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Price Parity Time Series Construction and Implications for Foreign Currency Translation and Quality of Earnings

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Abstract: The study presents the historical and theoretical underpinnings for the use of a price parity (PP) time series instead of market-generated exchange rates for foreign currency translation and relates these foundations to concepts of earnings quality. PP constructs generate a time series which is closer to the equilibrium exchange rate time series, and its use in translation of foreign accounts results in consolidated financial statements of multinational companies which are more decision useful. There are a number of possible methods for generating the PP series. The current study describes a method that is practical for application in accounting.

Key words: foreign currency translation; price parity; quality of earnings

JEL codes: M

1. Introduction

In 1974, the Committee on International Accounting suggested the possibility that purchasing power parity (PPP) might be appropriate for foreign currency translation prior to the preparation of consolidated statements of multinational firms, indeed that such PPP constructs might be superior to exchange rates for the purpose. At the time the committee expressed this notion, no empirical accounting research had been done to make the comparison between PPP translation methodologies and exchange rates methodologies and to suggest an answer as to which is better for the quality of earnings. The committee was calling for discovery research to be performed.

Theoretical insights into the effects of using PPP numbers instead of exchange rates for currency translation were advanced in a small number of early research papers and some few papers even presented fully developed translation methodologies based on PPP.

In more recent years, some empirical work has been done (also described in the literature review) to compare the consequences of using PPP instead of exchange rates and to bring accounting standard setting bodies and other accounting professionals closer to the answer to the committee's original question. These studies were based on translations between the US dollar and the UK pound. No similar empirical studies exist to describe what happens when PPP numbers are used instead of exchange rates for currency translation between the US dollar and various currencies other than the UK pound.

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2. Purpose of the Study

Accordingly, the purpose of the present study is to examine the characteristics of PPP time series constructs compared with exchange rate time series. One of the assumptions of the present inquiry is that the relative variability of the PPP series and the exchange rate series results in relative variability of reported earnings.

This study uses what may be referred to as “country pairings”, one of which is always the United States. For example, one pairing would be the United Kingdom and the United States. Another could be Russia and the United States. No pairings are considered which do not involve the United States. For example, the purpose of the study does not encompass PPP and exchange rate comparisons between say, Russia and the United Kingdom. For convenience, the term “country pairings” will be used in this study. For example, a “Germany pairing” will mean PPP time series and exchange rate comparisons between Germany and the United States.

It is not known to what extent the relative characteristics of PPP and exchange time series are the same for all currencies translated into the US dollar. Such knowledge has substantial implications for any proposal to use PPP numbers instead of exchange rates for translation. Although the economics literature does suggest that a PPP time series for a given country (in a “country pairing” between that country and the United States) should have lower variability than an exchange rate time series, the extent to which this is true for all countries is not known. Such knowledge is critical to PPP translation proposals; despite the theoretical economics literature and the theoretical accounting literature, it may be true that PPP translation methodologies might be highly meaningful and useful in some country pairings, but less useful, even harmful in terms of financial statement information content, in other country pairings.

3. Literature Review

Does lower variability of reported earnings result in more useful information? That is, is lower variability of reported earnings a normative criterion against which to evaluate alternative accounting methods? There are numerous research articles in the accounting literature that indicate that managers and other users view high variability of earnings as undesirable and less accurate depictions of the results of operations than lower variability of earnings.

3.1 Relevant and Representative 20th Century Literature

A number of foreign currency translation articles indicate that the requirements of SFAS #8 were perceived by many financial statement users, especially managers, to result in greater variability of reported earnings than other possible translation methodologies (Allan, 1976; Biel, 1976; Herschman, 1976; Mattlin, 1976; Merjos, 1977; Aggarwal, 1978; Porter, 1983; Selling & Sorter, 1983). Collins and Salatka (1993) concluded that including the translation adjustment in net income as required by SFAS #8 generated noises that made reported earnings less meaningful.

From the economics literature, the PPP theory 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 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).

Actual exchange rates are not likely to be equilibrium. Temporary factors affecting exchange rates are always in play, a condition that continually adds to the variability of exchange rates. Under the PPP theory as described by Officer, PPP would mitigate the effects of these temporary noise factors. This is a reasonable argument in favor of the use of PPP numbers instead of exchange rates for foreign currency translation, but the argument is theoretical and is not acceptable in accounting standard setting without supporting empirical and normative research.

3.2 Relevant and Representative 21st Century Literature

Bazaz and Senteney (2001) used an equity valuation model to investigate the extent to which SFAS No. 52 unrealized foreign currency translation gains and losses are reflected in levels of equity security prices.

Louis (2003) studied the association between change in firm value and the foreign translation adjustment. Accounting rules for currency translation usually result in financial statement numbers opposite to the economic effects of exchange rate variations. Thus, the translation adjustment was associated with a loss of value instead of an increase in value.

Holt (2004), a descriptive study, used a complex method of estimating the temporal characteristics of accounts and compared the information content of return on assets across translation methodologies, including PPP.

Kwon (2005) indicated that foreign investors generally price exchange risk differently from local investors, and that the source and magnitude of differences in exchange risk pricing varied significantly across countries.

In another empirical study, Pinto (2005) tested foreign currency translation adjustment value relevance in an earnings and book value model and observed that foreign currency translation adjustments are significantly value relevant.

Liu (2006) used an accounting-based equity valuation model for multinational firms to examine the forecasting and valuation properties of foreign currency translation gains and losses. It found that translation gains and losses could be subdivided into a core component and a transitory component. The combined effect was 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.

Chambers et al. (2007) provided evidence in the post-SFAS #130 period that other comprehensive income is priced by investors on a dollar-for-dollar basis. Two components of other comprehensive income, foreign currency translation adjustment and unrealized gains and losses on available-for-sale securities, were found to be priced by investors. But the study suggests that investors pay greater attention to other comprehensive information reported in the statement of changes in equity, rather than in a statement of financial performance.

Holt (2011) made a normative evaluation of translation methodologies based on firm valuation and found that PPP performed well against this criterion compared to exchange rates. Holt (2006) suggested superiority of the use of PPP over exchange rates for variability of reported earnings. Holt (2012) focused on two short-term liquidity ratios, the current ratio and inventory turnover and attempted to identify, in terms of empirical properties, if and in what ways foreign currency translation methodologies generate different results. Analysis of meaningfully-paired observations indicated substantially different current ratio and inventory turnover numbers

across translation methodologies. But the results were not consistent from year to year and the results of all the fifty sample companies, taken together, did not hold for all the individual companies. At the firm level, the results were highly firm specific.

Holt (2013) tested alternative translation methodologies against the Fischer Black Method of Evaluating accounting alternatives with a conclusion favorable to PPP. Holt (2014a) tested alternative translation methodologies against the normative criterion of present values of future cash flows to investors and concluded a favorable result for PPP. Holt (2014b) tested methodologies against the predictability of reported earnings with similar favorable results for PPP.

4. Methodology

4.1 Overview

The countries used to form the "country pairs" were taken from the top twenty-five countries according to gross domestic product as indicated in International Monetary fund 2013 and augmented by Treasury Direct 2005 and United States Census 2014. As noted above, all country pairs include the United States leaving twenty-four countries for pairing. For various economic reasons, Saudi Arabia and Turkey were excluded, resulting in twenty-two country pairings.

Month-end exchange rates between each of the twenty-two countries and the United States were obtained from January 1999 through December 2013. In order to construct the PPP monthly time series for the same period, the United States monthly consumer price indexes and the corresponding consumer price indexes for the twenty-two countries were obtained.

4.2 Purchasing Power Parity (PPP) Time Series Construction

There is no rigorous defense for the use of exchanges rates in translation, and exchange rates are not related in any clear way to accounting measures. None of the exchange-rate based translation methodologies has been shown theoretically or empirically to be superior to the others under all circumstances. Patz (1978) suggests this may result from the use of exchange rates themselves. The Price Parity Method of translation is described in full in Patz (1981). For an analysis of the state of the art of currency translation theory and the lack of definitive research of the PPP alternative, see Patz (2006).

Using the price parity methodology, foreign accounts are translated into dollars using a temporal method approach, but using a time series of price parity relative purchasing power indices. The purpose 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, but rather for the maximization of economic power which can be defined as the size of assets held (Churchman, 1961).

The price parity indices needed for translation from foreign currency to dollars under the price parity method were calculated 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.

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

4.3 Research Questions

The study addressed two research questions:

(1) For how many of the twenty-two country pairings is the variability of PPP less than the variability of exchange rates, and which country pairings exhibit this characteristic?

(2) Do any of the twenty-two country pairings exhibit anomalous results that would affect the use of PPP for currency translation in lieu of exchange rates, and what are the causes of these anomalies?

5. Results and Conclusions

The rank ordering of countries by gross domestic product according to the International Monetary Fund (2012) is as follows:

(1) United States
(2) China
(3) Japan
(4) Germany
(5) France
(6) United Kingdom
(7) Brazil
(8) Russia
(9) Italy
(10) India
(11) Canada
(12) Australia
(13) Spain
(14) Mexico
(15) South Korea
(16) Indonesia
(17) Turkey
(18) Netherlands
(19) Saudi Arabia
(20) Switzerland
(21) Iran
(22) Sweden
(23) Norway
(24) Poland
(25) Belgium

The purpose of consulting this list was to select countries which are active in international commerce. Such countries contain businesses which are likely to have Multi-national subsidiaries, and thus are affected by

accounting principles relating to foreign currency translation. The list was used merely for selection for use the in present study. Factors such as the precise rank ordering were not relevant.

As indicated under methodology, for various economic reasons, Iraq and Turkey were excluded, resulting in twenty-two country pairings with the United States.

Several of these countries use the euro. Although the time series of exchange rates between those countries' currencies and the United States dollar is the same, the time series of the constructed PPP numbers is different. Thus, the fact that several countries use the same currency does not eliminate the use of that country in the present study.

An implication of Officer (1982) was that the PPP construct's variance is lower than that exchange rate variance. Tables 1 and 2 make that comparison for the study period. Countries are ordered by gross domestic product.

Table 1 was constructed with a United States parent and a foreign subsidiary in mind, translating foreign currency into dollars, whereas Table 2 used the opposite scenario, a foreign parent and a United States subsidiary.

To answer research question #1, in each table we observe sixteen of the country pairings with higher variances for exchange rates than for PPP and six country pairings with the opposite result. The six countries for which the results were contrary to Officer (1982) arranged in order of gross domestic product are: Japan, Brazil, Russia, India, South Korea, and Indonesia. A tentative and cautious implication is that the use of PPP instead of exchange rates for currency translation between these countries and the United States might not be advantageous from the viewpoint of the information content of consolidated financial statements.

Table 1 Variances of Exchange Rates Compared to Variances of PPP
(Dollars per Foreign Currency)

Country	Exchange Rate Variance	PPP Variance	X = Exchange Rate Variance > PPP Variance
China	0.0308	0.0298	x
Japan	0.0001	0.0028	
Germany	0.2528	0.0777	x
France	0.2528	0.0739	x
United Kingdom	0.0075	0.0011	x
Brazil	0.0969	0.1671	
Russia	0.0031	0.0168	
Italy	0.2528	0.0207	x
India	0.0048	0.0075	
Canada	0.1767	0.0273	x
Australia	0.1712	0.0364	x
Spain	0.2528	0.0301	x
Mexico	0.0200	0.0191	x
South Korea	0.00004	0.00004	
Indonesia	0.00004	0.00005	
Netherlands	0.2528	0.0258	x
Switzerland	0.3465	0.1210	x
Iran	0.0004	0.00034	x
Sweden	0.0296	0.0107	x
Norway	0.0270	0.0060	x
Poland	0.0616	0.0130	x
Belgium	0.2528	0.1809	x

Table 2 Variances of Exchange Rates Compared to Variances of PPP (Foreign Currency Units per Dollar)

Country	Exchange Rate Variance	PPP Variance	X = Exchange Rate Variance > PPP Variance
China	1.5529	1.5226	x
Japan	1.4051	29.9925	
Germany	0.1822	0.0684	x
France	0.1822	0.0654	x
United Kingdom	0.0028	0.0004	x
Brazil	0.4036	0.9102	
Russia	2.9367	44.7313	
Italy	0.1822	0.0196	x
India	12.9564	26.1340	
Canada	0.2774	0.0549	x
Australia	0.2903	0.0945	x
Spain	0.1822	0.0307	x
Mexico	2.4754	2.3257	x
South Korea	52.2268	61.9771	
Indonesia	3,337	5,187	
Netherlands	0.1822	0.0248	x
Switzerland	0.4929	0.2391	x
Iran	16,273	7,213	x
Sweden	1.677	0.6954	x
Norway	1.3309	0.3599	x
Poland	0.7790	0.2386	x
Belgium	0.1822	0.1437	x

Of special interest among these six countries is Japan, as it is the fourth largest trading partner with the United States. It is important to understand why these results are observed for Japan. A major factor in constructing the PPP series, as described in the methodology section of this paper, is the variability of the consumer price index. The following table shows the rank orderings of countries based on the lowest variances of the consumer price indexes. This result for Japan is an anomalous result mentioned in research question #2.

Pursuant to officer (1982) and the methodology of the PPP time series construction used in this paper, a preliminary observation is that the higher the variance of a country's CPI, the less valuable would be the use of PPP for foreign currency translation compared to exchange rates. The striking result from Table 3, compared with the results from Tables 1 and 2, is that Japan has the lowest variability among the countries included in this study.

The other major factor in the construction of the PPP series is the CPI in the United States. Hence, the coefficient of variation between the foreign country's CPI series and the United States CPI series is highly relevant. Intuitively, the coefficient of variation would be positive for all countries for which a constructed PPP series would be viable for currency translation.

Table 4 rank orders countries by the coefficient of variation between that country's CPI series and the United States CPI series, showing the lowest coefficients first.

Table 3 Rank Ordering of Countries by Lowest Variances of Consumer Price Indexes

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

Table 4 Rank Ordering of Countries by Lowest Coefficient of Variation Between That Country's CPI Series and the United States CPI Series

Country	Coefficient of Variation
Japan	-0.5951
China	0.4737
India	0.8399
Mexico	0.8546
Iran	0.8952
Switzerland	0.9573
United Kingdom	0.9697
Poland	0.9762
Belgium	0.9772
Netherlands	0.9825
Norway	0.9836
Sweden	0.9862
Brazil	0.9876
Russia	0.9896
South Korea	0.9915
Australia	0.9939
Italy	0.9944
Indonesia	0.9948
Canada	0.9955
Germany	0.9956
France	0.9969
Spain	0.9971

Table 4 reveals Japan as a striking outlier; Japan's CPI series does not correlate with the United States series, an explanation for the anomalous result observed for the Japan pairing. This evidence suggests that the use of PPP for translation of accounts between the Japanese yen and the United States dollar for consolidation purpose is not likely to produce financial statements with information content superior to the use of exchange rates.

6. Limitations and Suggestions for Future Research

The present study drew on the implications of Officer (1982) and thus assumed that the use of an equilibrium exchange rate series, represented by PPP, rather than a market-generated exchange rate series would result in consolidated financial statements with greater information content. The study did not actually perform the daunting task of translating a significantly large sample of actual companies from one currency to another. Thus, no rank ordering of translation methodologies was done based on any normative criterion.

A number of papers reflect accounting normative criteria against which translation methodologies can be evaluated. For example, Ohlson (2001) studied the relationship between earnings, book values, and dividends in equity valuation. Ohlson (2005) examined accounting-based valuation formulae, and Juettner-Nauroth (2005) studied the relationship between earnings per share and firm value.

The explanation of the anomalous Japan pairing was based on the lack of correlation between the Japanese CPI series and the United States CPI series. This was a mathematical explanation, but the underlying business environment and cultural explanations for this phenomenon remain unknown.

Despite the results of this study related to Japan, the author believes future research should perform currency translations between the Japanese yen and the U.S. dollar for the purpose of comparing the results with a wide range of normative criteria. Such research should also be performed for the other twenty-one country pairs.

A list of normative criteria against which viable translation methodologies should be tested include, but is not limited to: variability of reported earnings, predictability of earnings, predictability of cash flows, the Fischer-Black method of evaluating accounting alternatives, and value of the firm.

References

Aggarwal Raj (1978). "FASB no. 8 and reported results of multinational operations: Hazard for managers and investors", *Journal of Accounting, Auditing and Finance*, spring, pp. 97-216.

Allan John H. (1976). "Currency swings blur profits", *New York Times*, 20 June, 1F, 7F.

Bazaz Mohammad S. and David L. Senteney (2001). "Value relevance of unrealized foreign currency translation gains and losses", *American Journal of Business*, Vol. 16, Issue 2, pp. 55-62.

Biel Heinz H. (1976). "Foreign woes: foreign exchange losses are proving costly for many multinationals", *Forbes*, December 1, p. 95.

Chambers Dennis et al. (2007). "An evaluation of SFAS no. 130 comprehensive income disclosures", *Review of Accounting Studies*, Vol. 12, No. 4, pp. 557-593.

Churchman C. West (1961). *Prediction and Optimal Decision*, Englewood Cliffs, New Jersey: Prentice-Hall.

Collins D. and Salatka W. (1993). "Noisy accounting earnings signals and earnings response coefficients: The case of foreign currency accounting", *Contemporary Accounting Research*, No. 10, pp. 119-159.

Committee on International Accounting, American Accounting Association (1974). "Report of the committee on international accounting", *Supplement to the Accounting Review*.

Financial Accounting Standards Board (1975). "Accounting for the translation of foreign currency transactions and foreign currency financial statements", *Statement of Financial Accounting Standards No. 8*, Stamford, Connecticut: FASB.

Financial Accounting Standards Board (1981). *Foreign Currency Translation. Statement of Financial Accounting Standards No. 52*, Stamford, Connecticut: FASB.

Financial Accounting Standards Board (1997). *Reporting Comprehensive Income: Statement of Financial Accounting Standards No. 130*, Stamford, Connecticut: FASB.

Free Financial Dictionary (2014). Accessed on December 18, 2014, available online at: http://financial-dictionary.thefreedictionary.com/Equilibrium+exchange+rate.

Hershman Arlene (1976). "Another accounting problem", *Dun's Review*, Vol. 107, June, pp. 68-69, 94.

Holt Paul E. (2004). "Comparative information content of return on assets based on alternative translation methods", *Southwest Business and Economics Journal*, Vol. 12, pp. 9-17.

Holt Paul E. (2006). "The variability of earnings across foreign currency translation methodologies: An empirical comparison", *Southwest Business and Economics Journal*, pp. 67-81.

Holt Paul E. (2011). "A normative evaluation of translation methodologies based on firm valuation", *Journal of Theoretical Accounting Research*, fall, pp. 79-107.

Holt Paul E. (2012). "Some effects of alternate foreign currency translation methodologies on two short-term liquidity ratios", *American Journal of Economics and Business Administration*, No. 3, pp. 645-651.

Holt Paul E. (2013). "The Fischer black method of evaluating accounting alternatives applied to currency translation methods", *Advances in Business Research.*

Holt Paul E. (2014a). "A normative evaluation of translation methodologies based on present values of future cash flows to investors", *Southwest Business and Economics Journal*, Vol. 21. pp. 21-34.

Holt Paul E. (2014b). "Earnings quality as measured by predictability of reported earnings", *Advances in Business Research*.

International Monetary Fund (2014). Accessed on December 18, 2014, available online at: http://www.imf.org.

Kwon Taek Ho et al. (2005). "Do foreign investors price foreign exchange risk differently?", *Journal of Financial Research*, Vol. 28 No. 4, pp. 555-573.

Liu Jing (2006). "On international accounting valuation", *Journal of International Accounting Research*, Vol. 5, No. 1, pp. 67-87.

Louis Henock (2003). "The value relevance of the foreign translation adjustment", *Accounting Review*, Vol. 78, No. 4, pp. 1027-1047.

Mattlin Everett (1976). "Playing the currency game", *Institutional Investors*, May, pp. 83-86, 88, 90, 93-94, 96, 124.

Merjos Anna (1977). "For better or worse FASB #8 continues to play hob with corporate earnings", *Barron's*, August 8, p. 11.

Officer Lawrence H. (1982). *Purchasing Power Parity and Exchange Rates: Theory, Evidence and Relevance*, Greenwich, Connecticut: Jai Press.

Ohlson J. A. (2001). "Earnings, book values and dividends in equity valuation: An empirical perspective", *Contemporary Accounting Research*, pp. 107-120.

Ohlson J. A. (2005). "On accounting-based valuation formulae", *Review of Accounting Studies*, pp. 323-347.

Ohlson J. A. and B. Juettner-Nauroth (2005). "Expected EPS and EPS growth as determinants of value", *Review of Accounting Studies*, pp. 349-365.

Patz Dennis (1978). "A price parity theory of translation: A reply", *Accounting and Business Research*, pp. 66-72.

Patz Dennis (1981). "Price parity translation: Methodology and implementation", *Accounting and Business Research*, pp. 207-216.

Patz Dennis (2006). "The state of the art in translation theory", *Journal of Business Finance and Accounting*, Vol. 4, No. 3, pp. 311–325, doi: 10.1111/j.1468-5957.1977.tb00716.x.

Pinto Jo Ann (2005). "How comprehensive is comprehensive income? The value relevance of foreign currency translation adjustments", *Journal of International Financial Management & Accounting*, Vol. 16, No. 2, pp. 97-122.

Porter Gary A. (1983). "Foreign currency accounting FAS 8 or 52? Multinationals experiment", *Massachusetts CPA Review*, summer, pp. 48-54.

Selling Thomas I. and George H. Sorter (1983). "FASB statement no. 52 and its implications for financial statement analysis", *Financial Analysts Journal*, May/June, pp. 64-69.

Treasury Direct (2005). Available online at: http://www.treasurydirect.gov/govt/rates/pd/avg/2005.

United States Census (2014). Accessed on December 14, 2014, available online at: http://www.census.gov/foreign-trade/statistics/highlights/toppartners.html.

Wang Yue et al. (2006). "The value relevance of dirty surplus accounting flows in the Netherlands", *International Journal of Accounting*, Vol. 41, No. 4, pp. 387-405.