Journal of Business and Economics, ISSN 2155-7950, USA
March 2017, Volume 8, No. 3, pp. 217-227
DOI: 10.15341/jbe(2155-7950)/03.08.2017/001

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Variability of Earnings in Japanese Subsidiaries Foreign Currency Translation Methodologies: Empirical Comparison with UK Subsidiaries

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Abstract: Previous studies empirically tested the use of several foreign currency translation methodologies, including a purchasing power parity (PPP) construct method against the normative criterion of variability of earnings, and found that the use of PPP resulted in lower variability of translated earnings when translation were made between the US dollar and the UK pound. In the current study, the temporal characteristics of fifty sample companies were determined and used to translate accounts between the US dollar and the Japanese yen and between the US dollar and the UK pound, using several translation methodologies, include a PPP construct methodology. Although the US/UK replication produced results similar to previous studies, the US/Japan translations produced a nearly opposite effect, which calls into question the informational value of PPP in the Japanese environment. However PPP should be tested against other normative criteria in the dollar/yen translation.

Key words: international accounting; price parity; foreign currency translation; Japan; United Kingdom; quality of earnings

JEL codes: M4, M14, M16

1. Introduction

1.1 International Accounting Problem

In accordance with US generally accepted accounting principles (GAAP), parent companies usually must prepare consolidated statements with their foreign subsidiaries. To achieve this, the foreign subsidiary's accounts must first be recast in accordance with US GAAP. Second, the foreign accounts must be restated into the reporting currency of the parent, the US dollar. This second step, foreign currency translation, has been the topic of numerous studies over several decades.

There are a number of possible methodologies for foreign currency translation, and certainly it matters which methodology is required by GAAP. Despite a massive literature, comparatively little is actually known empirically regarding how and in what ways the choice of translation methodology matters. There is no theoretical closure on the issue, and only during the past decade have any empirical studies been performed to begin to determine which translation methodology, if any, is superior to others in accordance with any normative criterion.

Accounting policy makers have made majors changes in GAAP for currency translation three times, each

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change more contentious than the previous one. The first official methodology in the US was the current-noncurrent method discussed in AICPA Bulletin No. 92 (1931), AICPA Bulletin No. 117 (1934) and Accounting Research Bulleting 43 (1953). The first change was required in 1965 by Accounting Principles Board Opinion No. 6 which required the monetary-nonmonetary method. The second change was made shortly after the organization of the Financial Accounting Standards Board (FASB) which the issuance of SFAS #8 (1975) which required the temporal rate method. The third change was SFAS #52 (1981) in which the current rate method was required under some conditions and the temporal rate method under others. It may well be that weariness with the issue, rather than widespread agreement best characterizes the present situation.

Each of these four exchange rate methodologies has its advantages and disadvantages, but none has been empirically or theoretically demonstrated to be superior to the others under all normative criteria. Exchange rates are not related in any certain way to accounting measures, and there is therefore no definitive defense for the use of exchange rates for currency translation (Patz, 1978).

1.2 Variability of Earnings

Managers are expected to be risk averse, to prefer ever-increasing reported earnings per share with low variability to major swings and greater variability. Investors in the United States see higher variability of earnings as a signal for a speculative investment. Managers of companies with significant foreign operations could therefore be expected to prefer translation methodologies that result in lower variability of translated subsidiary earnings. For these and other reasons, the variability of earnings can be viewed as a normative criterion. There is a substantial literature (see literature review) that reflects this normative criterion specifically with respect to foreign currency translation.

It does not necessarily follow, however, that any currency translation methodology that produces a lower variability of translated earnings is superior in information content to any other methodology that results in greater variability. The preferences of managers and investors are not adequate support of lower variability as a normative criterion against which translation methodologies should be tested.

But to the extent that greater variability in reported earnings is caused by noise rather than additional, useful information, lower variability of reported earnings is superior and should be pursued when selecting from among currency translation methodologies. The following section provides some theoretical support for lower variability of earnings as a normative criterion.

1.3 Price Parity and the Variability of Earnings Issue

The PPP concept of exchange rates is summarized in Officer (1982) in three propositions: (1) PPP is the principal determinant of the long-run equilibrium exchange rate, (2) the short-run equilibrium exchange rate in any current period is a function of the long-run equilibrium exchange rate in the sense that the latter variable is the principal determinant of, and tends to be approached by, the former, and (3) the short-run equilibrium exchange rate in any current period is determined principally by the PPP, with the former variable tending to equal the latter.

The equilibrium exchange rate between two currencies is the rate at which the demand for a currency and supply of the same currency are equal. At the equilibrium exchange rate, the price for exchanging two currencies will remain stable (The Free Financial Dictionary, 12/18/2014). It is intuitive that a time series of equilibrium exchange rates, which eliminates the temporary, market-generated noise, between any two currencies, is likely to be characterized by a lower variability than the time series of market-generated exchange rates. This intuitive conclusion is supported by various studies, including Holt (2006).

Subsequent to Officer's (1982) work, the Committee on International Accounting suggested, in 1974, that

purchasing power parity (PPP) constructs might be appropriate for foreign currency translation, indeed that such constructed time series might be superior to exchange rates. In effect, the committee was calling for research in this direction, and part of the spirit of the call was that the use of PPP, based on the equilibrium exchange rates, would result in lower variability of translated earnings and better information content in consolidated statements.

In more recent years, some empirical studies, based on translations between the US dollar and the UK pound, have found that the use of PPP does indeed result in lower variability of earnings and is superior to exchange rates when tested against a few other normative criteria (see the literature review). But, to date, no similar empirical studies are known to exist which describe what happens when a PPP time series is used instead of exchange rates for currency translation between the US dollar and various currencies other than the UK pound.

2. Purpose of the Study

Accordingly, the purpose of the present study is to compute the variability of translated earnings of subsidiaries, between the US dollar and the Japanese yen, across different translation methodologies, including PPP methodologies, and to compare these results with those generated by translations between the US dollar and the UK pound. The Japanese business environment is substantially different from the UK business environment. Thus, if PPP methodologies test well against exchange rate methodologies, translating between the US dollar and the Japanese yen, the proposition that PPP should be used for currency translation worldwide is enhanced. It is anticipated that the effects noted in previous studies, translating between the US dollar and the UK pound, would be repeated in translation between the US dollar and the Japanese yen, but to a lesser degree.

3. Literature Review

3.1 Variability of Earnings as a Normative Criterion

A number of early studies suggest that lower variability of translated earnings is more desirable than higher. Some of these studies were inspired by the SFAS #8 which required that the resulting translation adjustment be shown in current reported earnings.

Allan (1976), Biel (1976), Herschman (1976), Mattlin (1976), Merjos (1977), Aggarwal (1978), Porter (1983) and Selling and Sorter (1983) indicated that the requirements of SFAS #8 were perceived by many financial statement users to result in greater variability of reported earnings than other possible translation methodologies.

Aggarwal (1978) and Reckers (1978) proposed that SFAS #8 resulted in financial statements that, in one way or another, did not reflect economic reality because of the increased variability of reported earnings.

Collins and Salatka (1993) concluded that including the translation adjustment in net income as required by SFAS #8 generated noisier earnings signals. When SFAS #52 was implemented those companies whose currency translation gains or losses were most affected by the change from SFAS #8 to SFAS #52 showed significant increases in the earnings response coefficient. Markets perceived reported earnings under SFAS #52 to be of higher quality, that is, with less noise, than reported earnings under SFAS #8.

3.2 Relevant 21st Century Literature

The degree to which currency translation gains and losses under SFAS #52 affect equity security prices was explored in Bazaz and Senteney (2001) by applying an equity valuation model.

Louis (2003) also considered the relationship between change in firm value and the translation adjustment and noted that accounting rules for currency translation typically result in financial statement numbers opposite to

the economic effects of variations in exchange rates.

Holt (2004) was a descriptive study in which a complex method of estimating the temporal characteristics of accounts was used to compare the information content of return on assets across translation methodologies, including PPP. It was observed that the greatest difference in rank orderings of companies by return on assets was between the methodologies of SFAS #8 and SFAS #52 whereas the current-noncurrent and the current rate methodologies ranked companies similarly. Further, differences in information signals across translation methodologies were often enormous and were highly firm specific.

According to Kwon (2005), foreign investors commonly price exchange risk differently from local investors and the sources and magnitudes of differences in exchange risk pricing vary considerably from country to country.

Pinto (2005) used an earnings and book value model to observe that translation adjustments are significantly value relevant.

Liu (2006) examined the forecasting and valuation properties of foreign currency translation gains and losses with an accounting-based equity valuation model for multinational firms. The study observed that translation gains and losses could be subdivided into a core component and a transitory component and that translation gains and losses were more transitory than transitory earnings.

Wang et al. (2006) suggested that currency-translation differences are at times incrementally relevant to returns. The study found consistent evidence that both reported income and clean surplus income are relevant in explaining stock returns, although asset revaluations and currency-translation differences are at times incrementally relevant to returns.

Chambers et al. (2007) provided evidence in the post-SFAS #130 (1997) period that other comprehensive income is priced by investors on a dollar-for-dollar basis. The foreign currency translation adjustment component of other comprehensive income was found to be priced by investors.

Holt (2011 and 2012a) made normative evaluations of translation methodologies based on firm valuation and found that PPP performed well against this criterion compared to exchange rates when translation were made from the US dollar to the UK pound. The use of PPP was found to be superior over exchange rates for variability of reported earnings, and an analysis of meaningfully-paired observations indicated markedly different current ratio and inventory turnover numbers across translation methodologies.

Holt (2013, 2014a, and 2014b) found the use of PPP to be superior to the use of exchange rate methods when tested against the Fischer Black Method of evaluating accounting alternatives, present values of future cash flows to investors, and the predictability of reported earnings.

4. Methodology

4.1 Overview

As indicated in the literature review, previous studies have indicated that the use of PPP is superior to the use of exchange rates for currency translation between the US dollar and the UK pound when tested against various normative criteria, including variability of earnings. The present study somewhat replicates the testing for variability of earnings when translated between the US dollar and UK pound, but updates the previous work with more recent pre-translation financial statements and expands the number of translation methodologies tested. Further, the same pre-translation financial statements are translated between the US dollar and the Japanese Yen, using the same translation methodologies, for the purpose of comparing the results between Japan and the UK.

4.2 Sample Firms and Study Period

Fifty US companies were selected at random to build a data base of pre-translation financial statements, under the inclusion criterion that financial statement data had to be available for 10 consecutive years ending in 2013. This criterion insured the availability of the considerable information needed for this study that was not readily available from other sources, such as the cost of fixed assets acquired and retired, and when. Although the study period was the five years ending in 2013, financial data for ten years were needed to estimate the temporal characteristics of various accounts accurately for the five study period years. The resulting sample was representative of a wide range of firms in terms of industry, size, capital structure, profitability, etc.

The estimation of the temporal characteristics of various accounts, prior to translation, was achieved by the application of the methods described in detail in Holt (2012b). Month-end exchange rates between the US and the UK and between the US and Japan were obtained from January 2004 through December 2013. To construct the PPP monthly time series for the same period, the United States monthly consumer price indexes (CPI) and the corresponding CPIs for the three countries were obtained.

Translations of the fifty companies were made from US dollars to UK pounds and to Japanese yen, for each of the years in the study period, using each of the following eight translation methodologies:

- E/CR/D
- E/CR/N
- E/T/D
- E/T/N
- P/CR/D
- P/CR/N
- P/T/D
- P/T/N

Where:

E = exchange rates where used for translation

P = PPP numbers were used for translation

CR = the current rate method

T = the temporal rate method

D= deferral of translation gains and losses (not included in net income)

N = non deferral of translation gains and losses (included in net income)

For each of the years in the study period and for each of the translation methodologies, the variability of reported net income was calculated for each company, and the average variability of net income for each methodology determined.

4.3 Construction of the Purchasing Power

4.3.1 Parity (PPP) Time Series

The PPP method of currency translation is described in detail in Patz (1981), and an analysis of the state of the art of currency translation theory and the lack of definitive research of the PPP is available in Patz (2006).

As discussed in the Patz articles, there is no clear way in which exchange rates are related to accounting measures, and there is no rigorous defense for the use of exchanges rates in translation. Further, no existing research shows any of the exchange-rate based translation methodologies to be theoretically or empirically superior to the others under all circumstances. Patz (1978) suggests that the problem lies with the use of exchange rates themselves.

In the proposed price parity methodology, subsidiary accounts are translated using a temporal method approach, but using a constructed time series of price parity relative purchasing power indices. In the present study, an additional PPP methodology, using the current rate approach, is also included. The purpose of a PPP methodology is to reflect the command over goods and services in the economy in which the subsidiary operates. It is assumed that foreign subsidiaries do not exist solely for the purpose of generating dollar cash flows to the parent (Churchman, 1961), but rather for the maximization of economic power which can be defined as the size of assets held.

The calculation of the price parity indices needed for translation under the PPP method was achieved as follows:

$$PP_t = PP_b(CPI_{tk}/CPI_{ts})$$

where

PP_t = the price parity index for point in time t,

PP_b = an exchange rate assumed to approximate purchase power parity at the point in time b (b = December 31, 1993, a base point.)

CPI_{tk} = consumer price index in the foreign environment at time t, standardized to base period b = 100, and

CPI_{ts} = consumer price index for the U.S. at time t, standardized to base period b = 100.

This method is called the “constructed rate” approach for generating a price parity index time series. It is the method suggested by Patz (1981) as the simplest and most practical for accounting application.

4.3.2 Research Questions

The study addressed three research questions:

(1) To what extent is the time series of PPP numbers, between the US dollar and Japanese yen different from the time series between the US dollar and the other currencies used in other countries ranked among the largest by gross domestic product?

(2) To what extent is the average variability of translated earnings per share different across translation methodologies between the UK and Japan?

(3) Are the PPP translation methodologies as viable, based on variability of earnings per share, between the US dollar and Japanese yen as between the US dollar and the UK pound?

5. Results and Conclusions

5.1 Research Question 1

To what extent is the time series of PPP numbers, between the US dollar and Japanese yen different from the time series between the US dollar and the other currencies used in other countries ranked among the largest by gross domestic product?

Table 1 shows the variances of the consumer price index, from January 1999 through December 2013, for twenty-three of the twenty-five largest countries by gross domestic product. For various reasons, Saudi Arabia and Turkey were excluded.

The variability of the CPI is least in Japan among the twenty-three countries observed. Because the PPP time series is constructed with the ratio of two countries’ CPIs, it is noteworthy that the variability of the US and UK CPIs are similar. The variability of the Japanese CPI is, however, much lower than that of the US. It is therefore expected that the US/Japan PPP series will have greater variability than that of the US/UK series. The impact of this fact is observed in the translation results reported in the present study.

Table 1 Rank Ordering of Countries by Lowest Variances of CPIs

Rank by lowest variability of CPI	Country	Variance of CPI
16	Australia	0.3592
4	Belgium	0.0712
19	Brazil	0.9868
9	Canada	0.2204
2	China	0.0193
7	France	0.1816
6	Germany	0.1772
20	India	1.1083
21	Indonesia	1.2881
23	Iran	5.9975
11	Italy	0.2455
1	Japan	0.0131
18	Mexico	0.6194
10	Netherlands	0.2375
8	Norway	0.2116
17	Poland	0.3602
22	Russia	2.4444
15	South Korea	0.3496
14	Spain	0.3167
5	Sweden	0.1567
3	Switzerland	0.0631
12	United Kingdom	0.2692
13	United States	0.2735

Table 2 shows the rank ordering of countries by the coefficient of variation between that country's CPI series and the US CPI series.

Table 2 Rank Ordering of Countries by Lowest Coefficient of Variation Between That Country's CPI Series and the United States CPI Series

Rank by lowest coefficient of variation of CPI with US CPI	Country	Coefficient of Variation
16	Australia	0.9939
9	Belgium	0.9772
13	Brazil	0.9876
19	Canada	0.9955
2	China	0.4737
21	France	0.9969
20	Germany	0.9956
3	India	0.8399
18	Indonesia	0.9948
5	Iran	0.8952
17	Italy	0.9944
1	Japan	-0.5951
4	Mexico	0.8546
10	Netherlands	0.9825
11	Norway	0.9836
8	Poland	0.9762
14	Russia	0.9896
15	South Korea	0.9915
22	Spain	0.9971
12	Sweden	0.9862
6	Switzerland	0.9573
7	United Kingdom	0.9697

In accordance with PPP theory as envisioned by Officer (1982), it is expected that the PPP time series would be closer to the time series of equilibrium exchange rates and should be less variable than the time series of spot exchange rates. This is observed for sixteen of the twenty-two countries listed in Table 2. Japan is one of the six countries for which the variability of the PPP series is greater than that of the exchange rate time series. The other five countries are: Brazil, India, Indonesia, Russia, and South Korea.

5.2 Research Question 2

To what extent is the average variability of translated earnings per share different across translation methodologies between the UK and Japan?

Table 3 shows the average variability of reported earnings per share, using each of the eight translation methodologies, of the fifty companies selected for the pre-translation sample over the five-year study period ending in 2013.

Table 3 Average Variability of Earnings per Share as Translated from the US Dollar to the UK Pound, Rank Ordered by Translation Methodology (Lowest Variability to Highest)

Rank	Translation Methodology	Average Variability
1	P CR N	0.819
2	P T N	0.853
3-4	P CR D	0.955
3-4	E CR N	0.955
5	E CR D	0.957
6	P T D	0.959
7	E T N	1.108
8	E T D	1.457

Table 4 recasts Table 3 to demonstrate the head-to-head comparisons between PPP methodologies and exchange rate methodologies.

Table 4 Head-to-Head Comparisons of PPP and Exchange Rate Methodologies Based on Average Variability of Earnings per Share as Translated from the US Dollar to the UK Pound

PPP Methodology	Average Variability	Exchange Rate Methodology	Average Variability
P CR N	0.819	E CR N	0.955
P T N	0.853	E T N	1.108
P CR D	0.955	E CR D	0.957
P T D	0.959	E T D	1.457

Table 5 Average Variability of Earnings per Share as Translated from the US Dollar to the Japanese Yen, Rank Ordered by Translation Methodology (Lowest Variability to Highest)

Rank	Translation Methodology	Average Variability
1	E CR D	136
2	E CN D	138
3	E CN N	173
4	E T N	179
5	E T D	186
6	P T D	227
7	P CR D	229
8	P T N	230
9	P CR N	232
10	E CR N	244

In each of the four head-to-head comparisons, the PPP methodology results in lower average variability of earnings than the exchange rate methodology, although little difference is observed between P CR D and E CR D.

Tables 5 and 6 have the same formats as Tables 3 and 4, but translating to Japanese yen instead of pounds.

The difference between Table 3 and Table 5 is striking.

Table 6 Head-to-Head Comparisons of PPP and Exchange Rate Methodologies Based on Average Variability of Earnings per Share as Translated from the US Dollar to the Japanese Yen

PPP Methodology	Average Variability	Exchange Rate Methodology	Average Variability
P CR N	232	E CR N	244
P T N	230	E T N	179
P CR D	229	E CR D	136
P T D	227	E T D	186

In considerable contrast to the US dollar/UK pound translations, the Japanese head-to-head comparisons indicate lower average reported earnings for three exchange rate methodologies compared with their PPP counterparts. The only exception is the P CR N vs E CR N comparison.

5.3 Research Question 3

Are the PPP translation methodologies as viable, based on variability of earnings per share, between the US dollar and Japanese yen as between the US dollar and the UK pound?

Based solely on the normative criterion of variability of reported earnings, the answer to research question 3 is no. This answer may reduce the argument for a change in accounting principle related to foreign currency translation from exchange rates to price parity constructs, at least in Japan. But it was precisely because of major differences in the business environment and general culture between the UK and Japan that Japan was chosen for the present study. Japanese business people value low variability of earnings even more than US and UK business managers, and it is not known what cultural factors may have driven the results of this study.

6. Future Research

Foreign currency translation methodologies can be tested against a number of normative criteria.

One classification of criteria is value of the firm. For example, Ohlson (2001) studied the relationship between earnings, book values, and dividends in equity valuation. Ohlson (2005) examined accounting-based valuation formulae, and Ohlson and Juettner-Nauroth (2005) studied the relationship between earnings per share and firm value. These studies were not oriented specifically to foreign currency translation, but similar methodologies could be developed to do so.

Other normative criteria for testing translation methodologies include the Fischer Black method of accounting method selection and the present values of future cash flows to investors.

Although the present study does not clearly support PPP over exchange rate methodologies for Japan, the author feels that future normative research should include PPP translations between the US dollar and the Japanese yen as well as PPP translations between the US dollar and numerous other currencies.

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