the review of income and wealth

Review of Income and Wealth
Series 57, Number 4, December 2011
DOI: 10.1111/j.1475-4991.2011.00439.x

FORECASTING FDI EQUITY INCOME FOR THE DANISH BALANCE OF PAYMENTS

by Jannick Damgaard,* Mathies Lau Friis Laursen and Robert Wederkinck

Danmarks Nationalbank

Late and significant revisions are often observed in FDI equity income in many countries, hampering the quality of preliminary balance of payments statistics. We test a range of models on Danish data and find that forecasts for FDI equity income based on a combination of past profitability and consensus data for changes in expected private consumption growth outperform forecasts solely based on historical profitability. When the refined models are applied to the Danish balance of payments, the largest improvements are observed for outward and inward FDI separately. Revisions of net FDI equity income only decrease marginally because the significant revisions in gross terms resulting from the historical models have a tendency to (partly) cancel out each other on a net basis.

1. Introduction

The outcome of the annual revision of the Danish balance of payments is published in October every year. As in many other countries, the largest revisions in the current account can frequently be attributed to FDI equity income in the previous year (see Figure 1). The gross revisions are particularly large, but net FDI equity income is often revised significantly as well, directly affecting the current account balance. Large revisions of preliminary statistics cast doubt on the data and hamper the analytical usefulness of these statistics.

The late and significant revisions in FDI equity income have become common since the fifth edition of the *IMF Balance of Payments Manual* (*BPM5*) (IMF, 1993) introduced the estimation of reinvested earnings on FDI equity in 1993. Whereas most other data used for compilation of the preliminary monthly balance of payments are collected from reporters in time to be included in the first assessment, actual data for total FDI equity income, and thereby reinvested earnings, are normally obtained from the reporting companies' annual financial statements. These statements are only available with a considerable time lag, and therefore FDI equity income needs to be forecasted for the preliminary balance of payments. Box 2.5 of the fourth edition of the *OECD Benchmark Definition of Foreign Direct*

Note: The views expressed in this paper are those of the authors and do not necessarily represent the views of Danmarks Nationalbank. The authors are grateful to Niels Haldrup (CREATES, Aarhus University) for inspiration and practical advice regarding the choice of model specification. They thank Piet Philip Christiansen for collecting a vast amount of financial data for the purpose of the analysis. The paper also benefits from constructive suggestions from participants at the joint Eurostat/ECB FDI Workshop in November 2009. Finally, the authors highly appreciate the helpful comments received on earlier drafts of the paper from Allan Sall Tang Andersen, Bent Christiansen, Robert Evans, Niels Lynggård Hansen, Ulrich Kaiser, Nikolaj Malchow-Møller, Niki Saabye, and two anonymous referees. Any remaining errors are the responsibility of the authors alone.

*Correspondence to: Jannick Damgaard, Danmarks Nationalbank, Havnegade 5, DK-1093 Copenhagen, Denmark (jda@nationalbanken.dk).

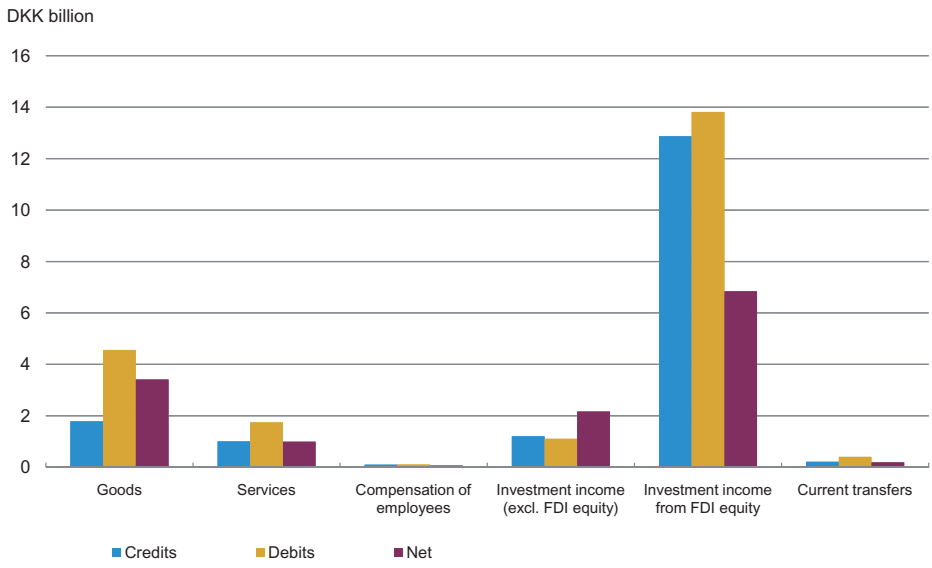

Figure 1. Average Absolute Current Account Revisions for 2006–08

Note: Every year in October, preliminary Danish current account figures for the previous year are revised. The figure shows the average of these revisions in absolute terms broken down by the main current account components.

Source: Authors' calculations based on official balance of payments publications from Statistics Denmark.

Investment (*BD4*) (OECD, 2008) recognizes that this practice leads to large revisions across countries.

A survey conducted by the ECB and Eurostat in 2009 confirms that most EU countries only receive annual income statements from the reporting companies. This is also the case in Denmark where only listed companies are obliged to publish quarterly financial statements, but since most FDI enterprises are not listed, companies are only required to report their total profits annually. Even in the minority of countries where companies report quarterly income statements, there is still a need to forecast FDI equity income for the monthly balance of payments.

The ECB/Eurostat survey also reveals that the majority of countries base their preliminary FDI equity income estimates purely on historical information. Following this practice, the forecast model for FDI equity income used in the Danish balance of payments until December 2009 was based on a 3-year moving average for the profitability of FDI enterprises. Nevertheless, some countries use a combination of historical information and income growth indicators, but so far, no best practice seems to be in place.

The purpose of this study is to test refined forecast models that include a range of indicators in addition to past performance to correct for turning points in the general economic conditions. To our knowledge, this study is the first one to systematically estimate various return on equity (*ROE*) correction models on a large number of financial and macroeconomic indicators, including consensus forecasts, and to methodologically evaluate these. We find consensus data for

changes in expected private consumption growth to be the strongest predictor for the development in profitability. The refined models based on expected private consumption growth changes outperform the 3-year moving average models as well as simple models solely based on performance in the latest available period. On average, the revisions of outward and inward FDI equity income are significantly reduced, whereas the impact on net revisions is smaller.

The remainder of this paper is organized as follows. Section 2 explains how FDI equity income should be recorded in the balance of payments according to the international macroeconomic statistical manuals. In Section 3, the specifications of the refined forecast models are introduced, and the results of the empirical modeling are presented in Section 4. Comparisons between the refined models and the simpler models are made in Section 5 to quantify the impact of implementing a new forecast method for the preliminary Danish balance of payments. Section 6 concludes the paper.

2. Recording FDI Equity Income

According to the international macroeconomic statistical manuals in the area of FDI,[1] income on equity between companies in an FDI relationship is recorded in the balance of payments in the following way:

$$INC_t = RIE_t + D_t, \tag{1}$$

where INC_t denotes FDI equity income in year t, RIE_t reinvested earnings in year t, and D_t dividends payable in year t. In a balance of payments context, FDI equity income is ideally compiled according to the current operating performance concept (COPC), which focuses on the net operating surplus and excludes all valuation changes such as exchange rate changes and realized gains/losses from the disposal of financial assets/liabilities. It also excludes writing-off of intangible assets (including goodwill) due to unusual events, writing-off of research and development expenditures capitalized in a prior period, provisions for losses on long-term contracts, etc. (*BPM6*, paragraph 11.43; *BD4*, paragraph 208). In practical terms, reinvested earnings are calculated as a residual item and are included as imputed transactions in both the income and financial accounts of the balance of payments.[2] Reinvested earnings may be negative in case of high dividends or negative net operating earnings.

[1]FDI statistics are currently compiled on basis of the fifth edition of the *IMF Balance of Payments Manual* (*BPM5*) and the third edition of the *OECD Benchmark Definition of Foreign Direct Investment* (*BD3*) (OECD, 1996). In 2008–09, however, the IMF and the OECD released new and fully consistent editions of the international standards, also known as *BPM6* (IMF, 2009) and *BD4*, which will be implemented in the coming years. The guidelines for recording FDI equity income have only changed slightly from *BPM5*/*BD3* to *BPM6*/*BD4*; we will refer to the new manuals in this study.

[2]For portfolio investment, with the exception of investment fund shares, investment income only includes dividends and not reinvested earnings (*BPM6*, paragraph 11.104). *BPM6* (paragraph 11.41) explains why equity income is defined differently for FDI than for portfolio investment: "The rationale behind the treatment of reinvested earnings on direct investment is that, because a direct investment enterprise is, by definition, subject to control, or influence, by a direct investor or investors, the decision to retain and reinvest some of its earnings within the enterprise represents an investment decision on the part of the direct investor(s)."

Typically, dividends payable will be reported throughout the year whereas information about total FDI equity income is available only after the publication of the companies' annual financial statements. In Denmark, reporting on the profitability of FDI enterprises takes place annually within five months from the end of the financial year. As the monthly balance of payments is published with a lag of 40 days, it is necessary to forecast FDI equity income until the actual data become available.

Like a number of other EU countries (Foreign Direct Investment Task Force, 2004, paragraph 226), Denmark applies an all-inclusive concept for FDI equity income rather than the COPC. Many countries choose to apply the all-inclusive concept rather than the COPC for two reasons. First, the reporting burden has to be considered, and it is easier for companies to report profits according to the all-inclusive concept rather than to the COPC because the former are readily available from their annual financial statements. Second, the all-inclusive concept offers better validation possibilities than the COPC because the reported figures can be checked directly against the figures in the publicly available financial statements.

Investment income defined according to the all-inclusive concept will be more volatile than income defined according to the COPC due to the inclusion of valuation (e.g. price, exchange rate, or other) changes, in particular resulting from unusual events, and is thus likely to be more difficult to predict. Nevertheless, reporters to the Danish balance of payments are instructed to exclude extraordinary gains and losses from FDI equity income. The definition of extraordinary income and expenses in the Danish GAAP is rather restrictive and only includes income and expenses originating from events that do not fall within the ordinary activities and are therefore not expected to be recurring. Examples of such events are unexpected natural disasters and expropriation.

The international macroeconomic statistical manuals are generally based on the accrual principle, but since no reliable distribution indicator is available, the actual annual income for a given FDI enterprise is distributed evenly throughout the year in the Danish balance of payments.[3] Still, total FDI equity income may differ from month to month as the population of FDI enterprises continuously changes due to M&A activity.

As a result of the late availability of final accounting data on FDI enterprises' profitability, it is necessary to estimate two models that can be used to forecast FDI equity income in year t until the actual data become available (see Figure 2). Forecast Model A is based on data from year $t-2$ and is used to construct forecasts for the period $[t(1); t(8)]$, i.e. January to August. In contrast, Forecast Model B is based on data from year $t-1$ and is used to make forecasts for the period $[t(9); t(12)]$, i.e. September to December. The actual data for year t are

[3]Some countries choose to apply interpolation methods to avoid abrupt changes between data in the last months of a year and the first months of the following year.

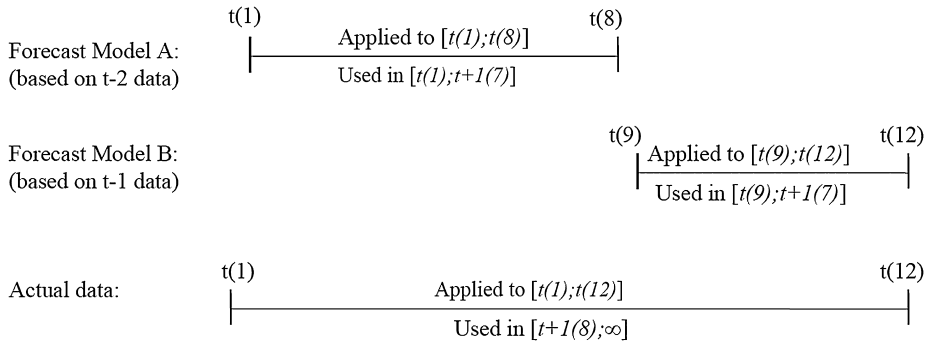

Figure 2. Use of Input Data in Forecast Models

incorporated in the annual revision in October of the following year with the first publication of $t + 1(8)$ data.[4]

3. Specifications of Forecast Models

3.1. *Moving Average Models*

The forecast model for FDI equity income applied in the Danish balance of payments until December 2009 was exclusively based on a 3-year moving average (*MA3*) for past performance. Initial forecasts for *ROE* ratios in month m of year t were calculated at company level in the following way:

$$E\left[ROE_{t(m),j,A,MA3}\right]_{t(m)} = \frac{1}{12}\sum_{t=-4}^{-2}\left(\frac{INC_{t,j}}{0.5\left(EQ_{t-1,j}+EQ_{t,j}\right)}\right)\Big/3, \tag{2}$$

where $INC_{t,j}$ and $EQ_{t,j}$ denote the FDI equity income and position, respectively, for company j in a given year. The subscript A denotes Forecast Model A, meaning that this model was used to make the preliminary estimates for January to August as illustrated in Figure 2. When actual data for year $t - 1$ became available, the model was based on data for the period $[t - 3; t - 1]$. The positions used for the calculation of *ROE* ratios were estimated as an average of the initial and final FDI annual positions. The use of the arithmetic mean for the calculation of monthly *ROE* ratios rather than the geometric mean may have caused a slight, general

[4]Even though the annual financial statements are available five months after the end of the financial year, the final data are not ready to be included in the published data until the detailed data validation process is finalized in October. For technical reasons, $t - 1$ data can only be used in the forecast models when $t(9)$ data are published in November. The regular Danish balance of payments revision policy only allows revisions of the two previous months when the balance of payments for a given month is first published. As our analyses using the empirical models have shown that the effect of revising the two previous months is minimal in practice, we only calculate one preliminary estimate for each month. To simplify, we do not take into account the fact that the account dates of a minority of reporting companies do not follow the Gregorian calendar year.

upward bias in the forecasts. Since extreme *ROE* ratios are often observed at company level, estimated *ROE* observations were adjusted if they were above or below certain thresholds.

3.2. *Refined Models*

The refined forecast models proposed in this paper arc also based on *ROE* ratios rather than on investment income directly because *ROE* ratios, unlike FDI equity income, are stationary.[5] The econometric literature (see, for instance, Granger and Newbold, 1974) has long emphasized that models estimated on non-stationary data often lead to spurious correlations, also termed nonsense correlations. Whereas both types of models are based on *ROE* ratios, the refined models differ from the moving average models in two important ways. First, in order to avoid the extreme *ROE* ratios often observed at company level, the refined models are estimated at country/industry group level for outward/inward FDI equity. The estimated *ROE* ratios can be applied to new FDI enterprises entering the population. Even though some kinds of new investment take several years to start producing equilibrium levels of income, it seems reasonable to apply the *ROE* ratios based on existing companies as most new FDI takes the form of brownfield rather than greenfield FDI.

The second and most important deviation is that the refined models follow the recommendations of the report of the EMI Sub-Group 4 of the BOP Financial Flows and Stocks Task Force (1997) and include macroeconomic and financial indicators in order to reflect turning points in the economy in the estimation of *ROE* ratios. In practice, the refined models compute expected *ROE* ratios as the sum of the latest available *ROE* ratio and a correction term. As will be seen below, this specification can be regarded as a difference transformation of the data and is in line with the recommendations of Granger and Newbold (1974).

To illustrate the calculation and use of *ROE* ratios, we first introduce a simple model, in which the *ROE* ratio in a given period is assumed to be equal to the observation for the corresponding month in year $t-2$ or $t-1$, depending on data availability, to take into account seasonal patterns. Even though investment income is equally distributed throughout the year, there may be seasonal effects in the *ROE* ratios. For instance, Danish companies typically pay out dividends in March–May, which would *ceteris paribus* have a negative effect on positions and consequently lead to higher *ROE* ratios in these months.[6] The *ROE* ratio for Forecast Model A in the simple version is given by:

[5]It may be argued that the *ROE* ratios in general will be upwardly biased because unlisted FDI equity positions are included in the Danish international investment position at *own funds at book value*, which may be lower than the actual market value due to the lack of registration of many intangible assets in international accounting standards (Kumah *et al*., 2009). However, the valuation principle is constant over time and will consequently only affect the scale of the *ROE* ratios, but not the forecasted investment income.

[6]As mentioned in Section 2, reinvested earnings are recorded in both the income and financial accounts. In case of high dividends, reinvested earnings have a tendency to be negative and thus lead to a decrease in positions.

$$(3) \qquad E\left[ROE_{t(m),c,i,A,simple}\right]_{t(m)} = ROE_{t-2(m),c,i} = \frac{INC_{t-2(m),c,i}}{0.5\left(EQ_{t-2(m-1),c,i} + EQ_{t-2(m),c,i}\right)},$$

where c and i denote country and industry groups, respectively. When $t-1$ data become available for the publication of $t(9)$ data, these data will be used instead of $t-2$ data. Forecast Model B is similar to Forecast Model A with the only exception being that it is based on $t-1$ data instead of $t-2$ data. As dividends and other flows such as capital injections/withdrawals, M&A activity, and valuation changes are reported/calculated on a monthly basis, positions including reinvested earnings can be estimated by applying the *ROE* ratios.

The simple model has the obvious weakness that it does not take business cycle changes into account. When the economy goes into a recession, last year's *ROE* ratio is likely to be upwardly biased and vice versa. Such turning points in the economy can be incorporated into the models by including a correction term. We specify a model for the correction term, which is defined as the difference between the actual *ROE* ratio and the latest available *ROE* ratio. The correction terms (*CT*) used in Forecast Model A for a certain country/industry group are computed for all periods available in the dataset in the following way:

$$(4) \qquad CT_{t(m),c,i,A} = ROE_{t(m),c,i} - ROE_{t-2(m),c,i}.$$

The calculation of past correction terms is based on actual data for both year t and $t-2$. There will be eight observations per year for the estimation of Forecast Model A as actual data for the previous year will be available for the estimation in period $t(9)$ onwards. Conversely, there will be four observations per year for the estimation of Forecast Model B, for which the correction terms are defined as:

$$(5) \qquad CT_{t(m),c,i,B} = ROE_{t(m),c,i} - ROE_{t-1(m),c,i}.$$

We have now constructed data for past correction terms, and the next step is to estimate models that will be able to predict the correction terms needed when simply applying the latest available *ROE* ratios. These models will be used as components in the refined Forecast Models A and B, respectively, and are specified in the following regression models:

$$(6) \qquad CT_{t(m),c,i,A} = \alpha_{c,i,A} + \beta_{c,i,A} x_{t(m),c,i,A} + \varepsilon_{c,i,A}$$

$$(7) \qquad CT_{t(m),c,i,B} = \alpha_{c,i,B} + \beta_{c,i,B} x_{t(m),c,i,B} + \varepsilon_{c,i,B},$$

where x indexes the macroeconomic/financial variable that will be used to predict the changes in the *ROE* ratios. As the dependent variable, i.e. the correction terms, is defined as a change variable, all input variables will be differenced. Forecast Model A considers changes from year $t-2$ to t whereas Forecast Model B focuses on changes from year $t-1$ to t.

Forecast Models A and B are based on monthly rather than annual data. Since we are essentially interested in estimating 1/12 of the annual FDI equity income every month, it may be argued that the application of monthly models will inflate the number of observations and artificially lead to more significant parameter estimates. However, one could argue that this is a logical consequence of trying to forecast annual profits before the end of the year.[7] An alternative solution would have been to estimate models on actual annual data and rescale them before applying them to monthly data. On the other hand, actual data for a given year will not be available when the models have to be applied; only forecasts for the macroeconomic variables and year-to-date values for financial variables such as stock market changes are available at that point in time. These data can only be regarded as proxies for the actual annual data. If the models were to be estimated on actual annual data, we would consequently use proxies (forecast and year-to-date data) for the correction term proxies (actual annual data for changes in the general economic and financial conditions) when applying the model. In addition, "actual" data are often revised; such revisions can significantly change the results and make it even more difficult to choose the proper "actual" data to be used in the models (see, for instance, Croushore and Stark, 2001). By estimating monthly models, we use the available monthly data in the estimation as well as in the application of the models.

The parameter estimates are assumed to be time-invariant, but the estimates may change marginally when new data are added to the model. As the between-year differences in data are expected to be more significant than within-year differences, autocorrelation within a year is anticipated. Autocorrelation will lead to underestimated standard errors in a standard OLS estimation, but we adjust for this by calculating heteroscedasticity and autocorrelation consistent standard errors as proposed by Newey and West (1987). In addition, the data have been detrended by using *ROE* ratios rather than total FDI equity income and by specifying a difference model rather than a level model in order to remove general time trends from the data.

The correction terms used in Forecast Models A and B are estimated on all available historical data. When we are in period [t(l); t(8)], actual company data will not be available for that period. Consequently, Forecast Model A computes the *ROE* ratio used to forecast FDI equity income in a given month in year t as the sum of the *ROE* ratio in the corresponding month in year $t - 2$ and the expected correction term:

[7]In case of intra-year turning points in the business cycle, the consensus forecasts for the whole year are likely to change significantly. When the models are applied, such changes will be picked up by the independent variables and will hence be reflected in the forecasts, but, due to the Danish revision policy, the changes can in principle be reflected in the estimates for the two previous months, the current month, and the remaining months of the year. If drastic changes in the economic outlook occurred late in the year, the regular revision policy would thus not allow us to revise income estimates for the first part of the year. Nevertheless, the models will not overcompensate for this by deviating from the 1/12 distribution principle in the latter part of the year in an attempt to mitigate the annual revisions of the balance of payments because it would be at the expense of higher revisions of the monthly balance of payments data. Instead, in case of a significant turning point, extraordinary revisions of the first months would be the proper solution.

$$(8) \qquad E\left[ROE_{t(m),c,i,A,refined}\right]_{t(m)} = ROE_{t-2(m),c,i} + E\left[CT_{t(m),c,i,A,refined}\right]_{t(m)}.$$

When we reach period $t(9)$, actual data for year $t-1$ will be available. Forecast Model B uses these data to construct forecasts for the period $[t(9); t(12)]$ in the following way:

$$(9) \qquad E\left[ROE_{t(m),c,i,B,refined}\right]_{t(m)} = ROE_{t-1(m),c,i} + E\left[CT_{t(m),c,i,B,refined}\right]_{t(m)}.$$

The *ROE* ratios can be used to forecast FDI equity income as well as FDI equity positions. If the projections of positions are incorrect, the forecast for the investment income would in principle also be incorrect even if the forecasted *ROE* ratio for a given month is correct. This situation might occur late in the year if the *ROE* estimates for the first months of the year were incorrect, for instance due to imperfect early consensus forecasts for the economic developments, thus leading to incorrect position estimates. However, the possible projection errors on positions are likely to be relatively small as other financial flows are reported/estimated on a monthly basis, which means that the possible position projection errors could be attributed to reinvested earnings alone.[8]

4. Empirical Modeling of Forecast Models

4.1. *Data*

Our dataset comprises (i) company data reported to Danmarks Nationalbank for balance of payments and international investment position statistics aggregated at country/industry group level and (ii) macroeconomic and financial indicators reflecting general economic conditions. Company data are available for the period 1999–2008, with annual data being available for the period 1999–2004 and monthly data for the period 2005–08. We construct monthly data for the period 1999–2004 by distributing FDI equity income and other flows evenly throughout the year. This allows us to estimate Forecast Model A on data for the period 2001–08 since $t-2$ data are needed as input for this model. Similarly, Forecast Model B can be estimated on data for the period 2000–08. Naturally, it would have been useful to base the model estimations on a longer time series, but additional data are not available at the necessary level of detail in the case of Denmark.

According to NBER's determination of American business cycles, the dataset covers two peaks (March 2001 and December 2007) and one trough (November 2001). Bordo and Helbling (2003) demonstrate an increased synchronization of national business cycles, and this conclusion validates the decision to aggregate data across countries in this study. The benefit of aggregation is that it makes the estimations less vulnerable to extreme *ROE* observations for countries, in which Danish companies have established only a few FDI enterprises. The models were initially tested on more disaggregated country/industry breakdowns, but due to the

[8]Positions at the end of a period are calculated as the sum of (i) initial positions; (ii) transactions (balance of payments flows); (iii) exchange rate changes; (iv) price changes; and (v) other changes in volume. *ROE* ratios can only feed in the forecast of reinvested earnings recorded as additional investments, i.e. only on account of (ii).

TABLE 1

AGGREGATION LEVELS USED FOR THE FORECAST MODELS

Group	Code	Description	Position
Country group:	EU/EFTA	Countries in the EU/European Free Trade Association	323.2
(Outward FDI)	NAFTA	Countries in the North American Free Trade Agreement	36.0
	ROW	Rest of the world and not allocated	70.3
Industry group:	DK1	Manufacturing, energy, materials, and utilities	50.4
(Inward FDI)	DK2	Trade, transportation, and consumer goods	163.3
	DK3	ICT and finance	111.3

Note: The last column gives the total FDI equity position in DKK billion for each group at end-2008.

TABLE 2

BASIC INDICATORS IN THE DATA

Indicator	Description	Data	Type
GDP	Gross domestic product	Consensus forecast	Growth rate
CON	Private consumption	Consensus forecast	Growth rate
INV	Investment	Consensus forecast	Growth rate
CP	Corporate profits	Consensus forecast	Growth rate
IP	Industrial production	Consensus forecast	Growth rate
MMIR	3-month money market interest rate	Actual data	Ratio
BBS	Broad-based stock index	Actual data	Level

relatively small number of observations, such detailed *ROE* ratios were too dependent on individual specific company circumstances. In addition, by limiting the number of models, the burden of maintaining and applying the models in the monthly production of balance of payments statistics will be kept at a reasonable level. Whereas the models for outward FDI equity are estimated for three country groups, the models for inward FDI equity are estimated for three industry groups (see Table 1).

With regard to macroeconomic and financial indicators used for the estimation of correction terms, we include a number of possible variables in the data (see Table 2). The macroeconomic indicators are expected to have an impact on FDI enterprises' profitability in the short run. The financial indicators include developments in stock indexes and interest rates. The former are expected to reflect earnings potentials of companies whereas the latter, as a measure of financing costs, will have a direct impact on profitability.

The macroeconomic indicators used in this study are consensus forecasts from Consensus Economics Inc. that predict the growth for the whole year since we are basically interested in forecasting 1/12 of the annual profits every month. New consensus forecasts are available every month. By including consensus forecast data in the models, we use other forecasters' predictions directly as input for our forecasting models. The variables used in Forecast Model A should in principle reflect the changes from year $t-2$ to year t while the variables used in Forecast Model B should represent changes from year $t-1$ to year t. Regarding financial indicators, we do not rely on forecasts, but only use actual data. Mose

TABLE 3

CONSTRUCTION OF INDEPENDENT VARIABLES FOR FORECAST MODELS A FOR REFERENCE PERIOD $t(m)$

Extension	Model	Raw Variable Type	Construction of Variable	New Variable Unit
_AG1	A	Growth rate	$(1 + E[x_{t/t-1}]_{t(m)})(1 + E[x_{t-1/t-2}]_{t-1(12)}) - 1$	Percent
_AG2	A	Growth rate	$(1 + E[x_{t/t-1}]_{t(m)})(1 + E[x_{t-1/t-2}]_{t-1(m)}) - 1$	Percent
_AG3	A	Growth rate	$E[x_{t/t-1}]_{t(m)} + E[x_{t-1/t-2}]_{t-1(12)} - E[x_{t-2/t-3}]_{t-2(12)}$	Percentage points
_AG4	A	Growth rate	$E[x_{t/t-1}]_{t(m)} + E[x_{t-1/t-2}]_{t-1(m)} - E[x_{t-2/t-3}]_{t-2(m)}$	Percentage points
_AG5	A	Growth rate	$E[x_{t/t-1}]_{t(m)} - E[x_{t-1/t-2}]_{t-1(12)} - E[x_{t-2/t-3}]_{t-2(12)}$	Percentage points
_AG6	A	Growth rate	$E[x_{t/t-1}]_{t(m)} - E[x_{t-1/t-2}]_{t-1(m)} - E[x_{t-2/t-3}]_{t-2(m)}$	Percentage points
_AR1	A	Ratio	$x_{t(m)} - x_{t-2(12)}$	Percentage points
_AR2	A	Ratio	$x_{t(m)} - x_{t-2(m)}$	Percentage points
_AL1	A	Level	$(x_{t(m)})/(x_{t-2(12)}) - 1$	Percent
_AL2	A	Level	$(x_{t(m)})/(x_{t-2(m)}) - 1$	Percent
_AL3	A	Level	$(x_{t-1(12)})/(x_{t-3(12)}) - 1$	Percent
_AL4	A	Level	$(x_{t(m)})/(x_{t-2(12)}) - (x_{t-2(12)})/(x_{t-4(12)})$	Percentage points
_AL5	A	Level	$(x_{t(m)})/(x_{t-2(m)}) - (x_{t-2(12)})/(x_{t-4(12)})$	Percentage points
_AL6	A	Level	$(x_{t-1(12)})/(x_{t-3(12)}) - (x_{t-2(12)})/(x_{t-4(12)})$	Percentage points

Note: The calculations in the table are performed for all the basic indicators (see Table 2), and the resulting variables are used in the estimation of Forecast Models A.

(2005) finds that consensus forecasts for financial indicators often contain very little information. In fact, he finds that the "naive" forecast of unchanged levels is more precise than consensus forecasts for bond yields and exchange rates. For this reason, we use year-to-date data for the financial indicators as a proxy for the development over the entire year. However, new data will be available every month so that updated information will be added to the independent variables throughout the year.

Changes between periods can be calculated in many different ways, and we thus construct a large number of variables based on the basic macroeconomic and financial indicators. The independent variables in the models consist of the basic indicator name and an extension, indicating how the variable is constructed (see Tables 3 and 4). For the macroeconomic indicators, we use growth variables directly as well as variables reflecting changes in growth rates. With regard to the financial indicators, we include a range of year-to-date variables, but also a number of lagged variables because financial markets often respond more quickly to new developments than does the real economy.

Since we estimate models for country groups rather than individual countries, we use weighted macroeconomic and financial indicators. For the EU/EFTA countries, the indicators are computed as the average of the national indicators for the five largest destinations for Danish FDI equity in this country group, namely Germany, Norway, Sweden, Switzerland, and the U.K. The calculation of NAFTA indicators is also based on the relative size of Danish FDI equity in the specific group of countries so that the national U.S. indicators weigh 2/3 and the national Canadian indicators 1/3. The ROW group consists of many countries and is rather heterogeneous. In the absence of a self-evident variable, we use the EU/EFTA indicators for the ROW group. Finally, we also use the EU/EFTA indicators in the estimation of the Danish models rather than Danish data. The reason is that a large proportion of Danish FDI enterprises are export-oriented

TABLE 4

CONSTRUCTION OF INDEPENDENT VARIABLES FOR FORECAST MODELS B FOR REFERENCE PERIOD $t(m)$

Extension	Model	Raw Variable Type	Construction of Variable	New Variable Unit
_BG1	B	Growth rate	$E[x_{t/t-1}]_{t(m)}$	Percent
_BG2	B	Growth rate	$E[x_{t/t-1}]_{t(m)} - E[x_{t-1/t-2}]_{t-1(12)}$	Percentage points
_BG3	B	Growth rate	$E[x_{t/t-1}]_{t(m)} - E[x_{t-1/t-2}]_{t-1(m)}$	Percentage points
_BR1	B	Ratio	$x_{t(m)} - x_{t-1(12)}$	Percentage points
_BR2	B	Ratio	$x_{t(m)} - x_{t-1(m)}$	Percentage points
_BL1	B	Level	$(x_{t(m)})/(x_{t-1(12)}) - 1$	Percent
_BL2	B	Level	$(x_{t(m)})/(x_{t-1(m)}) - 1$	Percent
_BL3	B	Level	$(x_{t-1(12)}/x_{t-2(12)}) - 1$	Percent
_BL4	B	Level	$(x_{t(m)})/(x_{t-1(12)}) - (x_{t-1(12)})/(x_{t-2(12)})$	Percentage points
_BL5	B	Level	$(x_{t(m)})/(x_{t-1(m)}) - (x_{t-1(12)})/(x_{t-2(12)})$	Percentage points
_BL6	B	Level	$(x_{t-1(12)})/(x_{t-2(12)}) - (x_{t-2(12)})/(x_{t-3(12)})$	Percentage points

Note: The calculations in the table are performed for all the basic indicators (see Table 2), and the resulting variables are used in the estimation of Forecast Models B.

(Statistics Denmark, 2009) and are thus more exposed to the economic developments in the EU/EFTA countries than to the Danish business cycle itself. Moreover, Dam (2008) finds that Danish business cycles to a large extent are harmonized with European business cycles.[9]

Before the models are estimated, we remove certain observations from the data in order to ensure that the models are estimated for homogeneous groups of companies. First, we take out data for Special Purpose Entities (SPEs), which in the Danish balance of payments are defined as pass-through companies with little or no economic activity in Denmark. The FDI income is balanced for these companies to ensure that they have a neutral effect on the primary income account in the balance of payments. Second, we remove a handful of special companies that have earnings patterns which cannot be explained by the developments in the general economic conditions. Examples include companies with extraordinarily lucrative patents or property rights for natural resources. These companies are defined as having annual profits in excess of DKK 1 billion and *ROE* ratios above 35 percent in at least three consecutive years including the most recent. The profits of these companies are rather stable over time so the latest observation for FDI income can be used as an approximation for the FDI income in the current period. In case of changing conditions, the estimates for the special companies can be adjusted by using information on dividend payouts and quarterly financial statements if available.

The impact of including independent variables and the sizes of the parameter estimates are expected to differ across the models. For instance, companies selling consumer goods are likely to be more sensitive to the growth in private consumption than pharmaceutical companies. Similarly, the profitability of FDI enterprises located in different countries may be impacted differently by macroeconomic and financial developments.

[9]Consensus forecasts for corporate profits are only available for Canada, the U.K., and the U.S. Hence, only U.K. data will be used for this variable in the EU/EFTA, ROW and industry group models.

Figure 3. Evolution of *ROE* Ratios for FDI Equity

Note: For the period 1999–2004, monthly data have been constructed on the basis of actual annual data while actual monthly observations are available from January 2005.

4.2. *Estimation Results*

In general terms, the evolution of *ROE* ratios for FDI equity seems to be synchronized with business cycles (see Figure 3). The ratios moved from a high level in the end of the 1990s and 2000 to a low level in connection with the trough in 2001 and increased gradually thereafter until the peak in 2007. When the downturn started by the end of 2007, this had an immediate negative effect on *ROE* ratios. These harmonized trends indicate that macroeconomic and financial data can be used in the prediction of FDI equity income.

TABLE 5

R^2 Values for Forecast Models A Depending on Input Variable

Variable	EU/EFTA	NAFTA	ROW	DK1	DK2	DK3	Average
GDP_AG1	0.20	0.01	0.26	0.01	0.01	0.30	0.16
GDP_AG2	0.24	0.01	0.21	0.02	0.03	0.36	0.18
GDP_AG3	0.01	0.12	0.55	0.05	0.04	0.02	0.07
GDP_AG4	0.10	0.06	0.54	0.00	0.00	0.13	0.11
GDP_AG5	0.60	0.58	0.03	0.14	0.24	0.47	0.42
GDP_AG6	0.30	0.41	0.30	0.08	0.14	0.17	0.24
CON_AG1	0.56	0.05	0.13	0.21	0.30	0.61	0.42
CON_AG2	0.56	0.08	0.11	0.20	0.35	0.56	0.43
CON_AG3	0.05	0.05	0.39	0.00	0.00	0.09	0.07
CON_AG4	0.14	0.00	0.34	0.00	0.03	0.14	0.12
CON_AG5	**0.76**	**0.61**	**0.03**	**0.25**	**0.53**	**0.40**	**0.55**
CON_AG6	0.31	0.32	0.14	0.09	0.23	0.08	0.23
INV_AG1	0.09	0.04	0.36	0.00	0.00	0.17	0.10
INV_AG2	0.08	0.01	0.22	0.00	0.00	0.17	0.08
INV_AG3	0.01	0.03	0.70	0.10	0.11	0.00	0.10
INV_AG4	0.03	0.01	0.57	0.02	0.01	0.06	0.08
INV_AG5	0.49	0.50	0.00	0.14	0.18	0.55	0.36
INV_AG6	0.23	0.30	0.37	0.15	0.13	0.25	0.22
CP_AG1	0.07	0.16	0.32	0.11	0.18	0.04	0.12
CP_AG2	0.06	0.21	0.26	0.09	0.22	0.00	0.11
CP_AG3	0.01	0.37	0.11	0.00	0.03	0.00	0.04
CP_AG4	0.01	0.22	0.30	0.00	0.00	0.02	0.04
CP_AG5	0.00	0.33	0.08	0.10	0.18	0.00	0.07
CP_AG6	0.07	0.26	0.01	0.03	0.04	0.03	0.06
IP_AG1	0.14	0.00	0.35	0.00	0.00	0.22	0.12
IP_AG2	0.17	0.01	0.28	0.00	0.01	0.27	0.14
IP_AG3	0.00	0.12	0.65	0.05	0.03	0.01	0.08
IP_AG4	0.04	0.06	0.60	0.01	0.00	0.08	0.09
IP_AG5	0.55	0.60	0.02	0.13	0.17	0.51	0.39
IP_AG6	0.37	0.44	0.26	0.12	0.18	0.26	0.29
MMIR_AR1	0.20	0.22	0.11	0.01	0.05	0.26	0.16
MMIR_AR2	0.41	0.04	0.06	0.09	0.15	0.51	0.30
BBS_AL1	0.17	0.09	0.33	0.09	0.21	0.03	0.16
BBS_AL2	0.01	0.00	0.48	0.13	0.13	0.00	0.09
BBS_AL3	0.05	0.17	0.42	0.02	0.01	0.11	0.09
BBS_AL4	0.58	0.36	0.13	0.22	0.45	0.42	0.45
BBS_AL5	0.41	0.22	0.36	0.38	0.55	0.31	0.41
BBS_AL6	0.24	0.05	0.53	0.34	0.45	0.18	0.30

Note: The table displays R^2 values resulting from estimations of equation (6) with different independent variables. The average R^2 value is weighted by end-2008 positions.

In order to find the best predictor for the development in *ROE* ratios, i.e. the correction term, we estimate univariate versions of equations (6) and (7) with every constructed independent variable. The results of these estimations can be found in Tables 5 and 6 and show that the performances of the independent variables vary across models as expected. Nevertheless, some variables perform well in most cases, for instance private consumption. Interestingly, variables based on changes in private consumption growth turn out to be better predictors for the development in *ROE* ratios than consumption growth itself. The reason is that changes in consumption growth are better than consumption growth at predicting the sharp falls in *ROE* ratios that are observed when the downturn sets in.

TABLE 6

R^2 Values for Forecast Models B Depending on Input Variable

Variable	EU/EFTA	NAFTA	ROW	DK1	DK2	DK3	Average
GDP_BG1	0.00	0.12	0.08	0.07	0.05	0.01	0.03
GDP_BG2	0.38	0.52	0.01	0.25	0.27	0.22	0.30
GDP_BG3	0.36	0.51	0.02	0.25	0.26	0.20	0.28
CON_BG1	0.02	0.03	0.09	0.19	0.04	0.01	0.04
CON_BG2	**0.49**	**0.41**	**0.01**	**0.38**	**0.33**	**0.20**	**0.36**
CON_BG3	0.49	0.38	0.00	0.38	0.30	0.21	0.35
INV_BG1	0.00	0.00	0.22	0.03	0.02	0.04	0.03
INV_BG2	0.41	0.38	0.19	0.22	0.21	0.18	0.30
INV_BG3	0.34	0.38	0.26	0.23	0.20	0.13	0.27
CP_BG1	0.10	0.39	0.09	0.41	0.44	0.05	0.20
CP_BG2	0.17	0.73	0.02	0.56	0.27	0.14	0.23
CP_BG3	0.16	0.73	0.03	0.52	0.29	0.13	0.22
IP_BG1	0.00	0.11	0.13	0.05	0.03	0.01	0.03
IP_BG2	0.45	0.55	0.05	0.31	0.27	0.30	0.35
IP_BG3	0.39	0.51	0.05	0.27	0.24	0.24	0.30
MMIR_BR1	0.05	0.31	0.01	0.26	0.16	0.03	0.10
MMIR_BR2	0.03	0.28	0.01	0.22	0.14	0.01	0.07
BBS_BL1	0.35	0.08	0.18	0.17	0.15	0.05	0.22
BBS_BL2	0.36	0.10	0.20	0.26	0.20	0.08	0.25
BBS_BL3	0.00	0.06	0.11	0.03	0.03	0.00	0.02
BBS_BL4	0.27	0.16	0.01	0.04	0.03	0.05	0.14
BBS_BL5	0.36	0.20	0.02	0.11	0.07	0.10	0.20
BBS_BL6	0.20	0.07	0.03	0.11	0.20	0.21	0.17

Note: The table displays R^2 values resulting from estimations of equation (7) with different independent variables. The average R^2 value is weighted by end-2008 positions.

For Forecast Models B, the variable based on year-to-year changes in expected private consumption growth is the best indicator, whereas a variable calculated as the current year's expected consumption growth minus the sum of consumption growth in the two previous years performs best in Forecast Models A. While Forecast Models B use acceleration/deceleration in expected private consumption growth directly, Forecast Models A do this in an indirect way. The correction terms resulting from the application of Forecast Models A will be positively affected by promising outlooks for consumption in the current year compared to the past years. It makes intuitive sense that the models yield high correction terms (i.e. an upward adjustment of the historical *ROE* ratio) in case of high expected consumption growth in the current year and low growth rates in the past two years.

Overall, private consumption performs slightly better than the other macroeconomic indicators. This finding may be explained by the structure of FDI in the case of Denmark. For instance, inward FDI equity is concentrated in industries that are highly exposed to developments in consumption (see Table 2). It may seem surprising that expected corporate profits growth does not give more explanatory power to the models than is the case because this variable represents directly what we are trying to measure. However, it may be more difficult to forecast this variable than GDP components such as private consumption and investment, which could explain the relatively poor performance by this variable. In addition, forecasts for corporate profits are only available for

a few countries, meaning that the data used in the models are not necessarily representative for the country/industry groups with the exception of the NAFTA group.

The variables based on stock market developments and money-market interest rates are sound predictors, but they are outperformed by the best performing macroeconomic variables. A possible explanation for this is that the financial indicators only contain year-to-date data rather than data for the entire year as the latter are not available when the models have to be put into effect. In general, the lagged financial variables do not perform as well as the year-to-date financial variables.

We choose to apply univariate models with an identical independent variable across country/industry groups to forecast FDI equity income as the estimations of univariate models have shown that it is possible to find a variable that performs consistently well across models, namely changes in expected private consumption growth. The Ramsey (1969) RESET test has been carried out for each model, and the results generally support the chosen model specifications. Multivariate specifications have been tested, but multicollinearity is an issue in all such specifications because the independent variables to a large degree convey the same information. A high correlation between the different macroeconomic indicators was expected, but a correlation analysis also reveals that the preferred variable for Forecast Models A, *CON_AG5*, has a correlation of almost 0.9 with the second best predictor, the financial variable *BBS_AL4*. As a positive side effect, the simplicity of the chosen models makes it easy to implement them in the monthly production of the Danish balance of payments.

The final models are presented in Table 7. There are no constant terms in Forecast Models B as these were insignificant. This insignificance was anticipated as the variable based on changes in consumption growth is expected to be stationary with a mean of zero. In all models with the exception of the ROW models, the prediction power, measured by R^2, exceeds 0.20 and the independent variable is significant even when the standard errors are corrected by the Newey and West (1987) procedure. The prediction power is low for the heterogeneous

TABLE 7

Regression Models for Correction Terms Based on Data for the Period 2000/01–08

	EU/EFTA	NAFTA	ROW	DK1	DK2	DK3
			Forecast Models A			
Constant term	1.36	1.66	0.24	0.63	1.01	0.81
t-value	*9.09*	*6.91*	*1.25*	*1.97*	*4.07*	*3.95*
CON_AG5	0.54	0.41	0.08	0.30	0.44	0.38
t-value	*10.73*	*8.43*	*0.96*	*2.72*	*4.48*	*6.26*
R^2	0.76	0.61	0.03	0.25	0.53	0.40
			Forecast Models B			
CON_BG2	0.32	0.29	0.02	0.40	0.34	0.23
t-value	*5.91*	*3.94*	*0.29*	*2.94*	*3.37*	*1.75*
R^2	0.49	0.41	0.01	0.38	0.33	0.20

Note: Forecast Models A and B are based on equations (6) and (7), respectively.

ROW group, indicating that the refined ROW models cannot be expected to perform significantly better than the simple ROW models. However, due to comparatively small positions (see Table 2) and low variation in *ROE* ratios for the ROW group (see Figure 3), the revisions, and therefore the importance of these models, are expected to be smaller than for some of the other country/industry groups.

4.3. *Robustness*

A way to evaluate the robustness, and thereby the validity, of the models is to monitor the impact on parameter estimates when new data are included in the estimations. If the models are specified correctly and there are no structural breaks, each parameter estimate will converge to its own unique value over time. Figure 4 shows how the parameter estimates in Forecast Models A and B develop when new observations from our data are added to the models. These empirical pieces of evidence strongly suggest that convergence is taking place, thus supporting the models' robustness and choice of independent variables. The hypothesis of parameter stability is supported by the outcome of Chow (1960) tests carried out for different data splits.

The parameter estimates seem to converge faster for Forecast Models A than for Forecast Models B. In this regard, one has to keep in mind that Forecast Models A are estimated on a larger number of observations than Forecast Models B as the former include eight observations per year whereas the latter are based on four observations per year. Based on the results displayed in Figure 4, we conclude that the refined models can be used with expected changes in private consumption as the independent variable, but continued parameter estimate convergence should be monitored when re-estimating the models as new data become available.

5. Comparisons of Forecast Models

The best way to test the prediction power of a forecast model is to compare it to the alternatives. In our case, the refined forecast models can be compared to the simple forecast models solely based on the latest observation of *ROE* ratios and the 3-year moving average models. We estimate all models at the country/industry group level. If we assume that the parameter estimates of the refined models converge as illustrated in Figure 4, the models based on 2000/01–08 data can applied for all years. Figure 5 illustrates the size of the revisions if the three different models had been applied for the period 2001–08. On average, the refined models lead to smaller revisions for both inward and outward FDI equity income than the simple models and 3-year moving average models.

Despite the convergence in parameter estimates, in-sample tests should only be used with utmost caution. Therefore, we follow the standard recommendation (see, for instance, Fildes and Makridakis, 1995) and conduct out-of-sample tests for the period period 2006–08. As recommended in the IMF's Data Quality Assessment Framework (IMF, 2003) and the ECB Quality Report (ECB, 2009),

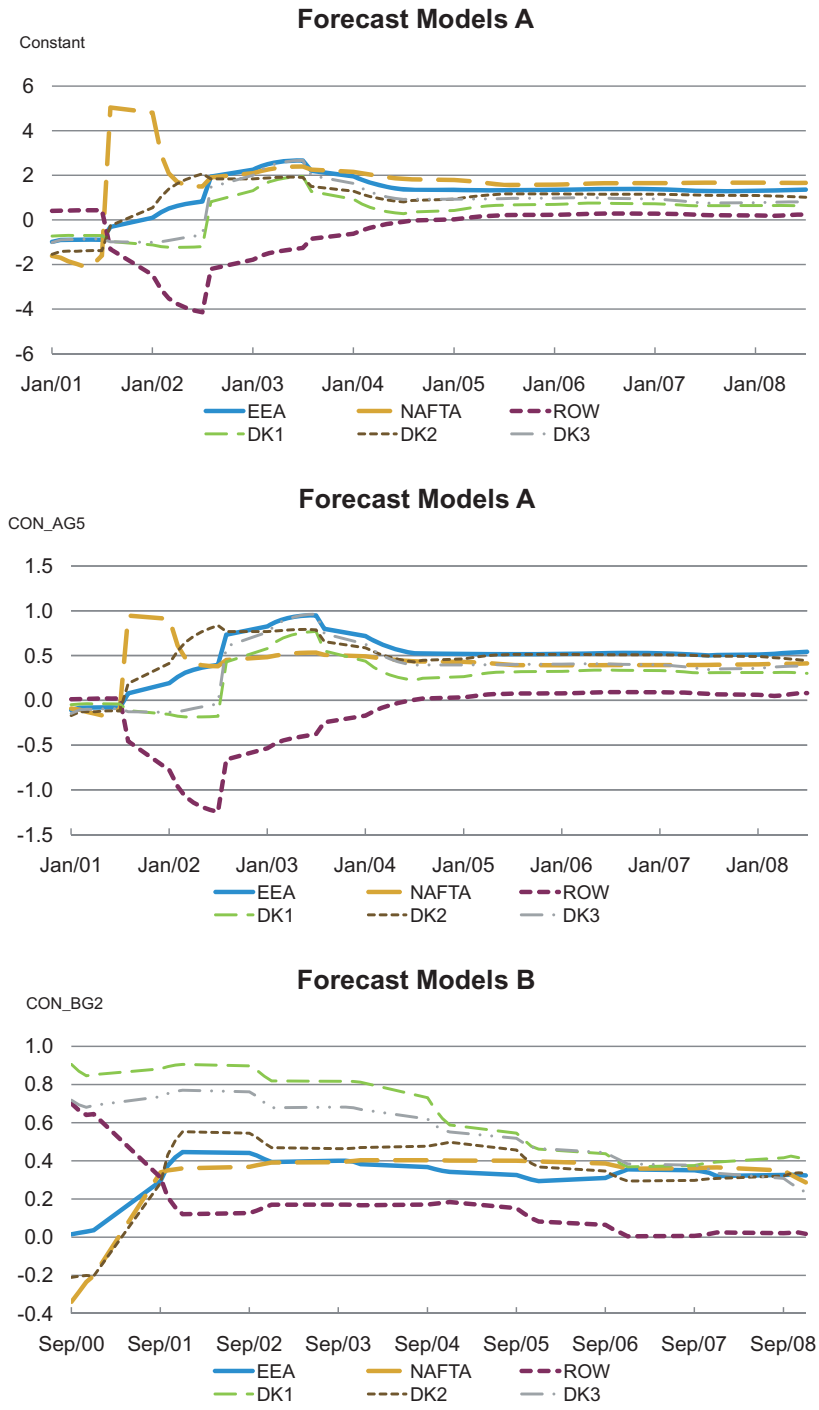

Figure 4. Developments in Parameter Estimates when New Data are Added to the Models

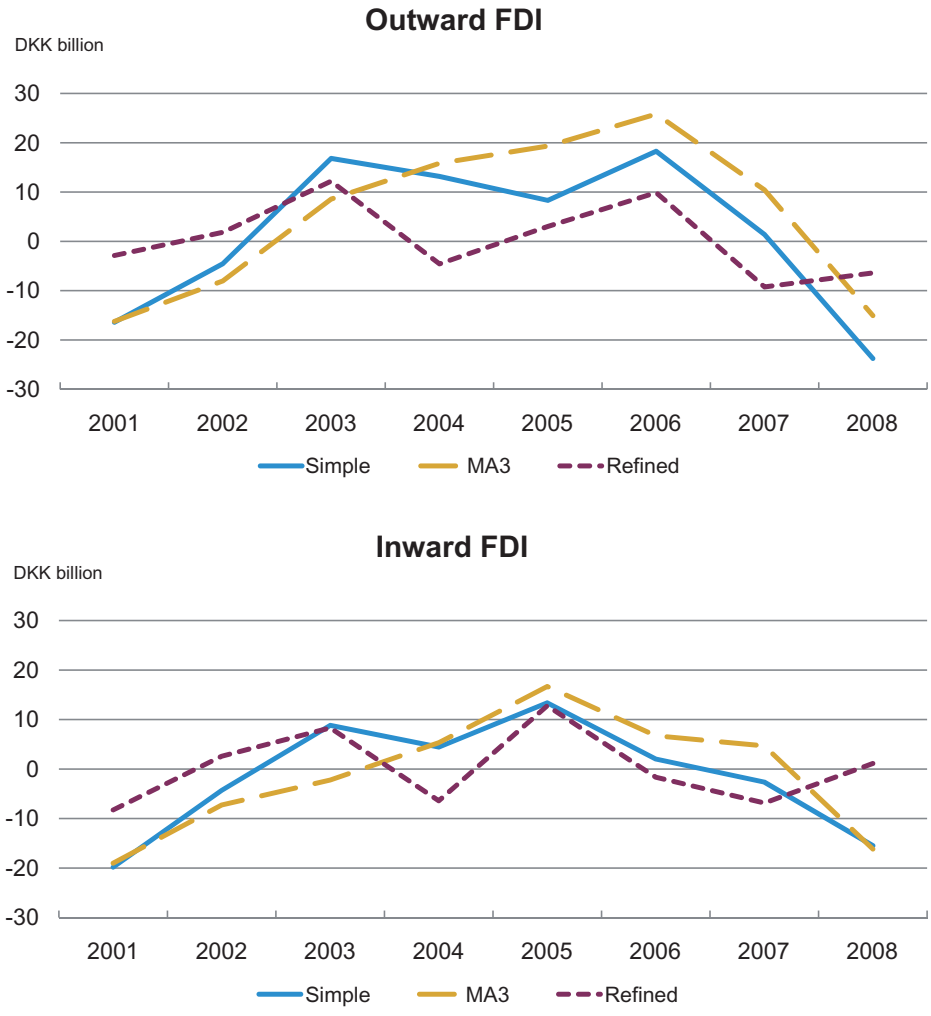

Figure 5. Revisions of FDI Equity Income

Note: As data are only available from 1999 onwards, the 3-year moving average is based on fewer observations in 2001–02.

we consider both the average and the absolute average of the revisions. The former measure contains information about possible systematic biases whereas the latter indicates the accuracy of a model. We can only conclude that a model performs well if both measures display low values.

The results in Table 8 confirm that the refined models, on average, yield considerably lower revisions for outward and inward FDI than the other models. For outward FDI, the refined models yield higher averages (measured as absolute values of non-absolute averages) than the simple models, suggesting higher bias in the refined models. However, the out-of-sample tests are only based on a 3-year period, which makes it difficult to draw strong conclusions

TABLE 8

Out-of-Sample Tests for Revisions in 2006, 2007, and 2008

Model	EU/EFTA	NAFTA	ROW	DK1	DK2	DK3	Net Income
				2006			
Simple	15.9	2.1	0.2	0.6	0.3	1.1	16.3
MA3	22.4	2.4	1.1	0.5	4.5	1.8	19.1
Refined	7.2	2.4	–0.1	0.1	–2.4	–0.9	12.6
				2007			
Simple	1.0	0.3	0.1	–0.1	2.3	–4.8	4.0
MA3	8.7	0.4	1.3	1.6	6.5	–3.4	5.8
Refined	–10.8	0.0	–0.3	–0.8	–0.5	–7.1	–2.7
				2008			
Simple	–20.9	–2.2	–0.6	–2.6	–6.5	–6.4	–8.3
MA3	–13.7	–1.1	–0.3	–2.5	–6.6	–7.1	1.1
Refined	–5.9	–1.2	–0.4	0.0	2.6	–0.7	–9.5
				Average (absolute) 2006–08			
Simple	–1.3 (12.6)	0.1 (1.6)	–0.1 (0.3)	–0.7 (1.1)	–1.3 (3.0)	–3.4 (4.1)	4.0 (9.5)
MA3	5.8 (14.9)	0.6 (1.3)	0.7 (0.9)	–0.1 (1.5)	1.5 (5.9)	–2.9 (4.1)	8.7 (8.7)
Refined	–3.2 (8.0)	0.4 (1.2)	–0.3 (0.3)	–0.2 (0.3)	–0.1 (1.8)	–2.3 (2.9)	0.1 (8.3)

Note: The refined models for 2006, 2007, and 2008 are based on data for 2000/0l–05, 2000/01–06, and 2000/01–07, respectively. The absolute average is displayed in brackets and is calculated as the average of annual revisions in absolute terms. The figures are given in DKK billion.

TABLE 9

Comparing Predictive Accuracy

Comparison	Inward FDI	Outward FDI	Net FDI
	In-sample tests (2001–08)		
Refined vs. simple	–4.67**	–11.10**	–4.20**
Refined vs. MA3	–2.85**	–9.98**	–1.32
	Out-of-sample tests (2006–08)		
Refined vs. simple	–2.15*	–4.28**	–3.70**
Refined vs. MA3	–2.47**	–4.75**	–0.34

Note: The table displays the Diebold–Mariano test statistic, S, for comparisons between predictive accuracy of monthly data. The null hypothesis of equal predictive accuracy is based on forecast errors (FE), defined as the difference between the forecasted value and the actual value, and is given by $H_0 : E[d_t] = 0$ where $d_t = |FE_{refined}| - |FE_{simple/MA3}|$. A negative test statistic indicates that the refined models have higher predictive accuracy than the simple/MA3 models. $S \overset{a}{\sim} N(0,1)$; * and ** indicate significance at the 5% and 1% levels, respectively.

regarding bias. An in-sample test for 2001–08 reveals that both the averages and absolute averages are smaller for the refined models than for the simple models.

We apply the Diebold and Mariano (1995) test for comparing predictive accuracy and find that the improvements in preliminary gross income estimates are statistically significant (see Table 9). However, on a net basis, the refined models only perform slightly better in terms of absolute revisions. The reason is that while the simple and 3-year moving average models lead to large errors in the forecasts, these errors often go in the same direction and cancel out each other to some extent

on a net basis. The refined models, on the other hand, aim at forecasting credits and debits as precisely as possible with the result that credits may be overestimated and debits underestimated or vice versa. For this reason, the revisions will not necessarily have the same tendency to cancel out each other on a net basis. Still, the results show that the refined models are preferable as they clearly outperform the simple and the 3-year moving average models in gross terms and also lead to marginally better net estimates on average.

6. Conclusions

The late and large revisions observed in FDI equity income result in significant corrections of balance of payments data and violate the important statistical quality criterion of stability. Even though forecasting is always connected with uncertainty, this study has shown that it is possible to come up with a method to improve the preliminary estimates for FDI equity income in the case of Denmark.

We find that variables constructed from changes in consensus data for expected private consumption growth serve as useful indicators for the development in FDI enterprises' profitability. Forecast models using this information clearly outperform models solely based on historical profitability for outward and inward FDI, respectively. The net revisions are only slightly smaller because the large gross revisions observed in the simpler models have a tendency to (partly) cancel out each other contrary to the refined models.

As a consequence of the promising results presented in this study, the new forecasting method has been implemented in the Danish balance of payments compilation system as of January 2010. Other countries could potentially reduce the revisions by introducing similar methods for the preliminary FDI equity income estimates. As an area for future research, we recommend testing the model specifications used in this paper as well as alternative specifications on data for other countries/geographical zones in order to develop an international best practice that could be adopted by balance of payments compilers across countries.

The models are based on data for the period 1999–2008 and should be re-estimated annually to take the extra information into account. The empirical evidence presented in this paper point to quick parameter estimate convergence, but possible future changes in parameter estimates should be monitored as these may be signs of structural breaks.

References

Bordo, Michael D. and Thomas Helbling, "Have National Business Cycles Become More Synchronized?" NBER Working Paper No. 10130, December 2003.

Chow, Gregory C., "Tests of Equality Between Sets of Coefficients in Two Linear Regressions," *Econometrica*, 28, 591–605, July 1960.

Croushore, Dean and Tom Stark, "A Real-Time Data Set for Macroeconomists," *Journal of Econometrics*, 105, 111–30, November 2001.

Dam, Niels Arne, "Konjunkturcykler i Danmark og Europa," *Nationaløkonomisk Tidsskrift*, 146, 135–55, 2008.

Diebold, Francis X. and Robert S. Mariano, "Comparing Predictive Accuracy," *Journal of Business and Economics Statistics*, 13, 253–65, July 1995.

EMI Sub-Group 4 of the BOP Financial Flows and Stocks Task Force, "Estimation Methods for Direct Investment," 1997.
ECB (European Central Bank), "Euro Area Balance of Payments and International Investment Position Statistics, 2008 Quality Report," March 2009.
Fildes, Robert and Spyros Makridakis, "The Impact of Empirical Accuracy Studies on Time Series Analysis and Forecasting," *International Statistical Review*, 63, 289–308, 1995.
Foreign Direct Investment Task Force, "Foreign Direct Investment Task Force Report," Eurostat and the European Central Bank, March 2004.
Granger, Clive W. J. and Paul Newbold, "Spurious Regressions in Econometrics," *Journal of Econometrics*, 2, 111–20, July 1974.
IMF (International Monetary Fund), *Balance of Payments*, fifth edition (*BPM5*), 1993.
———, "Data Quality Assessment Framework (DQAF) for Balance of Payments Statistics," July 2003.
———, *Balance of Payments and International Investment Position Manual*, sixth edition (*BPM6*), 2009.
Kumah, Emmanuel, Jannick Damgaard, and Thomas Elkjaer, "Valuation of Unlisted Direct Investment Equity," IMF Working Paper No. 09/242, November 2009.
Mose, Jacob Stæhr, "Expert Forecasts of Bond Yields and Exchange Rates," *Monetary Review*, Danmarks Nationalbank, 91–6, 4th Quarter 2005.
Newey, Whitney K. and Kenneth D. West, "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, 55, 703–8, May 1987.
OECD (Organisation for Economic Co-operation and Development), *OECD Benchmark Definition of Foreign Direct Investment*, third edition (*BD3*), 1996.
———, *OECD Benchmark Definition of Foreign Direct Investment*, fourth edition (*BD4*), 2008.
Ramsey, James B., "Tests for Specification Errors in Classical Linear Least-Squares Regression Analysis," *Journal of Royal Statistical Society, Series B (Methodological)*, 31, 350–71, 1969.
Statistics Denmark, "Udenlandske firmaer i Danmark"; theme publication about foreign-controlled affiliates in Denmark, June 2009.