Cross-border Investments, Currency Risks and Portfolio Returns:
The Case of Epack - Ghana

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Abstract
The study sought to examine the impact of currency risks on the performance of cross-border collective investment schemes. Using data monthly from Ghana and selected African countries over the period 2005 to 2010 and employing a Hendry type error correction model, the results of the study seem to indicate that currency risks are important in explaining the returns on cross-border investments albeit with a lag and upon aggregation. The findings also indicate significant effects flowing from macroeconomic variables such as interest rates. These findings indicate a need to consider currency risks and domestic interest rates when compiling investment portfolios. The findings have significant policy implications as regards international or cross-border investments.

Keywords: currency risk, collective investment schemes, international diversification

1. Introduction
Over the past decade, the Ghanaian financial landscape has witnessed the emergence of various collective investment schemes (CIS), which have come to play a significant role in the mobilization of savings. As at the end of 2010, twenty-four (24) CIS had been licensed by the Securities and Exchange Commission (SEC, 2011), with Databank Epack Investment Fund Ltd (Epack), the first licensed equity mutual fund since 2002, dominating the mutual fund industry with respect to market share and assets under management. Epack, an open-ended mutual fund, operates in Ghana with some overseas stocks in its portfolio, mainly as a consequence of the illiquidity on the Ghanaian stock market coupled with limited listed stocks, among other factors.

According to Chen and Ang (2001), and in consonance with several others, international diversification, while giving investors exposure to stock and bond markets outside their country of origin and providing asset diversification and the possibility for yield or gains significantly greater than that in the domestic market, the conversion of stock and bond prices from the currency of ‘investment country’ to the domestic currency can also have negative implications for the return earned by local investors. As put succinctly by Addae-Dapaah and Tan (2008), cross border activity means that investors must not only focus on the cashflow patterns but also on the impact of currency movements.

It is not farfetched therefore to hypothesize that the returns of Epack will be susceptible to a number of factors such as inflation, interest rate shocks and currency appreciation or depreciation among other macroeconomic fundamentals of the country where the investments are undertaken as well as on its homefront. The interplay of these factors can either enhance or reduce the net returns accrued to shareholders thereby introducing risk. Managing risks, in view of a given return, first involves the identification and measurement of the impact of the risk before appropriate steps can be taken. The interest of this study is therefore to unravel how one such risk, the currency risk, influences the returns that that accrue to cross-border investments such as Epack.

2. The Literature
This section reviews relevant issues on international investing, currency risk and investment returns as well some empirical evidence.

2.1 Cross-Border Investments and Related Issues
The dynamics of cross-border investments have received some significant research attention in recent years. This
due to the fact that globalization has blurred the lines between countries, causing investors to easily cross borders in search of high return investments (Agenor, 2003). The general consensus, as regards, cross-border investments, is that investors can potentially improve risk-adjusted performance of their portfolios just by investing internationally (Schmittmann, 2010). This notion, supported by Sharpe-Lintner’s CAPM and multi-factor models which suggests that investor go global, is also empirically documented by studies such as Levy and Sarnat (1970), Barry and Lockwood (1995), Ang and Bekaert (2002) and Solnik and McLeavey (2003) to mention a few.

The blurring of borderlines, as a result of globalization has, however, not evolved to cover the differences between countries’ macroeconomic fundamentals and their potential effects on foreign investments, giving rise to a new school of thought that posits that the idea of above-average returns on a combined portfolio of domestic and international investments compared to purely a domestic one is unduly overstretched (Goetzmann & Ibbotson, 2005). According to this divide, the apparent benefits of investing internationally is tempered significantly by the presence of currency risk, which ultimately alters the risk-return profile of international investments.

Currency risk, also referred to exchange rate risk, represents the degree or potential to which an investment is likely to be affected by exchange rate movements. It can also be referred as the “the sensitivity of a firm’s economic value, or stock price, to exchange rate changes” (Heckman, 1983) or its “economic exposure to exchange rate risk” (Adler & Dumas, 1984). Prior studies in the empirical literature have primarily focused on the measurement and impact of currency risk through the use of regressions and provided mixed results. However, after Adler and Dumas (1984), most studies on currency risk exposure have focused on measuring the exposure or currency risk as an elasticity between the change in firm value and exchange rate. Adler and Dumas (1984) regressed the return of an asset on an exchange rate change and reported different signs for different exchange rates. Bodnar and Wong (2000), regressed the stock returns on the change in exchange rate to obtain the currency risk elasticity.

Others researchers introduced additional exogenous variables to the model to ascertain whether the results will be the same. Jorion (1990) found evidence of significant exchange rate exposure by incorporating the market return as a control variable to determine the impact on the return on assets. He showed that the level of foreign sales is the main determinant of exchange rate exposure for large U.S. multinational firms.

However, Amihud (1994) and Bartov and Bodnar (1994) found no evidence of contemporaneous currency exposure for U.S. multinationals, although Bartov and Bodnar do find that U.S. firms respond to past quarterly exchange rate movements. Simiarly, by employing multivariate modelling approach, Miller and Reuner (2000) estimated economic exposure using a three-currency model, which included variables such as overall stock market return and interest rates. Flanney and James (1984) and Sweeney and Warga (1986) also used interest rates in their models when estimating the currency exposure of firms. In fact, Khoo (1994) added oil prices to interest rate in his estimation of foreign exchange of mining companies in Australia while Benson and Faff (2002), developed an accumulation index incorporating dividends to represent the domestic market return, the Australian Government 13-week Treasury notes to represent the risk free interest rate and the Morgan Stanley Capital International World Index (MSCI) to represent the international market return. They reviewed the possibility of using the weights of invested stock to determine the true impact of currency risk on excess fund returns in Australia. They found that the composite market return index is predictive with regards to portfolio returns. Most of such empiricals also control for the following in the regressions: interest rates, domestic and international indices.

It is obvious from the foregoing that the issue of currency risk cannot be taken lightly, as there is evidence even for domestic stock markets that currency risk exposure is valuable in explaining stock performance (Zubeiru et al., 2007; Adler & Dumas, 1984). Webb (1996) cautions, however, that though the issue of currency risk is evidently important, the impact holds more for international diversification in bonds and real estate than for stocks while Jorion (1990), indicates that its relevance only becomes apparent when it constitutes a significant portion of the assets’ risk. These viewpoints are summarized by Solnik (1996) who indicates that definitely in the area of international investing, currency risk is considered the most important area of risk management.

3. Methodology

This section, considers the methodology adopted for the research, the data collection and measurement techniques, the models adopted and estimation.
phenomena and prediction of their occurrence (Saunders, Lewis & Thornhill, 2000).

3.1 Data Sources, Measurement and Model

The purpose of this research is to assess the impact of currency risk on investment returns on an internationally diversified portfolio. Although Epack held investments across twelve (12) African countries including Ghana for the study period, (6) six countries which had investments of less than 3 percent (average over the past seven years) were not captured individually in the model, following the intuition of Jorion (1990) that currency relevance flowed from significance of size in asset risk profile, leaving six individual countries. In order to avoid the possibility of omission bias, these other countries were captured as an average exchange rate. Following the literature, the regressors included exchange rate in the seven (7) “countries” with the interest rate (91 day Treasury bill in Ghana) and Databank Stock Index as controls for the domestic economy. The research employed monthly secondary data from 2005 to 2010. Exchange rate data for the various countries, Epack returns, and databank stock index were obtained from Databank Asset Management Ltd. compilations. Whereas, interest rates data was obtained from Bank of Ghana periodic publications.

For this study, the model is derived from the work of Adler and Simon (1986), who regressed stock returns on percentage change in exchange rates. This research will however include variables such as the 91-day T-bill rate, as a proxy for the risk free interest rate and domestic market return using the Databank Stock Index also in the spirit of Benson and Faff (2002) who incorporated the domestic market return and a risk free interest rate.

The model for the analysis is stated as follows:

\[ \text{Pepack} = F(\text{Pegypt}, \text{Pkeny}, \text{Pmau}, \text{Pmala}, \text{Pnige}, \text{Ptan}, \text{Pavex}, \text{Pirg}, \text{Pdsi}) \]

\[ \text{Pegypt} \text{ is Percentage Change in Exchange rate Egypt; } \]
\[ \text{Pkeny} \text{ is Percentage Change in Exchange rate Kenya; } \]
\[ \text{Pmau} \text{ is Percentage Change in Exchange rate Mauritius; } \]
\[ \text{Pmala} \text{ is Percentage Change in Exchange rate Malawi; } \]
\[ \text{Pnige} \text{ is Percentage Change in Exchange rate Nigeria; } \]
\[ \text{Ptan} \text{ is Percentage Change in Exchange rate Tanzania; } \]
\[ \text{Pavex} \text{ is Percentage Change in Average Exchange Rate of countries with less than 3% in the fund asset; } \]
\[ \text{Pirg} \text{ is Domestic Interest Rate; and } \]
\[ \text{Pdsi} \text{ is Databank Stock Index.} \]

The general linear econometric model is given as:

\[ \text{Pepack} = \beta_1 + \beta_2\text{Pegypt} + \beta_3\text{Pkeny} + \beta_4\text{Pmau} + \beta_5\text{Pmala} + \beta_6\text{Pnige} + \]
\[ \beta_7\text{Ptan} + \beta_8\text{Pirg} + \beta_9\text{Pavex} + \beta_{10}\text{Pdsi} + \ell, \]

4. Estimation and Presentation of Results and Findings

The results of the estimations and the various diagnostic tests are presented below.

4.1 Stationarity of Variables

The monthly data were tested individually using the Augmented Dickey Fuller (ADF) Test in E-views. Most of the data were not stationary at levels and thus each series was tested at first and second difference. The order of integration is the number of unit roots contained in the series, or the number of differencing operations it takes to make the series stationary. A series is said to be stationary if the mean and autocovariances of the series do not depend on time. A differenced stationary series is said to be integrated and is denoted as I (d) where d is the order of integration. Any series that is not stationary is said to be non-stationary. The results of the test are summarised in the table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Augmented Dickey Fuller Test</th>
<th>T-statistic</th>
<th>Probability</th>
<th>Critical Value 5 percent</th>
<th>Order of Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pepack</td>
<td>-4.0005</td>
<td>0.0025</td>
<td>-2.9036</td>
<td>I(0)</td>
<td></td>
</tr>
<tr>
<td>Pegypt</td>
<td>-4.7751</td>
<td>0.0002</td>
<td>-2.9036</td>
<td>I(0)</td>
<td></td>
</tr>
<tr>
<td>Pirg(at 1st difference)</td>
<td>-8.1330</td>
<td>0.0000</td>
<td>-2.9036</td>
<td>I(1)</td>
<td></td>
</tr>
<tr>
<td>Pdsi</td>
<td>-4.3410</td>
<td>0.0008</td>
<td>-2.9030</td>
<td>I(0)</td>
<td></td>
</tr>
<tr>
<td>Pkeny</td>
<td>-6.9660</td>
<td>0.0000</td>
<td>-2.9036</td>
<td>I(0)</td>
<td></td>
</tr>
<tr>
<td>Pmau</td>
<td>-6.9602</td>
<td>0.0000</td>
<td>-2.9030</td>
<td>I(0)</td>
<td></td>
</tr>
<tr>
<td>Pmala</td>
<td>-3.3835</td>
<td>0.0148</td>
<td>-2.9030</td>
<td>I(0)</td>
<td></td>
</tr>
<tr>
<td>Pnige(at 1st difference)</td>
<td>-8.7004</td>
<td>0.0000</td>
<td>-2.9069</td>
<td>I(1)</td>
<td></td>
</tr>
<tr>
<td>Ptan</td>
<td>-5.0197</td>
<td>0.0001</td>
<td>-2.9030</td>
<td>I(0)</td>
<td></td>
</tr>
<tr>
<td>Pavex</td>
<td>-5.3201</td>
<td>0.0000</td>
<td>-2.9030</td>
<td>I(0)</td>
<td></td>
</tr>
</tbody>
</table>
From the results, the exchange rate of Nigeria and domestic interest rate were stationary at first difference while the rest of the variables were stationary at order zero I(0). Given that not all the variables were stationary at levels, one is unable to use the classical general linear model. We proceed to test for co-integration of the variables.

4.2 Co-integration and Error Correction Model One (ECM)

It is possible that a linear combination of two or more non-stationary series may be stationary (Granger, 1987). If such a stationary linear combination exists, the non-stationary time series are said to be co-integrated and interpreted as having a long-run equilibrium relationship among the variables. Given that the variables are of different orders of integration and particularly not stationary at levels, they violate the Engle–Granger condition for co-integration which requires all the variables to be integrated of order 1 or the same order before the test can be run. However, Johansen (1988) provided a co-integration test procedure for time series variables which have either the same order or different orders of integration. Hence, we employ the Johansen co-integration test which uses the likelihood ratio of variables to determine their long term relationship. The model can only be defined if it passes the Johansen co-integration test.

Table 2. Results of Johansen co-integration test

<table>
<thead>
<tr>
<th>Sample: 2005M01 2010M12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included observations: 69</td>
</tr>
<tr>
<td>Series: PEPACK PEGYPT PDSI PAVEX PIRG PKENY PMALA PMAU PNIGE PTAN</td>
</tr>
<tr>
<td>Selected (0.05 level*) Number of Co integrating Relations by Model</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Trend:</th>
<th>None</th>
<th>None</th>
<th>Linear</th>
<th>Linear</th>
<th>Quadratic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Type</td>
<td>No Intercept</td>
<td>Intercept</td>
<td>Intercept</td>
<td>Intercept</td>
<td>Intercept</td>
</tr>
<tr>
<td>Trace</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Max-Eig</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>


Since the results indicate a minimum rank of more than zero it could be concluded that the variables co-integrate and thus have a long-term relationship. An error correction model could be defined for the variables in the model. The Hendry type model was adopted because it provides the opportunity to examine the long-term and short-term effects of the exogenous variables on the endogenous variable. Thus, a variable may have a short-term impact on the endogenous variable but no long-term impact in the model. A Hendry type Error Correction Model is defined as follows:

$$D(Pepack) = \beta_1 + \beta_2 D(Pegypt) + \beta_3 D(Pkeny) + \beta_4 D(Pmau) + \beta_5 D(Pmala) + \beta_6 D(Pnige) + \beta_7 D(Pavex) + \beta_8 D(Pirg) + \beta_9 D(ldsi) + \beta_{10} D(Pepek) (-1) + \beta_{11} D(Peg) (-1) + \beta_{12} D(Pkeny) (-1) + \beta_{13} D(Pmau) (-1) + \beta_{14} D(Pmala) (-1) + \beta_{15} D(Pnige) (-1) + \beta_{16} D(Pavex) (-1) + \beta_{17} D(Pirg) (-1) + \beta_{18} D(ldsi) (-1) + \beta_{19} Pdsi (-1) + \epsilon_t$$

(2)

Where, D is the difference operator defined by: $D(X) = X_t - X_{t-1}$

4.3 Results of First Run of Model

Estimation of equation 2 produced a general over-parameterized model of the Hendry type error correction model. The insignificant variables in the initial results were eliminated to arrive at a parsimonious model using the AIC and SBC as guides.

4.4 Discussion of Study Findings

As per the findings of the study, current changes in the foreign exchange rates in all the countries prove inconsequential in explaining return changes on the Epack equity mutual funds. This is in consonance with Amihud (1994) and Bartov and Bodnar (1994) who found no evidence of contemporaneous currency exposure for U.S. multinationals. On the other hand, the foreign exchange rate changes in the previous periods, prove significant in explaining the performance of the fund albeit not for all the countries making up the portfolio. This is also in consonance with Bartov and Bodnar (1994) who found that U.S. firms do respond to past quarterly exchange rate movements. This might be an indication that portfolio returns only adjust to the changes in the currencies ex-post. In other words, expectations on the currency movement may influence portfolio re-compositions and ultimately their returns. By implication, it is expected that as a result of changes that may
have taken place in the foreign currency of an investment country and possibly expecting the direction of change to continue may result in the reconstitution of the portfolio and thereby affecting returns. Of course, the lag may also represent the time lag between actual occurrence and adjustments to reflect such.

Table 3. Parsimonious results of model

<table>
<thead>
<tr>
<th>Dependent Variable: D(PEPACK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method: Least Squares</td>
</tr>
<tr>
<td>Sample (adjusted): 2005M02 2010M12</td>
</tr>
<tr>
<td>Included observations: 71 after adjustments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>4.675735</td>
<td>1.092300</td>
<td>4.280634</td>
</tr>
<tr>
<td>D(PAVEX)</td>
<td>0.247289</td>
<td>0.171888</td>
<td>1.438667</td>
</tr>
<tr>
<td>D(PDSI)</td>
<td>0.314554</td>
<td>0.106645</td>
<td>2.949537</td>
</tr>
<tr>
<td>D(PMAU)</td>
<td>-0.067579</td>
<td>0.118067</td>
<td>-0.572379</td>
</tr>
<tr>
<td>PEPACK(-1)</td>
<td>-1.288685</td>
<td>0.118492</td>
<td>-10.87574</td>
</tr>
<tr>
<td>PDSI(-1)</td>
<td>0.258498</td>
<td>0.104848</td>
<td>2.465468</td>
</tr>
<tr>
<td>PIRG(-1)</td>
<td>-0.182965</td>
<td>0.064980</td>
<td>-2.815725</td>
</tr>
<tr>
<td>PNIKEI(-1)</td>
<td>0.235730</td>
<td>0.162745</td>
<td>1.448462</td>
</tr>
<tr>
<td>PAVEX(-1)</td>
<td>0.517679</td>
<td>0.194243</td>
<td>2.665116</td>
</tr>
<tr>
<td>PKENY(-1)</td>
<td>-0.262171</td>
<td>0.166369</td>
<td>-1.575837</td>
</tr>
<tr>
<td>DUM2</td>
<td>-2.776775</td>
<td>0.859403</td>
<td>-3.231051</td>
</tr>
</tbody>
</table>

R-squared 0.738047 Mean dependent var 0.189437
Adjusted R-squared 0.694388 S.D. dependent var 4.669071
S.E. of regression 2.581164 Akaike info criterion 4.875882
Sum squared resid 399.7444 Schwarz criterion 5.226438
Log likelihood -162.0938 Hannan-Quinn criter. 5.015287
Prob(F-statistic) 0.000000

The only variable that also proved significant in terms of current changes is the DSI. It can be inferred that since there was no need for currency conversions required in factoring in changes in the DSI, the changes reflect immediately, this finding is in consonance with conventional wisdom also given the weight of domestic stocks in the Epack fund (46%).

In terms of the coefficient signs, the DSI, as expected exhibits a positive sign in both cases of current changes and previous changes. By inference, current improvements in the DSI are associated with positive performance of the Epack fund and so is the lag at 1, possibly indicating some kind of persistence of the DSI’s effect on the Epack fund. The risk-free interest rate, proxied by the 91-day T-Bill rate, is however, negatively influential with regard to Epack returns. This could imply that as interest rates rise, firm level investments may drop as a result rise in cost of capital, which ultimately affect the stock prices of the firms held by Epack and thereby lowering the returns of Epack. The individual country level foreign exchange rate changes also proved insignificant in explaining return movements of the Epack fund.

The Pavex variable, however, proved positively significant in the first lag. In other words, a deteriorating currency position (increasing ‘local’ currency to unit Dollar) of another foreign currency to the US Dollar, positively impacts the return on Epack. The significance of the Pavex variable also holds another implication, that whilst the foreign currency movements in the foreign movements may not be individually significant enough to show up, aggregation may lend weight to it for it to appear significant.

The value of the error correction factor (captured as Epack (-1)) -1.2887 is and it indicates the velocity by which the Epack returns will get to its long-run equilibrium when it experiences a currency shock. Given that, the model used monthly data, a currency shock will take \(\left(^{\frac{1}{\mu}}\right)\left(\sqrt{1-1.2887}\right)=0.78\text{years}(9\text{months})\) to restore long-term equilibrium.

From table 3, it is evident that lagged Epack returns variable (the error correcting factor) in the ECM is very significant.

4.5 Tests of Suitability and Validity

In terms of model suitability, Table 4 provides the F-Statistic, the D-W Statistic among others. To also check whether the model is well-specified or not, the Ramsey test was run.
Table 4. Ramsey test results

<table>
<thead>
<tr>
<th>Ramsey RESET Test:</th>
<th></th>
<th>Prob. F(2,58)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>0.609425</td>
<td>0.5471</td>
<td></td>
</tr>
<tr>
<td>Log likelihood ratio</td>
<td>1.476580</td>
<td>0.4779</td>
<td></td>
</tr>
</tbody>
</table>

The specification test by Ramsey indicated that at 5 percent significance level, the model was well specified with the statistic of 0.55, which is greater than 0.05. Hence, accepting the null hypothesis of analysis and stating that the parsimonious model is well specified.

5. Conclusion and Policy Implications

The research concludes, based on the results obtained, that in aggregate, currency risks are important in explaining the returns earned on the Epacc Fund. Macroeconomic conditions, interest rates specifically, also influence the investment returns. In general, shocks to the returns on the fund take 9.4 months to fizzle out. In terms of policy implication, it may well be appropriate to watch for balance in investing internationally as aggregation of the currency risks result in significant impact but zero otherwise. The study has important policy implications for international investing.

References


Databank Epack Annual Reports


Securities and Exchange Commission, Various Annual Reports.


