Institutional Advisory Group: Currency Management Series
Common Theme, Uncommon Asset Class – The Currency Risk Premium

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Summary

- There is an attractive risk premium to be earned by investors from exposure to currency risk factors, one that is reasonably predictable and exploitable, despite volatility in currency markets.
- The key currency factors – carry, cyclicality, momentum and valuation – are exploited by active currency managers who time their exposures to these factors based on the prevailing economic environment.
- Currency management can serve to add value via both (i) timely exposure to foreign exchange opportunities (ii) risk reduction from diversification.

Introduction

CIBC Global Asset Management Inc. (CGAM) is publishing a series of papers outlining our research and recommendations for managing currency exposures. This research paper, The Currency Risk Premium, is the second in the Currency Management Series to be published by our Currency Team in conjunction with the Institutional Advisory Group.

The concept of a risk premium in the equity market is generally accepted; in order to reap the benefits of an equity investment, investors will be exposed to some level of risk[1]. This is commonly known as the equity risk premium. This same concept, the potential for increased returns given a higher level of risk, is not commonly associated with currency markets. This research paper explores the concept of the currency risk premium and how it can be exploited by active currency managers.

Investors are generally aware that, for a given currency pair (e.g. the Canadian Dollar versus the U.S. Dollar), the gains on one side equate to losses on the other – a zero sum game. This mathematical certainty is sometimes erroneously applied to active currency management. It is a mistake to extend the simple mathematics of a single currency pair to the entire currency asset class, since active currency management is only one of the market participants in the total currency market. The currency market includes commercial participants facilitating cross boarder trade, companies hedging known cash flows, central banks, and long term investors. Although the fact that there are market participants who aren't profit seekers does not guarantee that there are risk premiums available within the currency markets, it does justify looking for them.

[1]Fama and French (1993), and Carhart (1997)

Further, given the importance of the currency impact on an international equity portfolio, as explored in our previous publication, Compensation for Currency Risk, the possibility of exploiting risk premiums in currency markets should be of interest to any international investor.

We will look at several currency risk premiums, or factors, which contribute to movements in currency markets, by constructing theoretical currency portfolios based on each individual factor, and analyzing the results. We find that each factor is profitable over time, but, like equity risk premiums, the success of a given factor changes depending on the point in the economic cycle. Our factors can partially explain the performance of active currency managers in general[2]. We find that adding a market timing element in the analysis of active currency managers improves our ability to explain the reasons for success of active currency management.

At CGAM, we apply a mix of quantitatively derived factors and qualitative judgment in our currency process. This paper will focus on showing the existence and importance of currency risk premiums. In our next publication in the Currency Management Series, we will explore how quantitative factors can be adjusted to take current market conditions into account.

The first section of this research paper will examine a number of currency factors and determine whether exposure to these currency factors is profitable over time. This compensation for additional risk will be considered the currency risk premium. We look specifically at where the Canadian Dollar, U.S. Dollar and Chinese Yuan rank with respect to these factors.

In the second part we examine the implications of adding these currency factors to a portfolio including international equities. We have found that currency factors are generally uncorrelated to other factors in an international portfolio. We find that a portfolio with explicitly managed exposure to both currency and equity risk premiums is preferable to an international equity portfolio alone.

Factors Driving Currency Returns

There is no question that it is difficult to find a set of factors that consistently predict the movement of any given currency. In practice, a currency management strategy involves selecting a basket of currencies to hold rather than a single currency. This basket may be determined based on the currency exposures of a portfolio, as in the case of an active hedging mandate, or could be unconstrained, as in the case of a currency hedge fund. Both practitioners and academics have identified certain baskets of currency holdings that have performed well over time, based on certain factors. We look specifically at the valuation, carry, cyclicality and momentum factors.

Valuation

The basis for valuation of currencies is the Purchasing Power Parity (PPP), the concept of equal prices for all goods regardless of currency. Simple PPP unrealistically assumes that all goods and services can be traded freely by all countries, and that the economic efficiency of a country stays constant. Instead of PPP, we use a measure of valuation that takes into account changes in productivity and terms of trade (export prices less import prices), as well as inflation. Improvements in both productivity and terms of trade can offset the devaluing impacts of inflation and is essential to our measure of valuation.

Carry

Carry is simply the difference in interest rates between the currency being purchased and the currency being sold. A currency position which involves purchasing a higher interest rate currency, like the Mexican Peso, and selling a lower interest rate currency, like the Japanese Yen, will earn the interest rate differential as long as the exchange rate stays the same or improves. But high interest rate economies also often have high inflation which erodes the value of that currency, potentially resulting in a sharp depreciation.

Cyclicality

All else equal, currencies of high growth, more cyclical, economies are more likely to appreciate than those of low growth economies, as the higher growth rates will attract capital. In practice, active currency managers look at leading economic indicators and the performance of key assets such as the U.S. Dollar and global equities to understand the impact of economic growth on currency movements. The growth factor we use here is based on CGAM's proprietary cyclical indicator. It identifies the currencies most likely to perform well based on the current point in the economic cycle.

Momentum

Momentum in currencies is similar to momentum in equities and based on the presumption that information spreads slowly. Momentum can be measured in various ways. For the analysis below we use a CGAM proprietary momentum indicator which takes into account which currency – not necessarily the U.S. Dollar – is driving the markets at a given point in time. In particular, at the beginning of each month, we calculate the breadth of exchange rate moves (up or down) for all currencies against the U.S. Dollar, Japanese Yen, Euro and British Pound. We then construct a portfolio with positions in the direction of medium term momentum against the most dominant of those four currencies.

The currency factors we have examined have familiar cousins in the equity world. For example, both currency and equity investors take note of the valuation of their potential investments. In the same way that an equity investor would like to know the book value of company they are investing in, a currency investor would like to know the purchasing power of the currency they are buying.

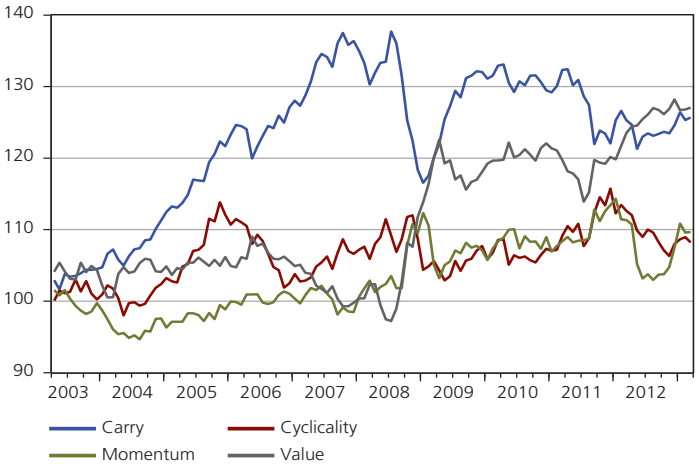
For each of the factors listed above, we have calculated the theoretical returns of a portfolio which has a long position in the top six currencies ranked on that particular factor and short the bottom six[3].

[2]We extend previous analysis by Middleton (2005), Pojarliev and Levich (2008) and Nasypbek and Rehman (2011) through the 2008 financial crisis up to March 31, 2013, and add to it by consolidating a number of different currency manager data sources. The results are consistent with previous findings, that there are currency risk premiums. Our work also examines the relationships between equity and currency factors. [3]Based on correlations, we find that our carry and valuation factors are similar to factors produced by Goldman Sachs which are available on Bloomberg LP. The definition of growth and momentum for currencies is not universal as those for carry and valuation and we have not found published factors that correspond closely to our proprietary version.

Performance of Currency Factors

As shown in the chart below, each of these factors have added absolute value over the last ten years (period ending March 31, 2013). The returns are scaled to have identical monthly volatility so that over the full time period the chart reflects a risk-adjusted return comparison. Carry and valuation have performed the best, but with markedly different paths. Momentum and cyclical factors have also added value over the period but with a lower return per unit of risk. Generally, we find that our currency factors add to return but a certain amount of risk must be taken to achieve that return. Again, this is the concept of the currency risk premium.

Comparison of Cummulative Risk-Adjusted Returns by Factor March 31, 2003 to March 31, 2013



Source: Thompson Reuters Datastream, CGAM calculations

It is clear from our analysis that some economic regime dependency exists in the performance of each currency factor. We have found that, in turbulent market conditions, valuation and momentum are preferred, whereas carry and cyclical factors perform better in risk taking regimes.

Returns of Active Currency Managers

Our analysis of active currency managers, which we describe below, shows that active currency managers are able to profitably exploit these factors. We look at actual currency manager returns in order to show that the currency risk premium, demonstrated via the theoretical portfolios, can be obtained by using an actual investment strategy.

In order to conduct our analysis, we needed to compile a track record of active currency managers and historical performance to determine if, in fact, active currency managers add value to client's portfolios. Since there are very few active currency vehicles eligible for investment and listed on an exchange, we relied on manager reported returns compiled in several different databases. Each database has its own process to vet the reported track records and the databases we use do keep track records of managers who have ceased reporting returns to remove survivorship bias. In order to reflect as wide a breadth of the universe of currency managers as possible, we use the equally-weighted, risk-adjusted, monthly average returns from three currency databases[4]: We adjusted for the T-Bill return so the performance represents the active currency return above the risk free rate, and rescaled the returns to 5% volatility for comparison purposes.

According to our research, the average active currency annualized return above the risk free rate for our ten year study period, from March 31, 2003 to March 31, 2013, is 3.9% (re-scaled to 5% risk). This a gross-of-fees figure and may, despite the efforts of the data providers, benefit from some selection bias, but does support the assertion that active currency management adds value.

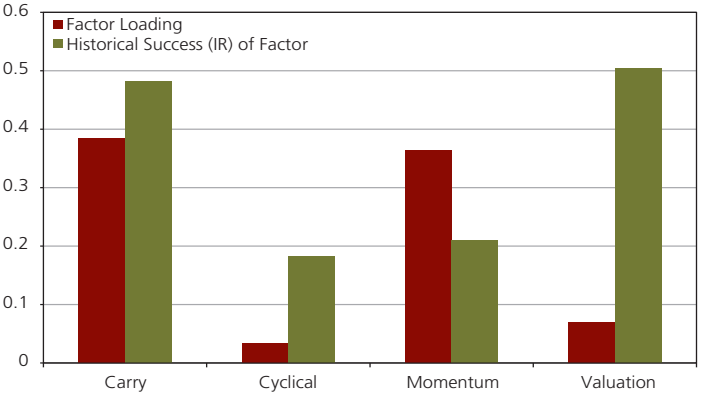
The next step in our analysis was to determine if this value added from active currency managers is a result of exploiting the factors, or currency risk premiums, that we outlined above, over the same ten year period. To do so we performed two regression analyses.

First, we regressed the active currency return against the currency factors to determine which factors the managers were exposed to and how much value each of these exposures added over the ten year period. In the first regression analysis, we assumed that managers, collectively, apply fixed weights to the factors. In other words, at the beginning of the period, currency managers construct their portfolios to best exploit the factors in the market environment at that time and hold the portfolio constant for the entire ten year period.

Second, to reflect a more dynamic, active currency manager, we regressed the currency return against the currency factors assuming that managers time their exposure to the factors. That is, as in the first regression, currency managers construct their portfolios to best exploit the factors in the market environment at the beginning of the period, but, in this regression scenario, the mangers are able to dynamically shift exposures in response to changing economic environments over the period.

The results of the first regression analysis, without allowing for changes in the factor exposures over the period, are used to construct the graph below[5]. The 'factor loading' is the extent to which currency managers were exposed to each factor over the ten year period and the 'historical success' of each factor is a reflection of the risk-adjusted returns of that specific factor over the period.

Factor Exposures of Active Currency Managers



Sources: Thompson Reuters Datastream, Bloomberg, Mercer, CGAM calculations
Historical Success is measured by the information ratio (IR), return per unit of risk

[4]CGAM calculations based on Hedge Fund Research, Inc., Parker Global Strategies LLP and Mercer Insight MPA™ databases. The former two were obtained via Bloomberg LP and the latter was obtained from Mercer LLC. [5]See detailed regression analysis results in the appendix.

We see that carry and momentum were the two most highly exploited factors while the exposure to the cyclical and valuation factors was lower. The large exposure to carry is to be expected since this factor has been successful in adding value over time reflected in the high 'historical success' result. The lower exposure to valuation, despite the success in adding value over the period, is an interesting result. This may be explained by the moderate success of the valuation factor prior to 2008, which would result in relatively few managers having exposure to valuation on average over the full period. As a result of the financial crisis, many currencies depreciated and became more attractive from a valuation standpoint but, in this first regression, we assume managers have fixed allocations to the factors and were unable to exploit the changing environment.

In this simple regression we assume that manager returns are attributable to either constant exposure to the currency risk premiums, or to 'alpha' (the constant term in the regression). The alpha is estimated at 0.20% per month, which makes up 61% of the average return. However, only 23% of the variance in the active currency returns over time (the R-squared) is explained by this regression. Given the low percentage of return explained as a result of exploiting the factors, there may be additional factors that we have not included in our analysis.

In practice, we know that most active currency managers shift exposures to different factors based on the market environment. To account for this, in our second regression analysis, we adjust our equation to allow for the average manager to change their exposure to a given factor over time. Adding the timing element to our equation improves the amount of variation explained from 23% to 26%, suggesting that timing exposure to these factors is an important element of active currency management.

After all of the factors, plus market timing, are taken into account, the constant in our equation, or the returns which are generated from factors outside of our model, is not significantly different than zero. This suggests that the average active currency manager adds value through a combination of factor exposures and the timing of factor exposures. We found that these results are robust to changes in the currency manager universe and construction of the factors.

The results of the second regression analysis, including an element of timing in currency management, fits our experience. If one recalls the market environment in October 2008, with the U.S. financial system in peril, a strategy of buying high yielding emerging market currencies to increase exposure to carry was not attractive, regardless of its historical success. Six months later, when some currencies had been pushed well below their fair value, there were opportunities to place greater emphasis on valuation strategies. Timing is a critical element in any active management strategy.

Factor Scores for the Chinese Yuan, the U.S. Dollar and the Canadian Dollar

To further illustrate how these factors relate to a currency's attractiveness, consider the ranking of the Chinese Yuan, U.S. Dollar and Canadian Dollar by factor.

Focusing on the carry, valuation and cyclical rankings, we show where these currencies ranked in a universe of 30 currencies as at May 31, 2008 and then again, five years later, at May 31, 2013. A ranking of 1 of is the most attractive to a currency investor and a rank of 30 is the least attractive.

	Carry		Cyclical		Valuation	
	May-08	May-13	May-08	May-13	May-08	May-13
Canadian Dollar	22 / 30	18 / 30	10 / 30	7 / 30	13 / 30	19 / 30
Chinese Yuan	29 / 30	8 / 30	21 / 30	25 / 30	11 / 30	17 / 30
U.S. Dollar	24 / 30	25 / 30	22 / 30	24 / 30	10 / 30	13 / 30

Sources: Thompson Reuters Datastream, CGAM calculations

The carry on the Canadian Dollar sits in the middle of our list of thirty currencies in the most recent observation. It was slightly lower ranked, and therefore less attractive, prior to the financial crisis. This change is a function of rates moving lower in the developed world rather than a reflection of Canada raising rates to attract capital. In May 2013, as global economies were showing strong signs of a recovery, its cyclical ranking was high. The Canadian Dollar generally behaves as a pro-cyclical currency and is positively correlated with stock markets and other leading economic indicators. In contrast, the valuation of the Canadian Dollar has deteriorated in the last five years, making it less attractive, as shown by the decrease in its ranking.

In 2008, the carry for Chinese Yuan was very unattractive, reflecting a concerted effort by the Chinese government to reduce the attractiveness of domestic savings by setting below-market interest rates. Since then, Chinese authorities have adopted policies to emphasize consumption at the expense of exports as a source of economic growth, including the allowance of interest rates to move towards market levels. The contentious low or under valuation of the Yuan five years ago has also been partially reversed.

The low carry ranking for the U.S. Dollar reflects its continued role it as the global financing currency. It was also unattractively ranked from a cyclical stand point in both May of 2013 and May of 2008. As of November 2008 (a period not shown in table), when a contractionary cyclical environment was firmly established the U.S. Dollar ranked second of thirty, reflecting its safe haven status. In the expansionary phase of an economic cyclical, currencies of higher growth economies are more attractive than the U.S. Dollar.

A factor score, or combination of factor scores, is not a forecast for a single currency. In the same way that every undervalued equity is not worth owning, not all high carry currencies are worth owning, despite the long term profitability of the carry factor. However, exposure to a combination of these currency factors, in a risk controlled portfolio context, has been profitable and, as the next section demonstrates, complementary to the equity risk factors found in a typical international equity portfolio.

Active Currency: Pushing Out The Efficient Frontier

A typical international portfolio is heavily exposed to equity factors, so we are naturally interested in comparing the currency factors to well known equity risk factors[6]. In the following table we see that there is low a correlation between the currency factors and the size, value and momentum factors in U.S. equities. The equity factor returns are based on long-short portfolios constructed based on company size, valuation and stock price momentum, following the standard approach established by Fama and French (1993).

Correlations Between Currency and Equity Factors

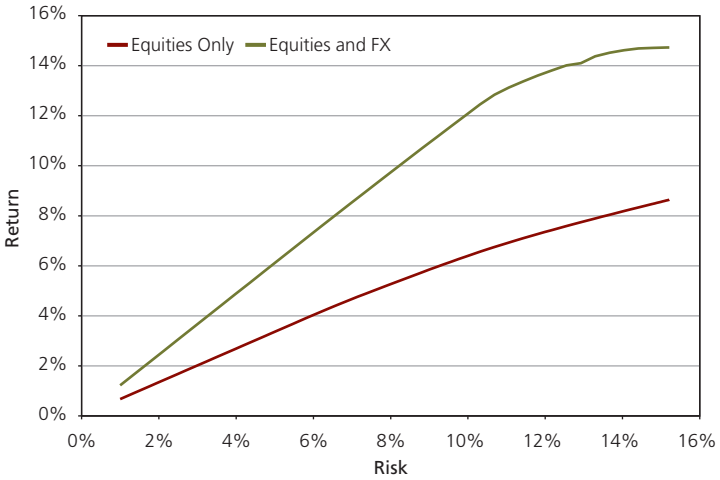
	Equity Market	Equity Size Factor	Equity Value Factor	Equity Momentum Factor
Currency Carry Factor	0.587	0.240	0.237	-0.160
Currency Cyclical Factor	-0.004	-0.135	-0.152	0.266
Currency Valuation Factor	-0.271	0.030	0.084	-0.148
Currency Momentum Factor	-0.234	-0.077	-0.158	0.125

Correlations of returns of theoretical portfolios based on these factors for the ten year period from March 31, 2003 to March 31, 2013

Sources: Thompson Reuters Datastream, CGAM calculations, Ken French

Given the low correlations amongst these factors, we can identify diversification opportunities when adding active currency management to an equity portfolio. To get a sense of the improved opportunity set available when active currency management is added to a portfolio, we compare the efficient frontier (the maximum return across various risk levels) with and without currency exposure. We start with an equity portfolio based on the factors above, but without leverage[7], and then add currency factors. We then compared the two efficient frontiers. The chart below shows that there are substantial potential benefits to adding currency exposure to an equity portfolio.

Changes in Efficient Frontier – Hypothetical Portfolios

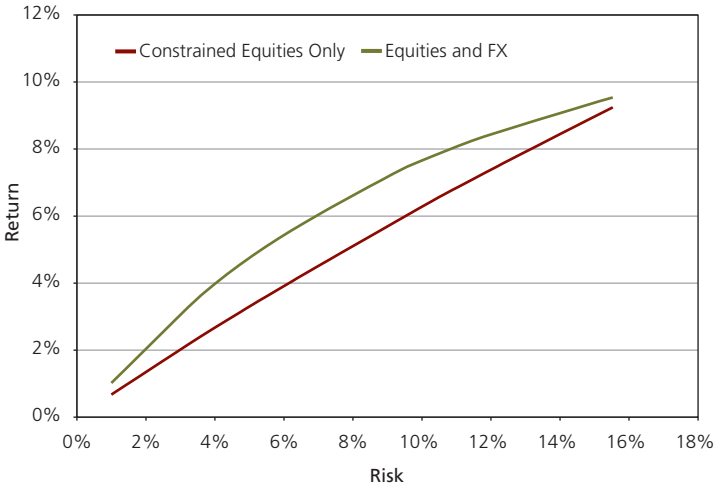


Sources: Thompson Reuters Datastream, CGAM calculations, Ken French

From the graph, we see that, for a portfolio with 6% risk, the added return from the addition of currency management could be as much as 3%. However, this analysis is still quite theoretical, making use of hypothetical portfolios based on currency and equity factors. For example, the optional allocation to currency factors for this period includes a healthy exposure to the valuation factor, which will fluctuate over time based on whether a currency is considered a safe haven or not, the benefit of which is more obvious in 2013 than it would have been in 2003.

To render our study more realistic, we did the same analysis using the median of a universe of actual active currency managers (see appendix for notes on the construction of our currency universe) over this period. We also constrained the total exposure to active equity management (approximated by the equity factors[8]) and active currency programs combined to 20% of the total investment. In other words we assume that the portfolio will have at least 80% of its assets invested in the S&P 500. This, we believe, reflects the constraints of a typical long-only investor. The structure we are assuming is consistent with a currency overlay on an international equity portfolio, or an allocation to an unconstrained currency strategy.

Changes in Efficient Frontier – Constrained Portfolios



Sources: Thompson Reuters Datastream, CGAM calculations, Ken French

Depending on the risk level, we see a potential return gain of roughly 0.5% to 2.0% percent, without any increase in volatility. The impact of adding currencies decreases as the constraints become more binding, at higher risk levels. For an investor working with a 12% risk target, the inclusion of active currencies would have increased the potential return from 7.4% to 8.4%. This is larger in magnitude than the value added of a typical international equity manager over this period[9].

[6]We use the U.S. equity factors based on Fama and French (1993) and Carhart (1997), source: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[7]Specifically, we restrict exposure to the equity risk factors, other than the market, to 20%, which is similar to allowing a 2% to 4% tracking error.

[8]We are using the U.S. based equity factors in these calculations due to their long and robust track record.

[9]The median value added for an international equity manager in the Mercer Insight MPA™ International Equities (Canadian Investors) universe was 0.64% per annum (net of fees December 2002 to December 2012). Source: Mercer LLC.

Conclusion

In this paper, The Currency Risk Premium, we have determined that opportunities in currency markets can be exploited by finding certain currency-related risk premiums, and determined that they can add value over time. Similarly to equity markets, there are inefficiencies in the currency markets which can, in theory, be exploited by gaining exposure to currency factors.

We determined that a portfolio can be improved by gaining exposure to these currency factors, both through diversification benefits and extra potential return without increasing risk. In practice, for an investor to capture this extra risk-adjusted return in the currency market, this typically means hiring an active currency manager. We found that active currency managers do take advantage of currency risk premiums, but also time their exposure to these factors.

Finally, we have shown that using either hypothetical portfolios, or actual currency manager returns, there is a diversification benefit to active currency in addition to an equity portfolio.

Our findings from this research indicate, in aggregate, that institutional investors can benefit from active currency management.

Currency Management Series

In the next CIBC Global Asset Management Institutional Advisory Group currency research paper, we will build on this topic and will address currency safe havens: active management of key currency relationships in a shifting landscape.

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Appendix

Regression Results

Regression 1 – Aggregate Universe and CIBC Global Asset Management (CGAM) factors

The form of the regression was of a standard factor model, with N factors:

$$R_t = c + \sum_{i=1}^{N} \beta_i F_{i,t} + \varepsilon_t$$

R_t = monthly return of the currency universe

$F_{i,t}$ = return of the ith factor (e.g. the return of a carry factor portfolio at time t)

ß = factor loading

c = constant

ϵ = error term

The specific results from our first regression are as follows:

Sample: 2003M04 2013M03 Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002016	0.001229	1.640122	0.1037
CGAM_CRRY_RET	0.386876	0.097124	3.983322	0.0001
CGAM_CYCL_RET	0.006566	0.086106	0.076258	0.9393
CGAM_MOMC_RET	0.368201	0.084858	4.339040	0.0000
CGAM_VALU_RET	0.072877	0.095376	0.764100	0.4464
R-squared	0.229047			
Adjusted R-squared	0.202231			
F-statistic	8.541512			
Prob(F-statistic)	0.000005			

Regression 2 – Aggregate Universe and CIBC Global Asset Management (CGAM) factors, plus timing

The timing regression follows the approach taken by Pojarliev and Levich (2008)

$$R_t = c + \sum_{i=1}^{N} \beta_i F_{i,t} + \sum_{i=1}^{N} \theta_i F_{i,t}^{\ 2} + \varepsilon_t$$

R_t = monthly return of the currency universe

$F_{i,t}$ = return of the ith factor (e.g. the return of a carry factor portfolio at time t)

ß = factor loading

Θ = factor timing parameter

c = constant

ϵ = error term

Sample: 2003M04 2013M03 Included observations: 120

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000403	0.001582	0.254536	0.7996
CGAM_CRRY_RET	0.434558	0.100281	4.333418	0.0000
CGAM_CYCL_RET	-0.021075	0.090570	-0.232691	0.8164
CGAM_MOMC_RET	0.357929	0.090511	3.954532	0.0001
CGAM_VALU_RET	0.000160	0.109247	0.001461	0.9988
CGAM_CRRY_RET^2	-3.998775	6.475357	-0.617537	0.5381
CGAM_CYCL_RET^2	3.477069	4.607378	0.754674	0.4520
CGAM_MOMC_RET^2	5.706772	3.194619	1.786370	0.0768
CGAM_VALU_RET^2	3.018171	5.048550	0.597829	0.5512
R-squared	0.263156			
Adjusted R-squared	0.210050			
F-statistic	4.955311			
Prob(F-statistic)	0.000029