research on the Multiples Valuation Method

Despite the widespread usage of multiple valuation method, it has been the subject of extensive academic study among the practitioners just more than a decade (Liu et al. 2002). Therefore, there is relatively little theory available to guide the application of these multiples in practice (Schreiner, 2006, p. III). Among the few exceptions, most of the empirical studies focus on the accuracy of different types of multiples and on statistical measures to obtain the average price-to-fundamental ratio (Dittman & Weiner, 2006). However, the literature on corporate valuation gives only a sparse evidence on how to apply multiples or on why individual multiples or comparable firms should be selected in a particular context (Schreiner, 2006, p. 13).

3.3.1 Valuation Accuracy of the Multiples Valuation Method

Kaplan & Ruback (1995, 1996) examine how DCF valuation model approximates highly leveraged transactions such as LBOs and MBOs. They conclude that a simple enterprise value to earnings before interest, taxes, depreciation and amortization (EV/EBITDA) multiple results in similar valuation accuracy with DCF valuations. The percentage of valuation errors within 15 percent of observed market values of completed transactions are around 40 % for the multiples valuation method in their study.

Gilson et al. (2000) compare market values of firms that recognize bankruptcy with value estimates from the multiples valuation and DCF method. They find similar results with Kaplan & Ruback (1995, 1996), as the DCF and the multiples approach have about the same degree of valuation accuracy.

Liu et al. (2002) look into the performance of multiples for the U.S equity market and find that multiples based on earnings forecasts explain stock prices reasonably well for most firms. In their study, the inverse P/E multiples using two-year earnings per share (EPS) forecasts generate valuations within 20 % of observed prices for almost 60 % of firm years. They also relate these results to the performance of the RIV model, and find that RIV model performs worse than the multiple approach.

Lastly, Lie & Lie (2002) show that the valuation accuracy of multiples varies with factors such as firm size, profitability and the level of intangible assets. They find that multiples produce more accurate valuation for larger firms. This can be seen as a drawback in light of this study, when noted that unlisted direct investments are on average of small size.

3.3.2 Selection of Value Relevant Measures

In more recent studies, Liu et al. (2003, 2005a and 2005b) analyze the ability of equity value multiples to approximate stock prices in international setting across ten countries. They compare the performance of numerous value drivers (forward earnings, historical earnings, cash flows, book value, and sales) and find that multiples derived from forward earnings best explain stock price. Thus, moving from trailing numbers to forecasts seems to improve the valuation accuracy, with the greatest improvement being observed for earnings.

Consistent with the results from the Liu et al.'s studies (2003, 2005a and 2005b), Kim & Ritter (1999) show that forward-looking P/E multiples outperform all other multiples in valuation accuracy in their study of how IPO prices are set using multiples. Two-year EPS forecasts are superior to one-year EPS forecasts, which dominate current EPS. Lie & Lie (2002) study the valuation accuracy of a conventional list of multiples for the companies within the Compustat North America database. They as well report superior performance of forward-looking P/E multiples compared to all other multiples. When analyzing trailing multiples, some of the studies find that multiples based on earnings perform better than multiples based on book values (see Liu et al. 2002). However, Kim & Ritter (1999) on the other hand discover that book values yield more accurate predictions for trailing multiples than measures from the income statement (sales, EBITDA, EBIT and earnings) within their sample.

The combination of book value and earnings multiples into a two-factor multiples valuation model is also rarely explored area. The study of Cheng & McNamara (2000) investigates the valuation accuracy of P/E and P/B multiples, and a combination of both using equal weights. For U.S. equity market, the combined P/E-P/B model outperforms the single P/E and P/B multiples, which shows that both earnings and book values are value relevant. Moreover, Liu et al. (2002 and 2005b) find that a combination of two or even more multiples indicates modest improvements in the valuation accuracy over that obtained for forward-looking P/E multiples. This suggests that it might be reasonable to combine book values and earnings in a multiples-based valuation framework. This would also be in line with the theoretical findings of Ohlson (1995) and Feltham & Ohlson (1995) in which equity value can be seen as a function of current book value and future earnings instead of discounted expected returns only.

To conclude, the empirical findings seem to favor forward-looking multiples over trailing multiples and earnings-based multiples over cash-flow multiples. Other results, for instance when it comes to the comparison of earnings-based multiples to book value multiples are diverse, which is likely caused by different research settings.

3.3.3 Identification of Comparable Firms

According to Liu et al. (2002) using the entire sample of companies in an industry is better than using the entire cross-section of companies in the market. Alford (1992) finds that the procedure of identifying comparable companies by using all companies in an industry is relatively effective. The valuation accuracy increases when the fineness of the industry definition is used to identify comparable firms is narrowed from broad 1-digit Standard Industrial Classification (SIC) codes to 2-digit and 3-digit SIC codes, there are not further improvements when 4-digit SIC codes are considered. However, he finds that adding controls for earnings growth, leverage, and size does not significantly reduce valuation errors. Boastman & Baskin (1981) compare the accuracy of P/E multiples from the same industry. Unlike Alford (1992), they find that relative to randomly chosen firms, valuation errors are smaller when comparable firms are matched on the basis of similar historical earnings growth.

Bhojraj & Lee (2001) develop a multiple regression model to predict a “warranted” multiple for each firm and match comparable firms based on underlying economic variables. They define a target firm’s peers as those firms with the closest warranted multiple, as identified in the regression model. Their results show that the use of warranted multiples can produce improvements over the use of 2-digit SIC codes. Similar results are produced by Bhojraj et al. (2003) in an international context. Compared to SIC codes, Bhojraj & Lee (2001), Bhojraj et al. (2003) and Hermann & Richter (2003) present evidence to identify appropriate peer group by considering fundamental factors related to growth, profitability and risk. However, the study of Cheng & McNamara (2000) shows that the industry membership is enough to define the peer group if the combined P/E-P/B valuation model is used.

Cooper & Cordeiro (2008) examine how a change in the quantity of comparable firms forming the peer group affects the accuracy of the multiple valuation method. With a global dataset on the S&P 500 industry groupings and peer group identified with criterion based on growth rates, they find that using a set of ten comparable companies is, on average, as accurate as using all the companies in an industry. The study is motivated by the contrast between practical and theoretical approaches. Practitioners often apply the multiple valuation method by identifying carefully a small number of similar comparable companies, to estimate the value of a couple of target companies. On the contrary, academic studies often identify comparable companies in a more mechanic way, and deal with large datasets. Therefore, academic studies typically use all companies in an industry as the peer group for the target company. Cooper & Cordeiro (2008) show that the inclusion of entire industry does not necessarily lead to better valuation but instead adds more noise and lowers the accuracy. However, there is the advantage that the procedure does not require additional identification criteria for comparable companies.

The great majority of empirical studies are exclusively dealing with U.S datasets. However, the study of Dittmann & Weiner (2006) is one of the few to address the question of comparable firms using European dataset. They find that for most of the European companies, identifying comparable companies from the countries of the European Union leads to better valuation than finding comparable companies only from their native market when using the EV/ EBIT multiple. Bhojraj et al. (2003) argue that accounting diversity and country-specific risk have differential effects on different multiples. Country-specific differences are least important in explaining the enterprise-to-sales ratio, as accounting differences governing the recognition of sales revenues are quite similar between countries. Country-based differences also play a relatively minor role in explaining P/B multiples, however they are extremely important in explaining variations in price-to-earnings ratios.

3.4 Issues Related Particularly to Valuation of Unlisted Equity

In addition to the difficulties already described above, there are a couple of issues which further complicate the valuation of unlisted equity. Palepu et al. (2010, p.13) mention that private corporations have less incentive to make their financial statements informative about the underlying business reality, as the information and incentive problems regarding the owners and the management are smaller. Also, private corporations often produce one set of financial statements that meets the requirements of both tax rules and accounting rules. Tax rules grant managers less discretion in their assumptions and the recording of costs and benefits is typically more associated with the payment and receipt of cash rather than the underlying economic activities. Consequently, the financial statement information becomes less useful in assessing the corporations' true economic performance.

Damgaard et al. (2009) list (1) liquidity, (2) the value of control and (3) negative equity values as the three main issues that set the valuation of unlisted equity apart from the valuation of listed equity. First, unlisted equity is often characterized by lower degree of liquidity which tends to have a negative effect on prices. When an investor decides to sell an asset, he will incur some trading costs. These costs consist of four components: the bid-ask spread, the price impact when buying or selling, the opportunity costs, and the commission (Damodaran, 2005). Damgaard et al. (2009) acknowledge that these costs will be lower for frequently traded assets and higher for infrequently traded assets, as there aren't that many buyers and sellers. Thus, listed companies should *ceteris paribus* trade at a higher price than similar unlisted companies since they already are listed on an established platform, on which they can be traded efficiently. Empirical studies that compare restricted stocks with publicly traded stocks of the same company have found average discounts of about 30-35 % for the US stock market (Pratt et al. 2000). Koeplin et al. (2000) on the other hand compute average illiquidity discounts of 20-30% by comparing publicly traded companies to similar private companies, which are acquisition targets. Given the existence of illiquidity discounts, the difficult question is how to take into account this effect when valuing unlisted FDI equity. BPM6 (IMF, 2008) does not give any hints regarding this topic. However, the *European system of national and regional accounts in the Community* (ESA 95, 1996, paragraph 7.54) acknowledges that unlisted equity must be valued with reference to listed equity and adjusted for differences in liquidity.

Second, unlisted companies typically have a much more limited ownership structure compared to listed companies, and many unlisted companies are in fact 100% owned by a single investor. Investors are often willing to pay a premium for equity if they can gain control of a company. Damgaard et al. (2009) question whether the assumption can be made that investors are willing to pay similar premiums for unlisted equity as with listed equity. They claim that investors are willing to pay high premiums for control in companies where it is easier to make management or strategic changes and which are inefficiently operated.

Third, it can be argued whether negative equity positions generated by valuation methods should be recorded in the IIP as direct investors would not be liable for any losses exceeding the capital invested in the enterprises. Thus, it can be argued that unlisted direct investment equity should be treated as listed equity, and negative positions should be revalued to zero. On the other hand, many of the direct investment enterprises are quasicorporations such as branches or notional units created for statistical purposes, and the direct investor would be liable for the debts in these units. BPM6 recognizes that the value of a direct investment enterprise's non-equity liabilities may exceed its assets, and allows negative direct investment equity positions in the IIP. However, individual practices differ on this manner and some countries do revalue negative equity positions in limited direct investment enterprises to zero. (Damgaard et al. 2009.)

Finally, Damodaran (2010, p.103) mentions one of the most difficult challenges that relates to relative valuation of private firms. The essence of relative valuation is to value a firm based upon how much the market is paying for similar firms. The problem is that public firms will have different fundamentals than private firms. Generally, public firms are larger, they have less potential for growth, more established markets than private businesses and they are often in different phase of their life cycle. Even though we consider multiples of traded firms in the same sector, they will differ with respect to risk, cash flow and growth characteristics from private firms. All these differences will manifest themselves in the price that investors pay for public companies and show up in the pricing multiples. Damodaran (2010, p. 104) continues that young and private firms often have very little revenues to show in the current year, negative earnings and less meaningful book values. In addition, these companies regularly have limited histories and they are particularly susceptible to failure. Thus, the relative valuation when working with private firms puts even more pressure to already complex and uncertain process of firm valuation.

3.5 Valuation Methods Recommended in BPM6

Market value is the general valuation principle in BPM6 and in many other macroeconomic statistical manuals. The term market value is defined as the value of assets and liabilities using the closing market prices on the balance sheet reporting date. However, if financial instruments are not traded in a market frequently, a market equivalent value should be estimated instead. This value is referred also to as fair value and is defined as "*the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's-length transaction"* (IMF 2008, paragraph 3.88).

Although market value is the recommended basis for valuating direct investment equity positions, values based on the books of direct investment enterprises are often used to determine the values of direct investment positions (Nivat & Topiol, 2010). This is because the book values may represent the only source of information on valuation particularly in regard to unlisted shares and because market value estimation is a very complex exercise. However, when the actual market value of the equity is not available, the 4th edition of the OECD's *Benchmark Definition of Foreign Direct*

Investment (OECD, 2008) recommends approximation to the market value. BD4 states that the choice of the method will depend on three factors:

1) The type of information available on which to base an approximation:
2) How well the method approximates market value: and
3) The need to allow comparability across countries and for symmetrical recording by creditors and debtors.

To address the valuation issue, The BPM6 (IMF, 2008, paragraph 7.16) includes a list of six different methods for approximating market value for unlisted direct investment equity. However, I will separate the method presented in paragraph 1.7(c) (Present value / Price to earnings ratio) as two different methods and treat them separately in this study. This shortlist should provide guidance to compilers on the methods and their suitability depending on country-specific factors. All methods have their strengths and weaknesses, and different methods can be applied in different circumstances. BPM6 (IMF, 2008) states that the choice of the method depends primarily on data availability, which is often the main constraint that compilers have. Therefore, some of the methods can be ruled out quite easily as the compilers don't have the information available to support the application of the method. When comparing the methods that could be implemented in practice, the main interest should be on how well the method approximates market value (IMF, 2008). Next, I will discuss the advantages and disadvantages that each method have in detail.

3.5.1 Recent Transaction Price

According to the method, when unlisted equity has been traded recently, the transaction price may be used as the market price. The transaction price should represent an 'arm's length' price between an independent buyer and seller, where neither party is under compulsion to engage in the transaction. It is recommended in the BPM6 that the transaction should have occurred within the past year. If the most recent transaction is more than one year old, it is probable that the changes in general market conditions and in the corporation's position have changed too much. In that case an alternative method should be considered. (IMF, 2008.)

Usage: A recent, arm's length transaction price is required (OECD, 2008).
Advantages: Easy to implement for equity, which has been traded. By definition, equals the market price at the time of the transaction. (Damgaard et al. 2009.)

Disadvantages: Not often available due to the low frequency of trades in unlisted equity (OECD, 2008). Market values might change rapidly with market conditions and company-specific factors and the information become dated (Damgaard et al. 2009.)

3.5.2 Net Asset Value (NAV)

The method suggests that fair value of unlisted equity can be estimated as total assets at current/market value less total liabilities (excluding equity) at market value. All financial and non-financial assets and liabilities of the enterprise, including intangible assets, should be stated in terms of current period prices. The appraisals should have been conducted within the prior year by knowledgeable management or independent auditors. (IMF, 2008.)

Usage: At minimum, the method requires an asset and liability valuation to be undertaken by the enterprise (OECD, 2008).
Advantages: Knowledgeable management and independent auditors, who are close to the company, often have superior knowledge about the actual value of a company. They may know how much potential buyers are willing to pay for a company, which would be a direct approximation of market value. In addition, the method takes specific company details into account. (Damgaard et al. 2009.)
Disadvantages: Since the valuation is left to reporters, compilers do not know for sure how much effort company officials put into the valuation process or if it is done consistently. In addition, some companies might have an interest in providing incorrect values for reasons such as tax evasion, shareholder protection or fear that competitors will obtain information. The risk of misinterpretation of market value, the existence of potential protectionist incentives and low effort might lead to a mix of accurate and inaccurate data (Damgaard et al. 2009). Also, NAV provided by an enterprise may exclude some classes of assets (e.g., intangibles), while other assets might be valued using historic cost or nominal value, distorted from the current market value (OECD, 2008.)

3.5.3 Present Value of Earnings

The value of an unlisted equity can be estimated as the present value of the forecast stream of future earnings. BPM6 does not provide more specific definition and mixes this method with price-to-earnings ratios. According to Damgaard et al. (2009) this method is about finding a way to forecast future earnings and determine appropriate discount rate by assessing company-specific risk factors.

Usage: Requires estimates of future earnings and discount rates (OECD, 2008.)
Advantages: Uses theoretically sound principle to determine the fundamental value of equity by including estimates of future earnings. If future earnings of a specific company are expected to differ significantly from past earnings, it becomes necessary to include such expectations to capture the effect on the market equivalent value. (Damgaard et al. 2009.)
Disadvantages: It is extremely time-consuming to make reliable earnings forecasts, if possible at all, at a company level. In addition, the direct valuation models such as the present value of earnings are used to estimate the intrinsic/fundamental value of an asset. However, the recommended valuation principle in international statistical manuals is market value or market value equivalents. Therefore, it is problematic to estimate fundamental values rather than market value equivalents. (Damgaard et al. 2009.)

3.5.4 Price to Earnings

The BPM6 does not give explicit guidelines for the calculation of valuation multiples. Damgaard et al. (2009) state that P/E ratios for listed companies can be calculated and applied to unlisted equity. They recommend recognizing potential industry-specific differences and suggest that the ratios are calculated for industry groups rather than calculating a common P/E ratio for all companies.

Usage: A market or industry price-to-earnings ratio can be applied to the earnings of unlisted enterprise to calculate a price (OECD, 2008.)
Advantages: The method is fairly easy to implement in practice. Furthermore, it uses actual market values rather than economic fundamentals in the estimations of fair value. In circumstances where the stock market seems to be out of line with economic fundamentals, the estimations will still result to market value approximations. (Damgaard et al. 2009.)
Disadvantages: Like other relative valuation methods, P/E multiple does not take individual company characteristics into account. Moreover, problems with peer group identification arise, as well as the question of how to take into account the illiquidity discounts between listed and unlisted equity. (Damgaard et al. 2009.)

3.5.5 Price to Book Value (Market capitalization method in BPM6)

Another variant of the relative valuation models, the price-to-book value method, proposes that book values reported by enterprises can be adjusted at an aggregate level by the statistical compiler. BPM6 suggests collecting information on "own funds at book value" as book value measure (see section 3.5.6), and then adjusting it with ratios based on suitable price indicators, such as the ratio of market capitalization to book value for listed companies in the same economy with similar operations. OECD (2008) adds that in constructing the capitalization ratio under this method, stock market data for an individual country may be used when stock market in that country is broad and trading volume is relatively high. It suggests using broad regional indexes when these circumstances do not exist.

Usage: A market or industry price-to-book ratio can be applied to the own funds at book value of unlisted enterprise to calculate a price (OECD, 2008).

This method shares the same pros and cons as the above mentioned price to earnings method. Main difference is that this method uses a stock variable (book value) in the estimation of market value while the other uses a flow variable (earnings). The general equity valuation theories define the value of a firm as the present value of future earnings. Therefore, it may seem more appealing to use earnings as input in the model rather than book values. However, earnings are more volatile and often negative, while book values tend to be more stable and they include, to some extent, previous earnings because of the accumulation of reinvested earnings are included in the book values. Thus, it is not clear which one of the approaches is superior to the other. (Damgaard et al. 2009.)

3.5.6 Own Funds at Book Value (OFBV)

Own funds at book value (OFBV) is based on the books of the direct investment enterprise and can be seen on its balance sheet as shareholder's equity. The BPM6 (paragraph 7.16e) defines OFBV as "*the value of the enterprise recorded in the books of the direct investment enterprise, as the sum of (a) paid-up capital (excluding any shares on issue that the enterprise holds in itself and including share premium accounts); (b) all types of reserves identified as equity in the enterprise's balance sheet (including investment grants when accounting guidelines consider them company reserves); (c) cumulated reinvested earnings; and (d) holding gains or losses included in own funds in the accounts, whether as revaluation reserves or profits or losses*". OFBV can be seen an attempt to standardize the term book value. It is also the current valuation method concerning the unlisted direct investment valuation in Finland as well as in most other countries. Damgaard et al. (2009) mention that the closer the accounting principles follow the IFRS, the better is the approximation of market value because these standards require most assets to be revaluated, at least, on annual basis.

Usage: The method may be used where books are kept on the basis of International Accounting Standards, and access is available to the books of the direct investment enterprise (OECD, 2008).
Advantages: The definition is precise and easy to implement. Also, if all countries used this method, it would promote symmetric bilateral recording. (Damgaard et al. 2009.)
Disadvantages: International Accounting standards prohibit the recognition of certain intangible assets (e.g. brands, mastheads, publishing titles, customer lists). Moreover, goodwill can only be bought, not internally generated and assets in some classes (loans, assets held to maturity and non-trading liabilities) may be valued at nominal or historic cost. All these cause distortion from the market valuation. (OECD, 2008.)

3.5.7 Apportioning Global Value

In apportioning global value method, the market value of each of the companies in a listed international group can be found by prorating the overall market value from the stock exchange to the entities, which make up the entire group. Sales, net income, assets, or employment figures can be used as apportioning indicators. The global value may be apportioned to each economy in which it has direct investment enterprises, on the basis of that indicator. The method is based on assumption that the ratio of net market value to sales, net income, assets, or employment is a constant throughout the transnational enterprise group. (IMF, 2008.)

Usage: Current market capitalization of the global enterprise group is required. As such, this method may only be feasible for outward investment. An indicator that correlates well with market value and is readily available is also needed. (OECD, 2008.)
Advantages: The market value approximations are based on the actual market value of the group. Hence, the fluctuations in market value due to changes in expectations on future earnings will be captured. Practical implementation is straightforward once the indicator data has been selected. (Damgaard et al. 2009.)
Disadvantages: It is difficult to determine how to prorate the value of the entire group to a company within the group. Also, if there is a sudden increase in the market value of the entire group, it may be the result of an expected increase in future earnings for a certain company in the group. Furthermore, this method can't be generalized, as many of unlisted direct investment enterprises are not part of a listed group. (Damgaard et al. 2009.)

Table 2: BPM6-recommended valuation methods (Damngaard et al. 2009)

Method	Description	Advantages	Disadvantages
Recent transaction price	Use recent transaction price as market price	• Easy to implement for traded equity • Equals market price at time of transaction by definition	• Market prices can change rapidly • Not a general method because most unlisted equity is rarely traded
Net asset value	Knowledgeable management or independent auditors' estimation of total assets minus liabilities (excluding equity) at current value	• Utilizes first-hand information about the company's value • Possible to take company-specific characteristics into account	• Uncertain that respondents use uniform principles • Companies may have an incentive to give incorrect estimates
Present value of earnings	Discount expected future earnings	• The theoretically best way to value equity • Possible to capture expectations to future earnings at company level	• Very time-consuming if done properly • Based on subjective estimates • Approximates fundamental value rather than market value • Assumes that future earnings are known
Price to earnings (P/E)	Apply P/E ratios from listed equity to unlisted equity	• Easy to implement • Based on actual market values	• Does not take company-specific characteristics into account • Assumes that a model based on listed equity can be transferred to unlisted equity
Price to book value (P/B)	Apply P/B ratios from listed equity to unlisted equity	• Easy to implement • Based on actual market values	• Does not take company-specific characteristics into account • Assumes that a model based on listed equity can be transferred to unlisted equity
Own funds at book value (OFBV)	The sum of paid-up capital, reserves, reserves, cumulated undistributed net profits, and holding gains and losses included own funds	• Easy to implement • Promotes symmetric recording if used by all countries	• Book values do not necessarily reflect market values • Accounting principles differ across countries
Apportioning global value	Prorate overall market value of listed group to individual entities	• Based on the actual market value of the specific group • Straightforward to make estimations	• Difficult to find the best apportioning indicator • Not a general method because many unlisted direct investment enterprises are not a part of listed group

3.6 Previous Studies on FDI Valuation

In the article by Kozlow (2002) the two methods used by the United States in revaluing historical cost financial statements to produce estimates of direct investment positions in prices of the current period are analyzed. In light of this study the more important of these two is the market value method. The market value method revalues the owners' equity portion using aggregate approach based on indexes of stock market prices. The author states that the key assumption behind this method is that the use of general stock price indexes may produce on average a reasonable estimate of the aggregate value of affiliates in a country. The method revalues the historical-cost value of owners' equity in foreign affiliates (the outward side) using weighted average foreign stock prices. The value of owners' equity in U.S affiliates (the inward side) is revalued using a broad-based U.S. stock price index.

Simard & Boulay (2006) provide an overview of the methods used to develop market value estimates of direct investment equity for the Canadian IIP. The Canadian methodology is based on the use of capitalization ratios with some restrictions such as the exclusion of small companies. The capitalization ratio is imputed by taking either the ratio of the parent or the Canadian industry average ratio for six different industries. The authors admit that the use of ratios based on the Canadian parent (if listed) or industry may not reflect the trend observed in foreign markets. Canadian direct investment abroad at market value totaled $808.3 billion at the end of 2005. Over the three year period, Canadian direct investment abroad at market value increased by 41%. At the same time, the book value estimates increased only 7%. (Simard & Boulay, 2006.)

The study of Damgaard et al. (2009) is by far the most comprehensive and theoretically grounded. They estimate market values for FDI investments in Denmark by conducting regression models on market value and calculating P/E and P/B valuation multiples. However, the drawback in their study is that the valuation models and estimates are directly applied only on the liabilities side of the IIP (inward direct equity). The authors make a crude assumption that outward direct investment equity is proportional to the adjustment made on inward direct investment equity. They claim that it is not realistic that every country can estimate country-specific models for every counterpart country on the outward side, and propose that every country developed models for the valuation of inward direct investment equity and shared them with other IIP compilers.

Nivat & Topiol (2010) show how the market value of unquoted foreign direct investment equity is estimated in France. Since 2009 the capitalization ratio method (meaning the ratio of market value to book value) has been used for both inward and outward FDI stocks. As a drawback the authors use CAC 40 companies listed in France as the benchmark population for the evaluation of France's outward FDI stocks. In addition, industries are grouped only into four broad branches in order to calculate the capitalization ratios.

A common factor in many of the studies conducted on FDI valuation is that the choice of valuation method and estimation technique can have a highly significant impact on countries' FDI figures and the international investment position (see e.g. Kozlow, 2002; Damgaard et al. 2009). The previous studies have also found that estimated market values for direct investment tend to be higher than book values. According to van den Dool & Hillebrand (2012) this is reasonable under normal conditions with favorable prospects, as the book values do not reflect any positive earnings expectations prevailing in the market. On the contrary, Nivat & Topiol (2010) show that the estimated market value of France's outward and inward FDI stocks was smaller than the book value for the year 2008, a year of major financial turmoil, when market capitalization ratios contracted.

Some criticism towards market value as a good measure of FDI stocks has also been raised among practitioners. Some economists feel that financial bubbles and volatile asset prices prohibit market prices as an instrument for measuring the value of companies from a long-term perspective. Moreover, many statisticians believe that it is impossible to come up with an accurate method for estimating the market prices of unlisted equity securities. (Nivat & Topiol, 2010.)

4 THEORETICAL FOUNDATIONS

In an efficient market, firm value is defined as the present value of future payoffs which the firm is expected to deliver to its shareholders, discounted at the appropriate risk adjusted rate of return (Kothari, 2001). Since shareholders receive cash payoffs from a company in the form of dividends, the value of their equity should be the present value of future dividends. However, since dividend discount models have practical problems, finance and accounting literature offers a number of alternative valuation methods, which are theoretically equivalent to dividend discounting. Although the multiples valuation models do not require forecasting financial statements or discounting future payoffs, it would be erroneous to conclude that multiples have no economic meaning. This is because multiples are simply derivations from fundamental equity valuation models, as shown later in this chapter. (Schreiner, 2006, p. 22)

4.1 Fundamental Equity Valuation Models

A Firm's current performance as summarized in its financial statements constitutes an important input to the firm's valuation. Fundamental analysis is a method of analyzing information in current and past financial statements, as well as other firm specific, industry and macroeconomic data to forecast future payoffs and eventually arrive at firm's intrinsic value (Penman, 2004, p. 74-75). According to Kothari (2001) there is an important role for fundamental analysis even in an efficient market, i.e. it helps to understand the determinants of a firm's market value, and thus facilitates investment decisions and valuation of private firms. Next, I will summarize the three fundamental equity valuation models that are most often covered in valuation textbooks: the dividend discount model (DDM), the discounted cash flow (DCF) model and the residual income valuation (RIV) model.

4.1.1 Dividend discount model (DDM)

Dividend discount model is based on the idea that shareholders' payoffs from owning shares in a firm consist of the dividend payments during the holding period on top of the market value of the shares when selling them. Therefore, a firm's value should be based on the stream of dividends D_1, $D_2, \ldots, D_T$ it is expected to pay in the future plus the market value of common equity p_T^{equity} at the end of the forecast horizon T. When the forecast horizon is assumed to be infinite, the DDM, generally attributed to Williams (1938), defines the intrinsic value of a firm as the present value of expected future dividends discounted at their risk adjusted expected rate of return. Formally,

$$v_t^{equity} = \sum_{i=1}^{\infty} \frac{E_t\,(D_{t+i})}{(1+r_{t+i}^{equity})^i} \tag{4.1}$$

where v_t^{equity} is the firm's intrinsic value of common equity at time t, $E_t\,(D_{t+i})$ is the expected future cash dividend in period $t+i$ conditional on information available at time t, and r_{t+i}^{equity} is the cost of equity in period $t+i$. As seen from forumula (4.1), value is dependent on the forecasts of future dividends and discount rates. (Schreiner, 2006, p. 23)

Gordon (1962) makes a simplifying assumption concerning the model to derive a simple valuation formula, which is referred to as the Gordon growth model (GGM). Specifically, if the cost of equity remains constant over time and dividends grow geometrically at a constant rate g^D, i.e., D, $D \cdot (1 + g^D)$, $D \cdot (1 + g^D)^2, \ldots,$ and $g^D < r^{equity}$, then

$$v_t^{equity} = \frac{D_{t+1}}{r^{equity} - g^D} \tag{4.2}$$

As said by Schreiner (2006, p. 24) the DDM and the GGM, as a special case of the DDM, have two well-known weaknesses. First, they neglect internal growth through retained earnings. For instance, many young firms with a high growth potential tend to retain most of their earnings or do not plan to pay any dividends within a finite forecast. The market values of such firms are usually much higher than indicated by either formula (4.1) or (4.2). Second, the DDM requires the prediction of dividends to infinity for going concerns. According to the Miller & Modigliani (1961) dividend irrelevance proposition, the value is unrelated to the timing of expected payouts prior to or after any finite horizon. Therefore, forecasted dividends (and their growth rate) are uninformative about value. Schreiner (2006, p. 24) states that both weaknesses arise from a common problem: the DDM targets the actual cash distribution to shareholders, which is not necessarily tied to value generation. For instance, firms can simply borrow money to pay dividends, which has nothing to do with creating value through investing or operating activities (Penman, 2004, p. 90).

4.1.2 Discounted cash flow model (DCF)

The DCF model improves the DDM model by moving away from cash distribution to cash generation. According to Damodaran (2006) the various variants of discounted cash flow models get the most play in academia and come with the best theoretical credentials. However, Gode & Ohlson (2006) remind that by considering only cash flows and ignoring other assets and liabilities, the DCF model deals with a narrow aspect of a firm's value. Thus, instead of focusing on value generation, the DCF method focuses only on cash generation.

The idea behind the DCF model is to determine the present value of free cash flows (FCF) to debt and equity holders, which a firm is expected to earn in the future. FCF earned in a certain period t is defined as the after-tax cash flow available to all investors of a firm. Thus, FCF equals net operating profit after taxes (NOPAT) less the change in invested capital (the cumulative amount a firm has invested in its core operations). Firms use FCF to distribute dividends, pay debt holders, or simply retain the cash. Therefore the future FCF can be seen as "firm dividends" and their present value as the value of the firm as a whole. Formally,

$$v_t^{entity} = \sum_{i=1}^{\infty} \frac{E_t\,(FCF_{t+i})}{(1+r^{wacc})^i} \tag{4.3}$$

where v_t^{entity} is the value of the firm as a whole at time *t*, $E_t\,(FCF_{t+i})$ is the expected future FCF in period $t+i$ conditional on information available at time t, and r^{wacc} is the weighted average cost of capital, indicated as a constant. In order to receive the equity value v_t^{equity} at time t, we must subtract the market value of debt including preferred stock less cash & equivalents at time t (market value of net debt at time t) from the equation (4.3). (Schreiner, 2006, p. 25-26.)

The DCF model has also some specific deficiencies. One of them relates to the difficulties in forecasting the future free cash flows. According to Gode & Ohlson (2006) DCF valuation typically starts with a forecast of operating profit and then accounts for the factors affecting the change in invested capital. Schreiner (2006, p. 27) proposes that this might be one of the reasons why many analysts provide estimates of earnings rather than estimates of cash flows. Given the prominence of earnings forecast in most prospective analyses, models have been developed that express equity value directly in terms of expected earnings, book values of equity and cost of equity (Palepu et al. 2010, p. 318).

4.1.3 Residual income valuation model (RIM)

In contrast to previous models, the residual income model derives forecasts for residual income (also referred to as abnormal earnings) directly from earnings forecasts. Ohlson (1995) defines residual income as

$$RI_t = NI_t - r^{equity} \cdot B_{t-1} \tag{4.4}$$

where RI_t is the residual income at time *t*, NI_t is net income for the period ending at time *t*, r^{equity} is the cost of equity, and B_{t-1} is the book value of common equity at time *t*-1. Thus, residual income is net profit adjusted for a capital charge, which is computed as the discount rate multiplied by the beginning book value of equity. (Schreiner, 2006, p. 27-28.)

According to clean surplus relation, all changes in book value of equity during a fiscal period are reflected in that period's net income or dividends distributed to shareholders (O'Hanlon & Peasnell, 2002). At the end of each period net profit less dividends of the period is added to retained earnings, a component of equity (Palepu et al. 2010, p. 319). This relation can be written as follows:

$$D_t = NI_t + B_{t-1} - B_t \tag{4.5}$$

Subsequently, by using the clean surplus relation, and substituting this identity for dividends into the dividend discount formula (4.1) and rearranging the terms, the value of a firm can be expressed as the present value of a combination of net income and book value of equity. Ohlson (1995) shows that this yields the RIV model,

$$v_t^{equity} = B_t + \sum_{i=1}^{\infty} \frac{E_t\,(RI_{t+i})}{(1+r^{equity})^i} \tag{4.6}$$

where v_t^{equity} is the intrinsic value of common equity at time t, B_t is the book value of equity at time t, $E_t\,(RI_{t+i})$ is expected future residual income in period $t+i$, and r^{equity} is the cost of equity capital.

Palepu et al. (2010, p. 319) mention that if a firm can earn only a normal rate of return on its book value, investors should not be willing to pay more than the book value for its shares. Thus, the deviation of a firm's market value from book value depends on its ability to generate "abnormal earnings". According to Schreiner (2006, p. 28) the RIV model moves away from the cash generating focus of the DCF model to book value of equity and net income, which together measure the generation of value. However, they remind that anchoring on book value of equity while deriving the intrinsic value of a firm might not work well in industries where conservative accounting is emphasized and book values are misplaced. Conversely, Palepu et al. (2010, p. 321) state that the accounting effects should not influence the value estimates, provided that the analysts recognize the impact of differences in accounting methods. They say that conservative accounting for example not only lowers a firm's current earnings and book equity but also reduces future capital charges and thus inflates its future abnormal earnings. Ohlson (2002) says himself that only few practitioners view current book values of equity as a starting point in valuation, and instead the majority tends to focus on earnings and earnings growth. Therefore, RIV does not conform to principles of equity valuation as we generally observe them in practice (Schreiner, 2006, p. 29).

4.2 Derivation of Intrinsic Multiples

Explicit expressions for most commonly used multiples can be derived using either the above mentioned DDM, DCF or RIV method with a few additional assumptions. These are called intrinsic multiples, as they are derivations of fundamental equity valuation models, which aim at estimating the intrinsic value of a firm. Intrinsic multiples also help to form an understanding of a multiple's fundamental drivers, which should guide the selection of comparable firms. The presented deviations are based on the study of Schreiner (2006, p. 31-38). More advanced deviations can be found from the papers by Fairfield (1994) and Penman (1996).

4.2.1 Intrinsic P/E multiple derived from the DDM

By assuming a constant payout ratio (*PR*), dividends at time *t* are fixed proportion of the net income at time t:

$$D_t = PR \cdot NI_t \tag{4.7}$$

Net income for the next year NI_{t+1} is determined by this year's net income NI_t and its constant growth rate g^{NI}

$$NI_{t+1} = NI_t \cdot (1+g^{NI}) \tag{4.8}$$

Substituting equation (4.8) into (4.7) gives the next year's dividends:

$$D_{t+1} = PR \cdot NI_t \cdot (1+g^{NI}) \tag{4.9}$$

Further substituting equation (4.9) into the GGM equation (4.2) gives:

$$v_t^{equity} = \frac{PR \cdot NI_t \cdot (1+g^{NI})}{r^{equity} - g^{NI}} \tag{4.10}$$

Dividing both sides of equation (4.10) by net income, finally leads to the intrinsic P/E multiple at time *t*

$$\frac{v_t^{equity}}{NI_t} = \frac{PR \cdot (1+g^{NI})}{r^{equity} - g^{NI}} \quad (4.11)$$

The fundamental determinants of the P/E multiple under the given assumptions can be seen from the equation (4.11). The P/E multiple is positively related to future earnings growth and negatively related to risk, as measured by the cost of equity. The equation (4.11) also implies that a high dividend payout ratio (PR) has a positive impact on the P/E multiple. However, according to Thomas & Zhang (2004) this impact is only a minor one.

4.2.2 Intrinsic P/B multiple derived from the RIV model

The derivation of the P/B multiple requires the assumptions of constant growth rate in residual income, dividends and book value of equity each year, $g^{RI} = g^D = g^B$. First, the same growing perpetuity relationship as used in the GGM is applied to the RIV formula (4.6):

$$v_t^{equity} = B_t + \frac{RI_{t+1}}{(r^{equity} - g^{RI}) \cdot (1 + r^{equity})} \quad (4.12)$$

Then, we introduce a new term: the return on common equity (ROCE) at time *t* is the rate of return a firm earns on each dollar of its common shareholders' invested capital from period *t* – 1 to *t*:

$$ROCE_t = \frac{NI_t}{B_{t-1}} \quad (4.13)$$

By substituting equation (4.13) to the rearranged RI definition (4.4), we see that residual income compares the actual rate of return to the required return of common equity.

$$\begin{aligned} RI_t &= NI_t - r^{equity} \cdot B_{t-1} \quad (4.14) \\ &= (ROCE_t - r^{equity}) \cdot B_{t-1} \end{aligned}$$

Now, we enter this definition of residual income into the constant growth RIV formula (4.12) and substitute g^{RI} with g^B:

$$v_t^{equity} = B_t + \frac{(ROCE_{t+1} - r^{equity}) \cdot B_t}{(r^{equity} - g^B) \cdot (1 + r^{equity})} \quad (4.15)$$

Finally by dividing equation (4.15) by B_t, we have the intrinsic P/B multiple:

$$\frac{v_t^{equity}}{B_t} = 1 + \frac{(ROCE_{t+1} - r^{equity})}{(r^{equity} - g^B) \cdot (1 + r^{equity})} \qquad (4.16)$$

The fundamental determinants of P/B multiple can be seen from equation (4.16). A firm's P/B multiple is a function of its expected profitability, measured by ROCE, its risk, measured by the cost of equity, and its growth in book value of equity. When a firm is expected to earn zero residual income in the future $\left(ROCE_{t+1} - r^{equity} = 0\right)$, its intrinsic P/B multiple is one, and thus the firm is exactly valued to its book value of equity (Schreiner, 2006, p. 37). According to Penman (1996), the P/B is a useful measure to get a quick impression of market's perception of the key value drivers of a firm: growth, profitability and risk. Any premium to the book value of equity, at which a firm trades, can be attributed to the expected positive residual income and growth in book value.

As can be seen from the fundamental determinants of the P/E and P/B multiple, both of them depend on the risk of a firm, measured by its cost of equity. The main difference is that the P/E multiple is mainly driven by future earnings growth, while the P/B multiple depends on future ROCE and growth in the book value of equity. (Schreiner, 2006, p. 37.)

4.3 Market Multiples

The above deviated intrinsic multiples help to form an understating of a multiple's fundamental drivers. They also help to recognize the fact that multiples are determined by the same variables and assumptions that underlie discounted cash flow valuation (Damodaran, 2006). However, when people refer to multiples, they usually mean market multiples. Market multiples (hereafter referred to as multiples) are measures, which inform about the market's opinion of a firm's market valuation compared to its competitors. This is achieved by using a ratio of a market price variable to particular value driver of a firm. Regardless of the specific valuation context, applying the multiple valuation method requires four steps (Schreiner & Spremann, 2007).

Step 1: Selection of value relevant measures

Authors categorize multiples often based on either the market price variable or the type of value driver used to create the multiples. Firstly, authors often differentiate between equity value and entity value multiples. Equity value multiples are based on the market capitalization (or the stock price) of a firm, while entity value multiples are based on the enterprise value of a firm. Practitioners often prefer using equity value multiples because the market capitalization does not need further adjustment for net debt as it is the case with entity value multiples. Equity value multiple $\lambda_{i,t}^{equity}$ of a firm *i* at time *t* can be formalized as:

$$\lambda_{i,t}^{equity} = \frac{p_{i,t}^{equity}}{x_{i,t}} \tag{4.17}$$

where $p_{i,t}^{equity}$ is the market value of common equity and $x_{i,t}$ is the underlying value driver of the multiple. The underlying value driver of the multiple $x_{i,t}$ is another differentiation criterion for categorization of multiples. When working with equity value multiples, the value drivers should be defined on an equity holder's level, i.e. the economic meaning of the numerator should match with that of the denominator with respect to the capital claims. Usually accrual flow (such as earnings), book value, cash flow and forward-looking multiples are distinguished. The most wide-spread equity value multiples are the P/E, P/B, P/SA, and P/OFC multiples. However, an increasing number of analysts employ forward looking P/E and PEG multiples because of their superior performance when compared to trailing multiples. (Schreiner, 2006, p. 49-50.)

Step 2: Identification of comparables

The second step deals with identifying the peer group. Palepu et al. (2010, p. 326) require comparables to have similar operating and financial characteristics as the firm being valued. The shareholder value concept of Rappaport (1981) implies that the peer group should represent a basket of firms, whose profile of expected future free cash flows is comparable to the target firm's profile. According to Schreiner (2006, p. 50), both of these definitions incorporate demand for similar prospects of key value drivers (profitability, growth and risk) among the peer group and the target firm. Damodaran (2006) states as well that a comparable firm should be one with cash flows, growth potential, and risk similar to the firm being valued.

However, in the search of a suitable peer group, practitioners often turn to firms from the same industry. Thus, an assumption is made that firms from the same industry have similar operating and financial characteristics. It is not obvious how an industry should be defined or what industry classification system and (sub)industry level should be used. One can also question if an industry definition fulfills the condition of comparability unaccompanied, and if further adjustments (e.g., for size or region) should be made. (Schreiner, 2006, p. 51.)

The traditional approach uses industry membership as the basis on selecting comparable firms. This is because the industry membership has been reported to constitute the major element that captures the cross-sectional differences in the P/E ratio (Alford, 1992). Researchers have also argued that using firms within the same industry grouping to represent the key value drivers (i.e., profitability, growth and risk) is a viable method (Park & Lee, 2003).

Step 3: Estimation of synthetic peer group multiples

After the identification of the peer group and the calculation of peer group multiples, the next step involves the aggregation of the multiples into single numbers through the estimation of synthetic peer group multiples. For this estimation, academic literature provides several methods. One of these is the aggregation of the peers' multiples into synthetic peer group multiple $\hat{\lambda}_{c,mean}$ using the arithmetic mean (i.e., the average) of the multiples $\lambda_1, \lambda_2, \ldots, \lambda_n$ of all firms j = 1,2,…,n of the peer group c (Schreiner, 2006, p. 52.)

$$\hat{\lambda}_{c,mean} = \frac{1}{n} \cdot \sum_{j=1}^{n} \lambda_j \qquad (4.18)$$

Despite of being the most popular statistical measure of central tendency, many academics do not recommend using it. As heavily affected by the outliers, it can be an inaccurate choice for the estimation of synthetic peer group multiples (Schreiner, 2006, p. 52). Instead, the median or the harmonic mean are often witnessed as more accurate methods (see Hermann & Richter, 2003). Damodaran (2010, p. 73) acknowledges that the median value is much more representative of the typical firm than the average because the distributions of the multiples are often positively skewed. One of the critical issues concerning the estimation of the synthetic peer group multiples is the bias caused by negative values. Many authors state that when a firm shows negative earnings, the P/E ratio is not meaningful and should not be included when calculating peer group multiples (see e.g. Damodaran, 2010, p. 74; Schreiner, 2006, p. 41). But when the firms that are losing money are taken out of the peer group, it creates a bias in the selection process. As a consequence, the resulting PE ratio for the group will be biased upwards as it is based on firms that show positive earnings

(Damodaran, 2010, p. 75). However, Damgaard et al. (2009) state that companies with non-positive earnings or book values may be included in the calculation of valuation multiples at the industry level if the industry sum of these variables is likely to be positive.

Meitner (2006, p. 38) adds that one can also apply a regression approach to put together data of comparable companies in order to create the substitute for the target company. An advantage of this method is that it allows a reasonable calculation of corporate values even if the basis of reference is zero or negative. This means that the regression models are not restricted to positive observations in the independent variables as calculations of central tendency measures are (Damgaard et al. 2009). However, using the regression approach is reasonable only if the sample of comparables is large enough to allow accurate results (Meitner, 2006, p. 40).

Step 4: Actual valuation

The actual valuation is done in the final step. For equity value multiples, the value of common equity $\hat{p}_{i,t}^{equity}$ of firm *i* is calculated by multiplying the synthetic peer group multiple $\hat{\lambda}_{c,t}^{equity}$ by the corresponding value driver $x_{i,t}$ of firm *i*.

$$\hat{p}_{i,t}^{equity} = \hat{\lambda}_{c,t}^{equity} \cdot x_{i,t} \tag{4.19}$$

where *t* denotes time. The denomination requires that both the synthetic peer group multiple and the value driver refer to the same point in time. (Schreiner, 2006, p. 52.)

4.4 Multi-Factor Models

Multi-factor models are characterized by a number of value drivers higher than one. As in the case of single-factor models these value drivers are applied to adjust the value of the comparable companies so that a target company's value is created synthetically. However, the approach takes into account multitude of factors. Thus, a more sophisticated and technically challenging approach such as the regression analysis is needed to modulate the corporate value of comparable companies. This makes the application of the multi-factor models slightly more demanding compared to the single-factor models. (Meitner, 2006, p. 34.)

When conducting regression analysis, a dependent variable is explained by using independent variables that are believed to influence on the dependent variable. In the simplest case, the corporate value (as the dependent variable) is explained by a set of independent fundamental variables (Meitner, 2006, p. 123). The underlying idea is to estimate a simple ordinary least squares (OLS) model:

$$Y = X\beta + \varepsilon, \quad (4.20)$$

where Y is a column vector of market values. The design matrix, X, includes a column of ones, i.e. a constant term and a number of quantitative and qualitative variables related to future earnings and risk. The constant term makes sure that the multi-factor models may generate positive market values even if the input variables are negative. The parameter estimates are represented by the column vector β and the error terms by the column vector ε. (Damgaard et al. 2009.)

Meitner (2006, p. 123-124) states that principally every set of variables can be applied on the right hand side of the regression equation. However, he reminds that only those models that rely on the ideas of the Ohlson model can be backed by financial theory. There are no other plausible theories that manage to link a set of accounting variables to the price, respectively the value of a company. Thus, in most cases price is explained by book value of equity and earnings (and sometimes dividends). Additionally, a certain multiple, such as the PE ratio can serve as the dependent variable, and the corporate value can be determined in a two-step process. An advantage of the multi-factor models is that the factors that are explicitly part of the valuation model drop out of the comparable company selection requirements. As more and more value explaining factors are added into the model, the requirements become less and less strict. As a result, the similarity criteria for multi-factor models are usually lower than for single-factor models. (Meitner, 2006, p. 124, 34.)

The criticism concerning the empirical approaches has been related to the lack of theoretical foundation and to the point that different companies might have different factor sensitivities. The latter problem might lead to noticeable mispricing in single cases (Meitner, 2006, p. 124). However, Meitner (2006, p. 124) also says that the companies are still probably priced accurately on average. If this is true, the problem related to different factor sensitivities can’t be seen critical when the focus is on the accuracy of the aggregates, instead of the company-specific valuation errors. Damgaard et al. (2009) add that the regression approach puts more pressure towards the number of companies in the peer group compared to the multiple valuation. Estimating models for specific industry groups can lead to problems, if the peer group of companies decreases to a point where the number of parameters is higher than the number of observations, leaving too few degrees of freedom. Damodaran (2010)[1] acknowledges as well that if sectors are defined too narrowly, the risk of having small sample sizes increases, which undercuts the usefulness of the regression. He therefore recommends defining sectors more broadly, as it entails fewer risks and as the differences across can be controlled in the regression. Damgaard et al. (2009) also mention that that parameter estimates may be affected by scale effects and multicollinearity. In the former, large observations will dominate other values in a regression analysis which can lead to distorted parameter estimates. In the latter, high correlation between the independent variables is the reason behind the biased results. The scale effects might also bring out the problem of heteroscedasticity, i.e. the non-costant variance in the error term. However, according to Damgaard et al. (2009) the heteroscedasticity does not result in biased parameter estimates, but leads to an underestimation of standard errors and consequently to a risk of including insignificant variables in the model.

The scale effect refers to the problem of overwhelming influence of large firms in regressions. According to Easton & Sommers (2003) the results of the regression of market capitalization of financial statement data are driven by relatively small subset of the very largest firms in the sample. This causes biased coefficient estimates, heteroscedasticity and leads to upwardly biased R-squares (Gil-Alana et al. 2011). Barth & Kallapur (1996) and Barth & Clinch (2009) present two main alternatives for dealing with the scale effect: deflation by a scale proxy and inclusion of a scale proxy as an additional independent variable. Barth & Kallapur (1996) go on to say that deflation is the better remedy if a true scale factor is known. If this is not the case, they recommend including a scale proxy as an independent variable to mitigate coefficient bias. Easton & Sommers (2003) suggest using market capitalization as an appropriate deflator in a weighted least squares regression. The work of Akbar & Stark (2003) however does not support the superiority of market value as the deflator in estimating cross-sectional valuation equations on UK data. A number of different deflators (number of shares, closing book value, opening market value) seem to have relatively similar effects. Gil-Alana et al. (2011) recommend the use of exogenous deflator such as the number of employees in marked-based accounting research models, as this alternative produces slightly better statistical results in their data than other (endogenous) deflators such as the market value, the book value of equity, or the total assets. Barth & Clinch (2009) find that the number of shares outstanding is generally more effective at mitigating scale effects, Brown et al. (1999) on the other hand claim that

[1] Source: Section 'Controlling for Differences across Firms' from extra material accompanying the book. This material can be found from www.wiley.com/go/littlebookofvaluation

number of shares is not a good deflator, as it is an arbitrary choice made by the firm that reveals new size differences. All in all, there is no single solution to this problem, as different studies propose different methods. However, the problem is severe and Lo and Lys (2000) assert that most valuation studies draw inappropriate conclusions due to scale effects.

Finally, Damodaran (2010)[2] reminds that while the focus in statistics is in increasing the explanatory power of the regression through the R-squared and including any variables that accomplish this, this is not the case in regressions in relative valuations. The objective is not to explain away all the differences in pricing across firms but only those that are explained by fundamentals. Thus, the R-squared on relative valuation regressions will almost never be higher than 70% and it is common to see them drop to 30 or 35%. Instead of focusing on R-squared, Damodaran (2010) [2] recommends focusing on the predictive power of the regression.

5 RESEARCH METHODOLOGY

When comparing the valuation methods that are applicable in practice, the main interest should be on how well the valuation methods approximate market value (IMF, 2008). Therefore, I will first test how well different valuation multiples and multi-factor models perform, before I apply the models to the valuation of unlisted foreign direct investments in Finland. As it is practically impossible to test how accurately various valuation models approximate market values for unlisted companies, I have to test the models with listed companies, for which the actual market values are known. More precisely, my intention is to see how different valuation methods work when valuing listed companies in international setting with data taken from European countries. In addition, I try to find out how comparable firms should be identified when applying the multiple valuation method. The valuation models are tested with data taken from all listed companies of 27 European Union member states during 2005-2011.

The research design of the pricing accuracy study largely follows the design of previous studies. First, market value predictions are calculated for each company in each year of the sample period. Several single-factor and multi-factor models are applied in this step. Second, the pricing error (i.e. the relative deviation of the predicted market value from the actual market value) for each firm, year and

[2] Source: Section 'Controlling for Differences across Firms' from extra material accompanying the book. This material can be found from www.wiley.com/go/littlebookofvaluation

model is computed. Finally, when the aggregated pricing errors are compared, I can make conclusions of the pricing accuracy of each model.

As the BPM6 does not provide specific recommendations regarding the estimation of relative valuation methods, I will rely on the work by Damgaard et al. (2009). They estimated market values for FDI investments by conducting regression models on market value and calculating single-factor P/E and P/B valuation multiples. Due to the lack of data, I will have to refrain from the use of forward-looking P/E and PEG multiples, despite their superior performance in empirical research (see Liu et al. 2002) and from knowledge-related multiples, which do take into account the value relevance of R&D investments (Schreiner, 2006, p. 104). Multi-factor regression models are included in this study because according to Meitner (2006, p. 34) the similarity criteria when selecting the peer group are usually lower than they are for single-factor models. This can be said as the multi-factor models transfer certain similarity criteria directly into the valuation model. Thus, multi-factor models decrease the peer group selection requirements while contemporaneously considering several value driving variables directly in the valuation model.

First, I will study how well different valuation methods estimate actual market values with my sample of listed European companies, and try to find out which valuation methods and models reduce company-level estimation errors most and lead to most accurate overall market approximations. These models will be subsequently applied to approximate the market value of unlisted inward and outward FDI equity in Finland.

The accuracy of the valuation models is tested by calculation of valuation errors. According to the majority of the literature on pricing accuracy (see e.g. Alford, 1992; Meitner, 2006, p. 193; Schreiner, 2006, p. 91) the valuation accuracy of the market value prediction is evaluated by calculating scaled absolute valuation errors:

$$\left|\frac{e_{i,t}}{p_{i,t}^{equity}}\right| = \left|\frac{\hat{p}_{i,t}^{equity} - p_{i,t}^{equity}}{p_{i,t}^{equity}}\right| \tag{5.1}$$

Next, to compare the valuation accuracy of different multiples and multi-factor models, I examine measures of dispersion for the pooled distribution of scaled absolute valuation errors $\left|e_{i,t}/\, p_{i,t}^{equity}\right|$. The key performance measures are the median and the mean absolute valuation errors. The performance indicators are first calculated for each year. Then, the yearly numbers are aggregated using the average. The valuation errors are pooled across the sample period similarly in the studies by Schreiner & Spremann (2007) and Meitner (2006, p. 193).

Data

The empirical analysis of the first part of the study measuring the valuation accuracy of the different valuation models is based on a panel of stock exchange listed companies from 27 European Union member countries. Data was merged from two sources. Financial data and initial firm year observations were collected from Bureau van Dijk's Orbis Database for the years 2005-2011. In addition, Thomson One database was used to collect market capitalization data for observations for which market capitalization was not available in Orbis database. The sample includes listed as well as formerly publicly listed companies. Several observations were deleted as the stock price and/or financial data required was not readily available in Orbis or Thomson One databases. In the end, 28 % of the initial firm year observations were left to the final sample. The share of eliminated observations is not particularly exceptional and rather similar elimination percentage can be found for instance in the study of Meitner (2006, p. 140). Table 3 summarizes the sample selection process for the valuation accuracy study. The final sample includes 32 247 firm year observations.

Table 3: Sample composition in the valuation accuracy study 2005-2011

Firm year observations 2005-2011 from Orbis database	**114 086**
(i.e Listed and formerly listed companies from EU-27 countries)	
- Observations of companies for which market capitalization data was not available from Orbis or Thomson One databases	
- Observations of companies for which financial data was not available	
- Observations of companies for which industry classification was not available	
= Basic sample	**32 247**

Data was collected from 27 countries of European Union as I want to capture the outward investment position of Finland reasonably well. In the year 2011, 74 percent of Finnish outward unlisted direct investment equity was ultimately invested in 27 countries of European Union. The average was 72% for the period of 2005-2011, which is covered by this study. To classify firms into different industries and sub-industries, I use the NACE Rev. 2 statistical classification system of economic activities in the European Community.

Table 4 shows the list of quantitative variables in the data set. The variables used in this study were selected to include theoretically well-founded variables related to earnings potential and risk. P/L before taxes was included to see how much the valuation error might decrease when using multiples or multi-factor models that contain earnings defined before income taxes, as corporate tax laws differ across countries in Europe. Earnings before interest and taxes were included to see how much the valuation accuracy might further be improved when going further upward in the income statement. The use of EBIT instead of net income could be reasonable, as the countries in Europe differ with respect to interest rates. In addition, being the bottom line number in the income statement, the differing accounting policies affect net income the most of all numbers in financial statements. Revenues were included as Bhojraj et al. (2003) argue that accounting differences governing the recognition of sales revenues are quite similar between countries, thus accounting diversities and country-specific risk might impose smaller effects on it.

Book value of equity was included as the country-based differences play a relatively minor role in explaining P/B multiples (Bhojraj et al. 2003). Alford (1992) uses firm size (measured by total assets) as a surrogate for risk, thus book value of total assets was included in the dataset. Capital structure variable was added because Gebhardt et al. (2001) show that firms with higher leverage have higher implied costs-of-capital and Bhojraj & Lee (2001) state that it might capture elements of cross-sectional risk not captured by the other variables. BvD independence indicator is the creation of Bureau van Dijk’s ownership database and depicts a company’s independence in relation to its shareholders. The BvD independence variable concerning ownership was included to see the impact of control premium to the valuation accuracy, i.e. if companies with few large investors truly are valued higher than other companies. The BvDEP Independence Indicators are noted as A, B, C, D and U, with further qualifications. In BvDEP terminology “A” companies are called “Independent companies” (i.e. no shareholder having more than 25% of direct or total ownership) and D companies are the least independent (i.e. a recorder shareholder with a direct ownership of over 50%). The classification system is translated to numbers as stated in table 4.

Table 4: List of quantitative variables in the data set

Name	*Description*	*Unit*
NI_{it}	Net income of company i in year t	EUR million
$PLBT_{it}$	P/L before taxes of company i in year t	EUR million
$EBIT_{it}$	Earnings before interest and taxes of company i in year t	EUR million
$SALES_{it}$	Turnover (revenues) of company i in year t	EUR million
BVE_{it}	Book value of equity (shareholders' equity) of company i in year t	EUR million
TA_{it}	Book value of total assets of company i in year t	EUR million
MVE_{it}	Total market value of equity at sample year-end (that is price per share times number of shares outstanding) for company i at the end of year t	EUR million
$CAPSTR_{it}$	Capital structure of company i in year t =(Current liabilities + Long term debt) / (Shareholders funds + Current liabilities + Long term debt)	Raw number
$CASH_{it}$	Cash and cash equivalent of company i in year t	EUR million
$GROWTH_{it}$	Sales growth ($SALES_{it}$ - $SALES_{it-1}$ / $SALES_{it-1}$)	Raw number
$INDP_{it}$	BvD Independence indicator of company i in year t D = 0, C= 1, C+ = 2, B- = 3, B = 4, B+ = 5, A- = 6, A = 7, A+ = 8	Raw number

6 VALUATION ACCURACY STUDY

6.1 Descriptive Statistics

Table 5: Descriptive statistics on the quantitative variables in the valuation accuracy dataset (2005-2011)

Variables	*Median*	*Mean*	*Standard deviation*	*1st quartile*	*3rd quartile*	*Negative values, %*	*Number of observations*
NI	1,5	80,0	626,7	-0,5	16,1	30,8 %	32247
PLBT	2,1	118,2	925,2	-0,4	21,6	30,1 %	32247
EBIT	2,5	135,1	951,8	-0,2	24,5	29,1 %	29187
SALES	61,7	1392,0	8020,8	10,8	341,4	0,1 %	32247
BVE	39,3	637,1	3554,7	9,0	181,8	2,9 %	32247
TA	92,4	1987,2	10939,7	21,0	471,3	0,0 %	32247
MVE	50,5	1176,0	6071,0	11,5	292,0	0,0 %	32247
CAPSTR	0,5	0,5	5,0	0,3	0,7	0,1 %	32247
CASH	6,9	172,7	988,2	1,1	38,3	0,0 %	32247
GROWTH	0,1	4,6	279,7	-0,1	0,2	36,5 %	32247
INDP	5,0	4,4	3,3	0,0	8,0	0 %	32247

[1)] *Number of observations for EBIT are lower since Orbis database does not contain EBIT information for the year 2005.*

Table 5 shows the descriptive statistics of the quantitative variables in the valuation accuracy dataset. The amounts are reported in millions of euros. It can be seen that the distributions are highly skewed. This occurs as size restrictions are not imposed during the sample selection process. It can be noted as well that the share of observations with negative earnings measures (NI, PLBT and EBIT) is quite large.

Table 6 shows the industry group breakdown used in this study. The 11-industry breakdown recommendation from the Banque de France and Eurostat's (2004) European Test Exercise is used as a starting point. However, I divide companies into 15 branches namely because dataset that is used in this study is large enough to allow this. As earnings, risks and growth prospects differ across industries, the use of too narrow industry breakdown might not be recommendable. The industry breakdown of 15 branches used in this study differs from the one used in Eurostat's European Test Exercise also because NACE classification codes have changed from what they were in 2004, i.e. NACE rev. 1.1. codes have been updated to NACE rev 2 codes. Evidently, the share of observations grouped to either branch number 1 (ICT activities) or 4 (Manufacturing) is quite large. Thus, one could argue whether the classification could be further narrowed regarding these groups.

Table 6: Industries of companies in the valuation accuracy study (2005-2011)

Branch code	***Short definition***	***NACE rev 2 code***	***Frequency***	***Percent***
1	ICT activities	J + 26, 27, 28, 325, 33, 422, 74, 7733, 85, 95	8340	25,9 %
2	Mining and quarrying	B	971	3,0 %
3	Electricity, gas, steam, air conditioning supply and water supply	D + E + 192	963	3,0 %
4	Manufacturing (non ICT + non refining petroleum products)	C (except 26, 27, 28, 325, 33, 192)	8582	26,6 %
5	Construction	F (except 422)	1049	3,3 %
6	Wholesale and retail trade	G	2632	8,2 %
7	Hotel and restaurants	H	928	2,9 %
8	Transports and storage	I	523	1,6 %
9	Financial intermediation and Insurance	64, 65, 84 (except 6420)	950	2,9 %
10	Financial and insurance auxiliaries	66	979	3,0 %
11	Holdings	6420, 7010	805	2,5 %
12	Real estate activities	L	1791	5,6 %
13	Professional, scientific and technical activities	M (except 7010,74)	1334	4,1 %
14	Agriculture, forestry and fishing	A	331	1,0 %
15	Others	N (except 7733) + Q + R + S (except 95)	2069	6,4 %
			32247	100,0 %

6.2 Correlations between Variables and the Value Relevance Measured by the Incremental R^2

Pearson and Spearman correlations are reported in Table 7. Pearson correlation coefficients measure the linear association between two variables of interest. The Spearman coefficient is the non-parametric counterpart to the Pearson coefficient, and is regarded as the safer measure if the association between the two variables under consideration is non-linear (Meitner, 2006, p. 164). The table includes correlations between all the variables, even though this would not always be economically meaningful. In line with expectations, all independent variables in the equity valuation models are positively correlated with market capitalization. The correlation coefficients are quite high in some cases which might indicate that there is a risk of multicollinearity in the multi-factor regression models. Multicollinearity depicts the phenomenon that in a regression model two or more independent variables are highly correlated so that a reasonable interpretation of the regression outputs becomes difficult (Meitner, 2006, p. 164). Though, a possible multicollinearity does not affect statistical inference when determining the incremental R^2, but instead has influence on the standard errors. Correlation table shows as well that capital structure, growth and independence indicator variables seem to be not as strongly correlated with market value as the other variables used in this study.

Table 7: Correlations between variables

Variables	NI	PLBT	EBIT	SALES	BVE	TA	MVE	CAPSTR	CASH	GROWTH	INDP
NI	-	0,95	0,92	0,73	0,69	0,64	0,74	0,00	0,51	0,00	0,05
PLBT	0,96	-	0,97	0,80	0,76	0,69	0,78	0,00	0,52	0,00	0,04
EBIT	0,83	0,87	-	0,82	0,82	0,76	0,83	0,00	0,56	0,00	0,05
SALES	0,58	0,61	0,70	-	0,84	0,85	0,74	0,00	0,67	0,00	0,05
BVE	0,60	0,61	0,64	0,79	-	0,87	0,83	0,00	0,64	0,00	0,06
TA	0,57	0,58	0.65	0,87	0,93	-	0,77	0,01	0,81	0,00	0,06
MVE	0,64	0,65	0,67	0,79	0,88	0,89	-	0,00	0,62	0,00	0,07
CAPSTR	0,02	0,04	0,16	0,4	0,04	0,30	0,13	-	0,01	0,00	0,01
CASH	0,53	0,55	0,58	0,77	0,81	0,83	0,83	0,16	-	0,00	0,05
GROWTH	0,19	0,19	0,19	0,07	0,06	0,04	0,13	-0,02	0,08	-	0,01
INDP	0,05	0,04	0,04	0,08	0,11	0,09	0,14	-0,02	0,13	0,03	-

[a] *Pearson (Spearman) correlations are reported above (below) the diagonal. Correlation is significant at the 0.01 level (2-tailed) for the shaded numbers.*

Table 8 depicts the value relevance of the accounting variables measured by the incremental R^2. Incremental R^2 measures the contribution of the specific independent variable to the R^2 of the starting multiple regression. It is calculated for variable X_1 given variable X_2 as follows: incremental R^2 X_1 = adj. R^2 X_1, X_2 – R^2 X_2, i.e. the incremental R^2 for variable X_1 given X_2 is the difference between the adjusted R^2 of the multiple regression (including X_1 and X_2 as independent variables) and the R^2 of a regression excluding X_1 from independent variable. (Meitner, 2006, p. 155)

Table 8: Incremental effects on adjusted R^2 of adding variables to the pooled regression models

Variable	NI	PLBT	EBIT	SALES	BVE	TA	CAPSTR	CASH	GROWTH	INDP	Average contribution
NI	-	0	0,008	0,091	0,06	0,107	0,553	0,251	0,553	0,549	0,241
PLBT	0,058	-	0,001	0,100	0,058	0,121	0,611	0,293	0,611	0,607	0,273
EBIT	0,135	0,070	-	0,143	0,067	0,137	0,680	0,335	0,680	0,676	0,325
SALES	0,085	0,036	0,010	-	0,008	0,025	0,547	0,194	0,547	0,543	0,222
BVE	0,188	0,128	0,068	0,142	-	0,099	0,681	0,316	0,681	0,677	0,331
TA	0,148	0,104	0,051	0,072	0,012	-	0,594	0,216	0,594	0,589	0,264
CAPSTR	0	0	0	0	0	0	-	0	0	0	0
CASH	0,076	0,06	0,033	0,025	0,013	0	0,378	-	0,378	0,375	0,149
GROWTH	0	0	0	0	0	0	0	0	-	0	0
INDP	0,001	0,001	0,001	0,001	0,001	0	0,005	0,002	0,005	-	0,002

Meitner (2006, p. 144) states that this allows for a better assessment of the value relevance of accounting figures since it shows how value relevance for certain variables changes if they are applied jointly with other variables (contrary to the pure assessment of value relevance as a stand-alone variable). Similar approach has been used for instance in the study of Brief & Zarowin (1999) to measure the value relevance of dividends, book value and earnings. As can be seen from the table 8, there are differences in the value relevance of earnings measures NI, PLBT and EBIT. When the average contribution is observed, EBIT seems to have the highest value relevance from the earnings variables. This is in line with expectations as corporate tax laws differ across countries in Europe and the countries in Europe differ also with respect to interest rates. This would suggest preferring EBIT over PLBT and PLBT over NI in the single-factor equity models, even though it is usually not recommended to use EBIT together with equity value multiples. This stems from the fact that the economic meaning of the numerator does not match with that of the denominator with respect to the capital claims (Schreiner, 2006, p. 57). The table also shows that the BVE has the most value relevance and that the earnings and BVE have complementary prediction power as Ohlson (1995) suggests.

6.3 Valuation Accuracy

The valuation accuracy of the valuation models is tested by dividing company observations randomly into two sub-samples each year from 2005 to 2011. First, the valuation multiples and the regression parameters used for multi-factor models are calculated using 80 % of the company observations each year. Then, these multiples and regression parameters are applied to calculate market value estimates for the remaining share of 20 % of companies each year. Now when the actual market values of these companies each year are known, I can calculate out-of-sample valuation errors and compare the performance of different models. Table 9 depicts the number of firm observations each year used for the estimation of valuation models and the number of observations used for the calculation of market value estimates and out-of-sample valuation errors.

Table 9: Division of firm observations into two sub-samples

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	∑
Estimation of valuation models	2448	2995	3491	3734	3891	4604	4634	25797
Calculation of market value estimates and out-of-sample valuation errors	612	749	873	934	972	1151	1159	6450
Total	3060	3744	4364	4668	4863	5755	5793	32247

Descriptive statistics of both sub-samples can be found in appendix 1. Appendix 2 shows the number of observations in different industries in both sub-samples and appendix 3 the number of observations in different countries in both sub-samples.

6.3.1 Multiples

The analysis of the valuation accuracy is begun by applying the multiple valuation method. The performance of different valuation multiples with different comparables selection methods can be seen in table 10. It shows the mean and median absolute prediction errors that are first calculated for each of the seven years from 2005 to 2011 and then aggregated using the average. Table 11 gives explanations to the different comparables selection methods that are tested. Similar to recent literature the availability of at least five comparables is required for the construction of the peer group (see e.g. Meitner, 2006, p. 190; Liu et al. 2002).

First, when comparing the various valuation multiples it becomes clear that P/B multiple outperforms other single-factor valuation multiples used in this study, i.e. both measures of forecast accuracy (the mean and the median absolute prediction error) are smaller when the book value of equity is used as an underlying value driver of the multiple. P/B multiple performs well also when it is compared to two-factor multiples valuation models using equal weights. The two-factor P/EBIT & P/B model gives better mean absolute predictions when comparables are selected using either 2, 3 and 4 digits NACE Rev. 2 Core codes.

Table 10: The valuation accuracy of multiples with different comparables selection methods measured by the mean and median absolute prediction errors

Multiple	15 Branches		NACE Rev. 2 Core code (2 digits)		NACE Rev. 2 Core code (3 digits)		NACE Rev. 2 Core code (4 digits)		15 Branches & 27 Countries		obs.
	Median APE	Mean APE	Median APE	Mean APE	Median APE	Mean APE	Median APE	Mean APE	Median APE	Mean APE	
P/SA	0,705	6,924	0,668	4,524	0,659	7,330	0,667	7,554	0,693	3,041	6450
P/EBIT	0,768	3,122	0,776	3,187	0,778	3,200	0,777	3,190	0,759	3,508	5838[1]
P/PLBT	0,755	3,602	0,766	3,634	0,765	3,771	0,767	3,843	0,762	4,163	6450
P/NI	0,789	4,544	0,776	4,588	0,774	4,811	0,777	4,869	0,782	5,378	6450
P/B	0,512	1,573	0,507	1,608	0,501	1,580	0,502	1,616	0,502	1,461	6450
P/TA	0,531	1,732	0,521	1,730	0,525	1,677	0,533	1,705	0,516	1,674	6450
P/EBIT & P/B	0,541	2,055	0,568	1,554	0,574	1,557	0,573	1,561	0,531	2,225	5838[1]
P/PLBT & P/B	0,541	2,202	0,536	2,240	0,547	2,306	0,548	2,350	0,538	2,464	6450
P/NI & P/B	0,566	2,644	0,557	2,691	0,565	2,799	0,571	2,834	0,555	3,063	6450

[1)] *Observations for models using EBIT are lower since Orbis database does not contain EBIT information for the year 2005.*

Table 11: Explanations of comparables selection methods

Comparables selection method	Explanation
15 Branches	Companies operating in the same branch are used as comparables.
NACE Rev. 2 Core code (2 digits)	First, companies having the same 2 digit NACE Rev. 2. Core code are used as comparables. When there are less than five companies having the same 2 digit NACE Rev. 2 Core code, companies operating in the same branch are used as comparables.
NACE Rev. 2 Core code (3 digits)	First, companies having the same 3 digit NACE Rev. 2. Core code are used as comparables. When there are less than five companies having the same 3 digit NACE Rev. 2 Core code, companies having the same 2 digit NACE Rev. 2. Core are used as comparables. When there are less than five companies having the same 2 digit NACE Rev. 2 Core code, companies operating in the same branch are used as comparables.
NACE Rev. 2 Core code (4 digits)	First, companies having the same 4 digit NACE Rev. 2. Core code are used as comparables. When there are less than five companies having the same 4 digit NACE Rev. 2 Core code, companies having the same 3 digit NACE Rev. 2. Core code are used as comparables. When there are less than five companies with the same 3 digit NACE Rev. 2 Core code, companies having the same 2 digit NACE Rev. 2. Core code are used as comparables. When there are less than five companies having the same 2 digit NACE Rev. 2 Core code, companies operating in the same branch are used as comparables.
15 Branches & 27 Countries	First, companies operating in the same branch and in the same country are used as comparables. When there are less than five companies operating in the same branch and country, companies operating in the same branch and in a country where the monthly average interest rate for long-term government bond in a given year was closest to the country being in question are added to the group of comparables. This procedure is repeated until at least 5 comparables are found.

However, the median absolute prediction errors of the combined P/EBIT and P/B model are higher to that of P/B multiple within every comparable selection methods. Thus, unlike in the study of Cheng & McNamara (2000) the valuation accuracy of a combination P/E and P/B multiples using equal weights does not outperform the single-factor P/B multiple. The reason for this might be in the finding of Bhojraj et al. (2003) who show that country-based differences play a relatively minor role in explaining P/B multiples but they are extremely important in explaining variations in price-to-earnings ratios. Thus, when valuing companies in an international setting, the use of a single-factor P/B multiple might be meaningful.

Second, the questions of how to define the industry, what (sub)industry level should be used and how comparables should be chosen is studied. One can see that the valuation accuracy varies as we move from broader comparables selection method of 15 branches towards narrower definition of 4-digit NACE codes. Surprisingly, the valuation errors do not always decline when narrower definitions for comparables are used but for some multiples the valuation errors actually increase instead. Thus, it is not self-evident what industry-definition should be used in international valuation context, as the impact of narrower definitions depends on the multiple and on the error measure that is used.

When considering the single-factor P/B multiple, the use of 3-digit NACE code seems slightly more favorable in light of the median absolute prediction errors. However, the mean absolute prediction error is much lower when using a comparables selection method that combines 15 branches with the countries that companies are operating in. This method not only takes into account industry-wide factor that might affect the multiple but also considers the country-wide differences inside EU-27 area. Now, comparable companies are first looked from the same branch and from the same country that the company being valued is operating in. When less than five companies can be found, an inclusion of a country where the monthly average interest rate for long-term government bond in the given year was closest to that country where the valuation target is located is made. This procedure is repeated until five comparables are finally found that all belong to the same branch with the company that is being valued. For example, when valuing a manufacturing-company operating in Spain for the year 2011, comparables are first seeked from all listed manufacturing companies located in Spain in 2011. In case less than five Spanish manufacturing companies can be found, the P/B multiple is calculated by using all the manufacturing companies operating in Spain as well as in a country where the long-term government bond yield was closest to Spain in 2011. Thus in this example, the P/B multiple would be calculated by using all the manufacturing companies operating in Spain as well as in Italy in that precise year. This procedure would be repeated until at least five listed companies operating in the manufacturing industry are finally found. The long-term government bond yield is used here to approximate country-related risks and growth prospects that affect firm valuation. Appendix 21 shows the monthly average interest rates for long-term government bonds for EU-27 countries that were used in this study.

To conclude, the use of a single-factor P/B multiple that takes into account both industry-wide differences as well as country-related factors seems to be reasonable when valuing companies in an international context. However, one can indeed argue that the average valuation errors shown in table 10 are high. For instance, when using the single-factor P/B multiple with a comparables selection method of 15 branches & 27 countries, the average absolute prediction error is 146 percent. At least two explanations for the high prediction errors can be given, which also propose that the results should not be compared to most other valuation accuracy studies. First, valuation studies often omit small firms when constructing the sample and testing the valuation models (see e.g. Schreiner & Spremann, 2007; Hermann & Richter, 2003). Schreiner & Spremann (2007) for example do not include firms for which the market capitalization is below 200 million U.S Dollars. However, as many of the unlisted foreign direct investments are small firms, it would not make sense for the purpose of this study to omit them. The presence of small firms increases the valuation errors as it is widely acknowledged that multiples produce more accurate valuations for larger firms (see Lie & Lie, 2002). In addition, other valuation studies often exclude firms with negative common equity and negative earnings, and some even make further exclusions by omitting firms that are exceptional in terms of some other accounting variables (see e.g. Bhojraj et al. 2003; Liu et al. 2002). Second, academics sometimes reduce the impact of outliers by excluding predictions that result to valuation errors that are above a certain limit. Meitner (2006, p. 193) for instance, excludes all predictions that result in an absolute valuation error of more than 100% from the calculation of the distribution measures. He claims that it is reasonable from economic perspective since appraisers in valuation practice would not believe in valuation results that lack economic plausibility. However, it would not make sense to conduct this procedure in this study, as the models are finally to be applied to value unlisted foreign direct investments, for which it is hard to evaluate the reasonability of single-company valuations.

6.3.2 Multi-Factor Models

I start my analysis of the accuracy of multi-factor models by testing five different models with and without the intercept. The multi-factor models tested at this point are built around the idea suggested by Ohlson (1995) that earnings and book value of equity might have complementary prediction power. In addition, valuation models 5a and 5b also include other variables that might affect firm valuation. The valuation accuracy of the previously tested P/B single-factor multiple that takes into account both industry- and country-wide factors can also be seen as a comparison in table 12. As can be seen from table 12, the absolute valuation errors are much higher compared to the results of the single-factor P/B multiple. The regression models without the intercept, i.e. which impose the restriction that the regression has to go through the origin perform better than the models with the intercept. The reason for this is that the intercept is affected by large values. However, the models that do not contain the intercept do not perform as well as the single-factor P/B multiple. The main reason for this is that the removal of the intercept does not completely eliminate the problem related scale effects and the other parameter estimates are still affected by large values. According to Damgaard et al. (2009) the problem of scale effects occurs when accounting data for companies of different sizes is used, which is the case in this study. Large companies often have large values for most accounting variables, and these larger values will dominate other values in a regression analysis leading to distorted parameter estimates.

Table 12: The valuation accuracy of multi-factor models with MVE as dependent variable

Model	**Absolute valuation errors**		**Obs.**
	Median	**Mean**	
1a) $MVE = b_0 + b_1 \cdot BVE + b_2 \cdot NI + \sum b \cdot D\_IND$	2,585	58,097	6450
1b) $MVE = b_1 \cdot BVE + b_2 \cdot NI + \sum b \cdot D\_IND$	0,581	2,398	6450
2a) $MVE = b_0 + b_1 \cdot BVE + b_2 \cdot NI + b_3 \cdot TA + \sum b \cdot D\_IND$	2,338	51,227	6450
2b) $MVE = b_1 \cdot BVE + b_2 \cdot NI + b_3 \cdot TA + \sum b \cdot D\_IND$	0,575	2,463	6450
3a) $MVE = b_0 + b_1 \cdot BVE + b_2 \cdot PLBT + \sum b \cdot D\_IND$	2,334	54,314	6450
3b) $MVE = b_1 \cdot BVE + b_2 \cdot PLBT + \sum b \cdot D\_IND$	0,572	2,257	6450
4a) $MVE = b_0 + b_1 \cdot BVE + b_2 \cdot PLBT + b_3 \cdot TA + \sum b \cdot D\_IND$	2,047	48,430	6450
4b) $MVE = b_1 \cdot BVE + b_2 \cdot PLBT + b_3 \cdot TA + \sum b \cdot D\_IND$	0,588	2,364	6450
5a) $MVE = b_0 + b_1 \cdot BVE + b_2 \cdot EBIT + b_3 \cdot TA + b_4 \cdot CAPSTR + b_5 \cdot CASH + b_6 \cdot GROWTH + b_7 \cdot INDP + \sum b \cdot D\_IND$	1,838	61,568	5838
5b) $MVE = b_1 \cdot BVE + b_2 \cdot EBIT + b_3 \cdot TA + b_4 \cdot CAPSTR + b_5 \cdot CASH + b_6 \cdot GROWTH + b_7 \cdot INDP + \sum b \cdot D\_IND$	1,476	60,073	5838
P/B (15 Branches & 27 Countries)	0,502	1,461	6450

When considering the fact that unlisted companies are on average much smaller than listed companies, the use of multi-factor models without considering the problem of scale effects can be hazardous. Veira (2006) claims that the problem related to scale effects is purely an econometric occurrence that can be solved by using logarithmic transformations of the variables. He states that the scale effect is related to the presence of skewed distributions with large tail and that logarithmic transformation, tending to restore normality, makes this scale effect to disappear. He also states that the removal of large firms does not remove the coefficient bias caused by the scale effect. This claim is based on a study by Easton and Sommers (2003), who show that it takes the removal of approximately the top 60% of the observations by market value before the scale-effect disappears. Appendix 4 shows the valuation errors of the previously tested multi-factor models after the exclusion of the top and bottom 5 % observations by market value. We can see that the absolute valuation errors are smaller compared to errors depicted in table 12 but still higher than the ones achieved by a single-factor P/B multiple. Thus, the exclusion of top and bottom 5 % observations by market value does improve the valuation but it does not eliminate the problems caused by the scale-effect.

Next, I test whether the problem related to scale effects is purely an econometric occurrence that can be solved by using logarithmic transformations of the variables as Veira (2006) claims. Appendix 5 shows the valuation errors of the same multi-factor models but this time using logarithmic transformations of the variables. We can see that the single-factor P/B multiple can't compete anymore with multifactor models after logarithmic transformations are taken of the variables. Almost every multi-factor model leads to smaller absolute valuation errors, even though the multi-factor models tested at this point do not even contain a variable controlling for country-wide factors affecting the valuation. This shows that the use of multi-factor models might be reasonable, if the problem caused by scale-effects is solved. However, one has to remember that logarithmic transformations of the variables can only be made for positive values. Thus, companies with negative earnings and book values are excluded from the estimation lowering the number of observations. This exclusion does not support the use of logarithmic transformations as a solution when unlisted direct investment enterprises are to be valued, as many of them show negative earnings and book values of equity.

For the reason that logarithmic transformations can only be made for positive values, other solutions are needed to deal with the problems of scale effects. One of them suggested by Barth & Kallapur (1996) and Barth & Clinch (2009) is deflation by a scale proxy. In this study, the book value of equity is chosen as the deflator, as Easton (1998) suggests that closing book value is a suitable deflator. Also, other deflators previously employed in cross-sectional valuation models as proxies for scale such as sales (Hirschey, 1985), number of employees (Gil-Alana et al. 2011), number of shares (e.g. Rees, 1997; Hand & Landsman, 2005) and (opening) market value (e.g. Lo & Lys, 2000; Easton & Sommers, 2003) can't be used due to data constraints related to unlisted direct investment enterprises for which the model is supposed to be finally applied.

Table 13 presents the valuation accuracy results for the same multi-factor models that now have been deflated by the book value of equity. Firstly, it is clear that the deflated models result in smaller absolute valuation errors when they are compared to the original models shown in table 12 that contain the intercept, i.e. models with letter a. However, when the deflated models are compared to the original models that do not contain the intercept, i.e. models with letter b in table 12, the results are not as obvious anymore. The undeflated models shown in table 12 without the intercept seem to work better when the valuation accuracy is measured with median absolute valuation error. On the other hand, the deflated models seem more accurate when looking at the mean absolute valuation error. To analyze this even further, it seems that deflation might be more rational the more variables are included in the model. If for instance the performance of model number 5b containing the most amount of accounting variables is looked at, one can see that the deflation does diminish the valuation error remarkably. If one makes the same comparison with simpler model 1b, it is not clear whether deflation improves the valuation accuracy at all. Therefore, one could conclude that deflation might be reasonable, when a multi-factor model includes many variables.

The results in table 13 clearly show us that deflating by book value of equity does not completely reduce the problems related to scale effect. According to Gil-Alana et al. (2011) the use of endogenous deflator such as book value of equity causes endogeneity problems. This means that the deflation with book value of equity does not maintain the original proportionality relation between market value and the accounting numbers. Lastly, the deflated multi-factor models in table 13 again result in higher absolute valuation errors than the previously tested single-factor P/B multiple. One reason behind this given by (Meitner, 2006, p. 124) could be that companies have differences in their factor sensitivities, which might result to noticeable mispricing in single cases when regression models are applied. In appendix 6 and appendix 7 one can see how multi-factor models perform when they are developed a bit further. Several dummy variables controlling for firm size, negative earnings and book values and for country-wide factors were added to see what kind of model is needed so that a multi-factor model would perform better than the single-factor P/B-multiple. Appendix 7 shows that model number 5d containing deflated variables of BVE, TA, PLBT, CASH and dummy variables for negative earnings and book values as well as dummy variables to control for industry- and country-wide factors is finally able to result in smaller mean absolute valuation errors than the simple single-factor P/B-multiple.

To finalize, it is not clear whether deflating by book value of equity is preferable when compared to the exclusion of the intercept, i.e. imposing the restriction that the regression has to go through the origin. However, when a multi-factor model that contains many explanatory variables is used, it might be more reasonable to use deflation. It can also be said that a single-factor P/B multiple that takes into account both industry-wide differences as well as country-related factors performs well against more complex multi-factor models when valuation accuracy is measured with company-specific absolute valuation errors.

Table 13: The valuation accuracy of multi-factor models with P/B as dependent variable after the exclusion of the top and bottom 1 % P/B values

Model	**Absolute valuation errors**		**Obs.**
	Median	**Mean**	
1a) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{NI}{BVE} + \sum b \cdot D\_IND$	0,632	2,267	6450
1b) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{NI}{BVE} + \sum b \cdot D\_IND$	0,639	2,263	6450
2a) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{NI}{BVE} + b_3 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND$	0,611	2,154	6450
2b) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{NI}{BVE} + b_2 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND$	0,617	2,150	6450
3a) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND$	0,633	2,280	6450
3b) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND$	0,641	2,275	6450
4a) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND$	0,611	2,148	6450
4b) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{PLBT}{BVE} + b_2 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND$	0,615	2,143	6450
5a) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{EBIT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{CAPSTR}{BVE} + b_5 \cdot \frac{CASH}{BVE} + b_6 \cdot \frac{GROWTH}{BVE} + + b_7 \cdot \frac{INDP}{BVE} + \sum b \cdot D\_IND$	0,597	2,275	5838
5b) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{EBIT}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot \frac{CAPSTR}{BVE} + b_4 \cdot \frac{CASH}{BVE} + b_5 \cdot \frac{GROWTH}{BVE} + + b_6 \cdot \frac{INDP}{BVE} + \sum b \cdot D\_IND$	0,612	2,278	5838
P/B (15 Branches & 27 Countries)	0,502	1,461	6450

***Note:** *Even though P/B is used as the dependent variable, the valuation accuracy is computed by calculating scaled absolute valuation errors as shown in formula 5.1.*

6.3.3 Multi-Factor Models Applicable for the Valuation of Unlisted Direct Investment Enterprises

The benchmark definition BD4 (OECD, 2008) states that the choice of the valuation method will depend on three factors:

1) The type of information available on which to base an approximation:
2) How well the method approximates market value: and
3) The need to allow comparability across countries and for symmetrical recording by creditors and debtors.

In this section, the first factor affecting the choice of the valuation method is finally considered: the type of information available on which to base an approximation. Some of the previously tested valuation methods and models include variables which are not currently applicable for the valuation of unlisted direct investment enterprises in Finland. This is because IIP compilers in Finland as well as in most countries collect data on unlisted direct investment equity directly from companies, and the response burden limits the amount of information that can be collected. Thus, the recommended valuation model should be based on variables which are already collected for IIP or balance of payments (BOP) purposes. The accounting variables that can be currently used when valuing unlisted FDI from Finnish point of view are net income, book value of equity and total assets. Therefore, in this section I continue the analysis and development of the multi-factor models but which now truly are applicable in the context of FDI valuation.

Next, I will argue why it might not be reasonable to include net income or any other earnings measure to valuation models when valuing unlisted FDI. The foreign direct investment enterprises often belong to multinational corporations. It is widely acknowledged that these multinational firms take advantage of tax differentials by manipulating profits across jurisdictions (see e.g. Peralta et al. 2006, Huizinga & Laeven, 2008). The shifting of profits out of high into low tax regions can happen in several ways. These include for instance the option to finance an affiliate with debt or equity and putting debt on the books of highly taxed subsidiaries, the choice of the organizational form (e.g. to own the affiliate or to engage in a joint-venture with a local firm), the payment of royalties or management fees between the parent company and its affiliates and the manipulation of transfer prices (Peralta et al. 2006). The objective in all of these is to reduce accounting profits in a high-tax country and to reduce the worldwide corporate tax liability. My argument is that due to this shifting of profits out of high into low tax regions, the reported net income of the direct investment enterprise does not depict the profitability in a similar fashion as the reported income of the whole group in the consolidated financial statement does. Thus, even though net income may be value relevant at the consolidated group level and when added to the multi-factor models lead to lower valuation errors, I do not want to use net income when valuing unlisted direct investment enterprises. Consequently, the accounting variables that I will use afterwards when trying to find an applicable valuation model only include the accounting variables book value of equity (BVE) and total assets (TA).

I tested 32 different multi-factor models that are based on the book value of equity, total assets and various dummy variables trying to capture the effects that firm size, industry- and country-specific factors as well as a dummy variable controlling for negative book values might have on valuation. The basic structure of the models is based on the idea of dividing the equation $MVE = b_0 + b_1 \cdot BVE + b_2 \cdot TA$ with book value of equity, which results in $\frac{MVE}{BVE} = b_0 \cdot \frac{1}{BVE} + b_1 + b_2 \cdot \frac{TA}{BVE}$. Thus, the multi-factor model including variables BVE and TA has been deflated by the book value of equity.

Table 14 shows the valuation accuracy of ten of the best valuation models ranked by median absolute valuation error measure. Appendix 8 shows the valuation accuracy results for all of the tested 32 multi-factor models. The dummy variables used in the valuation models are explained in table 15. The results show the importance of size-, industry- and country dummies, as many of the models produce smaller valuation errors compared to models tested earlier in table 13 that included more value-relevant accounting variables but didn't include size-, industry- or country-dummies. However, again the multi-factor models that are tested do not reach the same accuracy as the P/B multiple. By comparing the absolute valuation errors, the most accurate models seem to be model number 24 or 29 depending on the valuation error measure. Both of these models include book value of equity and total assets that have been deflated, country dummies and a variable INDPB controlling for industry-wide factors. The only difference between the models is that model 24 includes in addition three different size dummies for the book value of equity.

Table 14: The valuation accuracy of applicable multi-factor models with P/B as dependent variable after the exclusion of the top and bottom 1 % P/B values

Valuation model	Absolute valuation errors	
	Median	Mean
P/B (15 Branches & 27 Countries)	0,502	1,461
24) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}200 + b_4 \cdot DBVE{<}15 + b_5 \cdot DBVE{<}1 + b_6 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,581	1,687
20) $\frac{MVE}{BVE} = b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + b_4 \cdot DBVE{<}1 + b_5 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,581	1,720
31) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}0 + b_4 \cdot DBVE{<}200 + b_5 \cdot DBVE{<}15 + b_6 \cdot DBVE{<}1 + b_7 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,583	1,815
32) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}0 + b_4 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + b_5 \cdot DBVE{<}200 + b_6 \cdot DBVE{<}15 + b_7 \cdot DBVE{<}1 + b_8 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,585	1,809
21) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}200 + b_4 \cdot DBVE{<}15 + b_5 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,589	1,750
30) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}200 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,592	1,542
29) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,595	1,515
14) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + b_4 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,596	1,776
13) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,597	1,737
Number of observations	6450	

Table 15: Explanations for the dummy variables

Variable	**Explanation**
D_IND	Industry dummy variables for 15 branches with branch group 1 used as the reference group. The variable controls for industry-wide factors that affect the PB ratio.
INDPB	The harmonic mean of the price-to-book ratio for all firms having the same 2 digits NACE Rev. 2 Core code. The variable controls for industry-wide factors that affect the PB ratio.
D_COUNTRY	Country dummy variables for 27 countries with Sweden used as the reference country. The variable controls for country-wide factors that affect the PB ratio.
DBVE<200	Dummy variable for companies with BVE less than EUR 200 million. According to Damgaard et al. (2009) companies with BVE less than EUR 200 million display significantly higher P/B ratios than companies with BVE of EUR 200 million or more.
DBVE<15	Dummy variable for companies with BVE less than EUR 15 million.
DBVE<1	Dummy variable for companies with BVE less than EUR 1million.
DBVE<0	Dummy variable for companies with BVE less than EUR 0 million.

6.3.4 The Impact of the Aggregation Process and Firm Size on Valuation Errors

An important aspect of the valuation in FDI context is that the models are not going to be applied to company-specific analyses, but instead to macroeconomic statistics. Therefore, in this chapter I analyze the impact of the aggregation process to the valuation accuracy of the models, and the amount by which this process reduces random company-level estimation errors. In addition, I show how the valuation accuracy of the models depends on firm size.

First, observations that were previously used for the calculation of market value estimates and out-of-sample valuation errors are now pooled and divided into 10 different size categories (measured by the book value of equity). The limits of the size categories are set so that the number of observations is same in each category. Thus, each size category consists of 645 firm observations from the years 2005-2011. The limits of the size categories and the number of observations can be seen in table 16.

Table 16: The limits of the size categories

Size category	1	2	3	4	5	6	7	8	9	10	∑
Limits of the category (BVE)	< 2,2 M	2,2 - 6,06 M	6,06 - 13,1 M	13,1 - 22, 7 M	22,8 - 40,1 M	40,1 - 67,4 M	67,4 - 125,5 M	125,5 - 266,3	266,3 - 833,6 M	> 833,6 M	
# of observations	645	645	645	645	645	645	645	645	645	645	6450

Next, I calculate valuation errors by using aggregated actual market values and market value estimations of observations belonging to the same size category. For instance, the actual market values of all observations belonging to size category 8 are summed up. Then, the market value estimations achieved by different valuation models are summed up as well for the same observations belonging to the same size category 8, and the valuation errors are calculated from the aggregated figures. The valuation models tested are the same models that can be seen in appendix 8, including 32 multi-factor models with P/B as dependent variable and a single-factor P/B multiple.

Table 17: The impact of the aggregation process and firm size on valuation errors

	Size category									
Valuation model	1	2	3	4	5	6	7	8	9	10
1	153,8 %	48,1 %	31,5 %	25,7 %	2,5 %	0,4 %	2,2 %	10,3 %	8,9 %	4,2 %
2	77,1 %	46,6 %	29,3 %	23,4 %	5,7 %	2,9 %	5,5 %	7,5 %	6,3 %	7,0 %
3	74,0 %	46,5 %	29,3 %	23,4 %	5,7 %	2,8 %	5,4 %	7,6 %	6,4 %	6,9 %
4	154,3 %	50,4 %	33,6 %	26,4 %	1,0 %	2,4 %	5,2 %	3,7 %	5,4 %	10,2 %
5	78,6 %	49,0 %	31,5 %	24,1 %	3,8 %	4,2 %	7,6 %	1,7 %	3,2 %	12,4 %
6	155,8 %	50,3 %	32,3 %	24,9 %	3,0 %	4,0 %	7,1 %	3,2 %	6,0 %	9,1 %
7	78,5 %	48,3 %	29,5 %	21,8 %	7,1 %	8,0 %	11,2 %	1,0 %	6,2 %	8,8 %
8	82,9 %	48,5 %	30,8 %	23,2 %	5,0 %	5,6 %	9,0 %	2,2 %	6,2 %	8,9 %
9	78,6 %	48,6 %	30,9 %	23,3 %	4,9 %	5,4 %	9,0 %	2,3 %	6,2 %	8,9 %
10	79,5 %	46,7 %	31,0 %	24,5 %	4,0 %	5,9 %	8,0 %	2,6 %	4,9 %	9,1 %
11	137,2 %	47,5 %	32,0 %	26,0 %	2,2 %	4,8 %	6,3 %	3,4 %	4,5 %	9,3 %
12	136,7 %	47,5 %	31,8 %	26,5 %	2,9 %	4,8 %	5,2 %	4,0 %	3,9 %	9,6 %
13	147,1 %	40,0 %	21,4 %	31,2 %	8,8 %	5,4 %	4,1 %	8,7 %	4,2 %	9,6 %
14	152,7 %	40,5 %	21,9 %	31,3 %	8,9 %	5,5 %	4,2 %	8,8 %	4,4 %	9,6 %
15	136,9 %	47,8 %	32,5 %	26,7 %	1,4 %	3,8 %	5,3 %	2,9 %	1,6 %	12,6 %
16	138,2 %	47,4 %	32,0 %	25,7 %	1,7 %	4,3 %	6,3 %	2,3 %	3,3 %	11,3 %
17	137,3 %	48,1 %	33,2 %	27,3 %	0,2 %	2,4 %	4,2 %	3,9 %	2,8 %	11,5 %
18	132,9 %	53,7 %	39,9 %	33,5 %	6,2 %	8,3 %	1,4 %	10,3 %	4,7 %	9,3 %
19	155,9 %	41,0 %	21,2 %	32,3 %	9,1 %	8,4 %	2,8 %	17,6 %	23,9 %	11,5 %
20	153,9 %	40,7 %	21,1 %	32,1 %	7,6 %	6,8 %	6,3 %	14,8 %	14,1 %	1,3 %
21	144,8 %	40,5 %	22,5 %	31,1 %	8,6 %	5,5 %	4,1 %	8,7 %	4,4 %	9,6 %
22	143,7 %	40,6 %	22,4 %	31,7 %	8,2 %	5,8 %	5,5 %	9,5 %	4,0 %	9,4 %
23	148,1 %	41,2 %	21,9 %	32,3 %	9,1 %	8,8 %	3,3 %	18,0 %	24,3 %	12,0 %
24	146,1 %	40,8 %	21,8 %	32,0 %	7,6 %	7,0 %	6,3 %	14,9 %	14,3 %	1,4 %
25	173,2 %	42,4 %	19,4 %	31,4 %	7,9 %	9,0 %	6,7 %	16,4 %	18,2 %	3,6 %
26	169,3 %	42,0 %	20,2 %	31,1 %	8,6 %	7,3 %	5,5 %	9,8 %	5,4 %	9,7 %
27	170,9 %	42,1 %	20,6 %	30,7 %	9,4 %	7,4 %	4,5 %	9,1 %	5,9 %	9,3 %
28	176,4 %	43,0 %	19,5 %	31,6 %	9,7 %	11,2 %	3,0 %	19,1 %	28,5 %	14,9 %
29	135,6 %	50,6 %	35,9 %	31,4 %	2,8 %	3,8 %	3,0 %	9,0 %	2,1 %	12,7 %
30	138,5 %	48,3 %	32,5 %	27,4 %	2,6 %	2,3 %	3,4 %	10,2 %	14,7 %	1,5 %
31	80,3 %	41,3 %	20,6 %	31,9 %	7,9 %	7,3 %	6,1 %	14,6 %	13,9 %	1,1 %
32	78,3 %	41,3 %	20,6 %	31,9 %	7,9 %	7,3 %	6,1 %	14,6 %	14,0 %	1,1 %
P/B (15 Branches & 27 Countries)	139,1 %	64,2 %	50,4 %	44,9 %	23,6 %	21,9 %	23,2 %	27,5 %	29,1 %	15,6 %
# observations	645	645	645	645	645	645	645	645	645	645

Table 17 shows that the valuation errors of the aggregations are largest for observations belonging to size category 1. This category consists of the smallest companies in the pooled data set for which the book value of equity was smaller than 2.2 million euros, and includes many observations with negative book values of equity. When moving to larger firms and higher size categories, the valuation errors tend to decrease. This result is not surprising and is in line with the findings of Lie & Lie (2002). What is more relevant here is the fact that the P/B multiple that performed well against the multi-factor models earlier when the valuation error was calculated separately for each observation do not manage that well any longer when the observations are aggregated. In fact, all of the 32 multi-factor models show lower estimation errors after the aggregation process than the P/B multiple almost in every size category. The only exception for this is size category 1, where the single-factor P/B multiple is able to perform better than some of the multi-factor models.

It seems that the multi-factor models do not perform well when analyzing company-specific valuation errors with mean and median absolute valuation error measures. However, they do perform better when the focus is on the accuracy of the aggregates. One reason for this could be that different companies have different factor sensitivities in regressions, which causes noticeable mispricing in single valuation cases (Meitner, 2006, p. 124). However, when the focus is on the accuracy of the aggregates this random error is reduced.

To find out which of the multi-factor models might be most useful when applying them to the Finnish international investment position, I have to somehow weight the errors shown in table 17. One solution for this is to weight the errors based on how much companies belonging to each size category constitute to the unlisted direct investment equity with actual data. Table 18 depicts Finnish outward unlisted direct investment for the year 2011. Firms are divided into 10 size categories in a similar fashion that was done earlier with listed companies. This procedure is done to find out how much companies belonging to each size category contribute to the overall direct investment figures. For instance, firms that belong to size category 10, i.e. their book value of equity was larger than 833.6 M, made 53.5 % of the total unlisted FDI figure in Finland in 2011. By weighing the aggregated valuation errors in this way, I basically punish those valuation models that do not perform well when valuing large companies. This is done as larger companies constitute to the total FDI figures more than small companies. The absolute values in table 18 are used so that the effect of the negative weight in size category 1 is eliminated. Otherwise larger valuation errors in size category 1 would have resulted in smaller weighted valuation errors.

Table 18: Determination of the weights for size categories (outward FDI 2011)

Size category	1	2	3	4	5	6	7	8	9	10	total
∑ BVE	-2912,0	1121,0	2175,6	2692,4	4160,9	3154,0	4932,3	9150,2	15202,8	45716,3	85393,6
%	-3,4 %	1,3 %	2,5 %	3,2 %	4,9 %	3,7 %	5,8 %	10,7 %	17,8 %	53,5 %	100,0 %
| ∑ BVE |	2912,0	1121,0	2175,6	2692,4	4160,9	3154,0	4932,3	9150,2	15202,8	45716,3	91217,6
%, weights used	3,2 %	1,2 %	2,4 %	3,0 %	4,6 %	3,5 %	5,4 %	10,0 %	16,7 %	50,1 %	100,0%
# companies	323	284	234	170	139	93	76	61	51	30	1461

Table 19 shows the valuation errors of the aggregates for 10 of the best valuation models after weighing the errors with the impact that size categories had on the Finnish outward FDI figures in the year 2011. Appendix 9 shows the results for all of the 32 tested multi-factor models. First, it can be seen that all of the multi-factor models that were tested perform better than the single-factor P/B multiple. Secondly, the differences between the multi-factor models do not seem to be large. Part of this can be explained by looking at the valuation models in appendix 8. The valuation models are seemingly similar to each other, and in many cases only differ with respect to the dummy variables. On the other hand, the aggregation process significantly reduces the random errors and offsets some of the differences that the models might have when valuing single companies. Finally, the most accurate models within this valuation error measure seem to be valuation models 31 and 32. Both of these models include the two available accounting variables (book value of equity and total assets) as well as every possible size dummy tested in this study and dummy variables controlling for industry- and country-specific factors affecting the valuation.

Table 19: Weighted valuation errors of the aggregates

Ranking	Valuation model	Weighted valuation errors of the aggregates
1	32	9,71 %
2	31	9,77 %
3	3	10,24 %
4	2	10,37 %
5	10	11,03 %
6	9	11,14 %
7	7	11,19 %
8	30	11,21 %
9	8	11,28 %
10	1	11,90 %
33	P/B (15 Branches & 27 Countries)	26,26 %
	Observations	6450

6.3.5 The Ranking of the Valuation Models

Table 20 shows 10 of the best valuation models that I consider applicable in the context of FDI valuation. The models are ranked based on how well they perform against each other. Three different valuation error measures are used to analyze the valuation accuracy of the models. The median and mean absolute valuation errors are used to measure the company-specific valuation errors. The weighted valuation error of the aggregates (WVEA) is used to measure the impact of aggregation process and firm size to the valuation accuracy of the models. The average ranking shows how the models perform against each other when the average of the rankings is taken. Appendix 10 shows the ranking of all of the tested valuation models. The purpose is to find a model that works relatively well when valuing single-companies and as well as when valuing a large number of companies. The reason for this is that the models are going to be applied to macroeconomic statistics, where the interest is on the valuation accuracy of the aggregated figures. However, the statistics are sometimes also presented with geographical and industry breakdowns, where the number of companies might not be that large. Thus, I cannot only rely on the ability of the aggregation process to reduce random company-level estimation errors.

First, when looking at the average rankings of the models in appendix 10, a conclusion can be made that the worst performers are models that do not contain any accounting variables. Valuation models 25-28 contain only dummy variables controlling for size, industry- and country-wide factors affecting the PB ratio. For instance, valuation model 28 that has the lowest average ranking is otherwise identical with the valuation model 24 that performs rather well, except that it is missing the accounting variables. Therefore, I argue that it is reasonable to include at least some accounting variables in the valuation model that is to be applied in FDI valuation context. The multi-factor model that was applied in the study of Damgaard et al. (2009) for valuing the Danish foreign direct investment did not contain any accounting variables. The only variable that was not a dummy variable in their model was equity trading volume catching the effect of the illiquidity discount.

Table 20: Ranking of the Valuation Models

Valuation model	Ranking			
	WVEA	median AVE	mean AVE	average
30) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRY$	8	7	3	6
24) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<15 + b_5 \cdot DBVE<1 + b_6 \cdot INDPB + \sum b \cdot D\_COUNTRY$	11	2	13	8,67
20) $\frac{MVE}{BVE} = b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot DBVE<15 + b_4 \cdot DBVE<1 + b_5 \cdot INDPB + \sum b \cdot D\_COUNTRY$	13	3	15	10,33
32) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<0 + b_4 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_5 \cdot DBVE<200 + b_6 \cdot DBVE<15 + b_7 \cdot DBVE<1 + b_8 \cdot INDPB + \sum b \cdot D\_COUNTRY$	1	5	25	10,33
31) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<0 + b_4 \cdot DBVE<200 + b_5 \cdot DBVE<15 + b_6 \cdot DBVE<1 + b_7 \cdot INDPB + \sum b \cdot D\_COUNTRY$	2	4	27	11,00
P/B (15 Branches & 27 Countries)	33	1	1	11,67
17) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	17	14	5	12,00
29) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot INDPB + \sum b \cdot D\_COUNTRY$	26	8	2	12,00
11) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	14	18	6	12,67
12) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot INDPB + \sum b \cdot D\_COUNTRY$	15	15	9	13,00

Second, it might make sense to control the industry-wide factors affecting the P/B ratio with the harmonic mean of the price-to-book ratio for all firms having the same 2 digits NACE Rev. 2 Core code (INDPB) instead of with industry dummy variable (D_IND). For instance the valuation model

23 is otherwise similar to valuation model 24 but includes D_IND instead of INDPB and ends up producing higher valuation errors with every valuation error measure that was used.

Third, it is not evident how many dummy variables a valuation model should include to control the effect of firm size. For instance, valuation model 29 seems to perform as well as the valuation model 30 when considering the mean and median absolute valuation errors, even though it does not include any size dummies at all. However, when looking at the weighted valuation errors of the aggregates, models that contain all the size dummies (models 31 and 32) clearly lead to better results.

To conclude, it is difficult to find one single valuation model that performs well in light of every valuation error measure used in this study. Many of the models that are tested show relatively low valuation errors with some valuation error measure but on the other hand do not perform that well when analyzed by some other measure. However, the results might imply that multi-factor models perform better when the focus is on the accuracy of the aggregated figures. A single-factor P/B multiple on the other hand performs well when analyzing company-specific valuation errors with mean and median absolute valuation error measures. One explanation for the relatively poor performance of multi-factor models in single company-specific valuation might be that different companies have different factor sensitivities in regressions which according to Meitner (2006, p. 124) causes noticeable mispricing in single valuation cases. When the focus is on the accuracy of the aggregates, this random error that is related to company-specific valuations is reduced.

7 APPLICATION OF THE MODELS TO THE FINNISH INTERNATIONAL INVESTMENT POSITION

In this section, I illustrate the effects of applying the valuation models tested earlier to the unlisted FDI figures as well as to the Finnish international investment position. The empirical valuation models are based on data for listed companies and then subsequently applied to unlisted equity. Similar to the study of Nivat & Topiol (2010) an average illiquidity discount of 25% was applied in this study to capture the difference in value between unlisted and listed equity. An in-depth analysis of the illiquidity discounts is provided in Annex 2.

7.1 Data

To estimate market values for the companies located in Finland and in EU-27 countries, I collect data from all listed companies of the 27 European Union member countries from 2005-2011 in a similar fashion as in the valuation accuracy part of this study. The sample composition however differs from that used in the valuation accuracy study as the basic sample is now larger with 45.692 firm year observations instead of 32.247 used earlier. The number of firm observations is larger, as I do not impose as strict financial data requirements in this part of the study. The models that I am going to apply only contain accounting variables for book value of equity and total assets. Therefore, I can at this stage include observations that were previously omitted because they did not contain all the information of the accounting variables that were needed. Table 4 summarizes the sample selection process for this part of the study.

Table 21: Sample composition in the application of the models to the Finnish International Investment Position

Firm year observations 2005-2011 from Orbis database	**114,086**
(i.e Listed and formerly listed companies from EU-27 countries)	
- Observations of companies for which market capitalization data was not available from Orbis or Thomson One databases	
- Observations of companies for which financial data was not available	
- Observations of companies for which industry classification was not available	
= Basic sample	**45,692**

Appendix 11 shows the descriptive statistics of the companies that are used in this part of the study for valuing the companies located in Finland and in EU-27 countries. By comparing descriptive statistics to the previous sample that was used in the valuation accuracy study, one can see that the inclusion of 13.445 firm-year observations decreases the median and mean statistics of the variables. Thus, the companies that are included in this stage are on average smaller on size and present negative earnings more often. Appendix 12 describes the industries of the companies used in the application phase of the valuation models. The share of companies operating in ICT and manufacturing industries has decreased. On the other hand, there has been a significant increase in the share of observations belonging to the branch 9 'financial intermediation and insurance'. The countries of the companies used at this point can be seen in appendix 13.

As Finland has outward direct investment equity also outside EU-27 area, and practically all around the world, I also collect data from all listed companies around the world for the years 2005-2011 that are available on Orbis database. I value companies locating outside EU-27 area with a single-factor P/B multiple. Thus, data includes market value, book value of equity and industry classification information for the listed companies locating outside EU-27 area.

7.2 Valuation Models Used for the Valuation of Unlisted Direct Investment Equity

In this chapter, I will present the models that are applied for the valuation of unlisted direct investment equity. Table 22 shows the models that are used in this study. Three multi-factor models (valuation models 30, 24 and 32) and one single-factor P/B multiple model are included to find out how much Finnish IIP is dependent on the choice of valuation method. The valuation accuracy of these models was tested earlier in this study, and the models are now applied to value both inward and outward direct investment. Valuation models 30 and 24 are included as they are the two best valuation models when the average ranking of the models is considered. Valuation model 32 is included as it is the best valuation model when measured by the weighted valuation errors of the aggregates. Lastly, the single-factor P/B is included since it performs better than the multi-factor models when analyzing company-specific valuation errors. Multi-factor models 30, 24 and 32 differ from each other only with respect to the number of dummy variables controlling for firm size.

However, as Finland has direct investment also in countries locating outside EU-27 area, a new single-factor P/B valuation method is included (P/B 15 branches, 8 regions). With this method, comparable companies are first looked from the same branch and from the same country that the company being valued is operating in. However, when less than five companies can be found, I include all companies operating in the same branch and in the same region to the group of comparables. For example, when valuing an unlisted manufacturing-company operating in Brazil, comparables are first seeked from all listed manufacturing companies located in Brazil in the same year. When less than five manufacturing companies in Brazil can be found, the P/B multiple is calculated by using all the manufacturing companies operating in the same region, South and Central America. Definitions of the regions are shown in appendix 18. Thus, the impacts of four different valuation models are tested for companies operating in EU-27 countries. The valuation method concerning companies locating outside EU-27 is always the same, regardless of the model applied for valuing the companies locating in EU-27 area.

Table 22: Models used for the valuation of unlisted direct investment equity

Outward Direct Investment (Companies not locating in Finland)		**Inward Direct Investment** (Companies locating in Finland)
Companies locating in EU-27 area	Valuation model 30	Valuation model 30
	Valuation model 24	Valuation model 24
	Valuation model 32	Valuation model 32
	P/B (15 Branches & 27 Countries)	P/B (15 Branches & 27 Countries)
Companies locating outside EU-27 area	P/B (15 Branches, 8 regions)	-

Table 23 gives explanations to models that are used for the valuation of unlisted direct investment equity. An important thing to note here is that the estimations regarding the multi-factor models are based on different datasets depending on whether outward or inward direct investment is being valued. The multi-factor models that are applied to the inward FDI are based on data from 9 countries out of the EU-27 area. The reason is that when valuing companies locating in Finland, I want to include data from markets similar to Finnish stock market. In broad terms, business potentials and risks are more similar to Finland in the eight countries that are included than they are elsewhere in EU-27 area. Remaining country-specific differences in earnings perspectives, risks, regulations, taxation and accounting principles are controlled with a country variable, distinguishing between Finland on one side and the other 8 countries on the other side.

Table 23: Explanations of the models used for the valuation of unlisted direct investment equity

Model	Explanation	Outward Direct Investment	Inward Direct Investment
Valuation model 30	MVE/BVE = b1 · 1/BVE + b2 · TA/BVE + b3 · DBVE<200 + b4 · INDPB + ∑ b · D_COUNTRY	Listed companies from all EU-27 countries are included in data	Listed companies from Austria, Belgium, Germany, Denmark, Finland, France, Luxembourgh, Nethelands and Sweden are included in data
Valuation model 24	MVE/BVE = b1 · 1/BVE + b2 · TA/BVE + b3 · DBVE<200 + b4 · DBVE<15 + b5 · DBVE<1 + b6 · INDPB + ∑ b · D_COUNTRY		
Valuation model 32	MVE/BVE = b1 · 1/BVE + b2 · TA/BVE + b3 · DBVE<0 + b4 · DBVE<0 · 1/BVE + b5 · DBVE<200 + b6 · DBVE<15 + b7 · DBVE<1 + b8 · INDPB + ∑ b · D_COUNTRY		
P/B (15 Branches & 27 Countries)	First, companies operating in the same branch and in the same country are used as comparables. When there are less than five companies operating in the same branch and country, companies operating in the same branch and in a country where the monthly average interest rate for long-term government bond in a given year was closest to the country being in question are added to the group of comparables. This procedure is repeated until at least 5 comparables are found.		
P/B (15 Branches, 8 regions)	First, companies operating in the same branch and in the same country are used as comparables. When there are less than five companies operating in the same branch and country, companies operating in the same branch and in the same region are added to the group of comparables.		

Appendix 14 shows the P/B multiples that are calculated to value unlisted outward foreign direct investments locating in EU-27 countries. P/B multiple is calculated for every country and for every branch in which Finland had foreign direct investments during 2005-2011. In addition, appendix 14 shows the number of companies used in the calculation of each multiple and the number of steps that are taken to other countries inside the EU-27 area to find at least five comparable companies. For example, when valuing unlisted company locating in Austria and operating in branch number 1 in the year 2011, a P/B multiple of 1,390 is used. This multiple is calculated from 21 listed companies operating in Austria and in branch 1.

Appendix 15 on the other hand presents the P/B multiples that are used for the valuation of inward FDI during 2005-2011. Similar to appendix 14, the number of listed companies that are used in the calculation of the multiples is shown as well as the number of steps that are taken from Finland to other countries in order to find at least five listed companies in each branch. Thus, appendix 14 and

15 show how the valuation is conducted with one of the tested valuation models, P/B (15 Branches & 27 Countries).

P/B multiples that are used for the valuation of outward FDI for countries outside the EU-27 area can be seen in appendix 16. Multiples are calculated only for those countries and branches where Finland had foreign direct investments during 2005-2011. However, when less than five listed companies for given branch and country could be found from Orbis database, unlisted FDI locating outside the EU-27 area are valued with regional P/B multiples. Appendix 17 shows the P/B multiples that are calculated by using listed companies from all of the countries in a given region operating in the same branch.

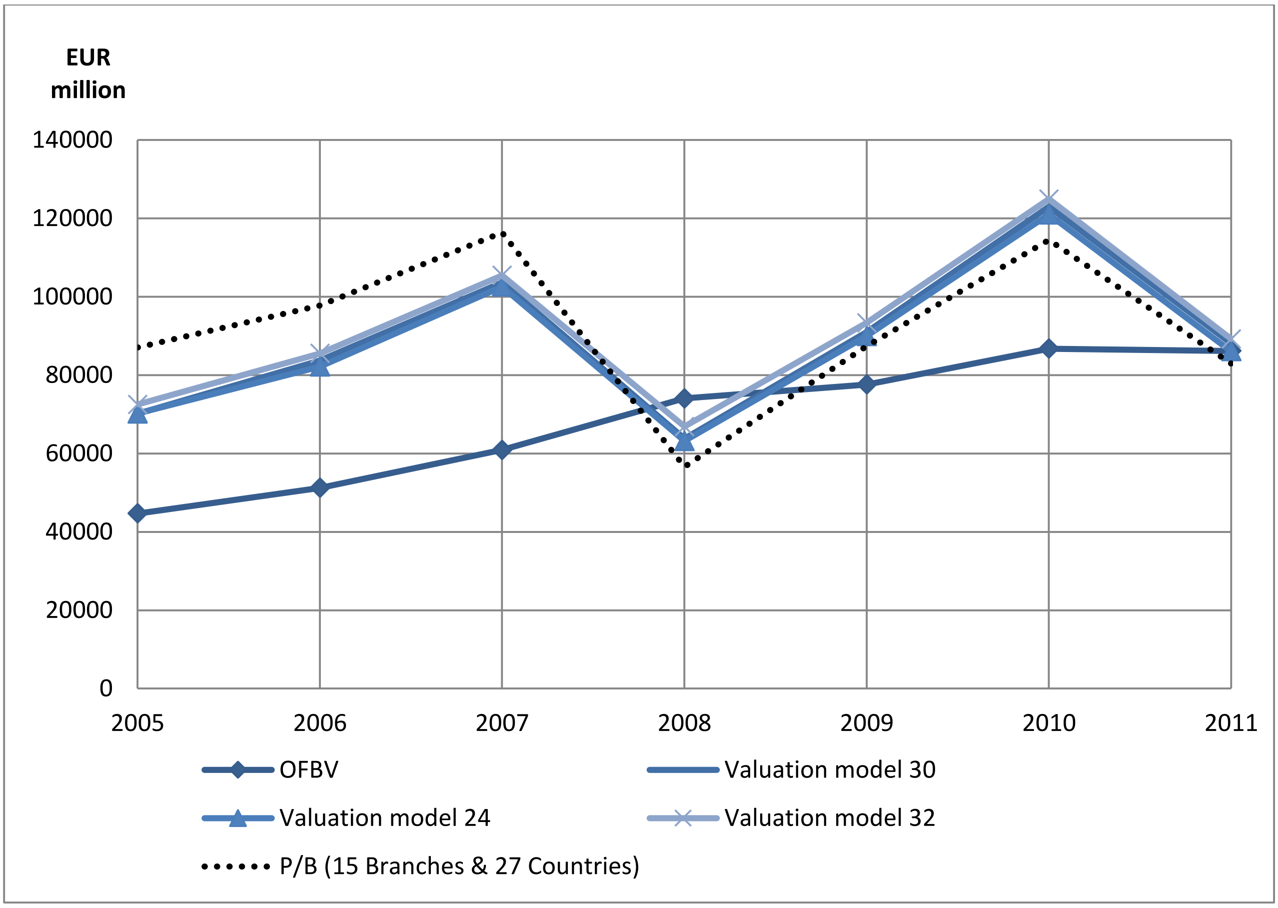
Appendix 19 and 20 show the regression results for one of the three multi-factor models that are tested in this study, valuation model 30, after the exclusion of top and bottom 1% P/B ratios. The model includes accounting variables book value of equity and total assets, which have been deflated by book value of equity. In addition, a dummy variable controlling for companies with OFBV<200 million is included as well as a variable controlling for industry-wide differences. The model also includes dummy variables controlling for country-wide factors affecting the valuation. Appendix 19 shows the regression results that are used when valuing outward foreign direct investments locating in EU-27 area. Appendix 20 on the other hand shows the results for valuing inward foreign direct investments, i.e. unlisted companies locating in Finland.

Bank of Finland is the official Finnish IIP compiler and has provided access to Finnish company specific data for the purpose of this research. Data on unlisted direct investment equity is collected directly through surveys from companies for IIP and balance of payments purposes. Appendix 22 shows descriptive statistics for unlisted direct investment enterprises for which the valuation models are applied in this chapter. A comparison with the figures for listed companies in the dataset confirms that unlisted companies generally are smaller than listed companies.

7.3 The Effects of the Valuation Models on Finnish FDI figures

Figure 1 shows the effects on the total market value of outward unlisted direct investment equity in the Finnish IIP when estimated with three multi-factor valuation models shown in table 22 and with one single-factor P/B multiple taking into account the industry-wide differences as well as country-related factors affecting the multiple. As a comparison, the figure also includes the current valuation practice based on the book values of equity (OFBV).

Figure 1: Value of outward unlisted direct investment equity in Finnish IIP 2005-2011



When comparing the unadjusted OFBV and the models approximating market value, the book value measure OFBV tends to generate lower estimates. This result is not surprising as accounting standards only capture intangibles to a limited extend, often favor historical cost accounting and as book values do not reflect positive earnings expectations. An exception for this is year 2008, a year of financial turmoil, when the market value estimations are below the book values.

The market value approximations produced by the four different valuation models seem to be rather similar to each other for most of the time. The results of the multi-factor models are especially robust and show that number of dummy variables controlling for firm size might not be that critical in the context of FDI valuation. However, the single-factor P/B multiple results in higher market value approximations during the years 2005-2007.

Figure 2: Impact of negative positions to the value of outward unlisted direct investment equity for the year 2011

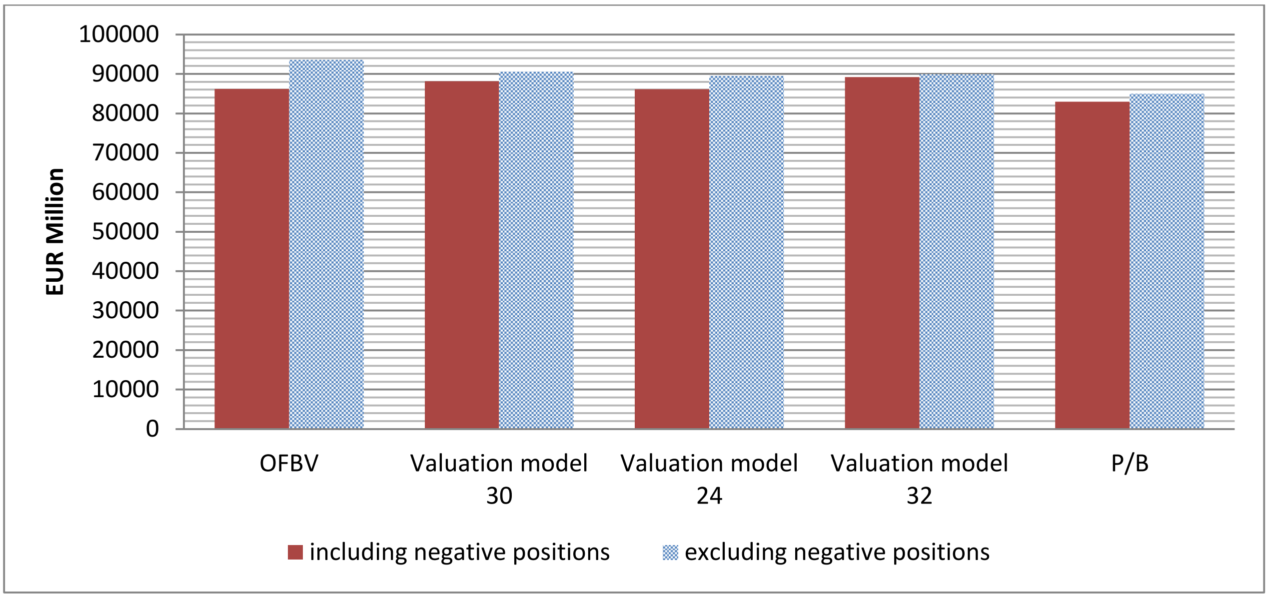
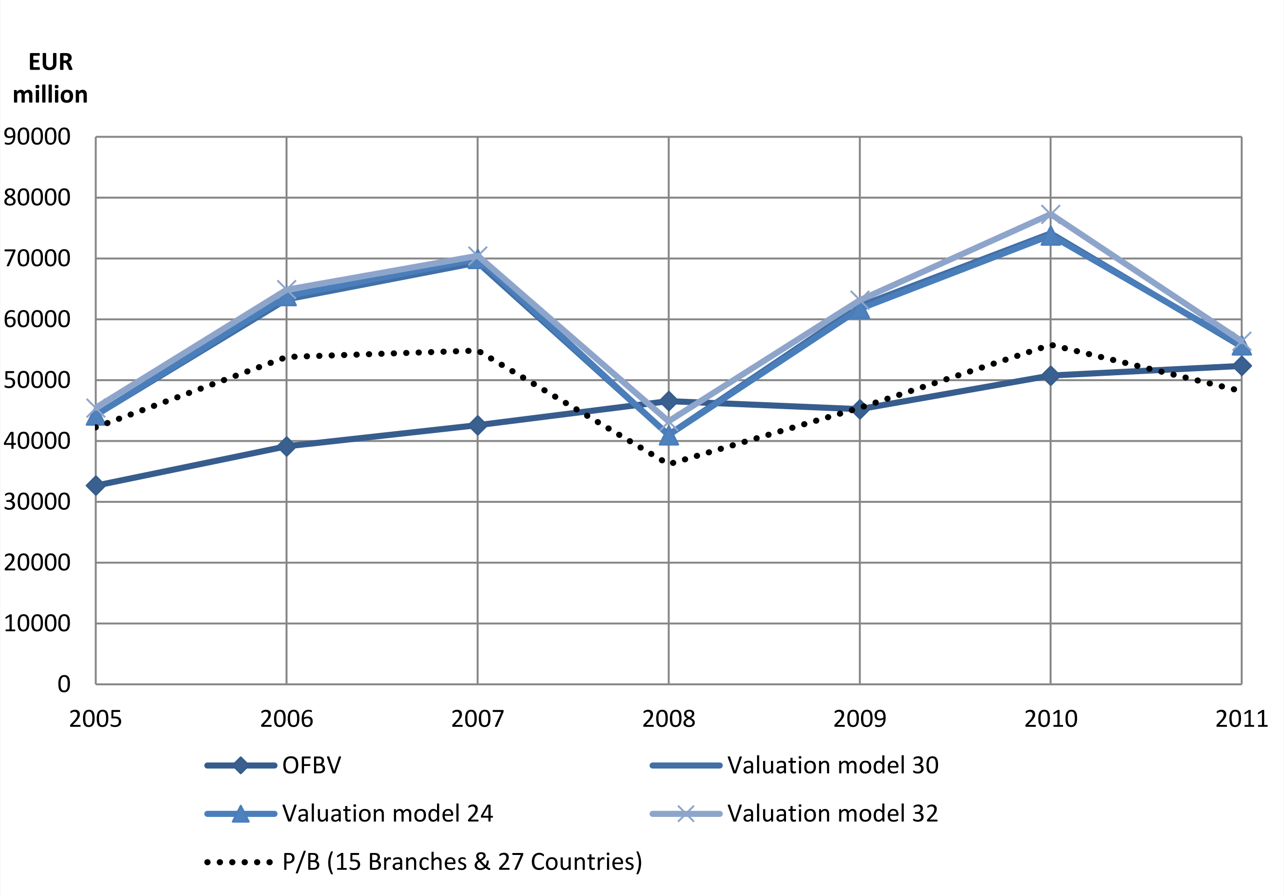


Figure 2 shows the consequences of implementing different valuation models and treatment of negative positions for the year 2011. The results do not seem to be highly sensitive to the choice of estimation technique, illustrating that P/B models are robust valuation predictors as Damgaard et al. (2009) acknowledge. The total market value estimates of unlisted outward direct investment equity vary from EU 83 billion to EUR 91 billion. Interestingly, it does not make a huge difference whether negative direct investment equity positions are included or not. Furthermore, the unadjusted OFBV seems to generate rather similar estimates with market value approximations for this year. The reason for this is the contraction in equity markets and market capitalization ratios during the year 2011, which lowers the market value estimates of the valuation models.

Figure 3 shows on the other hand the effects on the total market value of inward unlisted direct investment equity in the Finnish IIP. The general trend in market value approximations is again the same, the market value approximations are higher compared to the OFBV. According to van den Dool & Hillebrand (2012) this is reasonable under normal conditions with favorable prospects, as the book values do not reflect any positive earnings expectations prevailing in the market. In addition, similar to the results of Nivat & Topil (2010) the estimated market value of inward FDI is smaller than the book value for the year 2008, a year of major financial turmoil, when market capitalization ratios contracted.

Figure 3: Value of inward unlisted direct investment equity in Finnish IIP 2005-2011



Again, the three multi-factor valuation models result in market values that are seemingly similar to each other. However, the market value approximations generated by the single-factor P/B model are now much lower compared to the results of multi-factor models. As the valuation accuracy part of this study suggested that the multi-factor models might perform better when the focus is on the accuracy of the aggregated figures, the usage of a single-factor P/B multiple in inward FDI valuation might not be reasonable. What could explain the performance of P/B multiple compared to the multi-factor models? It could be that the use of median as a measure of central tendency results in undervaluation in FDI valuation context, as it does not recognize the positively skewed distributions. Also, part of the variation could be ascribed to the differences in peer group selection. Remember that the multi-factor models applied in inward side use all observations from 9 countries out of the EU-27 area and the country-specific differences are controlled with a country variable. However, the single-factor multiple considers only as small number of observations as needed, and the comparables are sought primarily from Finland and from countries where the long-term government bond yield is as close to Finland as possible.

7.4 The Impact of the Models to the Finnish International Investment Position

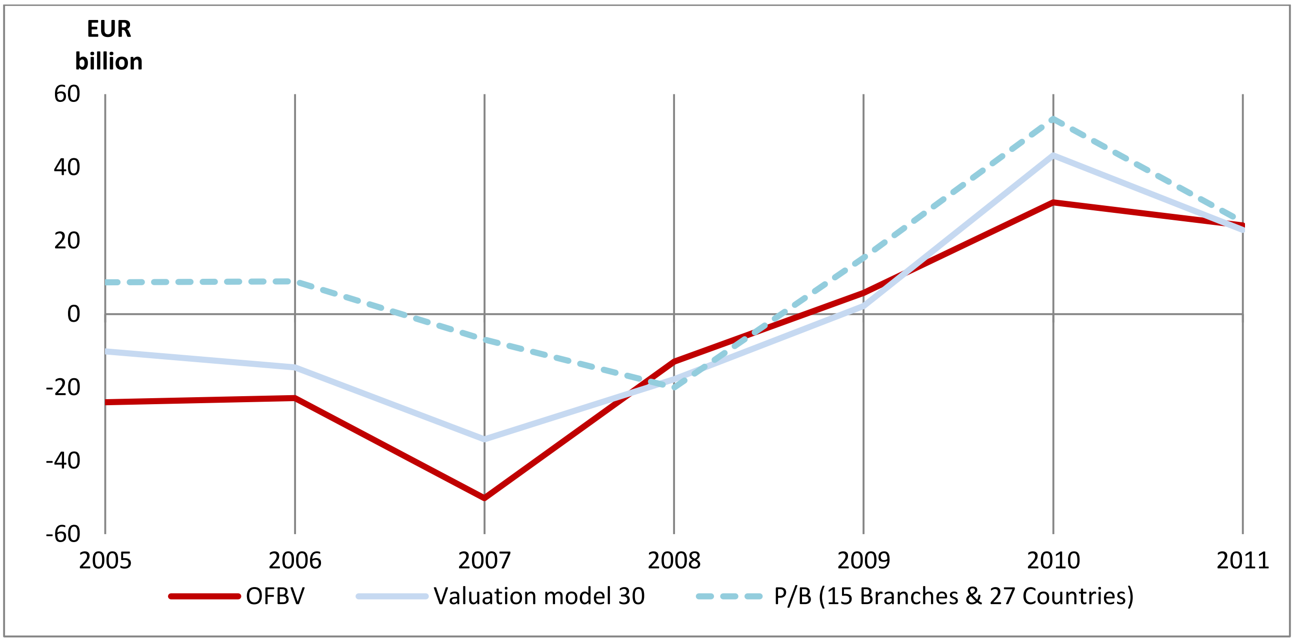
The difference between an economy's external financial assets and liabilities is the economy's net IIP, which represents either a net claim on or a net liability to the rest of the world (IMF, 2008). The next step is to analyze the overall effect of the valuation models by applying them to the Finnish IIP. Table 24 shows the consequences of implementing the multi-factor valuation model 30 to the Finnish IIP for the year 2011. It can be seen that Finland's total external assets would increase by 0,28% while the liabilities would increase by 0,47% compared to the official statistics, which for unlisted direct investment equity are based on book values of equity, OFBV. The effect of market value approximation is not tremendous. The reason is that for the year 2011, the market value approximations for unlisted FDI were exceptionally close to results generated by the OFBV valuation, as could be seen earlier in figures 1 and 3. Surprisingly, Finland's overall external financial position declines slightly from EUR 24.2 billion to EUR 22.9 billion, as the increase in unlisted inward FDI after market value approximation is larger than the increase for unlisted outward FDI.

Table 24: Finnish IIP end-2011 depending on valuation method for unlisted direct investment equity (amounts in EUR million; percentage change in brackets)

Valuation method	Financial instrument	Assets	Liabilities	Net assets
OFBV	Direct investment equity	103 297	66 016	
	All other financial instruments	593 269	606 388	
	Total	696 566	672 404	24 162
Market value (Valuation model 30)	Direct investment equity	105 221 (1,86%)	69 181 (4,79%)	
	All other financial instruments	593 269 (0%)	606 388 (0%)	
	Total	698 490 (0,28%)	675 569 (0,47%)	22 921

Figure 4 shows how market value approximations change Finland's overall net external financial position for the years 2005-2011. The effects are calculated with one multi-factor model (valuation model 30) as well as with a single-factor P/B multiple and compared to the results of OFBV method. As can be seen, valuation of outward and inward direct investment at market value instead of book value results in an increase in Finnish net external assets for most of the years. The average difference in net external assets for 2005-2011 is EUR 5.9 billion when OFBV is compared to multi-factor model 30. The average difference increases to EUR 19.1 billion when the market value approximation is conducted with a single-factor P/B multiple. This tells us that Finland's overall external financial position might be strongly understated, when the valuation of unlisted direct investment equity is based on the book values. Moving from OFBV to market value approximations resulted in positive improvements on IIP figures and net financial positions also in the studies of Damgaard et al. (2009) and Van den Dool & Hillebrand (2012). According to Damgaard et al. (2009) the net impact is likely to be large for countries with unbalanced direct investment equity positions, such as emerging markets, or for countries that observe considerable differences between P/B ratios for inward and outward direct investment equity.

Figure 4: Finnish net IIP depending on valuation method for unlisted direct investment equity 2005-2011



While figure 4 shows that moving from book values to market values might improve countries' net financial positions, it also demonstrates that the choice of valuation method and estimation technique can have a highly significant impact on countries' FDI figures and the international investment position. Even though both of the valuation models are based on P/B ratio, they generate seemingly large differences on the Finnish external financial position.

8 CONCLUSIONS

In this section, the study is concluded with main results, limitations of the study and suggestions for future research. The objective of this study was to analyze the various means for valuing unlisted equity in FDI context and to contribute to the international effort of improving market value estimates. The performance of various valuation models was tested based on how accurately they perform when valuing listed companies in 27 European Union member states during 2005-2011. In addition, the study further analyzed the impacts that market approximation had on Finnish international investment position during the years 2005-2011.

In response to the growing importance of measuring direct investment equity in a globalized world and to the current state of valuing unlisted direct investments at book value, OECD's BPM 6 has introduced specific valuation guidelines with the aim of achieving reliable market value estimates and increasing the cross-country harmonization in valuation principles. All seven valuation methods recommended in the BPM6 have their advantages and disadvantages. However, as compilers often have constraints regarding the information on which to base the valuation, many of the methods suggested can be ruled out quite easily. Consequently, practitioners are constrained to base their valuations on relative valuation methods, such as price multiples, as a substitute to more complex valuation techniques in FDI valuation context. When comparing the methods that are applicable in practice, the main interest should be on how well the method approximates market values (IMF, 2008).

As it is practically impossible to test how accurately different valuation methods might approximate market values for unlisted companies, valuation accuracy of the models was tested with a sample of listed companies, for which the actual market values are known. Several multiples together with different comparables selection methods were tested. Furthermore, the performance of various multi-factor models was studied to see whether an increase in the number of value drivers in the model could lead to more accurate valuation estimates. The empirical analysis was based on data from 27 European Union member countries, as I wanted to capture the outward investment position of Finland reasonably well and contribute to the international effort of improving market value estimates.

First, I compared the valuation accuracy of different multiples valuation methods. It was shown that when industry-wide differences as well as country-related factors are taken into account in peer group selection, a single-factor multiple based on the book value of equity yields most accurate predictions.

The performance of the P/B multiple was even more accurate than any of the two-factor models tested in the study. This result is in line with the findings of Bhojraj et al. (2003) who show that country-based differences play a relatively minor role in explaining P/B multiples but they are extremely important in explaining variations in price-to-earnings ratios. Thus, when valuing companies in an international setting, the use of a P/B multiple might be reasonable.

Next, I analyzed the performance of multi-factor models. It was shown that level-based regression models can be highly affected by scale effects, which cause significant valuation errors in research settings where accounting data for companies of different sizes is used. To reduce the problems related to scale effects, the multi-factor models were deflated by book value of equity. However, despite the deflation, the multi-factor models could not perform as well as the single-factor P/B multiple when valuation accuracy was analyzed by company-specific valuation error measures. Two explanations were provided. Firstly, the use of endogenous deflator such as book value of equity can cause endogeneity problems (Gil-Alana et al. 2011). This means that the deflation with book value of equity does not maintain the original proportionality relation between market value and the accounting numbers, which increases valuation errors. Secondly, the relatively poor performance of multi-factor models in single company-specific valuation might be ascribed to the differences that companies have in factor sensitivities when conducting regressions. Damgaard et al. (2009) however propose that when the focus is on the accuracy of the aggregates, this random error that is related to company-specific valuations is reduced.

As the valuation models are not going to be applied to company-specific analyses but instead to macroeconomic statistics, the impact of the aggregation process was also tested. It was shown that the aggregation process significantly reduces the random errors and offsets some of the difficulties that multi-factor models have. The performance of the multi-factor models significantly improved when the focus was moved to the accuracy of the aggregates. However, the single-factor P/B multiple that performed well when analyzed with company-specific valuation errors could not perform that well when the focus was moved to the accuracy of the aggregates. This demonstrates that the use of multi-factor models might be reasonable in FDI valuation context, where the interest is on the accuracy of the aggregated figures.

Next, I illustrated the effects of applying the valuation models to the unlisted FDI as well as to the Finnish international investment position. Similar to the study of Nivat & Topiol (2010) an illiquidity discount of 25% was applied to capture the average difference in value between unlisted and listed equity. Three multi-factor models and one single-factor P/B multiple model were included to find out how much the FDI valuation is dependent on the choice of valuation method. In addition, country-based and region-based P/B multiples were calculated to value companies operating outside of EU-27 area. A few generalizations can be said after comparing the market value approximations to the current valuation practice, which is based on the book values of equity. First, the book value measure OFBV tends to generate lower direct investment positions. This is reasonable as accounting standards capture intangibles only to a limited extent, often favor historical cost accounting and as book values do not reflect positive earnings exceptions. An exception for this is year 2008, a year of financial turmoil, when the market value approximations are below of the book values. Secondly, the market value approximations produced by the four different valuation models seem to result to rather similar positions for most of the time. This shows that the P/B valuation models are robust value predictors as Damgaard et al. (2009) acknowledge. However, when analyzing the market value of inward direct investment equity, the single-factor P/B multiple led to lower market value approximations compared to the results of the multi-factor models.

Finally, the impact of market approximation on the Finnish international investment position was analyzed. The effects of the valuation models to Finland's overall net external financial position was studied with one multi-factor model and with one single-factor P/B multiple. As a result, Finland's net external assets for years 2005-2011 were on average EUR 5.9 billion higher when the valuation of outward and inward direct investment was based on market values instead of book values. The average difference increased even further to EUR 19.1 billion, when the market value approximation was conducted with the single-factor P/B multiple. Results imply that Finland's overall external financial position might be strongly understated, when the valuation of unlisted direct investment equity is based on the book values. However, the results show as well that the choice of valuation method and estimation technique can have a highly significant impact on countries' FDI figures and to international investment positions. Therefore, more studies similar to this have to be carried out for other countries as well, so that precise guidelines can be given on how unlisted equity should be valued.

The results in this study imply that focus should be on P/B valuation models when developing models for valuing unlisted direct investment equity. However, more empirical research is needed on how P/B valuation should be conducted in practice. The use of a single-factor P/B multiple might be less demanding and lower the burden for IIP compilers. On the other hand, a more complex multi-factor model based on a regression with P/B multiple as dependent variable could lead to more reliable market value estimates. However, as it is a very time-consuming process to collect data for listed companies and to estimate valuation models, I recommend that the work should be conducted by one specific institution (e.g. OECD, IMF or Eurostat) in a centralized manner. Thus, this specific institution would collect data for listed companies, estimate parameters for valuation models and then share these valuation models to IIP compilers (as an example: P/B multiples shown in appendix 23). This would decrease the risk of bilateral asymmetries as every country would use the same valuation models, input data and level of industry breakdowns. In addition, this arrangement would lower the burden for IIP compilers.

Damgaard et al. (2009) suggest that every country should develop models for the valuation of inward direct investment equity and share them with other IIP compilers. Thus outward direct investment would be valued using the models obtained from other countries. To my mind, this would make the valuation of unlisted FDI a very complex and burdensome process. Countries would have to include as many models as there are IIP compilers in their FDI calculation systems, which might complicate the calculations too much. Therefore, I recommend using as few valuation models as possible, and preferably the same valuation models for outward and inward foreign direct investments. The use of different valuation models for inward and outward investment equity might lead to considerable differences between these valuations and to flawed net financial positions.

There are several limitations recognized in this study. Firstly, one can question whether it is meaningful to apply valuation models on unlisted equity that have been tested with data of listed equity in the first place. As Damodaran (2010, p. 103) says public firms have different fundamentals than private firms. They are larger, they have less potential for growth and more established markets, which will all manifest themselves in the price that investors pay for these companies. Second, there could be other ways to measure the valuation errors not used in this study. Instead of using the weighted valuation error of the aggregates, which might not be theoretically well-grounded, one could consider calculating scaled valuation errors. Scaled valuation errors (instead of scaled absolute valuation errors) might be used to measure the impact of the aggregation process by reducing random company-level estimation errors that are above and below the true value. Third, using an average illiquidity discount of 25 percent throughout the years 2005-2011 and applying it to all companies without considering country-, size- or industry-wide differences might not be reasonable. As there are not enough empirical studies on how illiquidity discounts vary within these limits, it might make more sense to include liquidity variables directly into the valuation models.

To sum up, there are not many studies in the area of firm valuation conducted with European datasets. The number of studies is even scarcer when emphasis is not only put on valuation multiples but also on multi-factor models. And to my knowledge, there is no other study where the valuation accuracy of various relative valuation models would have been studied from the perspective of FDI valuation. Therefore, more studies similar to this should be conducted that consider the limits that FDI context put on the valuations process. Alternative valuation models could be tested including explanatory variables that were not included in this study. Other ways to measure valuation errors, especially when measuring the impact of the aggregation process should be considered. Moreover, more effort should be laid in future research on how illiquidity should be taken into account when valuing unlisted equity.

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Annex 1: Apportioning Global Value

One of the methods recommended in the IMF *Balance of Payment and International Investment Position Manual* (IMF, 2008) for the valuation of unlisted equity is the apportioning global value method. OECD's *Benchmark Definition of Foreign Direct Investment* (OECD 2008) states that: "*If the equity in a particular direct investment enterprise is unlisted, but the enterprise belongs to a global enterprise group whose equity is listed, the current market value of the global enterprise group can be calculated and apportioned to the operations in each economic territory. The current market value of the global enterprise group should be based on its market price on the exchange on which it is traded, and the apportionment of this value to each economic territory should be based on an appropriate indicator (e.g. sales, net income, assets or employment).*"

Van den Dool & Hillebrand (2012) base their analysis of Dutch net foreign assets at market value on this method. Since the method requires market capitalizations of the global enterprise group, the BD4 (OECD, 2008) states that the method may only be feasible for outward investment. However, as the asset side of the IIP (the outward direct investment) has been much more significant than the liabilities side (the inward direct investment) in Finland, I tested this method for the year 2011 to see how it works in practice and to see the impact on Finnish outward direct investment figures. The method was applied to companies whose parent company was publicly listed. In 2011 these companies constituted 78.8 % of the unlisted direct investment equity. A description of how book value has been adjusted and converted into market value can be seen below in table 25. The methodology follows that of Van den Dool and Hillebrand (2012) except of the use of total assets as the indicator on which the apportionment is based instead of net income. This is done to avoid the problems related to negative values on net income. A significant share of the unlisted subsidiaries had negative net incomes. These subsidiaries together with the possible negative value gaps (book value larger than the market value) and negative group level profits make the apportionment based on net income problematic.

Table 25: Illustration of the application of apportioning global value method

Market capitalization of X	40
Consolidated book value of X	12
Value gap	28
Total assets of the group (unconsolidated)	25
Of which: total assets of subsidiary Y	5
Subsidiary's share	5/25
Foreign subsidiary (OFBV)	10
Allocated part of value gap (5/25 x 28)	5,6
Foreign subsidiary (market value)	15,6

Thus, the value gap (either positive or negative) was ascribed to group entities abroad based on their share of group level total assets. One can indeed question whether it is meaningful to allocate the value gap on foreign entities based on balance sheet totals. Sales figures for instance might be better indicator of the contributions of specific foreign subsidiaries to overall group operations.

Figure 5: Value of outward unlisted direct investment equity in the Finnish IIP for the year 2011

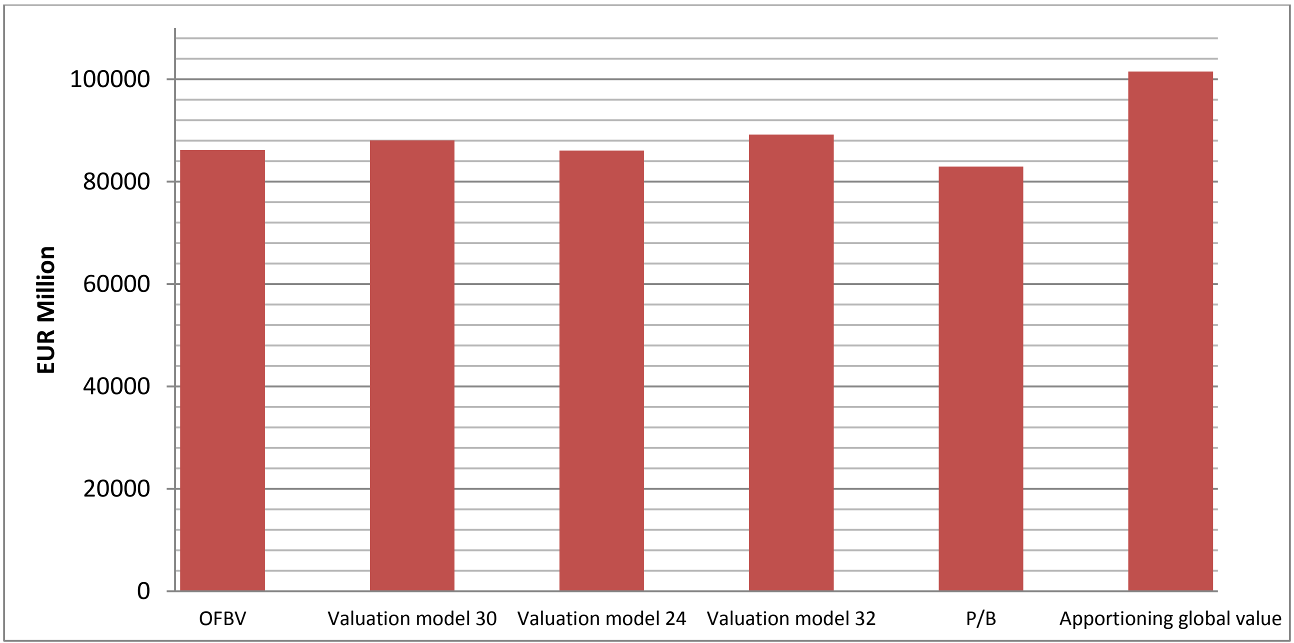

Figure 5 shows the value of unlisted outward FDI equity calculated with OFBV method, the previously tested valuation models as well as with apportioning global value method for the year

2011. When applying the apportioning global value method, the impact of market value estimations was an increase of 18.8 % in value for companies whose parent was publicly listed, i.e. for whom the method was directly applied. The remaining share (21.2 %) of unlisted direct investment equity, i.e. the unlisted direct investment enterprises that are not part of a listed group was handled by assuming that it increases relatively as much as the share of equity of companies whose parent was publicly listed. Figure 5 shows that apportioning global value method might lead to over-estimations of direct investment positions. The reason is that the method does not take into account the effect of liquidity on prices. Studies have shown (see e.g. Pratt et al., 2000; Nowak, 2000; Koeplin et al., 2000) that average illiquidity discounts can be as high as 20-35%, and by ignoring this effect that liquidity has on prices, the method might lead to overestimations of FDI and net external financial positions.

Thus, even though the method is easy to implement in practice and the approximations are based on actual market values of the group, I do not recommend this method as the solution for the FDI valuation problem. As Damgaard et al. (2009) state a sudden increase in market value of the entire group may be result of an expected increase in future earnings for a certain company in the group. It is difficult to find an indicator that will capture this effect, and it would lead to flawed estimates if this increase was ascribed to all group entities abroad. Moreover, the method is not compatible with equity valuation theory, it does not consider liquidity discounts and it can’t be generalized, since many unlisted direct investment enterprises do not belong to a listed group.

ANNEX 2: ILLIQUIDITY DISCOUNTS

As described earlier in this study, liquidity is one of the most important issues further complicating the valuation of unlisted equity. While it is obvious that unlisted equity is characterized by lower degree of liquidity, which tends to have a negative effect on prices, it is not as clear how this effect should be taken into account in practice.

When valuation multiples are applied, liquidity can't be included directly in valuation models. However, the effect can be controlled by applying average illiquidity discounts taken from liquidity studies (Damgaard et al., 2009). While there are numerous empirical studies on the estimation of illiquidity discounts, there is no agreement on the size of it (see e.g. Brennan et al. 1998; Nguyen et al. 2007 and Koeplin et al. 2000). Pratt et al. (2000) found average discounts of about 30-35% for the US stock market by comparing restricted stocks with publicly traded stocks of the same company. On the other hand, Koeplin et al. (2000) compute average illiquidity discounts of 20-30%. The disparity in the results illustrates how difficult it is to measure illiquidity discounts.

Figure 6: The effects of applying different average illiquidity discounts on the value of outward unlisted direct investment equity (valuation model 30) for the year 2011

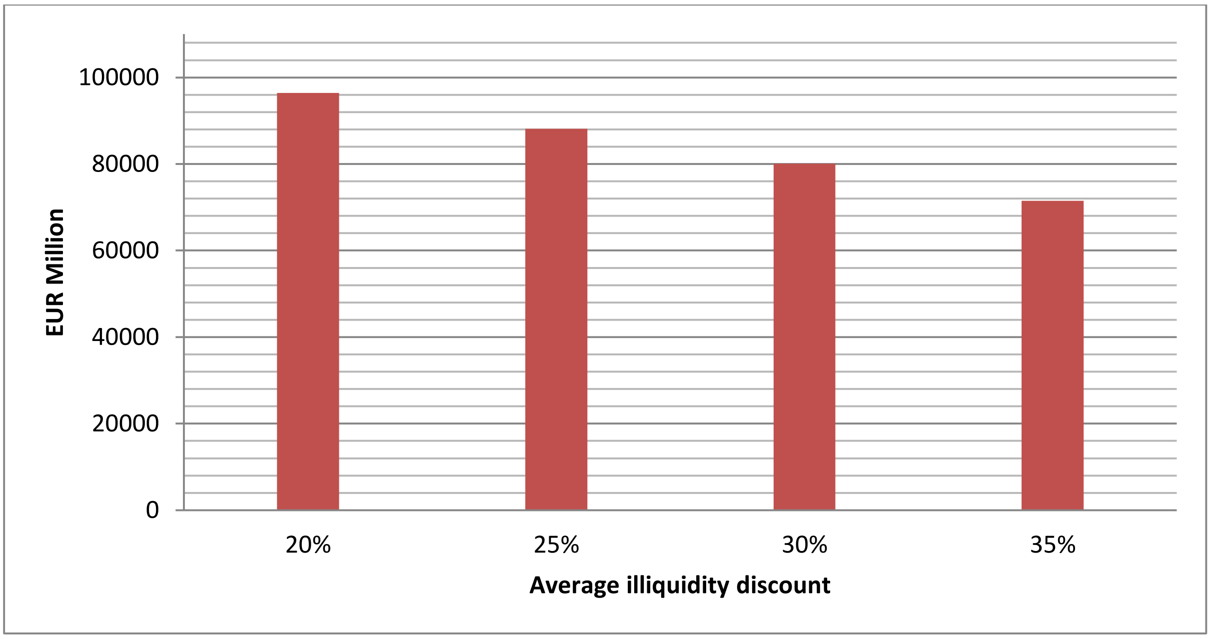

Figure 6 shows the effects of applying various average illiquidity discounts (20-35%) on the value of outward unlisted direct investment equity for the year 2011. As can be seen, the effects of applying different illiquidity discounts are significant, which underlines the importance of further research on this matter. Thus, more research is needed on how the average illiquidity discounts vary in time, in different countries and industries.

There is yet another solution to take liquidity into account in valuation. Liquidity can be included directly in the valuation models when multi-factor models are used. This can be done by including liquidity variables in the regression models. Damgaard et al. (2009) use equity trading volume and stock market index dummy variables to control the effects of liquidity on valuation. The former is based on the idea that trading volume can be set to zero for non-traded, unlisted equity. The latter on that companies which are included in the main stock indexes are normally traded at a premium because of their high liquidity. As expected, both liquidity variables had a positive impact on market value of equity and P/B ratios in their study.

Hence, the regression approach has also the advantage that it allows the direct inclusion of liquidity variables, when compared to single-factor multiples. However, there is no consensus among researchers on how to deal with the issue in practice and what variables should be used. Stowe et al. (2002) argue for instance that both illiquidity discount as well as marketability discount should be considered in the models. The former takes into account the differences in the depths of the market for the specific company while the latter is a dummy variable, which captures the difference in value that can be ascribed to whether or not equity is listed (Damgaard et al., 2009). Damodaran (2005) however argues that liquidity is a continuum since all assets can be sold, if the seller is willing to accept a lower price for them. Therefore, there is no need for a dummy variable capturing the marketability discount in the models.

Unfortunately, testing of the liquidity variables was not possible in this study due to data constraints regarding the liquidity variables. However, as different solutions can produce significant variations in valuation results, more effort should be laid in future research on how illiquidity issue should be tackled in the context of FDI valuation.

Appendix 1: Descriptive statistics of the companies in the valuation accuracy study 2005-2011

80 %

Variables	Median	Mean	Standard deviation	1st quartile	3rd quartile	Negative values, %	Number of observations
NI	1,5	80,8	644,0	-0,5	16,3	30,8 %	25797
PLBT	2,1	119,6	941,5	-0,4	21,6	30,1 %	25797
EBIT	2,6	136,6	949,0	-0,2	24,7	29,0 %	23349
SALES	62,1	1430,1	8234,8	10,7	346,8	0,1 %	25797
BVE	39,1	647,7	3602,4	9,0	183,5	2,9 %	25797
TA	92,5	2024,7	11155,3	21,0	476,7	0,0 %	25797
MVE	50,8	1189,5	6143,9	11,4	295,5	0,0 %	25797
CAPSTR	0,5	0,5	5,6	0,3	0,7	0,1 %	25797
CASH	6,8	176,6	1005,8	1,1	38,4	0,0 %	25797
GROWTH	0,1	4,2	258,2	-0,1	0,2	36,7 %	25797
INDP	5,0	4,3	3,3	0,0	8,0	0,0 %	25797

20 %

Variables	Median	Mean	Standard deviation	1st quartile	3rd quartile	Negative values, %	Number of observations
NI	1,5	77,1	552,0	-0,5	15,6	31,0 %	6450
PLBT	2,0	112,4	856,8	-0,4	21,1	30,2 %	6450
EBIT	2,4	129,3	962,7	-0,2	23,3	29,3 %	5838
SALES	60,4	1239,7	7100,0	11,0	321,3	0,1 %	6450
BVE	40,1	594,6	3357,5	9,1	175,2	2,7 %	6450
TA	91,1	1837,6	10031,9	21,0	455,6	0,0 %	6450
MVE	49,6	1122,2	5771,0	11,8	281,0	0,0 %	6450
CAPSTR	0,5	0,5	1,1	0,3	0,7	0,2 %	6450
CASH	7,1	157,1	914,5	1,2	37,8	0,0 %	6450
GROWTH	0,1	6,0	352,7	-0,1	0,2	35,9 %	6450
INDP	5,0	4,4	3,3	0,0	8,0	0,0 %	6450

Appendix 2: Industries of companies in the valuation accuracy study 2005-2011

			80 %		20 %	
Branch code	Short definition	NACE rev 2 code	Frequency	Percent	Frequency	Percent
1	*ICT activities*	*J + 26, 27, 28, 325, 33, 422, 74, 7733, 85, 95*	*6720*	*26,0 %*	*1620*	*25,1 %*
2	Mining and quarrying	B	775	*3,0 %*	196	*3,0 %*
3	Electricity, gas, steam, air conditioning supply and water supply	D + E + 192	787	*3,1 %*	176	*2,7 %*
4	Manufacturing (non ICT + non refining petroleum products)	C (except 26, 27, 28, 325, 33, 192)	6838	*26,5 %*	1744	*27,0 %*
5	Construction	F (except 422)	795	*3,1 %*	254	*3,9 %*
6	Wholesale and retail trade	G	2109	*8,2 %*	523	*8,1 %*
7	Hotel and restaurants	H	765	*3,0 %*	163	*2,5 %*
8	Transports and storage	I	413	*1,6 %*	110	*1,7 %*
9	Financial intermediation and Insurance	64, 65, 84 (except 6420)	747	*2,9 %*	203	*3,1 %*
10	Financial and insurance auxiliaries	66	798	*3,1 %*	181	*2,8 %*
11	Holdings	6420, 7010	643	*2,5 %*	162	*2,5 %*
12	Real estate activities	L	1443	*5,6 %*	348	*5,4 %*
13	Professional, scientific and technical activities	M (except 7010,74)	1034	*4,0 %*	300	*4,7 %*
14	Agriculture, forestry and fishing	A	256	*1,0 %*	75	*1,2 %*
15	Others	N (except 7733) + Q + R + S (except 95)	1674	*6,5 %*	395	*6,1 %*
			25797		6450	

Appendix 3: Countries of companies in the valuation accuracy study 2005- 2011

	80 %		20 %	
Country	**Frequency**	**Percemt**	**Frequency**	**Percemt**
Austria	366	1,4 %	102	1,6 %
Belgium	687	2,7 %	169	2,6 %
Bulgaria	831	3,2 %	210	3,3 %
Cyprus	343	1,3 %	85	1,3 %
Czech Republic	65	0,3 %	12	0,2 %
Germany	3612	14,0 %	865	13,4 %
Denmark	614	2,4 %	155	2,4 %
Estonia	64	0,2 %	16	0,2 %
Spain	882	3,4 %	232	3,6 %
Finland	636	2,5 %	165	2,6 %
France	3484	13,5 %	821	12,7 %
United Kingdom	5779	22,4 %	1452	22,5 %
Greece	1225	4,7 %	313	4,9 %
Hungary	148	0,6 %	21	0,3 %
Ireland	230	0,9 %	66	1,0 %
Italy	1114	4,3 %	285	4,4 %
Lithuania	140	0,5 %	34	0,5 %
Luxembourg	144	0,6 %	45	0,7 %
Latvia	126	0,5 %	44	0,7 %
Malta	46	0,2 %	11	0,2 %
Netherlands	632	2,4 %	144	2,2 %
Poland	1429	5,5 %	364	5,6 %
Portugal	283	1,1 %	57	0,9 %
Romania	873	3,4 %	233	3,6 %
Sweden	1794	7,0 %	501	7,8 %
Slovenia	170	0,7 %	32	0,5 %
Slovakia	80	0,3 %	16	0,2 %
	25797		6450	

Appendix 4: Absolute valuation errors of multi-factor models after the exclusion of the top and bottom 5 % market values

Model	Absolute valuation errors		Obs.
	Median	Mean	
1a) $MV = b_0 + b_1 \cdot BVE + b_2 \cdot NI + \sum b \cdot D\_IND$	1,582	34,863	6450
1b) $MV = b_1 \cdot BVE + b_2 \cdot NI + \sum b \cdot D\_IND$	0,531	1,634	6450
2a) $MV = b_0 + b_1 \cdot BVE + b_2 \cdot NI + b_3 \cdot TA + \sum b \cdot D\_IND$	1,474	32,614	6450
2b) $MV = b_1 \cdot BVE + b_2 \cdot NI + b_3 \cdot TA + \sum b \cdot D\_IND$	0,516	1,577	6450
3a) $MV = b_0 + b_1 \cdot BVE + b_2 \cdot PLBT + \sum b \cdot D\_IND$	1,498	33,052	6450
3b) $MV = b_1 \cdot BVE + b_2 \cdot PLBT + \sum b \cdot D\_IND$	0,508	1,618	6450
4a) $MV = b_0 + b_1 \cdot BVE + b_2 \cdot PLBT + b_3 \cdot TA + \sum b \cdot D\_IND$	1,402	31,403	6450
4b) $MV = b_1 \cdot BVE + b_2 \cdot PLBT + b_3 \cdot TA + \sum b \cdot D\_IND$	0,523	1,650	6450
5a) $MV = b_0 + b_1 \cdot BVE + b_2 \cdot EBIT + b_3 \cdot TA + b_4 \cdot CAPSTR + b_5 \cdot CASH + b_6 \cdot GROWTH + b_7 \cdot INDP + \sum b \cdot D\_IND$	1,200	41,115	5838
5b) $MV = b_1 \cdot BVE + b_2 \cdot EBIT + b_3 \cdot TA + b_4 \cdot CAPSTR + b_5 \cdot CASH + b_6 \cdot GROWTH + b_7 \cdot INDP + \sum b \cdot D\_IND$	1,094	69,341	5838
P/B (15 Branches & 27 Countries)	0,502	1,461	6450

Appendix 5: Absolute valuation errors of multi-factor models using logarithmic transformations of the variables

Model	Absolute valuation errors		Obs.
	Median	Mean	
1a) $ln(MV) = b_0 + b_1 \cdot ln(BVE) + b_2 \cdot ln(NI) + \sum b \cdot D\_IND$	0,408	0,860	4420
1b) $ln(MV) = b_1 \cdot ln(BVE) + b_2 \cdot ln(NI) + \sum b \cdot D\_IND$	0,449	0,851	4420
2a) $ln(MV) = b_0 + b_1 \cdot ln(BVE) + b_2 \cdot ln(NI) + b_3 \cdot ln(TA) + \sum b \cdot D\_IND$	0,403	0,862	4420
2b) $ln(MV) = b_1 \cdot ln(BVE) + b_2 \cdot ln(NI) + b_3 \cdot ln(TA) + \sum b \cdot D\_IND$	0,429	0,865	4420
3a) $ln(MV) = b_0 + b_1 \cdot ln(BVE) + b_2 \cdot ln(PLBT) + \sum b \cdot D\_IND$	0,404	0,848	4467
3b) $ln(MV) = b_1 \cdot ln(BVE) + b_2 \cdot ln(PLBT) + \sum b \cdot D\_IND$	0,450	0,840	4467
4a) $ln(MV) = b_0 + b_1 \cdot ln(BVE) + b_2 \cdot ln(PLBT) + b_3 \cdot ln(TA) + \sum b \cdot D\_IND$	0,405	0,851	4467
4b) $ln(MV) = b_1 \cdot ln(BVE) + b_2 \cdot ln(PLBT) + b_3 \cdot ln(TA) + \sum b \cdot D\_IND$	0,423	0,857	4467
5a) $ln(MV) = b_0 + b_1 \cdot ln(BVE) + b_2 \cdot ln(EBIT) + b_3 \cdot ln(TA) + b_4 \cdot ln(CAPSTR) + b_5 \cdot ln(CASH) + b_6 \cdot ln(GROWTH) + b_7 \cdot ln(INDP) + \sum b \cdot D\_IND$	0,418	1,414	4076
5b) $ln(MV) = b_1 \cdot ln(BVE) + b_2 \cdot ln(EBIT) + b_3 \cdot ln(TA) + b_4 \cdot ln(CAPSTR) + b_5 \cdot ln(CASH) + b_6 \cdot ln(GROWTH) + b_7 \cdot ln(INDP) + \sum b \cdot D\_IND$	0,448	1,399	4076
P/B (15 Branches & 27 Countries)	0,458	0,991	4420

Appendix 6: The valuation accuracy of multi-factor models with P/B as dependent variable after the exclusion of the top and bottom 1 % P/B values

Model	Absolute valuation errors		Obs.
	Median	**Mean**	
1c) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{NI}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot DBVE<0 + b_5 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_6 \cdot DNI<0 + b_7 \cdot DNI<0 \cdot \frac{NI}{BVE} + \sum b \cdot D\_IND$	0,568	2,003	6450
2c) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{NI}{BVE} + b_3 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,610	1,581	6450
3c) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{NI}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot DBVE<0 + b_5 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_6 \cdot DNI<0 + b_7 \cdot DNI<0 \cdot \frac{NI}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,556	1,532	6450
4c) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{NI}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot DBVE<0 + b_5 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_6 \cdot DNI<0 + b_7 \cdot DNI<0 \cdot \frac{NI}{BVE} + b_8 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,555	1,498	6450
5c) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{NI}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<0 + b_4 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_5 \cdot DNI<0 + b_6 \cdot DNI<0 \cdot \frac{NI}{BVE} + b_7 \cdot \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,557	1,539	6450
P/B (15 Branches & 27 Countries)	0,502	1,461	6450

Appendix 7: The valuation accuracy of multi-factor models with P/B as dependent variable after the exclusion of the top and bottom 1 % P/B values

Model	Absolute valuation errors		Obs.
	Median	**Mean**	
1d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot DBVE<0 + b_5 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_6 \cdot DPLBT<0 + b_7 \cdot DPLBT<0 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,542	1,476	6450
2d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{EBIT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot DBVE<0 + b_5 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_6 \cdot DEBIT<0 + b_7 \cdot DEBIT<0 \cdot \frac{EBIT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,576	1,755	5838
3d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{EBIT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{CAPSTR}{BVE} + b_5 \cdot \frac{CASH}{BVE} + b_6 \cdot \frac{GROWTH}{BVE} + b_7 \cdot \frac{INDEP}{BVE} + b_8 \cdot DBVE<0 + b_9 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_{10} \cdot DEBIT<0 + b_{11} \cdot DEBIT<0 \cdot \frac{EBIT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,574	1,757	5838
4d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{CAPSTR}{BVE} + b_5 \cdot DBVE<0 + b_6 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_7 \cdot DPLBT<0 + b_8 \cdot DPLBT<0 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,539	1,478	6450
5d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{CASH}{BVE} + b_5 \cdot DBVE<0 + b_6 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_7 \cdot DPLBT<0 + b_8 \cdot DPLBT<0 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,536	1,453	6450
6d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{GROWTH}{BVE} + b_5 \cdot DBVE<0 + b_6 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_7 \cdot DPLBT<0 + b_8 \cdot DPLBT<0 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,542	1,483	6450

7d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{CAPSTR}{BVE} + b_5 \cdot \frac{GROWTH}{BVE} + b_6 \cdot DBVE{<}0 + b_7 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + b_8 \cdot DPLBT{<}0 + b_9 \cdot DPLBT{<}0 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,540	1,485	6450
8d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{CAPSTR}{BVE} + b_5 \cdot \frac{GROWTH}{BVE} + b_6 \cdot \frac{CASH}{BVE} + b_7 \cdot DBVE{<}0 + b_8 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + b_9 \cdot DPLBT{<}0 + b_{10} \cdot DPLBT{<}0 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,533 (0,547)	1,460 (1,537)	6450 (5838)
9d) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{PLBT}{BVE} + b_3 \cdot \frac{TA}{BVE} + b_4 \cdot \frac{CAPSTR}{BVE} + b_5 \cdot \frac{GROWTH}{BVE} + b_6 \cdot \frac{CASH}{BVE} + b_7 \cdot \frac{INDP}{BVE} + b_8 \cdot DBVE{<}0 + b_9 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + b_{10} \cdot DPLBT{<}0 + b_{11} \cdot DPLBT{<}0 \cdot \frac{PLBT}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,534	1,462	6450
P/B (15 Branches & 27 Countries)	0,502	1,461	6450

Appendix 8: The valuation accuracy of multi-factor models with P/B as dependent variable after the exclusion of the top and bottom 1 % P/B values

Valuation model	**Absolute valuation errors**	
	Median	**Mean**
P/B (15 Branches & 27 Countries)	0,502	1,461
24) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}200 + b_4 \cdot DBVE{<}15 + b_5 \cdot DBVE{<}1 + b_6 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,581	1,687
20) $\frac{MVE}{BVE} = b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + b_4 \cdot DBVE{<}1 + b_5 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,581	1,720
31) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}0 + b_4 \cdot DBVE{<}200 + b_5 \cdot DBVE{<}15 + b_6 \cdot DBVE{<}1 + b_7 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,583	1,815
32) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}0 + b_4 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + b_5 \cdot DBVE{<}200 + b_6 \cdot DBVE{<}15 + b_7 \cdot DBVE{<}1 + b_8 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,585	1,809
21) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}200 + b_4 \cdot DBVE{<}15 + b_5 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,589	1,750
30) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}200 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,592	1,542
29) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,595	1,515
14) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + b_4 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,596	1,776

13) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot DBVE<15 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,597	1,737
22) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<15 + b_5 \cdot DBVE<1 + b_6 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,599	1,681
23) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<15 + b_5 \cdot DBVE<1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,600	1,750
19) $\frac{MVE}{BVE} = b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot DBVE<15 + b_4 \cdot DBVE<1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,600	1,783
17) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,607	1,572
12) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,608	1,598
15) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,609	1,593
25) $\frac{MVE}{BVE} = b_1 \cdot DBVE<200 + b_2 \cdot DBVE<15 + b_3 \cdot DBVE<1 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,609	1,818
11) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,610	1,589
16) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,614	1,594
26) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE<200 + b_2 \cdot DBVE<15 + b_3 \cdot DBVE<1 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRY$	0,616	1,810
10) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_5 \cdot DBVE<0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,617	1,696
27) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE<200 + b_2 \cdot DBVE<15 + b_3 \cdot DBVE<1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,619	1,867
2) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE<0 + \sum b \cdot D\_IND$	0,629	2,262
3) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE<0 + b_3 \cdot DBVE<0 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND$	0,630	2,257
1) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND$	0,630	2,279

18) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,632	1,544
4) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,634	1,642
5) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE<0 + b_3 \cdot DBVE<0 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,635	1,757
8) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot DBVE<0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,636	1,762
9) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_4 \cdot DBVE<0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,638	1,756
28) $\frac{MVE}{BVE} = b_1 \cdot DBVE<200 + b_2 \cdot DBVE<15 + b_3 \cdot DBVE<1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,639	1,893
6) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE<200 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,641	1,663
7) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE<200 + b_2 \cdot DBVE<0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	0,646	1,781
Number of observations	6450	

Appendix 9: Weighted valuation errors of the aggregates

Valuation model	Weighted valuation errors of the aggregates
32	9,71 %
31	9,77 %
3	10,24 %
2	10,37 %
10	11,03 %
9	11,14 %
7	11,19 %
30	11,21 %
8	11,28 %
1	11,90 %
24	12,14 %
5	12,21 %
20	12,28 %
11	12,87 %
12	12,94 %
16	13,52 %
17	13,53 %
6	13,61 %
22	13,76 %
21	13,78 %
13	13,80 %
15	13,86 %
4	13,90 %
18	13,98 %
14	14,06 %
29	14,80 %
27	14,86 %
25	14,94 %
26	15,02 %
19	19,32 %
23	19,49 %
28	22,71 %
P/B	26,26 %
Observations	6450

Appendix 10*: *Ranking of the Valuation Models

Valuation model	**Ranking**			
	WVEA	**median AVE**	**mean AVE**	**average**
30) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRY$	8	7	3	6
24) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<15 + b_5 \cdot DBVE<1 + b_6 \cdot INDPB + \sum b \cdot D\_COUNTRY$	11	2	13	8,67
20) $\frac{MVE}{BVE} = b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot DBVE<15 + b_4 \cdot DBVE<1 + b_5 \cdot INDPB + \sum b \cdot D\_COUNTRY$	13	3	15	10,33
32) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<0 + b_4 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_5 \cdot DBVE<200 + b_6 \cdot DBVE<15 + b_7 \cdot DBVE<1 + b_8 \cdot INDPB + \sum b \cdot D\_COUNTRY$	1	5	25	10,33
31) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<0 + b_4 \cdot DBVE<200 + b_5 \cdot DBVE<15 + b_6 \cdot DBVE<1 + b_7 \cdot INDPB + \sum b \cdot D\_COUNTRY$	2	4	27	11,00
P/B (15 Branches & 27 Countries)	33	1	1	11,67
17) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	17	14	5	12,00
29) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot INDPB + \sum b \cdot D\_COUNTRY$	26	8	2	12,00
11) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	14	18	6	12,67
12) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE<200 + b_3 \cdot INDPB + \sum b \cdot D\_COUNTRY$	15	15	9	13,00
10) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<0 \cdot \frac{1}{BVE} + b_5 \cdot DBVE<0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	5	21	14	13,33
22) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<15 + b_5 \cdot DBVE<1 + b_6 \cdot INDPB + \sum b \cdot D\_COUNTRY$	19	11	12	14,00
16) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	16	19	8	14,33
21) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE<200 + b_4 \cdot DBVE<15 + b_5 \cdot DBVE<1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	20	6	17	14,33
15) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	22	16	7	15,00

13) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	21	10	16	15,67
18) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	24	26	4	18,00
9) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + b_4 \cdot DBVE{<}0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	6	30	19	18,33
14) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + b_4 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	25	9	22	18,67
3) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE{<}0 + b_3 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND$	3	25	31	19,67
2) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE{<}0 + \sum b \cdot D\_IND$	4	23	32	19,67
8) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	9	29	21	19,67
5) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + b_2 \cdot DBVE{<}0 + b_3 \cdot DBVE{<}0 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	12	28	20	20,00
4) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	23	27	10	20,00
6) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE{<}200 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	18	32	11	20,33
23) $\frac{MVE}{BVE} = b_1 \cdot \frac{1}{BVE} + b_2 \cdot \frac{TA}{BVE} + b_3 \cdot DBVE{<}200 + b_4 \cdot DBVE{<}15 + b_5 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRY$	31	13	18	20,67
7) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE{<}200 + b_2 \cdot DBVE{<}0 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRIES$	7	33	23	21,00
19) $\frac{MVE}{BVE} = b_1 \cdot \frac{TA}{BVE} + b_2 \cdot DBVE{<}200 + b_3 \cdot DBVE{<}15 + b_4 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRIES$	30	12	24	22,00
1) $\frac{MVE}{BVE} = b_0 + b_1 \cdot \frac{1}{BVE} + \sum b \cdot D\_IND$	10	24	33	22,33
25) $\frac{MVE}{BVE} = b_1 \cdot DBVE{<}200 + b_2 \cdot DBVE{<}15 + b_3 \cdot DBVE{<}1 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRIES$	28	17	28	24,33
26) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE{<}200 + b_2 \cdot DBVE{<}15 + b_3 \cdot DBVE{<}1 + b_4 \cdot INDPB + \sum b \cdot D\_COUNTRIES$	29	20	26	25,00
27) $\frac{MVE}{BVE} = b_0 + b_1 \cdot DBVE{<}200 + b_2 \cdot DBVE{<}15 + b_3 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRIES$	27	22	29	26,00
28) $\frac{MVE}{BVE} = b_1 \cdot DBVE{<}200 + b_2 \cdot DBVE{<}15 + b_3 \cdot DBVE{<}1 + \sum b \cdot D\_IND + \sum b \cdot D\_COUNTRIES$	32	31	30	31,00

Appendix 11: Descriptive statistics of the companies used in the application of the models to the Finnish international investment position 2005-2011

Variables	Median	Mean	Standard deviation	1st quartile	3rd quartile	Negative values, %	Number of observations
NI	0,6	74,2	665,8	-0,5	11,4	35,5 %	45692
PLBT	0,8	106,8	903,7	-0,4	14,8	34,9 %	45692
SALES	44,0	1321,6	7587,1	5,9	281,5	0,3 %	40173
BVE	27,6	693,0	4183,5	5,3	149,8	2,8 %	45692
TA	60,0	5981,0	66229,8	9,8	366,5	0,0 %	45692
MVE	35,3	1093,0	6005,7	7,3	214,1	0,0 %	45692
CAPSTR	0,5	0,4	4,6	0,2	0,6	0,1 %	39200
CASH	3,8	132,5	861,3	0,4	23,8	0,0 %	42857
GROWTH	0,1	6,5	503,4	-0,1	0,2	37,9 %	37728
INDP	5,0	4,3	3,3	0,0	8,0	0,0 %	44045

Appendix 12: Industries of the companies used in the application of the models to the Finnish international investment position 2005-2011

Branch code	**Short definition**	**NACE rev 2 code**	**Frequency**	**Percent**
1	ICT activities	J + 26, 27, 28, 325, 33, 422, 74, 7733, 85, 95	9493	20,8 %
2	Mining and quarrying	B	1577	3,5 %
3	Electricity, gas, steam, air conditioning supply and water supply	D + E + 192	1079	2,4 %
4	Manufacturing (non ICT + non refining petroleum products)	C (except 26, 27, 28, 325, 33, 192)	9812	21,5 %
5	Construction	F (except 422)	1267	2,8 %
6	Wholesale and retail trade	G	3134	6,9 %
7	Hotel and restaurants	H	1073	2,3 %
8	Transports and storage	I	658	1,4 %
9	Financial intermediation and Insurance	64, 65, 84 (except 6420)	7495	16,4 %
10	Financial and insurance auxiliaries	66	1774	3,9 %
11	Holdings	6420, 7010	1590	3,5 %
12	Real estate activities	L	2154	4,7 %
13	Professional, scientific and technical activities	M (except 7010,74)	1545	3,4 %
14	Agriculture, forestry and fishing	A	439	1,0 %
15	Others	N (except 7733) + Q + R + S (except 95)	2602	5,7 %
			45692	100,00 %

Appendix 13: Countries of the companies used in the application of the models to the Finnish international investment position 2005-2011

Country	Frequency	Percent
Austria	594	1,3 %
Belgium	958	2,1 %
Bulgaria	1282	2,8 %
Cyprus	718	1,6 %
Czech Republic	132	0,3 %
Germany	5166	11,3 %
Denmark	1151	2,5 %
Estonia	91	0,2 %
Spain	4736	10,4 %
Finland	848	1,9 %
France	4914	10,8 %
United Kingdom	11223	24,6 %
Greece	1731	3,8 %
Hungary	218	0,5 %
Ireland	434	0,9 %
Italy	1675	3,7 %
Lithuania	194	0,4 %
Luxembourg	257	0,6 %
Latvia	180	0,4 %
Malta	106	0,2 %
Netherlands	970	2,1 %
Poland	2253	4,9 %
Portugal	390	0,9 %
Romania	2423	5,3 %
Sweden	2638	5,8 %
Slovenia	245	0,5 %
Slovakia	165	0,4 %
	45692	1

Appendix 14: P/B multiples used for the valuation of companies locating in EU-27 countries (outward FDI)

		2005			2006			2007			2008			2009			2010			2011		
	Branch	**P/B**	**#**	**steps**	**P/B**	**#**	**Steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**
Austria	1	3,086	17	0	3,124	19	0	3,047	19	0	1,324	21	0	1,298	23	0	1,991	20	0	1,390	21	0
Austria	4	1,389	19	0	1,516	21	0	1,793	23	0	0,620	23	0	0,815	22	0	1,194	23	0	0,947	25	0
Austria	5	-	-	-	-	-	-	-	-	-	1,659	10	1	0,881	7	1	1,220	14	1	0,917	13	1
Austria	7	1,494	5	1	2,909	8	1	1,850	6	1	1,106	8	2	1,133	6	1	1,424	17	1	1,201	17	1
Austria	13	2,253	17	3	2,965	26	2	2,395	34	3	2,670	5	1	3,123	7	1	1,925	31	1	1,581	31	1
Austria	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,211	48	1
Belgium	1	1,905	25	0	2,312	29	0	2,102	32	0	1,026	35	0	1,255	35	0	1,324	31	0	1,066	30	0
Belgium	3	3,017	17	2	1,096	5	1	2,952	15	1	0,892	6	0	1,056	6	0	0,853	6	0	0,772	6	0
Belgium	4	1,686	30	0	1,905	37	0	1,668	40	0	1,107	42	0	1,241	42	0	1,211	36	0	0,994	32	0
Belgium	7	2,493	6	1	2,816	10	1	3,063	6	1	1,106	6	1	1,133	6	1	-	-	-	-	-	-
Belgium	9	-	-	-	-	-	-	1,110	71	1	-	-	-	0,707	13	1	-	-	-	-	-	-
Belgium	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,003	7	2
Belgium	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,753	11	0	-	-	-
Belgium	13	-	-	-	-	-	-	2,916	6	0	1,261	6	0	-	-	-	-	-	-	-	-	-
Belgium	15	-	-	-	-	-	-	-	-	-	0,991	15	0	1,033	16	0	1,121	15	0	1,043	13	0
Cyprus	1	-	-	-	-	-	-	0,586	10	0	0,535	13	0	0,671	13	0	0,565	12	0	0,460	10	0
Cyprus	4	1,623	36	1	0,634	12	0	0,622	14	0	0,366	13	0	0,338	14	0	0,269	14	0	0,191	12	0
Cyprus	9	-	-	-	-	-	-	-	-	-	0,450	7	0	0,513	7	0	0,496	8	0	0,561	7	0
Czech Republic	1	2,142	51	1	2,942	20	1	2,145	211	1	1,479	10	1	0,771	5	1	0,663	6	1	1,270	211	1
Czech Republic	4	1,421	58	1	1,516	23	1	1,710	177	1	0,769	10	1	0,291	10	1	0,304	12	1	1,158	165	1
Czech Republic	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,462	5	2	1,162	11	1
Czech Republic	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,261	74	1
Czech Republic	7	-	-	-	-	-	-	-	-	-	-	-	-	1,185	14	4	-	-	-	-	-	-
Czech Republic	13	-	-	-	2,965	26	2	2,309	32	1	6,854	5	3	0,438	5	1	0,278	5	1	1,404	29	1
Czech Republic	15	-	-	-	2,329	33	2	1,779	42	1	0,613	5	2	0,492	18	2	0,462	5	1	1,258	47	1
Germany	1	1,844	196	0	1,933	230	0	1,815	233	0	1,056	237	0	1,348	231	0	1,633	229	0	1,474	217	0
Germany	4	1,611	139	0	1,848	153	0	1,772	162	0	1,160	159	0	1,535	158	0	1,527	154	0	1,148	149	0
Germany	5	-	-	-	-	-	-	-	-	-	1,107	6	0	1,406	6	0	1,399	6	0	1,378	6	0
Germany	6	1,577	33	0	1,564	41	0	1,972	54	0	1,001	54	0	1,328	55	0	1,437	57	0	1,243	62	0

Germany	7	1,902	17	0	1,459	19	0	1,750	20	0	1,265	21	0	1,260	23	0	1,408	22	0	1,085	21	0
Germany	9	1,479	31	0	1,680	34	0	1,358	36	0	0,998	33	0	1,030	34	0	1,009	34	0	0,839	34	0
Germany	11	-	-	-	-	-	-	-	-	-	-	-	-	1,224	24	0	1,299	24	0	1,353	24	0
Germany	13	2,227	19	0	2,464	20	0	2,924	27	0	2,044	24	0	2,185	23	0	2,094	22	0	1,838	24	0
Germany	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,225	43	0
Denmark	1	2,708	22	0	3,643	27	0	2,641	29	0	1,204	31	0	1,409	34	0	1,520	33	0	1,466	33	0
Denmark	2	2,423	12	1	2,091	5	2	5,384	6	2	0,952	17	2	1,636	15	1	1,514	18	1	1,135	13	1
Denmark	4	1,819	31	0	2,870	33	0	2,095	35	0	1,084	35	0	0,959	35	0	1,199	37	0	1,265	35	0
Denmark	5	2,938	12	1	1,189	7	1	1,582	10	1	0,523	6	1	1,238	16	1	1,406	9	1	0,943	10	1
Denmark	6	1,789	44	1	1,896	10	1	2,014	5	0	0,829	5	0	1,242	5	0	2,221	6	1	1,039	8	0
Denmark	7	3,166	6	0	3,049	6	0	3,711	7	0	1,096	7	0	1,951	7	0	1,362	7	1	0,962	6	0
Denmark	9	1,593	26	0	1,847	27	0	1,661	30	0	-	-	-	-	-	-	-	-	-	-	-	-
Denmark	10	1,624	12	1	1,081	8	0	1,009	9	0	1,005	9	0	0,904	9	0	1,079	9	1	1,515	9	0
Denmark	13	-	-	-	2,045	5	1	4,981	8	1	1,421	34	2	-	-	-	-	-	-	1,916	26	1
Denmark	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,546	11	3	-	-	-
Denmark	15	1,955	12	0	1,768	13	0	1,593	16	0	0,985	18	0	0,996	18	0	1,057	18	1	0,919	16	0
Estonia	1	1,945	21	3	1,801	5	2	2,440	7	1	0,957	60	1	0,428	6	1	0,453	80	1	1,157	22	1
Estonia	2	1,105	8	4	3,256	6	2	2,238	5	2	0,663	5	2	1,490	37	3	0,672	16	1	1,162	5	2
Estonia	3	1,681	5	2	1,678	10	4	1,746	11	4	0,618	7	1	0,496	7	3	0,225	11	1	0,870	11	1
Estonia	4	1,826	10	3	0,723	9	1	1,644	16	1	0,702	74	1	0,414	14	1	0,438	263	1	0,969	48	1
Estonia	5	0,851	11	4	1,586	14	4	4,472	8	2	1,024	24	1	0,615	5	2	0,511	82	1	1,052	13	1
Estonia	6	2,397	5	2	2,414	6	2	3,192	5	1	0,681	44	1	1,006	7	3	0,393	78	1	1,117	8	1
Estonia	7	0,977	5	2	1,233	13	4	0,907	6	3	0,578	6	2	0,360	5	3	0,374	52	1	0,607	15	2
Estonia	9	2,810	5	4	2,088	16	2	2,317	5	1	1,310	21	1	0,797	5	3	0,933	8	2	1,048	1691	1
Estonia	11	-	-	-	-	-	-	-	-	-	-	-	-	1,016	5	1	0,818	5	1	0,533	8	2
Estonia	12	1,837	5	4	1,372	13	4	0,529	21	1	0,529	16	1	0,769	34	1	0,657	66	1	0,793	17	1
Estonia	13	1,715	5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,790	9	2
Estonia	14	-	-	-	1,344	10	3	1,137	5	1	0,556	8	3	0,936	163	2	0,464	35	1	0,984	5	4
Estonia	15	2,091	12	4	0,401	15	3	1,566	5	3	1,843	8	1	1,032	8	3	0,915	15	1	1,769	6	1
Spain	1	2,681	15	0	3,727	15	0	2,887	17	0	1,270	17	0	2,230	17	0	1,644	20	0	1,407	20	0
Spain	2	-	-	-	-	-	-	3,220	17	1	0,613	6	1	1,142	6	1	-	-	-	-	-	-
Spain	4	2,021	35	0	2,556	40	0	1,998	43	0	1,253	43	0	1,579	44	0	1,329	44	0	0,981	44	0
Spain	6	3,637	24	1	1,856	10	1	1,551	8	1	1,917	6	1	1,607	6	0	1,132	6	0	1,034	6	0
Spain	13	2,228	15	1	4,631	9	2	6,248	5	1	2,670	5	1	3,352	5	1	2,504	9	1	2,790	9	1

France	1	2,458	160	0	2,588	190	0	2,158	210	0	1,051	213	0	1,395	219	0	1,439	224	0	1,267	210	0
France	4	1,488	144	0	1,830	167	0	1,716	174	0	0,930	172	0	1,127	173	0	1,216	171	0	1,158	163	0
France	5	3,183	9	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
France	6	1,834	40	0	1,865	52	0	1,594	64	0	1,116	67	0	1,334	72	0	1,405	70	0	1,261	72	0
France	7	1,212	9	0	-	-	-	-	-	-	0,980	14	0	1,553	15	0	1,424	15	0	1,201	15	0
France	13	3,042	18	0	2,917	24	0	2,323	31	0	1,365	31	0	1,517	30	0	1,899	29	0	1,493	28	0
United Kingdom	1	2,684	241	0	2,759	268	0	2,323	296	0	1,119	293	0	1,553	290	0	1,796	291	0	1,744	289	0
United Kingdom	3	2,737	21	0	2,918	29	0	2,245	33	0	1,506	35	0	1,530	35	0	1,457	36	0	1,114	34	0
United Kingdom	4	2,408	218	0	2,250	237	0	1,943	250	0	0,907	250	0	1,402	244	0	1,791	253	0	1,488	254	0
United Kingdom	5	-	-	-	-	-	-	1,396	40	0	0,596	41	0	0,869	41	0	0,808	39	0	0,740	38	0
United Kingdom	6	2,329	69	0	2,168	80	0	1,972	83	0	1,143	82	0	1,521	85	0	1,476	89	0	1,346	82	0
United Kingdom	7	2,457	21	0	3,305	24	0	2,321	27	0	0,975	25	0	1,229	23	0	1,215	26	0	1,002	26	0
United Kingdom	9	0,943	79	0	0,925	208	0	0,887	262	0	0,838	282	0	0,867	299	0	0,871	307	0	0,882	320	0
United Kingdom	13	2,516	55	0	-	-	-	2,102	75	0	0,895	79	0	1,056	82	0	1,256	80	0	1,378	82	0
Greece	1	1,452	33	0	1,789	43	0	1,857	45	0	-	-	-	0,871	43	0	0,524	37	0	0,305	36	0
Hungary	1	0,950	10	1	2,097	5	0	1,854	5	0	0,771	42	0	1,435	7	0	1,393	7	0	1,109	5	0
Hungary	4	1,105	9	0	1,167	10	0	1,604	10	0	1,323	6	0	1,077	10	0	1,135	10	0	0,675	10	0
Hungary	5	-	-	-	-	-	-	-	-	-	0,810	10	0	-	-	-	0,504	79	1	-	-	-
Hungary	7	-	-	-	-	-	-	-	-	-	-	-	-	0,851	17	1	-	-	-	-	-	-
Hungary	13	3,316	5	2	4,661	7	1	2,085	10	1	0,612	16	2	0,640	7	1	0,586	19	1	0,426	24	1
Hungary	15	3,758	6	3	5,478	5	1	3,726	9	2	0,403	5	3	1,032	6	1	0,903	16	1	0,542	15	1
Ireland	1	2,269	50	1	1,935	234	1	1,866	6	0	0,830	5	0	1,611	5	0	1,916	5	0	1,772	5	0
Ireland	4	3,419	15	0	3,092	17	0	2,739	20	0	0,907	18	0	1,376	19	0	1,786	20	0	1,694	19	0
Ireland	7	-	-	-	-	-	-	1,826	18	1	1,435	6	1	1,037	14	1	1,690	9	1	1,268	6	1
Ireland	14	0,911	5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	1	2,191	50	0	2,468	62	0	2,157	66	0	1,054	70	0	1,303	68	0	1,236	69	0	0,788	64	0
Italy	4	1,458	55	0	1,644	64	0	1,626	69	0	0,770	68	0	1,019	68	0	1,049	66	0	0,853	68	0
Italy	6	2,376	7	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	13	-	-	-	-	-	-	3,115	5	1	1,196	7	1	-	-	-	-	-	-	-	-	-
Lithuania	1	1,587	37	3	1,789	45	1	1,835	30	1	0,867	31	1	0,753	5	1	1,594	12	1	0,505	9	1
Lithuania	3	1,320	9	3	1,381	7	1	1,547	9	2	0,618	9	3	0,496	7	3	1,100	22	2	0,438	5	1
Lithuania	4	1,967	12	0	1,744	13	0	1,529	13	0	0,354	13	0	0,737	13	0	1,443	13	0	0,768	14	0
Lithuania	5	0,992	7	2	1,267	11	1	5,553	7	1	2,429	9	1	0,615	5	2	0,640	7	1	0,488	11	2
Lithuania	6	3,820	5	1	1,238	38	1	2,172	17	1	0,761	18	1	1,158	5	1	1,166	7	1	0,627	10	1

Lithuania	7	-	-	-	-	-	-	1,710	7	2	0,792	6	3	0,360	5	2	0,906	7	2	0,173	6	2
Lithuania	9	2,810	5	2	2,088	16	1	2,278	15	1	0,755	35	1	0,797	5	1	0,491	11	2	0,374	7	1
Lithuania	10	1,609	13	4	0,966	16	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	11	-	-	-	-	-	-	-	-	-	-	-	-	1,007	6	1	-	-	-	-	-	-
Lithuania	12	-	-	-	1,372	13	3	0,512	20	1	0,627	24	1	0,769	34	2	0,890	25	3	0,426	24	2
Lithuania	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,994	9	3
Lithuania	15	2,091	12	3	2,085	12	1	1,310	15	3	0,536	5	2	1,032	8	3	1,506	5	2	0,900	7	2
Luxembourg	1	-	-	-	1,746	8	0	2,093	9	0	1,211	9	0	1,470	9	0	3,172	10	0	2,071	11	0
Luxembourg	3	2,418	16	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luxembourg	4	3,419	19	1	3,281	5	0	2,147	7	0	0,687	7	0	1,192	7	0	1,335	9	0	1,249	11	0
Luxembourg	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,789	6	1
Luxembourg	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,177	20	1	-	-	-
Luxembourg	12	-	-	-	-	-	-	-	-	-	-	-	-	0,786	13	2	-	-	-	0,714	12	1
Latvia	1	1,587	37	3	0,734	10	1	1,953	47	1	0,923	62	1	0,428	6	1	0,475	41	1	1,212	140	1
Latvia	2	-	-	-	3,256	6	1	2,238	5	1	0,649	5	1	1,490	37	2	0,747	5	1	0,731	6	1
Latvia	3	1,320	9	3	-	-	-	1,999	6	1	0,589	7	1	0,496	7	3	0,766	9	1	0,760	21	1
Latvia	4	1,319	6	0	0,695	8	0	0,527	10	0	0,199	11	0	0,210	11	0	0,340	11	0	0,301	11	0
Latvia	5	0,851	11	2	2,640	7	3	3,661	15	1	1,219	22	1	0,615	5	2	0,179	10	1	0,879	42	1
Latvia	6	1,720	6	3	0,691	20	1	1,922	37	1	0,648	45	1	1,006	7	2	0,447	32	1	1,069	110	1
Latvia	7	-	-	-	-	-	-	-	-	-	-	-	-	0,360	5	2	-	-	-	-	-	-
Latvia	9	2,810	5	3	1,780	6	1	1,958	17	1	1,310	21	1	0,797	5	3	0,492	14	1	1,366	39	1
Latvia	11	-	-	-	-	-	-	-	-	-	-	-	-	0,797	5	3	-	-	-	-	-	-
Latvia	15	4,905	6	3	0,386	13	1	3,376	9	1	1,843	8	1	1,032	8	3	0,428	12	1	1,958	26	1
Malta	1	-	-	-	-	-	-	-	-	-	1,914	5	0	1,396	6	0	1,262	6	0	1,119	6	0
Malta	4	-	-	-	-	-	-	-	-	-	0,556	93	1	0,344	15	1	1,320	45	1	0,216	11	1
Netherlands	1	2,770	34	0	2,978	36	0	2,428	38	0	1,042	39	0	1,511	39	0	1,603	42	0	1,233	41	0
Netherlands	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,692	5	1	2,751	5	1
Netherlands	3	2,335	10	2	3,090	12	2	3,268	5	2	1,326	18	1	1,687	21	1	1,736	7	2	0,738	8	3
Netherlands	4	1,885	30	0	2,294	32	0	2,057	31	0	1,040	31	0	1,324	32	0	1,579	32	0	1,250	30	0
Netherlands	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,999	6	0	0,836	6	0
Netherlands	6	2,109	8	0	2,493	9	0	2,005	9	0	1,369	9	0	1,713	9	0	1,697	9	0	1,509	10	0
Netherlands	7	2,582	5	0	2,380	6	0	2,958	6	0	1,455	6	0	2,097	6	0	3,066	5	0	1,789	6	0
Netherlands	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,079	13	0	1,128	14	0
Netherlands	10	-	-	-	-	-	-	-	-	-	1,182	19	1	1,140	20	1	1,831	6	1	1,904	6	1

Netherlands	12	-	-	-	1,318	7	0	1,062	10	0	0,658	10	0	0,956	10	0	0,931	10	0	0,732	9	0
Netherlands	13	3,576	6	0	-	-	-	-	-	-	-	-	-	2,302	7	0	2,642	8	0	1,660	10	0
Netherlands	15	-	-	-	-	-	-	2,548	5	0	1,021	5	0	1,637	6	0	1,976	6	0	1,003	6	0
Poland	1	2,325	18	0	3,707	29	0	2,026	43	0	0,991	58	0	1,286	68	0	1,691	103	0	1,260	136	0
Poland	2	-	-	-	-	-	-	2,238	5	1	0,663	5	1	1,637	5	0	1,340	6	0	0,858	5	0
Poland	3	1,681	5	2	1,742	5	2	2,253	5	0	0,604	6	0	1,132	10	0	1,288	18	0	0,853	20	0
Poland	4	1,765	34	0	3,038	46	0	1,881	57	0	0,718	71	0	1,121	79	0	1,471	107	0	0,998	128	0
Poland	5	-	-	-	3,606	8	0	3,691	14	0	1,291	21	0	1,612	23	0	1,990	33	0	0,904	41	0
Poland	6	1,289	9	0	1,665	20	0	2,132	34	0	0,654	42	0	1,189	52	0	1,699	75	0	1,069	108	0
Poland	7	-	-	-	-	-	-	-	-	-	0,578	6	2	1,446	6	1	7,336	5	0	2,231	8	0
Poland	9	2,202	12	0	2,542	16	0	1,958	17	0	1,310	21	0	1,405	22	0	2,188	32	0	1,366	39	0
Poland	13	3,316	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,544	63	0
Poland	15	4,456	5	1	5,478	5	1	3,551	8	0	1,969	7	0	3,371	9	0	2,133	17	0	2,280	25	0
Portugal	1	3,122	8	0	2,945	8	0	2,262	8	0	1,728	7	0	-	-	-	1,710	9	0	0,936	8	0
Portugal	3	3,017	17	2	-	-	-	1,452	19	2	0,734	11	2	0,900	20	2	-	-	-	-	-	-
Portugal	4	1,146	15	0	1,333	18	0	1,084	18	0	0,668	19	0	0,730	19	0	0,778	20	0	0,667	18	0
Romania	1	0,946	6	0	1,190	6	0	1,222	12	0	0,521	33	0	0,462	44	0	0,438	78	0	0,477	80	0
Romania	4	0,764	21	0	1,377	19	0	1,337	30	0	0,463	104	0	0,524	139	0	0,432	259	0	0,420	267	0
Romania	7	1,035	6	3	1,328	5	4	1,444	6	2	0,776	13	0	0,851	17	0	-	-	-	-	-	-
Romania	9	-	-	-	-	-	-	-	-	-	-	-	-	1,270	6	1	-	-	-	-	-	-
Romania	13	-	-	-	-	-	-	-	-	-	0,612	16	1	0,640	7	0	0,586	19	0	-	-	-
Romania	14	-	-	-	-	-	-	-	-	-	0,869	163	1	0,845	7	0	0,464	35	0	0,441	42	0
Sweden	1	3,334	94	0	2,683	106	0	2,146	125	0	1,219	128	0	1,611	133	0	1,795	139	0	1,749	143	0
Sweden	2	4,959	8	0	3,166	11	0	1,854	14	0	0,478	15	0	1,357	16	0	1,401	16	0	1,371	16	0
Sweden	3	2,335	10	1	2,401	19	1	2,493	25	1	1,986	25	1	2,017	24	1	1,367	6	1	1,522	25	1
Sweden	4	2,702	66	0	3,255	73	0	2,355	84	0	1,039	86	0	1,727	86	0	1,979	87	0	1,296	88	0
Sweden	5	2,597	5	0	3,362	5	0	2,356	5	0	1,107	5	0	1,571	5	0	2,576	5	0	1,378	10	1
Sweden	6	3,637	22	0	4,723	25	0	4,869	29	0	1,822	32	0	3,402	36	0	3,905	40	0	2,080	39	0
Sweden	7	1,494	5	1	1,459	23	1	0,962	5	0	0,718	5	0	0,524	5	0	0,662	5	0	1,278	6	0
Sweden	9	1,940	7	0	2,125	7	0	1,405	8	0	-	-	-	1,062	8	0	1,217	8	0	1,339	8	0
Sweden	10	1,709	6	0	1,004	11	0	0,974	13	0	0,510	13	0	0,680	17	0	0,926	16	0	0,761	15	0
Sweden	11	-	-	-	-	-	-	1,615	22	0	0,908	24	0	1,177	23	0	1,183	24	0	0,911	24	0
Sweden	12	1,226	14	0	1,101	17	0	1,020	20	0	0,601	20	0	0,817	20	0	1,052	20	0	0,884	20	0
Sweden	13	2,018	13	0	2,033	14	0	1,483	19	0	0,737	19	0	1,529	23	0	2,323	32	0	1,837	41	0

Sweden	14	-	-	-	1,828	9	3	1,811	5	2	1,545	5	2	1,129	6	2	1,546	11	3	-	-	-
Sweden	15	3,164	15	0	3,520	15	0	2,804	19	0	1,477	23	0	2,486	26	0	2,602	29	0	2,175	28	0
Slovenia	1	-	-	-	-	-	-	1,909	30	1	1,189	11	1	-	-	-	0,623	6	0	-	-	-
Slovenia	4	-	-	-	-	-	-	-	-	-	0,571	12	0	0,537	12	0	0,454	11	0	0,413	12	0
Slovenia	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,374	5	0
Slovakia	1	2,142	51	2	0,999	22	1	2,087	70	1	0,994	74	1	0,671	17	1	-	-	-	0,352	5	0
Slovakia	4	-	-	-	0,230	5	1	0,326	7	0	0,387	8	0	0,269	7	0	0,259	9	0	0,185	10	0
Slovakia	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,165	5	0	1,037	10	2
Slovakia	7	-	-	-	-	-	-	-	-	-	-	-	-	1,185	14	3	-	-	-	-	-	-
Slovakia	15	-	-	-	-	-	-	-	-	-	1,656	10	1	0,378	16	1	0,462	5	1	0,660	7	1

Appendix 15: P/B multiples used for the valuation of companies locating in Finland (inward FDI)

		2011			**2010**			**2009**			**2008**			**2007**			**2006**			**2005**		
	Branch	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**	**P/B**	**#**	**steps**
Finland	1	1,748	47	0	1,892	48	0	1,800	49	0	1,351	50	0	2,398	49	0	2,413	49	0	2,219	47	0
Finland	2	2,751	5	1	4,692	5	1	2,871	5	1	0,952	17	2	3,070	7	2	5,461	6	2	3,214	14	2
Finland	3	0,738	8	2	1,736	7	1	1,699	24	2	1,700	5	1	2,676	7	1	3,090	12	1	2,418	16	1
Finland	4	1,050	39	0	1,609	39	0	1,241	39	0	0,779	39	0	1,575	39	0	1,893	38	0	1,673	37	0
Finland	5	0,888	9	1	1,555	9	1	1,351	9	1	0,523	6	1	1,875	10	2	3,909	10	1	1,368	8	1
Finland	6	0,799	7	1	1,097	7	0	1,210	7	0	0,665	7	0	1,343	6	0	1,726	7	0	1,816	6	0
Finland	7	1,141	10	1	2,007	9	1	1,466	10	1	0,908	11	1	1,850	6	1	1,836	5	1	1,902	21	1
Finland	8	1,566	6	5	1,369	15	4	1,131	11	2	1,243	14	3	2,023	13	3	2,174	13	4	2,041	23	2
Finland	9	0,854	6	0	0,992	6	0	0,967	5	0	0,948	5	0	1,268	5	0	1,212	5	0	1,465	35	1
Finland	10	1,904	6	1	1,831	6	1	1,846	6	1	1,005	11	1	0,454	5	1	1,504	7	2	1,258	28	1
Finland	11	0,617	12	1	0,598	11	1	0,664	11	1	0,918	10	1	1,323	6	1	1,494	18	1	1,333	19	1
Finland	12	0,732	11	1	0,931	12	1	0,991	13	1	0,855	16	1	0,866	10	1	2,467	17	1	1,842	30	1
Finland	13	1,855	12	1	3,000	9	1	2,486	8	1	1,421	34	2	5,191	9	2	4,631	9	2	2,248	20	1
Finland	15	1,003	8	1	1,976	8	1	1,637	8	1	0,985	20	1	2,172	8	2	4,092	6	1	1,763	33	1

Appendix 16: P/B multiples used for the valuation of outward unlisted FDI (calculated for countries outside EU-27 area)

Country	Branch	2005	2006	2007	2008	2009	2010	2011
Argentina	1	-	-	1,355758	1,01241	1,27212	1,38449	1,176565
Argentina	4	-	-	-	0,965064	0,916821	1,315605	1,47072
Australia	1	1,054626	2,6173	2,991225	1,701714	1,27936	1,543074	1,515614
Australia	4	2,236198	2,185626	2,608589	1,50408	1,173926	1,519537	1,48658
Australia	13	-	-	3,480742	1,598897	1,671431	1,962415	2,407871
Bangladesh	1	-	-	1,019677	1,328665	3,237487	3,572055	1,852036
Bermuda	1	1,27605	1,187954	1,109241	0,492727	0,965886	1,049081	0,710252
Bermuda	3	-	-	1,537035	0,783839	0,679718	0,534014	0,558196
Bermuda	4	-	1,092223	-	-	-	-	-
Brazil	1	-	0,462931	1,808745	1,058738	1,49767	1,548456	1,013474
Brazil	4	-	1,888834	1,597359	0,706444	1,371228	1,013106	0,880782
Brazil	5	-	-	2,180388	0,666001	1,375555	1,390173	0,874061
Bulgaria	1	-	1,12332	2,248587	-	-	-	-
Canada	1	2,37745	2,082164	2,734075	1,286126	1,789225	2,053172	1,931536
Canada	3	-	-	1,789589	1,22727	1,382652	-	-
Canada	4	1,658976	1,922828	2,306775	0,982774	1,483145	2,28874	1,699767
Canada	13	-	-	4,055657	1,956296	3,175343	4,737663	4,025113
Cayman Islands	1	1,118632	-	-	-	-	-	-
Cayman Islands	9	-	-	-	0,595898	0,723327	0,825682	-
Chile	1	-	-	2,479921	1,489761	1,735663	3,01917	2,98241
Chile	4	-	1,606315	1,457729	0,963598	1,15708	1,479216	1,156973
China	1	3,949186	1,994465	2,663712	1,026035	2,746788	2,838008	1,398222
China	4	1,082148	1,815869	2,736293	1,097851	2,786368	2,631609	1,597119
China	6	-	-	-	-	-	-	1,775073
China	7	-	-	-	0,616887	1,374602	1,031241	0,873648
China	13	-	1,160205	1,615307	0,860652	1,146257	0,84546	1,23631
Guernsey	1	-	-	2,872285	1,113272	1,553292	1,831161	1,745254
Guernsey	3	-	-	2,244847	1,539427	1,530046	1,466059	1,1144
Guernsey	4	-	2,251959	-	-	-	-	-
Hong Kong	1	0,709398	0,984388	1,788695	0,854357	1,084313	1,065222	0,779563
Hong Kong	4	1,396833	0,845436	1,141548	0,604853	0,868725	1,052479	0,693635
India	1	3,376781	1,787751	1,600364	0,649763	1,221926	1,069127	0,934625
India	4	2,373331	1,028598	0,986467	0,487613	0,970046	0,911284	0,720515
India	6	-	-	-	-	-	0,827426	-
India	13	-	1,675172	1,805018	0,689856	1,317994	0,976501	0,973613
Indonesia	1	-	0,942215	2,659426	1,182613	0,892042	1,903171	1,929496
Indonesia	4	-	0,940975	1,20686	0,840387	0,99115	1,178432	1,252475
Iran	1	-	-	0,969296	-	1,100934	1,138467	1,59917
Iraq	1	-	-	-	-	-	-	4,924928
Israel	1	-	2,031374	-	-	-	-	-
Japan	1	1,785236	1,484005	1,013396	0,708702	0,90162	0,874178	0,855881
Japan	4	1,420269	1,186575	0,859408	0,650357	0,810333	0,800188	0,760714
Jordan	1	-	-	-	-	1,394759	1,3965	1,361161
Kazakhstan	1	-	-	2,332775	1,437964	0,776004	-	-
Kazakhstan	4	-	-	1,38634	0,939793	1,257815	-	-
Kenya	1	-	-	-	-	-	-	1,444402
Korea, Republic of	1	-	1,209328	1,292549	0,667386	1,174979	1,181263	1,072421
Korea, Republic of	4	1,282501	0,819698	0,968535	0,52683	0,77887	0,84548	0,80809
Kuwait	1	-	-	1,744099	1,514676	-	-	-
Malaysia	1	0,901806	1,107692	1,080044	0,713917	0,875613	1,014552	1,122784
Malaysia	4	0,58971	0,742643	0,776799	0,517174	0,626322	0,731786	0,695485
Mexico	1	-	-	-	1,697247	1,395533	1,509115	1,571539
Mexico	4	-	1,203612	0,949962	0,867401	1,439371	1,53487	1,372728
Morocco	1	-	-	1,689696	-	-	1,827979	-
New Zealand	1	-	-	2,764219	2,164117	-	1,492478	1,547764
New Zealand	4	-	-	2,565667	1,237522	-	1,556452	1,505898
Norway	1	-	3,380859	2,414098	0,948278	1,646452	1,589014	1,314528
Norway	4	-	2,415445	2,078641	0,733477	1,311135	1,495376	0,862021

Norway	5	-	-	2,257613	0,953206	1,319167	2,145969	2,32285
Norway	6	-	-	1,815563	0,603349	1,039779	1,41195	1,062216
Norway	7	-	1,643627	1,576551	0,707987	0,801597	0,894499	0,780676
Norway	9	-	-	0,583112	0,327194	-	1,264165	0,953464
Norway	13	-	-	-	-	-	3,259381	-
Oman	1	-	-	-	-	-	1,606695	1,518545
Pakistan	1	-	-	1,620527	1,356471	0,458788	0,769035	0,663275
Peru	1	-	-	0,235209	0,479588	0,741061	0,215677	0,146541
Philippines	1	-	1,365404	2,177855	1,188669	1,63748	1,45371	1,490525
Russian Federation	1	-	-	1,189313	0,775883	0,71152	1,151989	0,706422
Russian Federation	3	-	-	2,718693	0,954915	0,749946	1,588676	1,121119
Russian Federation	4	-	-	1,907368	0,744607	1,200994	1,592357	0,982085
Russian Federation	6	-	-	-	-	-	1,811984	1,239711
Russian Federation	7	-	-	-	0,606426	0,843389	-	0,856037
Russian Federation	9	-	-	-	-	-	1,171084	1,266589
Saudi Arabia	1	-	4,86029	5,166814	2,401086	2,443978	2,482403	1,998573
Singapore	1	0,844719	1,26812	1,460175	0,628677	0,958567	0,963127	0,714611
Singapore	3	-	-	1,223426	0,529967	1,082759	1,160805	0,692666
Singapore	4	0,939057	0,978988	1,284624	0,673451	0,928859	1,005601	0,7049
Singapore	9	-	1,044593	1,197369	0,811907	0,946977	0,888291	0,865837
Singapore	13	-	-	-	-	1,514993	1,326943	0,987692
South Africa	1	2,555137	2,348401	2,698922	1,444024	1,043898	1,208913	1,268236
South Africa	4	-	2,683999	2,514144	1,512387	1,375264	1,474979	1,520801
South Africa	13	-	-	-	0,963929	-	0,773501	-
Sri Lanka	1	-	-	1,256	0,832829	1,718688	1,755027	1,590031
Switzerland	1	-	2,206583	2,132489	1,240074	1,838119	2,117508	1,471436
Switzerland	3	-	-	-	-	1,637469	1,466129	1,35454
Switzerland	4	-	2,003512	2,222558	1,370395	1,544249	2,145517	1,524288
Switzerland	9	-	1,368661	1,268722	1,069986	0,997103	1,109756	0,936662
Switzerland	10	-	-	-	0,811141	0,90272	0,863335	-
Taiwan	1	-	1,750732	1,629273	0,737928	1,859993	1,72935	1,060473
Thailand	1	-	1,713698	1,333633	0,906667	1,332991	1,743027	1,530665
Thailand	4	1,187953	0,76528	0,831712	0,611483	0,834102	1,148977	1,093093
Thailand	13	-	1,045024	-	-	-	-	1,198885
Turkey	1	-	1,475333	1,711078	0,60667	1,361506	1,597412	1,187823
Turkey	4	-	1,138975	1,372565	0,543951	1,100041	1,54256	1,198256
Turkey	7	-	-	-	-	1,563668	-	-
Turkey	9	-	-	-	-	1,655721	-	-
Ukraine	1	-	-	2,231606	1,623504	1,452425	-	0,884386
Ukraine	4	-	-	1,738076	-	0,647441	0,855285	0,769559
Ukraine	6	-	-	-	-	-	2,163053	1,739633
Ukraine	7	-	-	-	-	-	-	0,494172
Ukraine	15	-	-	-	-	-	-	1,133761
United States	1	2,435889	2,380296	2,664543	1,536885	1,933224	2,179256	1,95474
United States	3	-	-	2,002326	1,399879	1,473334	1,547537	1,617815
United States	4	2,152929	2,326831	2,380403	1,50016	1,856904	2,07685	1,922737
United States	5	-	-	1,755689	-	-	-	-
United States	7	-	-	1,757242	1,287386	1,546668	-	-
United States	9	1,874723	1,268526	1,092994	0,875007	0,842171	0,910763	0,851784
United States	11	-	-	3,69679	-	0,909718	0,968331	0,940241
United States	13	-	2,782686	-	2,556093	3,087859	2,978525	2,605434
Vietnam	1	-	-	-	-	-	-	0,427968
Vietnam	4	-	-	1,259621	0,871347	1,400706	1,167202	0,658881

Appendix 17: P/B multiples used for the valuation of outward unlisted FDI (calculated for regions outside EU-27 area)

Region	Branch	2005	2006	2007	2008	2009	2010	2011
Africa	1	2,108546	2,177696	2,728138	1,461379	1,439527	1,533924	1,422477
Africa	4	2,040085	-	-	-	-	-	-
Africa	13	-	-	2,626075	1,965238	0,809621	-	0,71475
Eastern Europe	1	1,674565	1,932687	-	0,782091	0,853159	1,068668	0,811037
Eastern Europe	3	1,15396	1,082266	-	-	-	-	-
Eastern Europe	4	1,488331	1,340626	-	0,59144	0,690928	0,680681	0,652268
Eastern Europe	5	0,989306	2,976575	2,764943	0,736888	0,725802	0,777733	0,694624
Eastern Europe	6	1,57745	1,515633	2,257258	0,762292	0,918137	-	-
Eastern Europe	7	-	1,147251	-	-	-	-	-
Eastern Europe	9	-	2,703173	2,453167	0,983953	0,945561	-	-
Eastern Europe	11	-	-	-	0,616943	0,698678	-	0,823502
Eastern Europe	12	-	0,390512	-	-	0,753179	0,774888	0,669661
Eastern Europe	13	-	-	-	-	-	-	1,105764
Eastern Europe	15	-	1,949034	2,532383	0,663263	1,21656	1,076409	1,133761
Far East and Central Asia	1	1,786255	1,492445	1,370506	0,745114	1,305263	1,249694	1,001136
Far East and Central Asia	4	1,433532	1,114933	-	-	-	1,063348	0,885608
Far East and Central Asia	6	-	-	-	-	0,940147	-	-
Far East and Central Asia	9	1,125991	-	-	-	-	-	-
Far East and Central Asia	13	1,726749	-	-	-	1,145623	-	-
Middle East	1	-	2,103801	1,822252	0,868076	1,282794	1,581037	1,277782
Middle East	3	-	-	2,834688	-	1,545243	1,572422	1,332349
Nordic	1	2,806861	-	-	-	-	-	-
Nordic	3	3,740719	3,393034	-	2,007029	1,60004	-	-
Nordic	4	2,127778	-	-	-	-	-	-
Nordic	5	2,358013	2,785762	-	-	-	-	-
Nordic	6	3,005091	2,518583	-	-	-	-	-
Nordic	10	-	-	1,001722	0,933436	0,878931	0,987	0,984038
Nordic	13	2,822233	-	-	1,939324	1,749591	-	2,367052
Nordic	15	2,670949	1,971225	1,721617	1,062202	1,866518	2,111277	1,645194
Oceania	1	1,164106	4,670365	-	-	1,851338	-	-
Oceania	4	2,381448	2,815071	-	-	1,535157	-	-
South and Central America	1	1,234552	1,361069	1,517094	0,635482	1,18762	1,325786	0,896364
South and Central America	4	0,734747	1,361069	1,45153	0,685921	1,099968	1,287124	0,922691
South and Central America	5	-	-	1,492047	0,634767	1,18762	1,165927	0,826088
South and Central America	7	-	1,674227	1,893261	0,864198	1,167584	1,203874	0,94099
South and Central America	9	-	1,321743	1,124088	-	-	-	-
South and Central America	13	-	1,715312	2,177826	1,018884	2,676218	1,439956	1,366518
Western Europe	1	2,262577	-	-	1,061945	1,406747	1,577315	1,345947
Western Europe	3	-	-	-	1,332639	-	-	-
Western Europe	4	1,694104	-	-	-	-	-	-
Western Europe	13	2,501758	2,878236	2,534957	1,437903	1,625936	1,78938	1,773491

Appendix 18: Definitions of the regions

Africa	Eastern Europe	Far East and Central Asia	Middle East	Nordic	Oceania	South and Central America	Western Europe
Algeria	Albania	Afghanistan	Bahrain	Denmark	Australia	Anguilla	Andorra
Angola	Belarus	Armenia	Iran	Finland	East Timor	Antigua and Barbuda	Austria
Benin	Bosnia-Herzegovina	Azerbaidjan	Iraq	Iceland	Fiji	Argentina	Belgium
Botswana	Bulgaria	Bangladesh	Israel	Norway	Kiribati	Aruba	Cyprus
Burkina Faso	Croatia	Bhutan	Jordan	Sweden	Marshall Islands	Bahamas	France
Burundi	Czech Republic	Brunei Darussalam	Kuwait		Micronesia	Barbados	Germany
Cameroon	Estonia	Cambodia	Lebanon		Nauru	Belize	Gibraltar
Cape Verde	Hungary	China	Oman		New Zealand	Bermuda	Greece
Central African Republic	Latvia	Georgia	Palestine		Palau	Bolivia	Ireland
Chad	Lithuania	Hong Kong	Qatar		Papua New Guinea	Brazil	Italy
Comoros	Macedonia	India	Saudi Arabia		Samoa	Cayman Isl.	Liechtenstein
Congo	Moldavia	Indonesia	Syria		Solomon Islands	Chile	Luxembourg
Congo, the Democratic Republic of the	Montenegro	Japan	United Arab Emirates		Tonga	Colombia	Malta
Ivory Coast	Poland	Kazakhstan	Yemen		Tuvalu	Costa Rica	Monaco
Djibouti	Romania	North Korea			Vanuatu	Cuba	Netherlands
Egypt	Russian Federation	South Korea				Curacao	Portugal
Equatorial Guinea	Serbia	Kyrgyzstan				Dominica	San Marino
Eritrea	Slovak Republic	Laos				Dominican Rep.	Spain
Gabon	Slovenia	Macau				Ecuador	Switzerland
Gambia	Ukraine	Malaysia				El Salvador	Turkey
Ghana		Mongolia				Grenada	Great Britain
Guinea		Myanmar				Guatemala	
Guinea Bissau		Nepal				Guyana	
Kenya		Pakistan				Haiti	
Lesotho		Philippines				Honduras	
Liberia		Singapore				Jamaica	
Libya		Sri Lanka				Mexico	
Madagascar		Taiwan				Nicaragua	
Malawi		Tadjikistan				Panama	
Mali		Thailand				Paraguay	
Mauritania		Turkmenistan				Peru	
Mauritius		Uzbekistan				Saint Kitts & Nevis Anguilla	
Morocco		Vietnam				Saint Lucia	
Mozambique						Saint Vincent & Grenadines	
Namibia						Sint Maarten	
Niger						Suriname	
Nigeria						Trinidad and Tobago	
Rwanda						Uruguay	
Saint Tome (Sao Tome) and Principe						Venezuela	
Senegal						Virgin Islands (British)	
Seychelles							
Sierra Leone							
Somalia							
South Africa							
South Sudan							
Sudan							
Swaziland							
Tanzania							
Togo							

Appendix 19: Regression models with P/B ratios as dependent variable for outward FDI in EU-27 countries (Valuation model 30)

2011

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,029	,003	9,258	,000	,022	,035
TA/BVE	,008	,001	7,071	,000	,006	,010
OFBV<200	,589	,058	10,144	,000	,475	,703
INDPB	1,515	,084	17,965	,000	1,349	1,680
DE	,552	,094	5,844	,000	,367	,737
DK	,300	,167	1,797	,072	-,027	,626
LU	,255	,293	,870	,384	-,319	,829
NL	,374	,181	2,068	,039	,020	,728
FI	,623	,200	3,119	,002	,232	1,015
AT	,297	,227	1,308	,191	-,148	,743
FR	,364	,095	3,851	,000	,179	,550
CZ	,436	,533	,817	,414	-,609	1,481
BE	,553	,189	2,924	,003	,182	,924
SK	-,814	,369	-2,207	,027	-1,536	-,091
MT	,387	,447	,866	,387	-,489	1,263
SI	-,760	,349	-2,179	,029	-1,445	-,076
LT	-,131	,374	-,349	,727	-,864	,603
BG	-,363	,155	-2,345	,019	-,667	-,060
IT	,122	,140	,870	,384	-,153	,397
ES	,882	,078	11,262	,000	,729	1,036
EE	,161	,534	,302	,763	-,886	1,209
CY	-,829	,206	-4,024	,000	-1,233	-,425
LV	-,873	,393	-2,224	,026	-1,643	-,103
PL	,530	,102	5,182	,000	,329	,730
RO	-,396	,094	-4,226	,000	-,580	-,212
HU	-,213	,363	-,586	,558	-,925	,499
IE	,839	,271	3,095	,002	,308	1,370
PT	,101	,285	,355	,723	-,458	,660
GR	-,468	,150	-3,123	,002	-,762	-,174
GB	,470	,075	6,248	,000	,322	,617
Adjusted R^2	,408					

2010

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,012	,002	5,009	,000	,007	,017
TA/BVE	,044	,003	14,823	,000	,039	,050
OFBV<200	,603	,064	9,464	,000	,478	,728
INDPB	1,263	,076	16,703	,000	1,114	1,411
DE	,607	,105	5,776	,000	,401	,813
DK	,182	,183	,992	,321	-,177	,541
LU	,818	,350	2,338	,019	,132	1,504
NL	,690	,199	3,474	,001	,301	1,080
FI	,783	,217	3,606	,000	,358	1,209
AT	,276	,254	1,090	,276	-,221	,773
FR	,385	,103	3,744	,000	,183	,586
CZ	-,151	,537	-,281	,779	-1,202	,901
BE	,546	,204	2,678	,007	,146	,946
SK	-,751	,393	-1,914	,056	-1,521	,018
MT	,367	,501	,733	,464	-,614	1,348
SI	-,711	,368	-1,932	,053	-1,433	,011
LT	,100	,430	,233	,816	-,742	,942
BG	-,241	,167	-1,442	,149	-,568	,086
IT	,156	,155	1,004	,315	-,149	,461
ES	,926	,082	11,231	,000	,764	1,088
EE	,344	,585	,587	,557	-,804	1,491
CY	-,569	,219	-2,595	,009	-,998	-,139
LV	-,813	,430	-1,890	,059	-1,656	,030
PL	1,259	,122	10,289	,000	1,020	1,499
RO	-,346	,105	-3,292	,001	-,553	-,140
HU	,228	,387	,588	,557	-,532	,987
IE	,730	,297	2,461	,014	,149	1,312
PT	-,058	,310	-,185	,853	-,666	,551
GR	-,665	,159	-4,180	,000	-,977	-,353
GB	,653	,083	7,905	,000	,491	,815
Adjusted R^2	,415					

2009

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,232	,015	15,275	,000	,202	,262
TA/BVE	,063	,003	18,575	,000	,057	,070
OFBV<200	,464	,057	8,096	,000	,351	,576
INDPB	1,220	,066	18,436	,000	1,090	1,349
DE	,293	,094	3,117	,002	,109	,477
DK	,119	,159	,748	,455	-,193	,431
LU	,579	,320	1,807	,071	-,049	1,207
NL	,447	,172	2,596	,009	,110	,785
FI	,590	,188	3,139	,002	,222	,958
AT	-,122	,216	-,563	,573	-,546	,302
FR	,202	,092	2,195	,028	,022	,382
CZ	-,210	,462	-,454	,650	-1,115	,696
BE	,372	,171	2,178	,029	,037	,707
SK	-,721	,363	-1,983	,047	-1,433	-,008
MT	,099	,441	,224	,823	-,766	,963
SI	-,512	,307	-1,670	,095	-1,113	,089
LT	-,514	,390	-1,318	,187	-1,278	,250
BG	-,510	,143	-3,571	,000	-,790	-,230
IT	,088	,136	,643	,520	-,179	,354
ES	1,142	,121	9,450	,000	,905	1,379
EE	-,085	,520	-,163	,870	-1,104	,934
CY	-,697	,189	-3,688	,000	-1,068	-,327
LV	-1,141	,377	-3,027	,002	-1,880	-,402
PL	,365	,125	2,918	,004	,120	,610
RO	-,291	,120	-2,425	,015	-,527	-,056
HU	,193	,348	,554	,579	-,489	,874
IE	,437	,252	1,730	,084	-,058	,932
PT	,028	,266	,106	,916	-,493	,549
GR	-,478	,136	-3,500	,000	-,745	-,210
GB	,279	,074	3,768	,000	,134	,425
Adjusted R^2	,453					

2008

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,332	,016	20,311	,000	,300	,364
TA/BVE	,037	,003	11,940	,000	,031	,043
OFBV<200	,370	,049	7,578	,000	,274	,466
INDPB	1,041	,071	14,753	,000	,903	1,180
DE	,544	,078	6,931	,000	,390	,697
DK	,498	,137	3,637	,000	,230	,766
LU	,621	,276	2,251	,024	,080	1,162
NL	,562	,150	3,750	,000	,268	,855
FI	,412	,159	2,592	,010	,100	,724
AT	,152	,185	,824	,410	-,210	,515
FR	,477	,079	6,073	,000	,323	,631
CZ	,036	,390	,093	,926	-,728	,800
BE	,668	,146	4,586	,000	,383	,954
SK	-,591	,348	-1,699	,089	-1,274	,091
MT	,696	,401	1,735	,083	-,091	1,483
SI	-,032	,268	-,119	,905	-,557	,493
LT	-,205	,329	-,623	,533	-,850	,440
BG	-,046	,124	-,370	,711	-,289	,197
IT	,253	,118	2,151	,032	,022	,483
ES	,894	,148	6,028	,000	,603	1,185
EE	-,119	,439	-,272	,786	-,980	,741
CY	-,210	,160	-1,318	,187	-,523	,102
LV	-,660	,313	-2,108	,035	-1,274	-,046
PL	,283	,113	2,492	,013	,060	,505
RO	-,203	,119	-1,702	,089	-,436	,031
HU	,119	,317	,375	,708	-,503	,741
IE	,593	,220	2,690	,007	,161	1,025
PT	,224	,232	,966	,334	-,231	,679
GR	-,121	,116	-1,047	,295	-,348	,106
GB	,447	,062	7,179	,000	,325	,569
Adjusted R^2	,442					

2007

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,573	,041	13,846	,000	,492	,654
TA/BVE	,076	,006	12,419	,000	,064	,088
OFBV<200	,533	,077	6,907	,000	,382	,684
INDPB	1,219	,063	19,468	,000	1,097	1,342
DE	,267	,127	2,107	,035	,019	,515
DK	,594	,222	2,674	,008	,158	1,029
LU	1,300	,453	2,867	,004	,411	2,189
NL	,415	,238	1,743	,081	-,052	,883
FI	,384	,251	1,532	,126	-,107	,876
AT	,151	,295	,513	,608	-,426	,729
FR	,321	,128	2,513	,012	,071	,572
CZ	-,533	,603	-,885	,376	-1,715	,649
BE	,433	,231	1,871	,061	-,021	,887
SK	-1,478	,539	-2,743	,006	-2,535	-,422
MT	,821	,702	1,169	,242	-,555	2,198
SI	-,534	,436	-1,224	,221	-1,389	,321
LT	-,241	,519	-,464	,643	-1,258	,777
BG	,055	,211	,259	,795	-,358	,468
IT	,107	,186	,575	,565	-,258	,472
ES	,857	,200	4,283	,000	,465	1,250
EE	,758	,729	1,039	,299	-,672	2,187
CY	-,796	,255	-3,116	,002	-1,296	-,295
LV	-1,263	,493	-2,560	,010	-2,230	-,296
PL	,838	,197	4,244	,000	,451	1,225
RO	-,066	,343	-,192	,848	-,737	,606
HU	-,180	,509	-,353	,724	-1,177	,818
IE	,760	,345	2,204	,028	,084	1,435
PT	-,064	,365	-,175	,861	-,779	,652
GR	-,093	,184	-,505	,614	-,453	,268
GB	,402	,104	3,863	,000	,198	,606
Adjusted R^2	,499					

2006

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,242	,035	6,981	,000	,174	,310
TA/BVE	,101	,007	14,920	,000	,088	,115
OFBV<200	,866	,091	9,527	,000	,688	1,044
INDPB	1,097	,061	18,012	,000	,978	1,216
DE	-,117	,148	-,793	,428	-,408	,173
DK	,795	,261	3,051	,002	,284	1,306
LU	,002	,595	,003	,998	-1,165	1,168
NL	,681	,274	2,487	,013	,144	1,218
FI	,354	,279	1,269	,204	-,193	,900
AT	-,187	,334	-,561	,575	-,842	,467
FR	,390	,148	2,638	,008	,100	,681
CZ	-,476	,686	-,694	,488	-1,820	,868
BE	,443	,273	1,621	,105	-,093	,979
SK	-1,890	,778	-2,430	,015	-3,415	-,365
MT	,265	1,446	,183	,855	-2,571	3,100
SI	-1,197	,518	-2,310	,021	-2,213	-,181
LT	-,304	,574	-,530	,596	-1,431	,822
BG	-1,012	,269	-3,758	,000	-1,539	-,484
IT	,158	,214	,737	,461	-,262	,578
ES	1,314	,273	4,815	,000	,779	1,848
EE	1,767	,969	1,824	,068	-,132	3,666
CY	-,985	,330	-2,986	,003	-1,632	-,339
LV	-1,473	,689	-2,138	,033	-2,823	-,123
PL	1,275	,256	4,975	,000	,773	1,778
RO	-,317	,462	-,687	,492	-1,223	,588
HU	-,380	,564	-,674	,500	-1,484	,725
IE	1,126	,415	2,712	,007	,312	1,940
PT	-,429	,412	-1,041	,298	-1,236	,379
GR	-,383	,207	-1,853	,064	-,789	,022
GB	,573	,122	4,707	,000	,335	,812
Adjusted R^2	,504					

2005						
Variable	**Coef.**	**Std.Error**	**t-value**	**P>t**	**[95% Conf. Interval]**	
1/BVE	,514	,050	10,214	,000	,415	,612
TA/BVE	,062	,006	9,819	,000	,050	,075
OFBV<200	,577	,089	6,468	,000	,402	,752
INDPB	1,090	,059	18,472	,000	,974	1,206
DE	-,034	,144	-,232	,816	-,317	,250
DK	,487	,245	1,985	,047	,006	,967
LU	,146	,580	,252	,801	-,991	1,283
NL	,698	,260	2,689	,007	,189	1,207
FI	,344	,253	1,362	,173	-,151	,840
AT	-,108	,313	-,345	,730	-,723	,506
FR	,326	,146	2,237	,025	,040	,611
CZ	-,639	,598	-1,069	,285	-1,811	,533
BE	-,015	,264	-,057	,955	-,534	,503
MT	1,602	1,450	1,105	,269	-1,240	4,444
SI	-,665	,890	-,747	,455	-2,411	1,081
LT	,872	,511	1,708	,088	-,129	1,873
BG	-,390	,892	-,437	,662	-2,139	1,359
IT	,188	,201	,938	,348	-,205	,582
ES	,869	,253	3,440	,001	,374	1,364
EE	1,947	1,030	1,891	,059	-,072	3,966
CY	-,599	,556	-1,078	,281	-1,690	,491
LV	-,670	,677	-,989	,323	-1,997	,658
PL	,011	,269	,040	,968	-,517	,539
RO	-,602	,409	-1,473	,141	-1,403	,199
HU	-,726	,509	-1,425	,154	-1,725	,273
IE	1,447	,393	3,681	,000	,676	2,218
PT	-,295	,373	-,790	,429	-1,027	,437
GR	-,333	,199	-1,678	,093	-,723	,056
GB	,779	,124	6,284	,000	,536	1,023
Adjusted R^2	,541					

Appendix 20: Regression models with P/B ratios as dependent variable for inward FDI (Valuation model 30)

2011

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,573	,037	15,517	,000	,501	,645
TA/BVE	,004	,001	2,879	,004	,001	,007
OFBV<200	,492	,076	6,498	,000	,344	,640
INDPB	1,432	,069	20,829	,000	1,298	1,567
FI	,258	,179	1,441	,150	-,093	,610
Adjusted R^2	,496					

2010

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,348	,022	16,121	,000	,306	,390
TA/BVE	,045	,005	8,980	,000	,035	,055
OFBV<200	,395	,080	4,933	,000	,238	,552
INDPB	1,374	,062	22,156	,000	1,252	1,495
FI	,289	,194	1,485	,138	-,093	,670
Adjusted R^2	,512					

2009

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,520	,041	12,756	,000	,440	,599
TA/BVE	,052	,005	9,856	,000	,042	,062
OFBV<200	,415	,077	5,381	,000	,264	,566
INDPB	1,241	,064	19,506	,000	1,117	1,366
FI	,324	,182	1,780	,075	-,033	,681
Adjusted R^2	,504					

2008

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,900	,057	15,854	,000	,789	1,011
TA/BVE	,025	,004	5,824	,000	,017	,033
OFBV<200	,397	,068	5,871	,000	,264	,529
INDPB	1,295	,075	17,315	,000	1,148	1,441
FI	,039	,157	,246	,806	-,270	,347
Adjusted R^2	0,483					

2007

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	2,247	,128	17,586	,000	1,997	2,498
TA/BVE	,054	,007	7,973	,000	,041	,067
OFBV<200	,577	,101	5,733	,000	,380	,774
INDPB	1,169	,060	19,369	,000	1,051	1,287
FI	,279	,231	1,210	,226	-,173	,731
Adjusted R^2	,553					

2006

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	2,059	,150	13,748	,000	1,765	2,353
TA/BVE	,058	,008	7,535	,000	,043	,073
OFBV<200	,953	,104	9,146	,000	,748	1,157
INDPB	1,045	,055	19,037	,000	,937	1,153
FI	,270	,250	1,078	,281	-,221	,761
Adjusted R^2	,553					

2005

Variable	Coef.	Std.Error	t-value	P>t	[95% Conf. Interval]	
1/BVE	,282	,052	5,394	,000	,180	,385
TA/BVE	,046	,007	6,949	,000	,033	,059
OFBV<200	1,013	,097	10,416	,000	,822	1,204
INDPB	,996	,051	19,386	,000	,895	1,096
FI	,129	,222	,579	,563	-,307	,564
Adjusted R^2	,562					

Appendix 21: Monthly average interest rates for long-term government bonds (EU-27 countries)

	2005	2006	2007	2008	2009	2010	2011
Sweden, Swedish krona	3,383	3,705	4,168	3,888	3,250	2,893	2,605
Germany	3,353	3,763	4,217	3,984	3,223	2,743	2,608
Denmark, Danish krone	3,405	3,812	4,287	4,286	3,588	2,928	2,730
United Kingdom, UK pound sterling	4,458	4,374	5,061	4,501	3,359	3,364	2,869
Luxembourg	2,414	3,303	4,461	4,608	4,229	3,169	2,923
Netherlands	3,374	3,781	4,287	4,227	3,687	2,992	2,989
Finland	3,352	3,783	4,293	4,290	3,738	3,011	3,006
Austria	3,394	3,800	4,298	4,358	3,937	3,226	3,319
France	3,410	3,797	4,304	4,234	3,650	3,118	3,320
Czech Republic, Czech koruna	3,543	3,800	4,303	4,633	4,838	3,884	3,708
Belgium	3,428	3,815	4,328	4,418	3,902	3,463	4,233
Slovakia	3,522	4,412	4,491	4,723	4,706	3,872	4,448
Malta	4,555	4,318	4,724	4,808	4,542	4,188	4,489
Slovenia	3,807	3,853	4,531	4,607	4,375	3,833	4,971
Lithuania, Lithuanian litas	3,699	4,081	4,546	5,608	14,004	5,567	5,160
Bulgaria, Bulgarian lev	3,874	4,183	4,539	5,377	7,215	6,005	5,357
Italy	3,556	4,048	4,487	4,681	4,313	4,037	5,424
Spain	3,388	3,785	4,308	4,367	3,979	4,251	5,441
Cyprus	5,162	4,134	4,475	4,600	4,600	4,600	5,788
Latvia, Latvian lats	3,875	4,133	5,283	6,432	12,358	10,338	5,908
Poland, Polish zloty	5,218	5,232	5,484	6,072	6,120	5,782	5,956
Romania, Romanian leu	6,992	7,230	7,134	7,698	9,694	7,337	7,293
Hungary, Hungarian forint	6,599	7,116	6,744	8,238	9,123	7,282	7,635
Ireland	3,329	3,765	4,306	4,526	5,225	5,739	9,602
Portugal	3,438	3,915	4,425	4,519	4,212	5,396	10,241
Greece	3,585	4,070	4,500	4,803	5,174	9,092	15,749

1) There are no Estonian sovereign debt securities that comply with the definition of long-term interest rates for convergence purposes. To find comparables for companies operating in Estonia and to take country risks into account in multiple valuation models, I calculated an approximation for Estonia using the average interest rates of Lithuania and Latvia.
2) For Cyprus, primary market yields are reported. The same applies to Bulgaria and Romania up to December 2005, Slovenia up to October 2003 and Lithuania up to October 2007.
3) Long-term government bonds are denominated in Euro for euro area Member States and in national currencies for Member States that have not adopted the Euro.
4) The rates are calculated from monthly secondary market yields of government bonds with a remaining maturity close to 10 years. Source: ECB's Statistical Data Warehouse

Appendix 22: Descriptive statistics for unlisted direct investment enterprises (2005-2011)

Variables	Median	Mean	Standard deviation	1st quartile	3rd quartile	Negative values, %	Number of observations
NI	0,8	6,3	71,5	-0,3	4,0	32,1 %	11706
OFBV	9,5	84,0	458,8	2,5	33,7	10,2 %	12199
TA	31,9	354,2	5808,8	11,4	102,2	0,0 %	12179

Appendix 23: P/B multiples of EU-27 countries calculated for 15 branches for the year 2011

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sweden	1,75	1,37	1,52	1,30	1,38	2,08	1,28	2,05	1,34	0,76	0,91	0,88	1,84	2,03	2,17
Germany	1,47	1,34	1,52	1,15	1,38	1,24	1,09	2,05	0,84	1,04	1,35	0,97	1,84	1,68	1,23
Denmark	1,47	1,14	1,38	1,26	0,94	1,04	0,96	1,57	0,55	1,51	1,09	0,64	1,92	1,30	0,92
Luxembourg	2,07	0,88	0,82	1,25	0,84	1,51	1,79	1,57	1,07	0,82	0,62	0,71	1,66	0,78	0,80
Netherlands	1,23	2,75	0,74	1,25	0,84	1,51	1,79	1,57	1,13	1,90	0,62	0,73	1,66	0,78	1,00
Finland	1,75	2,75	0,74	1,05	0,89	0,80	1,14	1,57	0,85	1,90	0,62	0,73	1,85	0,78	1,00
Austria	1,39	1,05	0,89	0,95	0,92	1,28	1,20	1,33	0,61	1,15	0,91	0,59	1,58	1,28	1,21
France	1,27	1,23	0,97	1,16	1,16	1,26	1,20	1,26	0,44	1,28	0,94	0,85	1,49	1,43	1,26
Czech Rep.	1,27	1,23	1,30	1,16	1,16	1,26	1,20	1,26	0,45	1,28	0,94	0,83	1,40	1,43	1,26
Belgium	1,07	1,29	0,77	0,99	1,57	1,44	0,41	1,11	0,50	1,00	0,74	0,92	2,32	1,01	1,04
Slovakia	0,35	1,29	0,44	0,19	1,04	1,55	1,20	1,11	1,16	1,00	0,76	0,09	1,36	1,01	0,66
Malta	1,12	1,29	0,44	0,22	1,04	1,55	1,20	1,11	1,27	1,00	0,76	0,09	1,99	1,01	0,66
Slovenia	0,54	0,86	0,44	0,41	0,49	0,55	0,17	0,69	0,37	1,49	0,40	0,43	1,99	1,01	0,90
Lithuania	0,50	0,86	0,44	0,77	0,49	0,63	0,17	0,69	0,37	1,49	0,40	0,43	1,99	1,01	0,90
Bulgaria	1,17	1,15	0,75	0,68	0,46	0,60	0,63	0,60	0,71	1,49	0,39	0,50	2,11	0,98	0,91
Italy	0,79	1,16	0,70	0,85	0,76	1,76	0,80	0,56	0,48	1,99	0,37	0,61	3,44	0,98	0,91
Spain	1,41	1,16	0,87	0,98	1,07	1,03	0,63	0,56	1,05	1,12	0,50	0,84	2,79	0,98	1,45
Estonia	1,16	1,16	0,87	0,97	1,05	1,12	0,61	0,56	1,05	1,12	0,53	0,79	2,79	0,98	1,77
Cyprus	0,46	0,29	0,76	0,19	0,85	0,28	0,43	0,83	0,56	0,39	1,03	0,59	1,55	0,59	0,17
Latvia	1,21	0,73	0,76	0,30	0,88	1,07	0,63	1,09	1,37	0,99	1,04	0,61	1,54	0,58	1,96
Poland	1,26	0,86	0,85	1,00	0,90	1,07	2,23	1,09	1,37	0,99	1,04	0,61	1,54	0,58	2,28
Romania	0,48	0,60	0,21	0,42	0,56	0,41	0,45	0,40	0,65	1,19	0,99	0,69	0,43	0,44	0,54
Hungary	1,11	0,61	0,23	0,68	0,56	0,42	0,45	0,43	0,65	1,19	0,99	1,02	0,43	0,44	0,54
Ireland	1,77	1,03	0,70	1,69	0,48	0,79	1,27	0,64	0,67	0,94	0,83	0,82	0,45	0,44	1,50
Portugal	0,94	1,14	0,70	0,67	0,48	1,46	1,27	0,64	0,43	0,94	0,83	0,82	0,45	0,44	1,50
Greece	0,30	0,84	0,56	0,31	0,13	0,37	0,74	0,64	0,29	0,94	1,11	0,87	0,45	0,37	0,32
UK	1,74	1,40	1,11	1,49	0,74	1,35	1,00	1,63	0,88	0,91	1,02	0,79	1,38	1,08	0,96