

## RESEARCH NOTES

# Foreign direct investment—how much is it worth? Comment on S. J. Gray and A. M. Rugman

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This short comment focuses on methodological issues in the revaluation of foreign direct investment stocks and advances several criticisms of the article published by Sidney J. Gray and Alan M. Rugman in an earlier issue of *Transnational Corporations*. The note reviews the literature, discusses the methods available and suggests some general and specific criticisms of market valuation as applied by Gray and Rugman. It concludes that the results derived by Gray and Rugman exaggerate their case compared to those obtained when a better methodology is applied. The imbalance between United States and Japanese bilateral foreign direct investment stocks is slightly reduced, but still remains after revaluation when measured in terms of constant values and even increases when measured in current values.

### Introduction

In an earlier issue of *Transnational Corporations*, Sidney J. Gray and Alan M. Rugman raised the question: "Does the United States have a deficit with Japan in foreign direct investment?". Gray and Rugman are quite right to raise this question, and to point out that the conventional valuation of foreign direct investment (FDI) stock at historic cost leads to an undervaluation of the stock of an older established investor nation, such as the United States, relative to the stock of a newer investor country, such as Japan. However, they appear to take their argument too far, when they conclude that a revaluation of the bilateral FDI stocks between the two countries "shows that the United States and Japan are basically in balance as far as these investments are concerned" (p. 128). This result not only contradicts the

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“common sense” about the United States-Japanese bilateral FDI balance but raises more fundamental questions.

This short note focuses on the methodology for the calculation of the revaluation, argues that the Gray and Rugman result is derived from an inadequate methodological basis and presents some alternative estimates drawn up using a different methodology.

## Valuation

Since Gray and Rugman draw only indirectly on the recent literature on revaluation of FDI which has emerged in the United States and the United Kingdom,<sup>1</sup> tables 1 and 1a present an overview of the principal results of these studies.

Outward and inward FDI stocks may be valued at *historic cost* (i.e., book values) or at *replacement cost* at constant or current prices. The *current* prices may reflect either the *cost of capital* (e.g., gross fixed domestic capital formation price index) or the *cost of firms* listed in the stock-exchange (e.g., the share-market price index). From this classification, two separate issues emerge in relation to the Gray and Rugman article in particular and to any revaluation in general:

- Are stock-market values to be preferred to replacement values and vice versa?
- Once this decision has been taken, what kind of methodology is to be applied?

The rest of this subsection deals with the first issue, the following subsection with the second.

The decision as to whether replacement or market-valuation is to be preferred depends, in our view, largely on the research question. If one re-values FDI stocks, e.g., to estimate an employment or output effect, one would choose replacement values; yet, if one is, e.g., interested in the magnitude of takeovers of foreign affiliates listed on the stock exchange, a general stock-market index would provide the information needed.

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<sup>1</sup> Instead they quote directly from some literature on bilateral trade issues.

**Table 1. Results of earlier studies on United States FDI**  
(Billions of dollars)

Year	Inward FDI	Outward FDI	Net FDI	Source
<b>A. Book values</b>				
1986	208	259	51	Hooker (1988)
1987	272	307	36	Eisner, Pieper (1990)
1987	262	309	47	Ulan, Dewald (1989)
1988	329	327	2	Stekler, Stevens (1989)
1987	271	314	43	Landefeld, Lawson (1991)
1988	315	336	21	Cantwell, Bellak (1994)
<b>B. Replacement values</b>				
1987	269	706	438	Eisner, Pieper (1990)
1988	329	407	78	Lederer (1990), taken from Pratten, 1991, p. 83, because neither Lederer himself, nor Landefeld, Lawson give a figure in inward FDI when citing his study
1988	450	750	300	Stekler, Stevens (1989)
1987	323	485	162	Landefeld, Lawson (1991)
1988	345	395	50	Cantwell, Bellak (1994): constant values (1985 prices and exchange rates)
1988	371	523	152	Cantwell, Bellak (1994): current values
<b>C. "Market values"</b>				
1986	274	584	310	Hooker (1988)
1987	309	621	312	Eisner, Pieper (1990)
1987	496	1016	521	Ulan, Dewald (1989): stock-market prices
1987	162	808	646	Ulan, Dewald (1989): capitalized earnings
1987	300	714	415	Ulan, Dewald (1989): investment deflators
1987	323	578	255	Landefeld, Lawson (1991)

Source: Updated from Cantwell and Bellak, 1994, p. 23.  
NOTE: The years have been chosen to be closest to 1988.

**Table 1a. Results of earlier studies on United Kingdom FDI**  
(Billions of dollars)

Year	Inward FDI	Outward FDI	Net FDI	Source
<b>A. Book values</b>				
1955	-	0.9	-	Reddaway (1968) (manufacturing, mining, plantation, excl. oil companies)
1964	-	1.6	-	Reddaway (1968) (manufacturing, mining, plantation, excl. oil companies)
1989	86.5	154.1	58.6	CSO (based on the cost of assets when purchased or last revalued)
1989	80.1	136.4	56.3	Pratten (1991): American method
1990	-	66.9	-	Pratten (1991): DAE method, outward FDI, based on 140 companies
1990	18.0	-	-	Pratten (1991): DAE method, inward FDI, based on 75 companies
1990	107	126.9	20.3	Cantwell, Bellak (1994) (includes oil and finance)
<b>B. Replacement values</b>				
1980	-	54.0	-	Cantwell (1984) (excludes oil and finance)
1990	114.5	220.0	105.5	Cantwell, Bellak (1994) (includes oil and finance); constant values
1990	128.4	182.4	54.1	Cantwell, Bellak (1994) (includes oil and finance); current values
<b>C. 'Market values'</b>				
1955	-	1.1	-	Reddaway (1968) (manufacturing, mining, plantation, excl. oil companies)
1964	-	2.2	-	Reddaway (1968) (manufacturing, mining, plantation, excl. oil companies)
1988	-	-	'may be' <58.6	Bank of England (Stock-market prices of host countries 1988) (see Pratten, 1991 for critical comments)
1989	250.1	314.1	64.0	Pratten (1991): American method, unadjusted
1989	142.0	212.7	70.7	Pratten (1991): American method, adjusted
1989	140.8	240.2	99.4	Pratten (1991): American method, revalued
1990	173	290.2	117.2	Financial Times (1990): at domestic stock-market prices, inward FDI on the assumption that the ratio of market to book values was the same as for outward FDI, 2.0
1990	-	141.3	-	Pratten (1991): DAE method, outward FDI, based on 140 companies
1990	31.3	-	-	Pratten (1991): DAE method, inward FDI, based on 75 companies

Source: Compiled from the studies indicated in the table.

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Gray and Rugman are essentially interested in the "nature and extent" of the activities of Japanese and United States affiliates,<sup>2</sup> which is also supported by their reference to trade issues. From this perspective, Gray and Rugman should find replacement values better suited to the issue they have examined than stock-market values. The former reflect the *real* extent of underlying international production better than the latter which largely reflect *monetary* or *financial* phenomena and, as tables 1 and 1a suggest, tend to overestimate the extent of the revaluation from the point of view of the real assets active in production. In addition, stock-market indices are an average for all firms, while the value of foreign affiliates may not be adequately represented by share prices, if only a few of them are listed.

## Methodological criticisms

Turning to the second issue, namely the methodology applied, there are several points to be made. The wide range of results shown in tables 1 and 1a tells us that several methods have been applied so far, and all of them have their shortcomings, some more so than others. Yet, the "state-of-the-art" approach (see next section), which is by now widely acknowledged, has not been applied by Gray and Rugman.

A first criticism refers to the calculation of the initial capital stock. If one starts rather arbitrarily in a certain year to accumulate FDI flows, this implies that the influence of the already existing FDI stock is neglected. Gray and Rugman start in 1960 and (fortunately), in the case of United States-Japanese FDI stocks, the influence of the initial 1960 FDI stock is rather low. (But see also the discussion under the subsection headed "Data" below.)

The second point concerns the way in which the FDI stock is calculated. Gray and Rugman start from the annual FDI flows which (in the case of United States investment in Japan, see their table 3) are transferred to

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<sup>2</sup> They state that "... whereas only 8 per cent of Japanese FDI in the United States was in manufacturing (with over 80 per cent of it in wholesale trade, i.e., distribution)" (p. 135). Assessing the number of jobs created or the volume of exports generated on the basis of the FDI stock invested is common practice. Yet, this indirect estimation of real parameters via investment measures only works provided that the underlying industrial classification is correct. A closer look into the statistics shows that *production* is very often linked to *distribution* but only the latter is reported, since it often is the main purpose of the foreign affiliate highest in the hierarchy. Production is often carried out in sub-affiliates, while a single industrial classification is applied to a group as a whole. Besides, what is known about the actual production of Japanese firms in the United States suggests a much larger share in total activity than 8 per cent; for example, some Japanese motor vehicle industry investments appear under "distribution" in the United States statistics, even though they are known to include local manufacturing activities.

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United States dollars, then “market-value adjusted” and via the 1992 exchange-rate recalculated in 1992 values. These flows are then summed up to give the 1992 FDI stock. The problem that arises from this method is that the FDI flow figures cannot be adjusted directly, since they are given net of depreciation of the existing capital stock at historic cost. Hence, the revaluation of an FDI flow in time  $t_1-t_0$  alters the stock in  $t_1$  and thus the flow between  $t_1$  and  $t_2$  and so forth. But by how much does the FDI stock actually change between two points in time? Clearly, not only by the net FDI flow, but by the amount allowed for depreciation as well! Here lies the gist of our argument. It is certainly *not* justified to adjust FDI stocks by applying the price changes directly to the flows by simply deflating for (share) price movements or adjusting for exchange-rate changes, since the revaluation of depreciation must be incorporated into the adjustment process.

This leads us to our third point, which focuses on the other elements of change of net FDI stocks, i.e., depreciation, gross investments, gross stocks and retirements. These elements are totally excluded from Gray’s and Rugman’s analysis. Yet, depending on their magnitude, they may increase or decrease the net FDI flow and hence the stock. Besides depreciation, it is especially important to take account of the retirement of assets after they have exhausted their service life, in order to avoid an overestimation of the productive capacity of the existing FDI stock.

Fourthly, since we are comparing and accumulating flows at different points in time, the adjustment from book values to constant values has to be made *before* the adjustment to market values and not *afterwards*. Moreover, all stocks and flows have to be transferred to constant values, not only by the exchange rate (as is done by Gray and Rugman), but also by a relevant price-index (be it share prices, capital formation prices or some other appropriate set of prices).

To summarize Gray’s and Rugman’s approach, they basically *adjust* the annual flow figures, but they do not *revalue* them. A revaluation must include a “detour” via the gross-capital stock and all other components that ultimately contribute to the net capital stock. The remainder of the note proposes a solution to the problem and assesses the magnitude of the “error” which arises from the application of Gray and Rugman’s method.

## Data

Data on bilateral United States-Japanese net FDI stocks are published in the *Survey of Current Business*. Despite the fact that John H. Dunning and

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Rajneesh Narula (1994) and Gray/Rugman quote the same source, their data sets differ to some extent for certain years.<sup>3</sup> Concerning Japanese FDI in the United States, it is especially notable that the FDI stocks differ substantially in the initial year and then again in 1970-1972. After checking the original source, we found data to be correct as given in Dunning/Narula. In the case of United States FDI in Japan, the data sets differ from 1965 onwards, yet the eventual stocks are quite similar in 1990.

The main problem involved here is the magnitude of the initial capital stock. Data for United States FDI in Japan are available from 1950 onwards, data on Japanese FDI in the United States from 1959 onwards. The latter stock is US\$ 80 million, with a very modest increase (and some decrease) in subsequent years. It seems, therefore, to be reasonable to assume a stock of US\$ 1 million in 1950 and a constant annual average growth rate between 1950 and 1959. The extension of the data series backwards is important to allow for the influence of the initial capital stock on the level and growth of stocks in later periods as earlier investments (assets) are retired after their service life is exhausted.<sup>4</sup> If we had assumed additionally that some capital stock remained from the pre-World War II period, we would have to extend the data series backwards to 1930, as explained in John Cantwell and Christian Bellak (1994).<sup>5</sup> In the light of this discussion, we use both data sets in our revaluation and compare the results, which are shown in the next subsection.

## Revaluation

A first attempt to solve the revaluation issue on a *cross-country basis* was suggested by Cantwell and Bellak (1994). Without going into detail here, the methodology applied is a perpetual inventory model<sup>6</sup> on a rather aggregated basis, modified to include exchange-rate changes and changes in the geographical composition of FDI across host countries. However, by far

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<sup>3</sup> Small, negligible differences may occur when one uses different issues of the *Survey of Current Business*, showing different magnitudes of stocks in a certain year. These are not our concern here.

<sup>4</sup> Assuming, for example, an average service life of 20 years and simultaneous exit of assets implies that the FDI stock 1950-1970 is retired in 1970-1990.

<sup>5</sup> Besides these methodological issues, it should be mentioned that data from earlier periods, both on Japanese FDI in the United States and vice versa, are available (see e.g., Lewis, 1976; Wilkins, 1982, 1990).

<sup>6</sup> Similar to that used in domestic capital-stock estimation.

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the most important improvement is that a perpetual inventory model does not simply deflate the FDI stocks, but rather estimates the magnitude of the flows first (these are gross investments, retirements, depreciation, etc.), re-values the flows and from these derives the stocks. Although we accept that this method can be improved upon, we believe that the results derived (i.e., FDI at constant or current replacement values) reflect real FDI stocks far better than just multiplying FDI stocks or flows by a price index. An application of our version of the perpetual inventory model to the bilateral FDI stocks of Japan and the United States yields the results presented in table 2. The basic assumptions in applying the perpetual inventory model are those of linear depreciation, the simultaneous exit of assets after their service life is exhausted and an average service life of assets of 20 years.

Table 2 shows the bilateral FDI stocks at historic values, at 1992 values as published in Gray and Rugman and at current values as estimated by the authors on both data sets, i.e., Dunning/Narula and Gray/Rugman. The results are compared for the years 1990 and 1992. According to the basic hypothesis, namely that the bilateral imbalance of FDI stocks between Japan and the United States—which was at a ratio of 3.69 in 1990 and 1992 at historic values—is reduced following revaluation, the ratios before and after the different revaluations have to be compared. Gray and Rugman argue that the ratio drops to 1.36 in 1990 (at 1992 prices, stock-market valuation). In contrast, our estimation on both data sets suggests a ratio of 4.1 in current and 2.9 in constant values in 1990. This result confirms our expectations and seems to accord much better with what is common knowledge about the activities of both countries' TNCs abroad. Gray and Rugman are quite right to claim that the historic cost figures substantially overestimate the extent of their imbalance. However, the ratio derived here is close to 3 in constant values and thus reflects a huge imbalance of the bilateral FDI stocks.

Another important aspect of revaluation is the extent of the change in FDI stocks. While Gray and Rugman suggest a substantial change in magnitude of FDI stocks, our revaluation effect is very modest, which is mainly due to the price indices used. In the case of Japanese FDI in the United States, it increases from 20 to 108 between 1950 and 1990 (1985 = 100); in the case of United States FDI in Japan, it moves from 32 to 79 only. Thus, the different extent of revaluation reported in table 2 can be attributed partly to the methodology applied and partly to the price indices used.

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**Table 2. Results of the revaluation**  
(Billions of dollars)

Year	Historic values		1992 values	Constant 1985 values (current values)	
	Gray/ Rugman	Dunning/ Narula	Gray/ Rugman	Gray/Rugman by Bellak/Cantwell	Dunning/Narula by Bellak/Cantwell
<b>United States FDI in Japan</b>					
1990	22 511	20 994	115 101	27 159 (21 564)	26 974 (21 417)
1992	26 213	..	118 285	31 785 (25 746)	..
<b>Japanese FDI in the United States</b>					
1990	83 091	83 498	156 282	78 144 (87 560)	78 830 (88 368)
1992	96 743	..	170 916	89 214 (100 098)	..
<b>Ratio of (Japanese FDI in the United States)/(United States FDI in Japan)</b>					
1990	3.69	3.98	1.36	2.9 (4.1)	2.9 (4.1)
1992	3.69	..	1.44	2.8 (3.9)	..

Source: Compiled from the studies indicated in the table.

## Concluding remarks

This short note presented a criticism of the method of revaluation of FDI stocks as used by Gray and Rugman. A different revaluation shows that—despite the appreciation of the Japanese yen against the United States dollar—the bilateral FDI gap does *not* disappear. The main reason for this is that the United States FDI stocks in Japan are of a relatively recent vintage<sup>7</sup> (as are the Japanese FDI stocks in the United States) and hence the main difference in the revaluation magnitude between United States and Japan can be

<sup>7</sup> Contrary to Gray and Rugman (p. 128: "... and much of the United States FDI stock in Japan occurred before then (i.e., before 1982, Christian Bellak and John Cantwell.)"), we conclude from their table 2 that the bulk of United States FDI in Japan is of a very recent nature. After all, in 1982 the United States stock in Japan was \$6.4 billion but it had roughly doubled by 1986 (\$11.5 billion) and more than doubled again by 1992 (\$26.2 billion). The late liberalization of inward FDI in Japan is consistent with the belief that there has been a recent upsurge in investment.

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attributed—in the light of their case of a constant exchange rate<sup>8</sup>—to the stock-market prices in the Gray and Rugman analysis. The shortcomings of using stock-market prices and a simple “deflation method” have been explained above. The ratio of Japanese FDI to United States FDI, which is 3.69 at historic cost, does not fall to 1.36 as Gray and Rugman suggest, but instead increases to 4.1 at current cost in 1990 when revalued with a perpetual inventory model. We conclude that the imbalance of FDI stocks also seems to reflect the real extent of international production in place between the United States and Japan.

## Appendix

A crucial technical point is often neglected in the revaluation of FDI stocks: the statistics on FDI stocks frequently report *negative* book values. Of particular relevance here are the Japanese FDI stocks in the United States in 1971 and 1972: nobody would seriously claim that Japan’s FDI stocks in the United States were *actually* negative or even zero during these years! The explanation for this phenomenon and its impact on the revaluation of capital stock is as follows.

Unlike domestic capital stocks, FDI stocks may turn negative, because of accounting practices. Between the beginning and the end of a certain period, FDI stocks abroad not only change by the additional investment minus divestment and other factors (as do domestic capital stocks), but also by numerous other transactions between parent firms and affiliates. *Outflows* of capital (i.e., an increase of the stock abroad; e.g., the parent firm increases its stake in an existing affiliate, the parent firm grants a loan to its affiliate) and *inflows* of capital (i.e., a reduction of the stock abroad; e.g., a parent firm reduces its stake in an existing affiliate, the affiliate suffers losses, the affiliate reduces its intercompany debt by repayment of a loan) are balanced. Over the years, if reductions exceed increases by a certain amount which is larger than the initial capital stock plus the annual flows, this will ultimately result in a negative book value.

It is important to emphasize that this reflects merely a financial phenomenon and only partly a real phenomenon. However, it has an important implication for the application of a perpetual inventory model on FDI stock revaluation: since a perpetual inventory model roughly adds investment

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<sup>8</sup> In their table 3, Gray and Rugman use the term “current” exchange rate but actually apply the 1992 “constant” exchange rate for all years.

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flows to existing capital stocks, a negative capital stock reported (as in the case of Japan) leads to a negative net capital flow which, when added to the stocks, ultimately results in an even larger reduction of the stock. The results thus underestimate the real extent of the investment abroad.

Three options, of which we chose the first, are open to the researcher to deal with this problem:

- to rely on the statistics and use the data as they are reported and take into account the possible underestimation of the results;
- to set the negative values to nil and assume that the real stocks were actually all scrapped (which admittedly is a very unrealistic scenario for Japanese FDI stocks in the United States in the early 1970s);
- to use gross values of FDI stocks. This option is not feasible because book values are reported net in the companies' books.

A simple example illustrates the problem:

Assume an FDI stock in year 1 of 100, in year 2 of 200 and in year 3 of -50. The change from year 1 to year 2 was brought about by an increase in the parent firm's stake in the affiliate's equity by 70 and a loan by the parent firm of 50 and a repayment of a parent firm's loan by 20. From year 2 to year 3, the parent firm increased its stake by 20, the affiliate suffered a loss of 200 and extended its loan to the parent by 70. These transactions are reported as follows:

$$\text{Year 1} \Rightarrow \text{year 2: } 100 + 70 + 50 - 20 = 200$$

$$\text{Year 2} \Rightarrow \text{year 3: } 200 + 20 - 200 - 70 = -50$$

Thus, even if the book value reported is negative in financial terms, the real book value abroad is still positive in year 3. Now, assuming zero instead of -50 may reduce the difference between the "true" and the "reported" book value abroad, but it is unclear by how much, since the first is not known and cannot be calculated from the statistics. Yet, this procedure makes little difference to the results. This is not to say, however, that the statistical reporting system is wrong. What needs to be emphasized is how reporting practice affects our calculation. (This problem was of minor relevance for Gray and Rugman: since their revaluation was much higher, single years having a relatively small impact on total revalued stock.) From what has been said above, it is clear that the absolute values derived in our analysis are some-

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what too low, yet the ratios are correct, since both countries' stocks are reported by the same accounting methods. ■

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