

The Suitability of Purchasing Power Parity Constructs for Foreign Currency Translation for Subsidiaries in Five European Countries

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Abstract

Previous research studies tested the use of several foreign currency translation (FCT) methodologies, including purchasing power parity (PP) construct methodologies against the normative criterion of variability of earnings, and found that the use of PP resulted in lower variability of translated earnings when translations 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 from the euro to the US dollar using the current rate method and the temporal rate method. The translations were done two ways: using exchange rates and PP constructs. The translations were done for five representative countries which use the euro: France, Germany, Italy, The Netherlands, and Spain. The variability of earnings per share (EPS) using exchange rates was compared with the results using PP constructs. The use of PP constructs and the temporal rate method resulted in lower EPS for all five countries and most companies than the use of exchange rate methodologies. For the current rate method, the opposite result was found for all five countries.

Keywords: international accounting, price parity, foreign currency translation, euro, France, Germany, Italy, Netherlands, Spain, quality of earnings.

An International Accounting Problem

US generally accepted accounting principles (GAAP) require that 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. This second step, FCT, has been the topic of numerous studies over several decades.

Aside from the methodologies officially required in the US and other countries, there are many theoretically possible methodologies for FCT. Despite a massive literature, comparatively little is known empirically regarding how and in what ways the official 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.

In the US, accounting policy makers have made major changes in GAAP for currency translation three times, each 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 Bulletin 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) with 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).

Variability of Earnings

Managers are expected to be risk averse, to prefer ever-increasing reported EPS, with low variability, to major swings and greater variability. Investors in the US 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 substantial literature (see literature review) that reflects this normative criterion specifically with respect to FCT.

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 for 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.

Purchasing Power Parity (PP) and the Variability of Earnings Issue

The PP concept of exchange rates is summarized in Officer (1982) in three propositions: (1) PP 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 PP, with the former variable tending to equal the latter. Tyers & Zhang (2014) noted that "...real exchange rates are seen to be influenced in the long run by forces that return economies to purchasing power parity and by differences in productivity growth across sectors and across regions."

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,

3/25/2020). 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).

The Committee on International Accounting suggested, in 1974, that PP constructs might be appropriate for FCT, 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 PP, 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 PP 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 PP time series is used instead of exchange rates for currency translation between the US dollar and various currencies other than the UK pound.

Purpose of the study

Accordingly, the purpose of the present study is to compute the variability of translated earnings of subsidiaries, from the euro to the US dollar, across four translation methodologies: the current rate method and the temporal rate method, each performed with exchange rates and PP constructs. If PP methodologies empirically test well against exchange rate methodologies, using variability of translated earnings as a normative criterion, the proposition that PP should be used for currency translation worldwide is enhanced. The current rate method and the temporal rate method are used in the present study as these two methods are required by SFAS #52, depending on circumstances.

Literature Review

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 & 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 & 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.

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) 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 PP. 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 FCT 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, Buijink, and Eken (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, Linsmeier, Shakespeare, and Sougiannis (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 FCT 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 PP performed well against this criterion compared to exchange rates when translations were made from the US dollar to the UK pound. The use of PP 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.

Methodology

Overview

As indicated in the literature review, previous studies have indicated that the use of PP 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 uses variability of earnings as a normative criterion and translates from the euro to the US dollar, using both exchange rates and PP constructs for comparison.

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 fifteen consecutive years ending in 2018. 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 ten years ending in 2018, financial data for fifteen years were needed to estimate the temporal characteristics of various accounts accurately for the ten-year study period. 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 euro were obtained from January 2004 through December 2018. To construct the PP monthly time series for the same period, the US monthly consumer price indexes (CPI) and the corresponding CPIs for the US and the five selected European countries were obtained.

Translations of the fifty companies were made from the euro to the US dollar for each of the years in the study period, using each of the following four translation methodologies (a total of 2,000 financial statement translations):

E T

P T

E C

P C

Where:

E = exchange rates were used for translation

P = PP constructed numbers were used for translation

C = the current rate method

T = the temporal rate method

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

Construction of the Purchasing Power

Parity (PP) Time Series

The PP 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 PP is available in Patz (2006). There are several methods of generating a price parity time series. The method used in this study is called the “constructed rate” method which is the method suggested by Patz (1981) as the simplest and most practical for accounting application.

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 exchange 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 price parity methodology proposed by Patz, 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 PP methodology, using the current rate approach, is also included. The purpose of a PP 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 PP method was achieved as follows:

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

Where:

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

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

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

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

Research Questions

The study addresses five research questions:

- (1) For each of the five countries, is the variability of the PP time series greater or less than the variability of the exchange rate time series?
- (2) For each of the five countries, and for the temporal rate method, is the variability of earnings resulting from FCT from euros to dollars, using PP, greater or less than the variability using exchange rate translation methods?
- (3) For the temporal rate method, are the five countries rank ordered differently by average variability of earnings? That is, does it matter in which country the subsidiaries are located?
- (4) For each of the five countries, and for the current rate method, is the variability of earnings resulting from FCT from euros to dollars, using PP, greater or less than the variability using exchange rate translation methods?
- (5) For the current rate method, are the five countries rank ordered differently by average variability of earnings? That is, does it matter in which country the subsidiaries are located?

Results and Conclusions

Research Question 1

For each of the five countries, is the variability of the PP time series greater or less than the variability of the exchange rate time series?

Because of the small variance numbers, the data are presented in Table 1 as standard deviations instead of variances, for ease in reading.

Table 1

Comparison of the variability of the PP time series with the variability of the time series of the euro across five countries

Country	Exchange rates, dollars to euros	Exchange rates, euros to dollars	Price parity, dollars to euros	Price parity, euros to dollars
FRANCE	.0341	.0624	.0074	.0111
GERMANY	.0341	.0624	.0061	.0116
ITALY	.0341	.0624	.0038	.0070
NETHERLANDS	.0341	.0624	.0063	.0144
SPAIN	.0341	.0624	.0052	.0097

For each of the five countries, the standard deviation of the PP time series is significantly lower than that of exchange rates, whether calculated from dollars to euros or euros to dollars. The result is not surprising based on the theoretical contention of less noise in the PP series.

Research Question 2

For each of the five countries, and for the temporal rate method, is the variability of earnings resulting from FCT from euros to dollars, using PP, greater or less than the variability using exchange rate translation methods?

Table 2

Comparisons of PP and exchange rate methodologies based on average variability of earnings per share as translated from the euro to the dollar using the temporal rate method

Country	Average Variability of EPS E T method	Average Variability of EPS P T method	Number of companies with P T less than E T	Number of companies with E T less than P T
FRANCE	27.913	13.248	40	10
GERMANY	27.913	10.558	48	2
ITALY	27.913	12.257	42	8
NETHERLANDS	27.913	12.585	41	9
SPAIN	27.913	11.957	42	8

For each of the five countries, the average variability of earnings per share is significantly lower using PP constructs for the temporal rate method than using exchange rates. This result is observable for the vast majority of the fifty sample companies, but not all.

Research Question 3

For the temporal rate method, are the five countries rank ordered differently by average variability of earnings? That is, does it matter in which country the subsidiaries are located?

Table 3

Rank ordering of countries by average variability of earnings using the temporal rate method and price parity

RANK	COUNTRY
1	FRANCE 13.248
2	NETHERLANDS 12.585
3	ITALY 12.257
4	SPAIN 11.957
5	GERMANY 10.558

There is no rank ordering of countries by average variability of earnings using exchange rates, as all five countries use the euro. But Table 3 indicates that the variability of earnings of subsidiaries is different, when using price parity constructs, depending on the location of the subsidiaries within the five countries.

Research Question 4

For each of the five countries, and for the current rate method, is the variability of earnings resulting from FCT from euros to dollars, using PP, greater or less than the variability using exchange rate translation methods?

Table 4

Comparisons of PP and exchange rate methodologies based on average variability of earnings per share as translated from the euro to the dollar using the current rate method

Country	Average Variability of EPS E C method	Average Variability of EPS P C method	Number of companies with P C less than E C	Number of companies with E C less than P T
FRANCE	11.490	13.338	9	41
GERMANY	11.490	13.021	8	42
ITALY	11.490	12.236	10	40
NETHERLANDS	11.490	12.475	10	40
SPAIN	11.490	12.374	10	40

In sharp contrast to Table 2, all five countries have a greater variability of earnings using P C than E C. By comparing Table 4 with Table 2, the implication is that the use of PP constructs for FCT results in lower variability of earnings using the temporal rate method, but the opposite is true when using the current rate method.

These results are in contrast with Holt (2006). In that study, translations were made between the US dollar and the UK pound. It was observed that whether the temporal rate method

or the current rate are used, the use of price parity constructs resulted in lower variability of earnings. It should be noted that Holt (2006) used different sample companies than the present study, as well as a different study period.

Research Question 5

For the current rate method, are the five countries rank ordered differently by average variability of earnings? That is, does it matter in which country the subsidiaries are located?

Table 5

Rank ordering of countries by average variability of earnings using the current rate method and price parity

RANK	COUNTRY
1	FRANCE 13.338
2	GERMANY 13.021
3	NETHERLANDS 12.475
4	SPAIN 12.374
5	ITALY 12.236

As in Table 3, there is no rank ordering of countries by average variability of earnings using exchange rates, as all five countries use the euro. But both Tables 3 and 5 indicate that the variability of earnings of subsidiaries is different, when using price parity constructs, depending on the location of the subsidiaries within the five countries.

Conclusions

Relevant to the conclusions are the purposes for the temporal rate method and the current rate method. The temporal rate method is based on the concept that the translation process should change the unit of measure from foreign currency to dollars without changing the underlying accounting principles. Further, the command over goods and services in the foreign environment is measured rather than the value that theoretically could be repatriated to the parent company. The current rate method seeks to measure the net investment by a US parent in a foreign subsidiary and the change in the net investment across reporting periods.

Therefore, as supported by this study, using PP constructs with the current rate method does not give as accurate a measure of the command over goods and services in the foreign environment as does the temporal rate method.

Singh (2014) points out that only the PP method "... correctly reports the effects of the inflation of both countries" and that "the Current Rate Method fails to correctly report the effect of the subsidiary country's inflation and the temporal method (using exchange rates) does not correctly report the parent country's inflation." Further, Singh argues that exchange rate risk is related to violations of purchasing power parity.

SFAS #52 requires the use of the temporal rate method for "remeasurement" when the currency of the books and records of the subsidiary is different from the functional currency, and if the functional currency is different from the parent's reporting currency, the current rate method must be used for "translation." In some situations, it is necessary to both "remeasure" from the currency of the books and records to the functional currency and "translate" from the

functional currency to the reporting currency.

Positing lower variability of EPS as a normative criterion, and noting the results of the present study and previous studies relating to UK pound to US dollar translations, it can be proposed that the “remeasurement” required in SFAS #52 should be done using the temporary rate method with PP constructs instead of exchange rates, and that “translation” should be done using the current rate method using exchange rates. Such an approach would generally result in lower variability of subsidiaries’ EPS and cause subsidiaries’ financial numbers to have a more useful impact on consolidated statements.

Future Research

FCT methodologies, both exchange rate and PP methodologies, can be tested against normative criteria other than variability of reported earnings.

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 EPS and firm value. These studies were not oriented specifically to FCT, but similar research 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. The authors believe that future empirical, normative research should include PP methodologies as well as numerous other national currencies.

The current study focuses on translations from subsidiaries in five European countries to US dollars. It would be useful to know the impacts of using PP or exchange rates for translations from the US dollar to the euro, the currency of consolidation with European parents.

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