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FOREIGN DIRECT INVESTMENT AND THE EXTERNAL WEALTH OF NATIONS: HOW IMPORTANT IS VALUATION?

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While the balance sheet approach has increased the focus on position data, differences in valuation practices for foreign direct investment (FDI) make cross-country comparisons difficult. To enhance comparability, the IMF's Balance of Payments and International Investment Position Manual, sixth edition, which some countries have already implemented and others will implement in the coming years, recommends seven methods for valuation of unlisted FDI. This paper demonstrates that both the valuation method and simple differences in estimation techniques can fundamentally change a country's financial balance sheet. Using Denmark as an illustration, unlisted FDI equity liabilities vary from 22 to 156 percent of GDP when applying different estimation techniques, but just one valuation method, *price to earnings*. These measurement uncertainties can lead to important misunderstandings and affect policy recommendations, thus pointing to the need for further international harmonization. While the results are presented in an FDI context, the uncertainties also apply to other macroeconomic datasets, including national accounts statistics.

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1. INTRODUCTION

Foreign direct investment (FDI) is an important part of the balance sheet approach (BSA) and other macroeconomic analyses, but the different valuation methods and estimation techniques used in macroeconomic statistical standards can lead to large variations in FDI data and, possibly, erroneous policy conclusions. For instance, using Denmark as an illustration, unlisted FDI equity liabilities vary from 22 to 156 percent of GDP when applying different estimation

Note: This paper builds and extends on IMF Working Paper WP/09/242: "Valuation of Unlisted Direct Investment Equity" by Emmanuel Kumah, Jannick Damgaard, and Thomas Elkjaer. The working paper primarily focuses on providing practical guidance for compilers of FDI statistics. This paper, on the other hand, focuses on the impact that valuation choices can have on the analysis of FDI statistics, for example when data are used for the balance sheet approach or as an indicator of globalization. The views expressed in this paper are those of the authors and should not be attributed to Danmarks Nationalbank or the International Monetary Fund, its Executive Board, or its management.

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techniques, but just one valuation method, *price to earnings*. This variation points to a need for prescriptive international guidelines to ensure comparable FDI data. While the results are presented in an FDI context, the uncertainties also apply to other macroeconomic datasets, including national accounts statistics.

The BSA is widely used in macroeconomic risk analysis to assess how weaknesses in one sector can spill over to other sectors and affect the whole economy since financial difficulties of a debtor represent difficulties for its creditors (Allen *et al*., 2002). The external wealth of a nation, also called the international investment position (IIP), is an important part of the national financial balance sheet. FDI often makes up a large part of the IIP and includes all cross-border investments between companies in an FDI relationship, which is defined according to control or significant influence; the operational threshold is 10 percent or more for equity ownership. FDI is also one of the most challenging items to compile and measure. In addition to normal compilation challenges, for example coverage, market-equivalent values for FDI have to be estimated because most direct investment enterprises, both in general and in the case of Denmark, are unlisted and infrequently traded. While it is well known that FDI has surged in the last two decades, it is much less known how substantially the valuation method and estimation technique can affect FDI data.

This paper studies to what extent recent international harmonization of practices for valuation of FDI can be expected to generate internationally-comparable FDI data. The key focus is on FDI liabilities. This approach is consistent with the common view amongst compilers that inward FDI data are more reliable than outward FDI data for two main reasons: (i) it is easier to identify direct investment enterprises rather than the direct investors; and (ii) once a relevant company is identified, it is easier to get accounting or other relevant information from a resident company compared to a non-resident company, in particular when the company is unlisted. The Coordinated Direct Investment Survey (CDIS) also reflects this view: all countries report inward FDI while outward FDI is an "*encouraged item*." In the same way, any cross-country data sharing to promote international consistency would probably be based on each country sharing FDI liabilities information. However, different valuation models will also affect FDI assets and, thereby, the IIP, both net and gross. This paper finds that, although the harmonization in the IMF Balance of Payments and International Investment Position Manual, sixth edition (*BPM6*) (IMF, 2009), which some countries have already implemented and others will implement in the coming years, can be expected to enhance comparability, differences in valuation methods and estimation techniques can still significantly affect FDI estimates.

The remainder of this paper is organized as follows. Section 2 highlights the increased focus on position data, including for BSA purposes, in macroeconomic statistical standards. Section 3 introduces the valuation methods recommended in the *BPM6* and discusses the treatment of liquidity, control premium and negative positions in macroeconomic statistics. In Section 4, data are presented. The empirical models are estimated, compared and discussed in Section 5, and in Section 6 the results are applied to Danish FDI data. Section 7 concludes and offers recommendations for improving market-value approximations and cross-country comparability.

2. Increased Focus on Position Data in Macroeconomic Statistical Standards

The growing importance of the BSA is reflected in the sixth and latest edition of the *BPM6* from 2009, which applies an integrated approach to flows and stocks of funds. The IIP was introduced in 1977 in the fourth edition of the Manual, while the fifth edition from 1993 presented a systematic IIP framework.

The availability and quality of IIP data have increased rapidly; from 25 countries reporting to the IMF in 1995, to 137 in 2013. In addition, there was a significant contribution to data availability by Lane and Milesi-Ferretti (2001, 2007), who estimated external assets and liabilities for 145 countries, in the "External Wealth of Nations" dataset. The availability and quality of FDI data have also increased rapidly. Starting with data for 2009, the IMF conducts an annual survey of FDI positions, the CDIS, to which around 100 countries currently report data to.

The *BPM5* provided only limited guidelines on how to estimate the market value of unlisted FDI, but the *BPM6* includes specific methods. This paper finds that, although the harmonization in the *BPM6* can be expected to enhance comparability, differences in valuation methods and estimation techniques can still significantly impact FDI estimates.

3. Valuation in Macroeconomic Statistical Standards

Market value is the preferred valuation principle in macroeconomic statistical standards, including in the *System of National Accounts 2008* (2008 SNA), the *European System of Accounts* (ESA 2010), and the *BPM6*. If financial instruments are not or only infrequently traded, a *fair value* should be estimated as: "the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's-length transaction" (*BPM6*, paragraph 3.88). Some of the financial instruments that are commonly valued on the basis of valuation methods rather than observable market prices are unlisted equity, insurance technical reserves, and pension entitlements. According to the *BPM6* (paragraph 3.86), loans and deposits are valued at nominal value. This is partly for pragmatic reasons such as data availability and symmetric cross-country recording, and also because nominal value constitutes the legal value in case of bankruptcy.

The IIP is divided into five functional categories: (i) FDI; (ii) portfolio investment; (iii) financial derivatives and employee stock options; (iv) other investment; and (v) reserve assets. While unlisted equity can be a part of several of the functional categories, the impact of valuation methods is mainly relevant to FDI, because this is typically in the form of unlisted companies.

To enhance comparability, the *BPM6* (paragraph 7.16), as a new feature, recommends seven[1] methods for estimating market values of equity in unlisted

[1]The *BPM6* (paragraph 7.16) only lists six methods, but the method in paragraph 7.16(c) can be seen as two separate methods. The six/seven methods are the result of discussions in several international bodies, e.g. the IMF Committee on BOP Statistics, the OECD WG on International Investment Statistics, and the Eurostat/ECB Task Force on FDI. A further description of the methods and their usages and caveats can be found in the draft *BPM6 Compilation Guide*, which is available at the IMF website. The fourth edition of the *OECD Benchmark Definition of Foreign Direct Investment* (OECD, 2008) also describes these methods.

direct investment enterprises. These methods are based on theoretical equity valuation models, which can be split into *absolute* and *relative valuation models*. In absolute valuation models, equity value is determined only by the characteristics of the particular company. Most absolute valuation models take a net present value approach, by discounting future cash flows. In relative valuation models, a company is valued at the same price as companies with similar characteristics since, for arbitrage reasons, similar assets must trade at similar prices.

Some methods, for example *price to earnings* (P/E) and *price to book value* (P/B), are also used in financial markets to estimate a company's value.[2] The method *own funds at book value* (OFBV) serves mainly macroeconomic statistical purposes, to harmonize book value definitions across economies and accounting standards. Table 1 provides the pros and cons of the different methods.

3.1. *Universal Applicability of the BPM6 Valuation Methods*

The seven *BPM6*-recommended valuation methods have different advantages, but if a valuation method cannot be used by most statistical agencies and on most companies, then that method is very unlikely to yield comparable cross-country data. Consequently, methods that are not, at least broadly, applicable in practice are dropped in this paper. First, the methods must be based on publicly available information about a company rather than subjective assumptions, for example future cash flows. Even if the individual statistical agency might be able to make such assumptions in a consistent manner, this is unlikely to hold across countries, potentially leading to asymmetries. The publicly-available information constraint eliminates both *present value of earnings* because it requires assumptions about future earnings, and *net asset value* because it requires first-hand information about the companies.[3]

Second, the information must be available for most companies, which eliminates both *recent transaction price* because a recent transaction price does not exist for most unlisted companies, and *apportioning global value* because many unlisted companies are not a part of a listed group. Thus, four of the seven *BPM6* methods are eliminated. For the remaining three methods, P/E and P/B and *OFBV*, the required data are publicly available. This narrowing of methods also reflects the most commonly-used method among statistical agencies; for instance, in the CDIS more than 80 percent of the countries use the OFBV valuation method.

3.2. *Other Issues Related to Valuation of Unlisted Equity*

Three additional factors can significantly affect the valuation of unlisted equity: liquidity; control premium; and negative equity values. These issues are only briefly discussed in macroeconomic statistical manuals.

[2]Valuation multiples are typically calculated as price per share divided by factor units per share. The focus of this study is to estimate the value of the whole company, so it is not necessary to divide by the number of shares. Therefore, in this study, P denotes total market value of the company while E and B denote total company earnings and book value, respectively.

[3]The International Financial Reporting Standards (IFRS) also contain a similar thinking on preferable valuation methods. In IFRS, fair value methods are split into three levels based on their desirability: level 1 is valuation based on quoted prices for identical instruments, level 2 is estimation based on market prices of similar instruments, and level 3 is companies' own fair-value estimates based on internal information, which should only be used if inputs from levels 1 and 2 estimates are not available.

TABLE 1

OVERVIEW OF THE BPM6-RECOMMENDED VALUATION METHODS

Method	Name	Description	Advantages	Disadvantages
A (absolute)	Recent transaction price	Use recent transaction price as market price	• Simple implementation 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
B (absolute)	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	• Unlikely that respondents use uniform principles • Companies may have an incentive to report incorrect estimates for protectionist reasons
C1 (absolute)	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	• Assumes that future earnings are known • Approximates fundamental value rather than market value
C2 (relative)	Price to earnings (P/E)	Apply P/E ratios from listed equity to unlisted equity	• Simple implementation • 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
D (relative)	Price to book value (P/B)	Apply P/B ratios from listed equity to unlisted equity	• Simple implementation • 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
E (absolute)	Own funds at book value (OFBV)	The sum of paid-up capital, reserves, cumulated undistributed net profits, and holdings gains and losses included in own funds	• Simple implementation • Promotes symmetric recording if used by all countries	• Book values do not necessarily reflect market values • Accounting principles differ across countries
F (absolute)	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 the estimations	• Difficult to find the best apportioning indicator • Not a general method because not all direct investment enterprises are a part of a listed group

First, unlisted companies typically are less liquid than listed companies which tends to negatively affect valuation and should, if significant, be taken into account when estimating market-equivalent values.

Second, since unlisted companies usually have one or few owners, a control premium is frequently paid for a controlling stake. Given that this premium is normally offered to all owners, all shares in a company should be valued at the same price.

Third, the valuation methods can generate negative positions, which are not consistent with the limited liability aspect of equity. For instance, the price-to-earnings method often generates negative market-value estimates as earnings are volatile and frequently negative. While it may be argued that negative equity positions should not be included, some direct investment enterprises are quasi-corporations, such as branches or notional units, which are needed to make a split between resident and non-resident elements. As the direct investor would be liable for the debt of these units, negative equity may be recorded. Moreover, many direct investment enterprises are owned by a single investor, who may recapitalize a distressed company or extend guarantees beyond the equity. Since the *BPM6* is flexible on whether to include negative FDI in the IIP, country practices differ.

4. Data

Because market prices are typically only available for listed companies, then, consistent with common practice, models based on listed companies will be used to value unlisted companies. This practice rests on four assumptions: (i) the law of one price; (ii) comparables exist; (iii) the models are transferable; and (iv) data projections outside the range of the input data can be made (see Kumah *et al*., 2009).

To estimate valuation models for unlisted Danish FDI liabilities, Bureau van Dijk's Odin Database is used. By using only a single, comprehensive dataset, variation stemming from different datasets is eliminated. It contains information on all public and private limited companies, with the exception of banking and insurance companies, in Denmark, Finland, Norway, and Sweden. Data are on company level, rather than group consolidated. For a description of the quantitative variables, see Table A1 in the Appendix.

A number of qualitative variables are also used; see Table A2 in the Appendix. Companies are combined into industry groups with similar earnings potential and risks, but since the number of companies in the Danish stock market is limited, the model estimations will also be based on data from Finland, Norway, and Sweden. There are no capital restrictions for investors in these countries, and business potentials and risks are comparable. Remaining country differences, such as regulations and accounting, can be captured by a country dummy variable. Finally, a dummy variable is used to identify companies included in one of the Nordic main stock indexes.

5. Estimation of Valuation Models

Estimation techniques, in addition to the valuation methods discussed above, are also important for valuation. Combinations of valuation methods and

estimation techniques that lead to robust valuations (stable ratios) are preferred, because these will increase cross-country comparability. Central tendency measures or the regression approach can be used to estimate P/E and P/B ratios. The central tendency measures are easily applied, but only allow direct inclusion of a single variable. The regression approach, on the other hand, makes it possible to include several variables.

5.1. *Central Tendency Measures for Valuation Multiples*

Different central tendency measures should, in principle, yield identical ratios for each industry group, because the single factor, earnings or book value, would be able to explain all variation in market value across companies in the same group. In practice, ratios vary across different central tendency measures. Robust central tendency measures, as measured by dispersion across different estimation techniques, are preferred. No general rule exists to determine the best measure; it depends on the distribution of the multiples, the proportion and size of the negative values, and the expected distribution of multiples for unlisted equity. Central tendency measures for P/E and P/B can be estimated using different techniques: *mean*, *median*, or *summation* (see Table 2).

As suggested in the *BPM6* (paragraph 7.16 (d)), OFBV is used as the book value (B) in P/B ratios and earnings before taxes (E) as earnings in P/E ratios. Valuation multiples are only defined for positive denominators, but companies with non-positive OFBV or earnings may be included in the *total summation*

TABLE 2
CENTRAL TENDENCY MEASURES FOR VALUATION MULTIPLES

Measure	Formula	Excluded Observations
Total summation	$\frac{P_i}{X_i} = \frac{\sum_{j=1}^{n} P_j}{\sum_{j=1}^{n} X_j}$	None
Positive summation	$\frac{P_i}{X_i} = \frac{\sum_{j=1}^{n} P_j}{\sum_{j=1}^{n} X_j}$	Listed companies where $X_j \leq 0$
Arithmetic mean	$\frac{P_i}{X_i} = \frac{1}{n} \cdot \sum_{j=1}^{n} \frac{P_j}{X_j}$	Listed companies where $X_j \leq 0$, and highest and lowest 5% of multiples
Weighted mean	$\frac{P_i}{X_i} = \frac{\sum_{j=1}^{n} \frac{P_j^2}{X_j}}{\sum_{j=1}^{n} P_j}$	Listed companies where $X_j \leq 0$, and highest and lowest 5% of multiples
Median		Listed companies where $X_j \leq 0$

Notes: P denotes market value of equity; X earnings or OFBV; i unlisted companies; j listed companies in the peer group; n total number of listed companies in the peer group. The 5 percent outlier threshold is arbitrary, but the purpose is to eliminate the effect of outliers, which particularly in small datasets can influence the results. The threshold will depend on the characteristics of the individual datasets.

estimates as long as the sum of book values or earnings are positive at the industry group level. For all the estimation techniques, the multiples may also be applied to direct investment enterprises with negative earnings or OFBV, which would provide negative valuations; cf. the discussion of negative FDI in Section 3.2.

Valuation multiples calculated at the company level can result in extreme values. For instance, in a given year, some companies' earnings can be affected by temporary shocks or anomalies due to large write-downs, extraordinary gains or losses, unusually strong or weak demand, or heavy investment in intangible assets that is accounted for as a current expense. In such cases, the earnings can be regarded as outliers, and the valuation of those companies should be based on projected normal earnings.

One way to reduce the effect of temporary shocks would be to use a moving average of earnings for the calculation of P/E ratios. Such an approach may, however, lead to outdated market-value estimates. For instance, if a company has displayed strong earnings in the past few years, but the profitability has declined significantly in the last year due to a permanent change in the company's earning potential, the moving average would lead to an upwardly-biased market-value estimate. In addition, a moving-average approach would be substantially more demanding in terms of data requirements, than an approach based on data for a single year.

An alternative approach to try to adjust for some of the potential distortions of using earnings could be to use "funds from operations" as a better measure of income than the earnings as defined in accounting because the high depreciation charges that are deducted in calculating earnings do not necessarily reflect the real change in the asset value, for instance for real estate holdings. Or if revenues are growing rapidly, the business may be investing in intangibles and growth and therefore be more valuable than its current earnings would imply. However, such an approach, like the moving-average approach, requires additional data or more company-specific judgment to make it broadly applicable.

To mitigate the above concerns about potential distortions, the practical approach taken in this study is to limit the impact of outliers by excluding the highest and lowest 5 percent of the valuation multiples in the calculation of the mean measures.

A main advantage of the *total summation* technique, unlike the means and median, is that its application to the original dataset will generate FDI valuation that equals the sum of the observed prices in the original dataset, if negative FDI is recorded in the IIP. This approach is, in effect, also a way to smooth volatile earnings data across companies. Some companies are likely to have extraordinary high earnings in a given year while other companies will have extraordinary low earnings, in which cases the *total summation* technique will generate too high valuations for the former and too low, and probably negative, valuations for the latter. However, if there are no systematic differences between unlisted companies and listed companies, which have been used as the basis to estimate the valuation models, the aggregation process will eliminate or significantly reduce company-level estimation errors at the macroeconomic statistical level. On the other hand, if negative positions were to be excluded, this approach could lead to upwardly-biased estimates and provide biased IIP data.

TABLE 3
CENTRAL TENDENCY MEASURES FOR P/E AND P/B RATIOS

	All	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
				P/E ratios			
Total summation	14.5	14.6	19.6	8.3	7.8	27.1	10.3
Positive summation	12.8	13.9	16.4	7.5	7.2	23.8	8.8
Arithmetic mean	40.5	41.4	34.0	35.3	30.9	42.0	53.8
Weighted mean	29.5	24.9	24.0	23.5	19.9	34.5	43.6
Median	20.7	30.5	21.6	15.2	11.3	27.1	24.0
Dispersion	216%	198%	107%	371%	329%	76%	511%
				P/B ratios			
Total summation	3.0	4.5	2.7	2.1	1.4	4.2	3.0
Positive summation	3.0	4.5	2.7	2.1	1.4	4.2	3.0
Arithmetic mean	3.6	3.8	3.5	3.7	2.7	3.7	3.5
Weighted mean	4.2	5.4	3.9	3.0	2.3	4.6	4.1
Median	2.7	2.9	2.9	2.5	1.5	2.6	2.9
Dispersion	56%	86%	44%	76%	93%	77%	41%

Notes: Dispersion is calculated as the difference between the highest and lowest measure in percent of the lowest measure. The six industry groups are defined in Table A2 in the Appendix.
Source: Calculations based on data from Bureau van Dijk's Odin Database.

To compare the dispersion of the P/E and P/B models across the different estimation techniques, the central tendency measures are calculated for six industry groups (see Table 3). P/E ratios are considerably more dispersed than P/B ratios, which means that differences in estimation techniques have a larger impact under the *price-to-earnings* valuation method; that is, FDI data based on P/E ratios are likely to differ across statistical agencies because different estimation techniques are applied. The distributions of multiples are right-skewed because, for instance, the P/E ratio is only defined at the company level for companies with positive earnings. For this reason, the *arithmetic mean*, in particular, tends to be upwardly biased.

The central tendency measures exceed 1 for all industry groups for P/B ratios, implying that the market values of companies are higher than their book values which may be explained by the fact that many intangible assets are not included in book values. Moreover, if companies value their assets and liabilities at outdated historical costs, OFBV is less suitable as a proxy for market value. This means that while OFBV promotes cross-country comparability, it does not necessarily lead to updated market-value approximations. The *BPM6* (paragraph 7.16(e)) emphasizes that frequent revaluation of assets and liabilities provides a closer approximation to market prices.

The estimation technique plays an important role for the valuation multiples not only for Nordic companies, but also in a global context. For instance, P/B ratios based on companies in the global stock index, S&P Global 1200, vary from 1.8 when applying the *total summation* measure to 3.3 using the *arithmetic mean*. This finding clearly indicates that other countries' FDI and IIP data would also be significantly affected by a shift from OFBV to a P/B model.

5.2. *Regression Models*

The second approach is to estimate FDI regression models, which are useful when several explanatory variables are relevant. These include both quantitative

and qualitative variables related to future earnings and risks. The regression models can be used to estimate valuation multiples, which are subsequently applied to unlisted FDI in the same way as for the central measures above.

Since level-based regression models on company level data usually are biased due to scale effects and multicollinearity, company-specific valuation multiples can be used as the dependent variable, thus mitigating scale issues (see Kumah *et al*., 2009).

When valuation multiples are robust (i.e., low dispersion across companies), earnings or book value can account for most of the variation in equity valuations. On the other hand, if the dispersion is high, earnings or book value are not able to account for the majority of the variation in equity valuations and, therefore, are not suitable as a stable deflator of market values across companies. Consequently, since the different central tendency measures are significantly more robust for P/B than P/E, only regression models based on company-specific P/B ratios are estimated.

A clear advantage of the regression approach is that liquidity and other relevant variables can be included directly. The two liquidity variables, log of trading volume (*LOGVOL*) and the stock market index variable (*INDEX*), are significant, thus illustrating the need to account for liquidity in the estimation of models based on data for listed companies (cf. Section 3.2). The stock market index variable has a parameter estimate of 0.81, which indicates that a company included in one of the Nordic main stock indexes will *ceteris paribus* trade at a P/B ratio that is 0.81 higher than other companies.

The size of a company may also have an impact on the valuation. Large companies will often trade at higher ratios due to high liquidity. However, assuming the liquidity effect is picked up by the liquidity variables, large companies often trade at discount, for instance due to lack of focus, extra management layers, and cross subsidization (Berger and Ofek, 1995). Hence, another dummy variable (*OFBV < 200*) is used to distinguish between companies with OFBV below and above 200 million euro. The variable has a significantly positive parameter estimate, i.e. higher P/B ratios for smaller than for larger companies.

Only the industry group dummy variable for *financial intermediation and auxiliaries*[4] (*DUM_IND4*) industry group is significant. Companies in the financial intermediation and auxiliaries group have lower P/B ratios than other companies, which may be explained by financial companies' tendency to revalue their assets and liabilities often, for instance by mark-to-market, thus bringing OFBV more in line with market value and reducing the need for a P/B adjustment. Table 4 shows the P/B regression results where only the significant variables from Tables A1 and A2 are included in the final model.

Unlisted companies are rarely traded so the trading volume parameter is dropped in the application of the regression model. Hence, there will be four different P/B ratios: two for the *financial intermediation and auxiliaries* group for companies with OFBV below 200 million euro (1.92) and above 200 million euro

[4]As noted, banking and insurance companies are not included in Bureau van Dijk's Odin Database so this group consists mainly of companies classified in the NACE revision 1.1 as *other financial intermediation n.e.c.*

TABLE 4
REGRESSION MODEL WITH P/B RATIOS AS DEPENDENT VARIABLE

Variable	Coefficient	S.E.	t-value	P > |t|	95% C.I.
Constant	1.76	0.43	4.08	0.00	0.91 to 2.61
LOGVOL	0.13	0.04	2.98	0.00	0.04 to 0.21
INDEX	0.81	0.41	1.97	0.05	0.00 to 1.62
OFBV < 200	0.99	0.30	3.35	0.00	0.41 to 1.57
D_IND4	–0.83	0.37	–2.23	0.03	–1.57 to –0.10
Adjusted R^2	0.04				

Notes: Companies with highest and lowest 5 percent of P/B ratios have been excluded prior to the model estimation.
Source: Calculations based on data from Bureau van Dijk's Odin Database.

(0.93), and two for the remaining industry groups for companies with OFBV below 200 million euro (2.75) and above 200 million euro (1.76).

6. A Country Illustration: Impact on Danish FDI Data

Danish FDI data are highly sensitive to both the choice of valuation method and estimation technique: Danish unlisted FDI liabilities can change from 48 to 340 billion euro. While these numerical results are specific for Denmark and the precise quantitative result should not be extended to other countries, the large variation in P/B ratios based on companies in the S&P Global 1200 clearly indicates that other countries' FDI/IIP data are also very sensitive to differences in methods and techniques. Denmark can be seen as a typical country in terms of open financial account, significant FDI assets and liabilities, and data availability. According to UNCTAD (2009), Denmark had the 20th highest inward FDI position in the world, at end-2008.

P/E central tendency measures generate unlisted FDI liabilities ranging from 54 to 340 billion euro (see Table 5). This difference corresponds to 131 percent of the Danish GDP. The treatment of negative positions is also an important source for the variation, in particular for P/E models, because unlisted companies' negative earnings are not masked by the earnings of a few large-cap companies as seen for listed companies. Exclusion of negative positions leads to FDI estimates that are more than 50 percent larger than when negative positions are included. As mentioned in Section 3.2, the *BPM6* allows the inclusion of negative FDI, but country practices differ.

For P/B models, FDI estimates are considerably more stable. Total market-value estimates of unlisted FDI liabilities vary from 101 to 186 billion euro. The variation corresponds to 39 percent of GDP which, while still large, is much smaller than for the P/E models. The P/B models consistently generate higher FDI estimates than OFBV, which may be explained by the fact that accounting standards only capture intangibles to a limited extent. Or put differently, since P/B ratios, on average, are higher than 1, the use of unadjusted OFBV would underestimate market values.

As was the case for P/E models, the *means* produce the highest FDI estimates for P/B models. The *arithmetic mean* is upwardly biased because it is affected by

TABLE 5

VALUE OF UNLISTED FDI EQUITY LIABILITIES IN THE DANISH IIP DEPENDING ON VALUATION METHOD AND ESTIMATION TECHNIQUE

	Incl. Negative Positions		Excl. Negative Positions
		P/E models	
Total summation	62		94
Positive summation	54		82
Arithmetic mean	211		340
Weighted mean	158		258
Median	102		162
		P/B models	
Total summation	134		137
Positive summation	134		137
Arithmetic mean	168		172
Weighted mean	182		186
Median	130		132
Regression	101		104
		OFBV	
	48		49

Notes: Estimates for end-2006 in billion euro. Banking and insurance companies are not included in the calculations.

Source: Calculations based on data from Bureau van Dijk's Odin Database and Danmarks Nationalbank.

skewness in the distribution of P/B ratios while the *weighted mean* is upwardly biased because of the influence of a few large companies included in major stock market indexes. Even though almost 15 percent of the unlisted direct investment enterprises display negative OFBV, it only makes a small difference whether negative FDI is included when the P/B models are applied, because there is a limit to how negative OFBV can get before a company is liquidated or the equity is restored to stay in business. Consequently, the negative OFBV observations are small compared to the positive observations.

The wide range from 48 to 340 billion euro generated by applying different valuation methods and estimation techniques to Danish unlisted FDI equity liabilities can be narrowed down significantly by excluding measures that are subject to the known biases described above. The *mean* measures will result in upwardly-biased estimates because the effects of the highly right-skewed P/E and P/B ratios feed directly through to the valuations, even after the exclusion of the 5 percent highest and lowest valuation multiples in the calculation of the *mean* measures. OFBV, on the other hand, is likely to lead to downwardly-biased estimates due to the limited inclusion of intangibles in book values. After exclusion of these estimates, based on the central tendency measures, the P/E method yields estimates ranging from 62 to 162 billion euro while the range for the P/B method is considerably smaller: from 130 to 137 billion euro. Clearly, the P/B method provides more stable valuations across estimation techniques than the P/E method, and therefore the P/B method is preferred. With regard to the estimation technique, while both the *median* and *summation* techniques offer the advantage of a narrow range for FDI estimates, they do not allow for the inclusion of liquidity and company-size

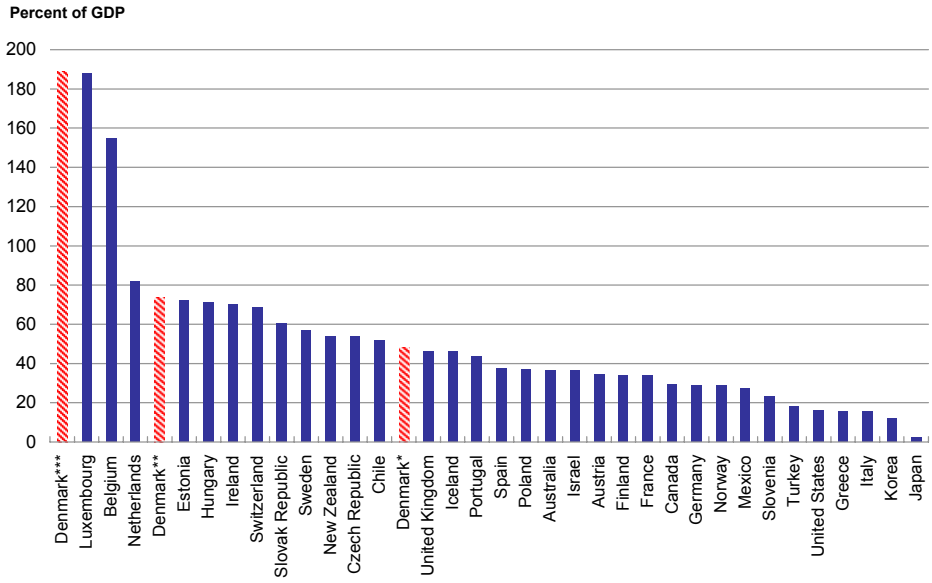

Figure 1. Inward FDI as Percentage of GDP for OECD Countries

Notes: Data for end-2006. Denmark* represents the official Danish FDI statistics where *OFBV* is used for the valuation of unlisted equity. Denmark** represents the favored model in this study, i.e. the *P/B regression model*, while Denmark*** represents the *P/E model* based on the *arithmetic mean* estimation and with the exclusion of negative positions.

Source: OECD and own calculations.

variables. Therefore, the favored approach, in the case of Denmark, is to base the valuation on the P/B method in combination with the regression approach because (i) it allows the inclusion of liquidity and company-size variables; and (ii) it yields estimates within a very narrow range from 101 billion euro including negative positions to 104 billion euro excluding negative positions.

A commonly used indicator for an economy's attractiveness or the extent of globalization is FDI as a percentage of GDP, according to which Denmark is ranked 13th among the OECD countries (see Figure 1).[5] Most—but not all—OECD countries use OFBV. If Denmark decided to change from OFBV to this study's favored model—that is, the P/B regression model—Denmark would be ranked 4th. A shift to a P/E approach based on the *arithmetic mean* and with the exclusion of negative values would put Denmark in 1st place. All three approaches are fully in line with the *BPM6*. This example illustrates that the valuation method and estimation technique can significantly affect FDI data and could, potentially, lead to erroneous conclusions in cross-country comparisons, pointing to the need for further international harmonization.

This paper focuses on FDI liabilities and does not attempt to make specific estimates for FDI assets. However, the large variation in P/B ratios, using the S&P Global 1200, clearly illustrates that moving from OFBV to other market-value

[5]The high ratios in the Benelux countries can, to a large extent, be explained by the widespread existence of special purpose entities (SPEs) in these countries.

approximations would also have a significant impact on FDI assets. The net IIP effect of a change in valuation practice will be, *ceteris paribus*, larger for countries with large net FDI positions, which is typical for emerging markets, and for economies with large differences between P/B ratios for FDI assets and liabilities. This could be the case if national accounting practices require revaluation more often than in other countries, thereby reducing the need for adjustments of FDI liabilities compared to assets.

7. Findings and Recommendations

Valuation is important for FDI and can significantly impact the IIP. Even with the harmonization provided by the *BPM6*-recommended valuation methods, which some countries have already implemented and others will implement in the coming years, FDI data may not be comparable across countries. This study contains three important findings in relation to FDI compilation. First, differences in estimation techniques have a larger impact for the P/E method than the P/B method; that is, FDI data based on P/E are likely to differ across countries because different estimation techniques are applied. Second, some valuation methods, especially the P/E method, tend to result in significantly negative market-value estimates for a large number of direct investment enterprises. Since some countries record negative positions in the IIP while others do not, the treatment of negative positions plays a vital role if P/E ratios are used for the valuation of direct investment enterprises. Third, the OFBV method may promote cross-country comparability, but does not necessarily lead to updated market-value approximations, particularly if assets and liabilities are not revalued frequently.

To increase the quality and comparability of FDI data, four recommendations could be considered. First, the shortlist of valuation methods recommended in the *BPM6* is an improvement, but the number of methods and, equally important, the range of estimation techniques should be reduced. Combinations of valuation methods and estimation techniques that lead to robust valuations are preferred, because these will increase cross-country comparability. Prime candidates to stay in as valuation methods are *OFBV*, *P/E*, and *P/B*. On the other hand, *present value of earnings* and *net asset value* seem less relevant because these methods are based on subjective assumptions. Similarly, *recent transaction price* and *apportioning global value* seem less relevant because the methods are not generally applicable. With regard to the estimation techniques, since distributions of valuation multiples are typically highly right-skewed, valuations based on mean measures are likely to be upwardly biased and should only be used with caution. If models are estimated on the basis of listed companies, compilers should try to take into account the illiquidity discount of unlisted companies, for example by estimating regression models on valuation multiples with liquidity variables as explanatory variables, or alternatively by applying a fixed illiquidity discount to valuations based on the *median* and *summation* techniques.

Second, more explicit and harmonized guidance on the issue of negative equity positions would be helpful. The following principles could be used to determine whether a direct investment enterprise with negative equity should be included in the IIP: (i) negative equity in branches and notional units should be

recorded in the IIP as the direct investor would be liable for the debt of such units in case of bankruptcy; and (ii) negative equity in limited liability direct investment enterprises should not be recorded unless the direct investor has given an explicit guarantee to cover the debt of the direct investment enterprise, in which case negative equity should be recorded (however, the recorded amount cannot exceed the guaranteed amount). In practice, caution should be exercised when excluding negative positions. At the company level, some valuations are likely to be too high and others too low (and probably negative). If only the latter are excluded from the IIP, the final result at the macroeconomic statistical level may be upwardly biased.

Third, information-sharing among statistical agencies could be improved. For example, each country could develop models for the valuation of resident direct investment enterprises and share the models with other compilers. It is likely that country differences would be reduced if most compilers use the same model to value direct investment enterprises located in a given economy, and data quality would improve if the valuation models were estimated by compilers with extensive knowledge about the specific economy.

Fourth, given FDI data's high sensitivity to the compilers' choice of valuation method and estimation technique, statistical agencies could publish alternative FDI datasets based on different methods. The range of results will help users to understand the sensitivity of the estimates.

To promote consistent FDI estimates, the IMF's CDIS recommends the use of OFBV as the valuation principle for unlisted FDI, which is in line with this study's conclusion that P/B ratios should be used to value unlisted FDI. If P/B models are estimated for all countries, the CDIS will be able to provide input data to estimate market values for unlisted FDI in most participating countries based on comparable valuation methods. Such an initiative would be a valuable contribution to the analysis of the external wealth of nations.

Appendix Tables

TABLE A1

Quantitative Variables

Name	Unit	Description	Mean	S.D.	Min.	Max.
P	EUR million	Total market value of equity	1,043	4,052	0	63,388
B	EUR million	Own funds at book value	349	1,196	–3	11,124
E	EUR million	P/L before taxes	72	423	–637	7,404
VOL	EUR million	Equity trading volume in December	15,873	101,719	0	2,172,892

Note: Based on data for 2006 for listed companies in Denmark, Finland, Norway, and Sweden.
Source: Calculations based on data from Bureau van Dijk's Odin Database.

TABLE A2

Qualitative Variables

Variable	Value	Description	NACE Code	Frequency (%)
DK	1	Denmark	–	103 (15)
	0	Finland	–	124 (18)
	0	Norway	–	113 (17)
	0	Sweden	–	342 (50)
Index	1	Included in main stock market index	–	66 (10)
	0	Not included in main stock market index	–	616 (90)
Industry	1	Information and communication technology (ICT) activities	30, 313, 32, 332, 333, 642, 7133, 72	103 (15)
	2	Mining/energy	C + E	18 (3)
	2	Manufacturing (non-ICT)	D (except 30, 313, 32, 332, 333)	119 (18)
	2	Construction	F	7 (1)
	3	Trade	G	51 (8)
	3	Hotel/restaurants/transports/ communication (non-ICT)	H + I (except 642)	36 (5)
	4	Financial intermediation	65	46 (7)
	4	Insurance	66	0 (0)
	4	Financial and insurance auxiliaries	67	6 (1)
	5	Real estate/non-financial services (non-ICT/non-holdings)/others	K (except 7133, 72, 7415) + others	157 (23)
	6	Holding companies	7415	139 (20)

Notes: Based on data for 2006 for listed companies in Denmark, Finland, Norway, and Sweden. The 11-industry group breakdown recommendation from the European Test Exercise (Banque de France and Eurostat, 2004) is used as a starting point. When industry groups only include a few companies in the Nordic dataset, close industry groups are combined, resulting in six industry groups as indicated in the value column.

Source: Calculations based on data from Bureau van Dijk's Odin Database.

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