

Currency Risk in Europe's Emerging Financial Regime

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Abstract:

New currencies will emerge if the European Economic and Monetary Union (EMU) ruptures. Hypothetical forward rates are candidate proxies for exchange rates of new EMU currencies against the US dollar. The hypothetical forwards are generated by a formal application of covered interest rate parity to the euro/US dollar spot exchange rate and EMU sovereign interest rates. An empirical study of hypothetical forward rates for EMU currencies against the US dollar during 2011 reveals:

- *Returns to the euro spot exchange rate and hypothetical 1-year forward exchange rates for the deutschmark were virtually identical.*
- *Returns to the hypothetical 1-year forward rate for a new Greek drachma against the US dollar were substantially more volatile than returns to the euro.*
- *The euro and the hypothetical 1-year forward exchange rate for a new Greek drachma effectively decoupled in 2011.*

Why This Matters:

Risk analysis is a key element of investment decisions in turbulent times. Proxies for nascent EMU currency exchange rates facilitate scenario risk forecasts and stress tests in advance of a rupture. This paper examines a candidate proxy for a new Greek drachma based on interest rate differentials.

What if New Currencies Emerge in Europe?

How volatile would a new Greek drachma be in the initial days after it decouples from the euro? And how correlated would the euro and a new Greek drachma be? It is impossible to know the answer with certainty, but a perspective on these questions can be obtained by examining the EMU sovereign bond markets.

Greece's short interest rates are currently at 100% per year. These rates may reflect investors' concern about default, or perhaps they signal investors' worry that Greece will exit the EMU and re-denominate its debt in new drachmas. It may not be possible to disentangle these effects since the clean distinction between default risk and currency risk blurs under stress. Consider that in the event of a default or restructuring, holders of Greek government bonds may lose 60% of their principal. This may not be so different from a redenomination in a new drachma, which immediately falls by 60% against the euro.

To get an indication of how a new currency might behave if the EMU ruptures, assume that Greece's interest rates are driven by redenomination risk, and apply the covered interest rate parity formula to generate hypothetical forward exchange rates for nascent EMU currencies against the US dollar.¹

The construction amounts to assuming that European bonds are default-free, but their prices are driven by expectations of a future redenomination. This assumption represents a limiting case in the spectrum of possible outcomes to the euro crisis, providing a novel perspective on currency risk in the eurozone.

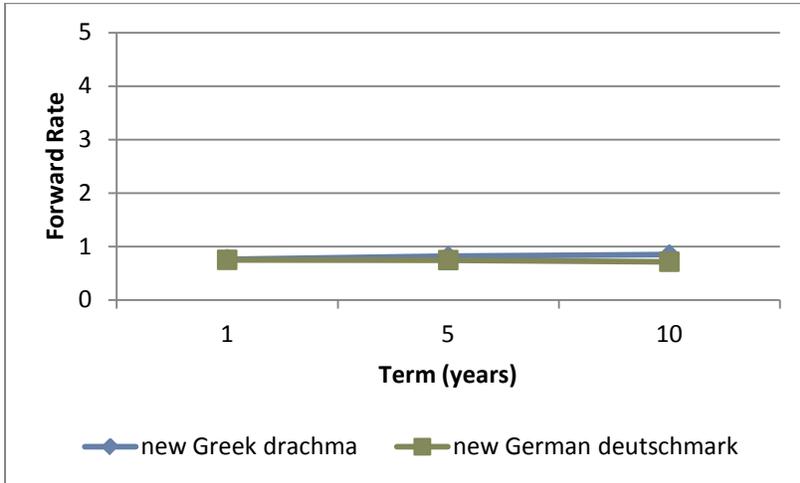
Hypothetical forward curves for a new Greek drachma and new German deutschmark against the US dollar on three dates in 2011 are displayed in Figure 1 below. The curves were pried apart over the course of 2011, with the point of separation migrating toward zero. A complete separation would give rise to a new zero-maturity forward; this would correspond to the spot exchange rate for a new Greek drachma.²

¹ A standard no-arbitrage argument provides an exact formula for currency forwards between two default-free borrowers. The forward rate $F(L, B)$ between the lending and borrowing currency is given by:

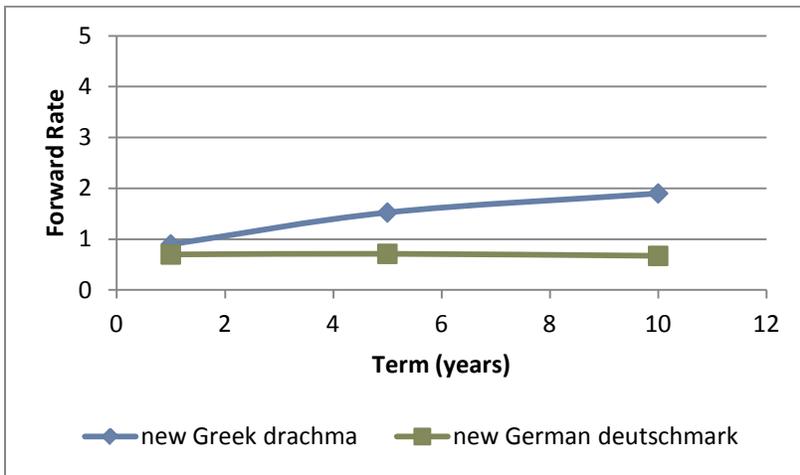
$$F_t(L, B) = X(L, B) \exp((r_L - r_B)t)$$

Where r_L is the default-free interest rate in the lending currency, r_B is the risk free rate in the borrowing currency, $X(L, B)$ is the spot exchange rate and t is the term of the forward rate.

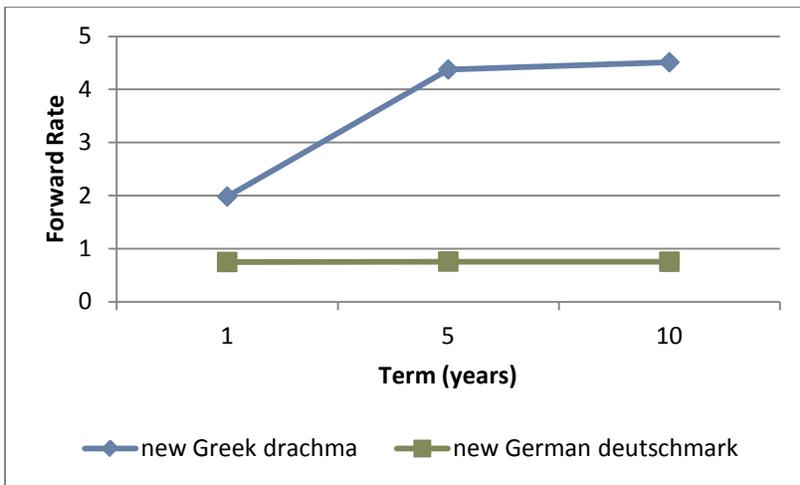
² When Greece joined the EMU in January 2001, there were 340.75 Greek drachmas to the euro.



3 January 2011



5 July 2011



9 December 2011

Figure 1: Hypothetical forward exchange rates for a new Greece drachma and new German deutschmark on three dates in 2011. The separation of the curves at the short end is consistent with the emergence of a new currency. Source: BarraOne.

Daily returns to the euro spot exchange rate and to hypothetical 1-year forward exchange rates for a new Greek drachma and a new German deutschmark from a US dollar perspective in 2011 is shown in Figure 2 below.³

The euro hid the deutschmark because the two series virtually coincided. The drachma is distinct, and it exhibited relatively high volatility since August.

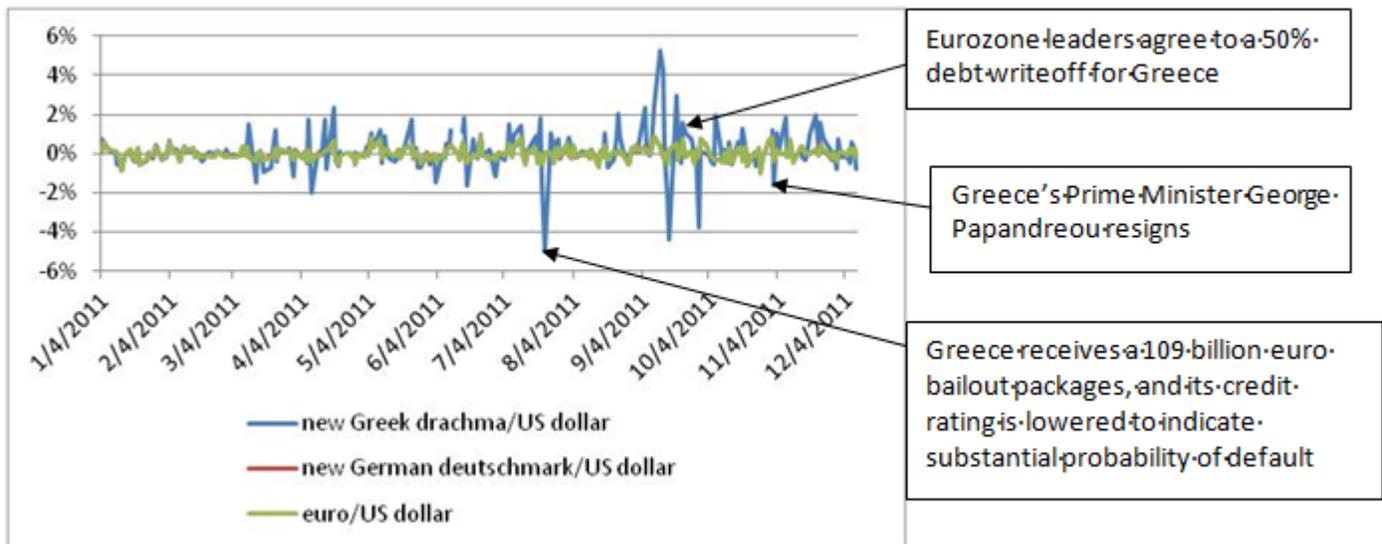


Figure 2: Daily returns to the euro spot exchange rate and to hypothetical 1-year forward exchange rates for a new Greek drachma and the new German deutschmark from a US dollar perspective. The euro hides the deutschmark because the two series virtually coincide. Source: BarraOne.

³ This exercise looks at total returns to currency, not excess returns.

Figure 3 shows rolling 21-day estimates of the correlation between returns to hypothetical 1-year forward exchange rates for a new Greek drachma and a new German deutschmark, and spot exchange rates for euro, from a US dollar

perspective. The deutschmark and euro were perfectly correlated. In contrast, the drachma drifted away from the euro during 2011. The drachma/euro correlation ranged between 0.2 and 0.6 since August.



Figure 3: Rolling 21-day estimates of the correlation between returns to the euro and two hypothetical 1-year forward exchange rates from a US perspective. The deutschmark and euro are perfectly correlated, while the drachma effectively separated from the euro in the course of 2011. Source: BarraOne.

Figure 4 displays rolling 21-day estimates of the volatility returns to hypothetical 1-year forwards for a new Greek drachma and new German deutschmark from a US perspective. During 2011, the deutschmark volatility was

roughly constant at 5%. The drachma volatility varied in response to extreme returns. Since early October, the level of the drachma volatility was two to three times the level of the deutschmark volatility.

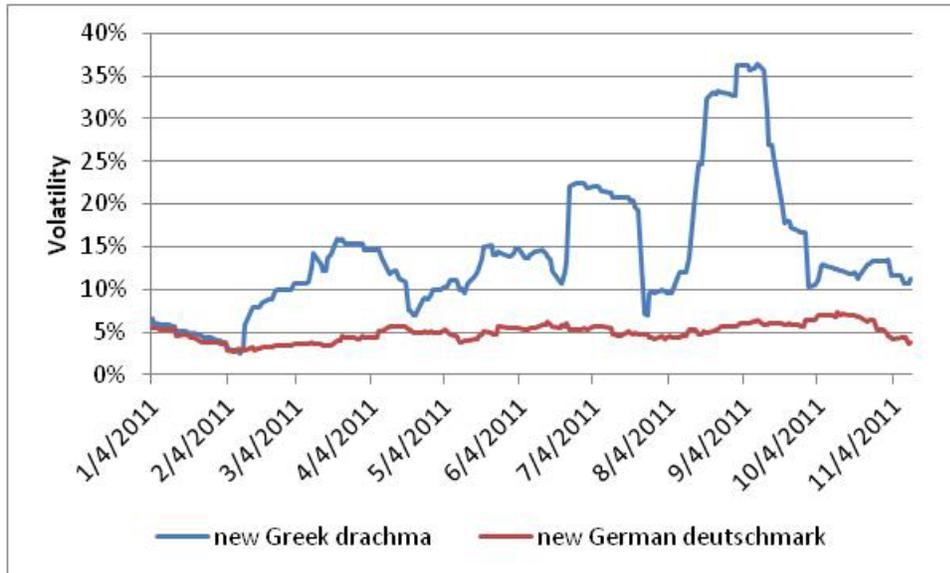


Figure 4: Rolling 21-day estimates of the volatility of the hypothetical 1-year forward exchange rate for a new Greek drachma and a new German deutschmark from a US perspective. Source: BarraOne.

How Many Risk Factors Drive Hypothetical Forward Curve Fluctuations?

The changes in the shape of hypothetical forward exchange rate curves for a new Greek drachma over the course of 2011 suggest that there may be different risk drivers at different maturities. Figure 5 below displays rolling 21-day estimates of the correlation between the 1- and 5-year hypothetical forward exchange rates. While this curve is relatively noisy, the

near-zero correlation between the 1- and 5-year rates indicates that forward curve fluctuations are not simply parallel shifts. Risk factors may include a write-down of euro-denominated Greek debt in the near term; if this does not stave off disaster, then Greece may subsequently exit the EMU.

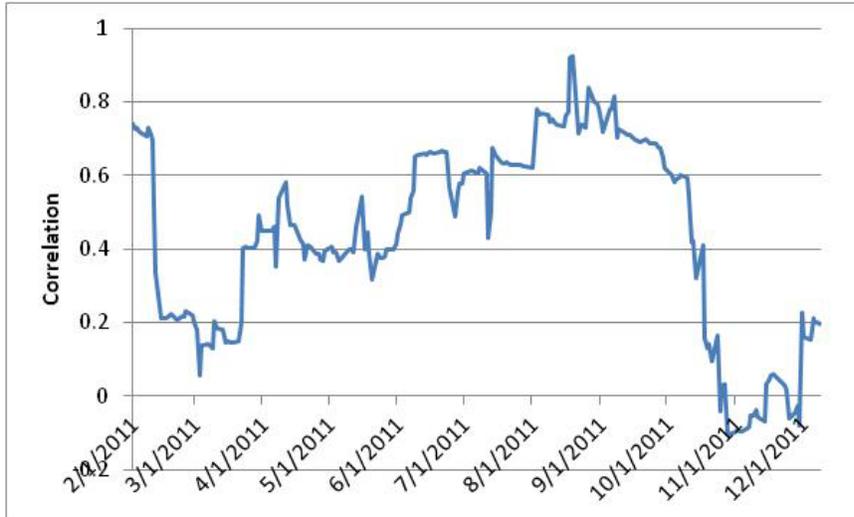


Figure 5: Rolling 21-day estimates of the correlation between returns to the 1-year and 5-year hypothetical forward exchange rates for a new Greek drachma from a US perspective. Source: BarraOne.

Who is Next?

Figure 6 shows the hypothetical 1-year forward exchange rate for stressed EMU sovereigns and a new German deutschmark from a US dollar perspective on December 9, 2011. The order of the curves – the new Portuguese escudo

following new Greek drachma, and the Irish pound following the new Portuguese escudo – is no surprise. The hockey stick silhouette emerging in the escudo curve suggests market concerns about a new regime.

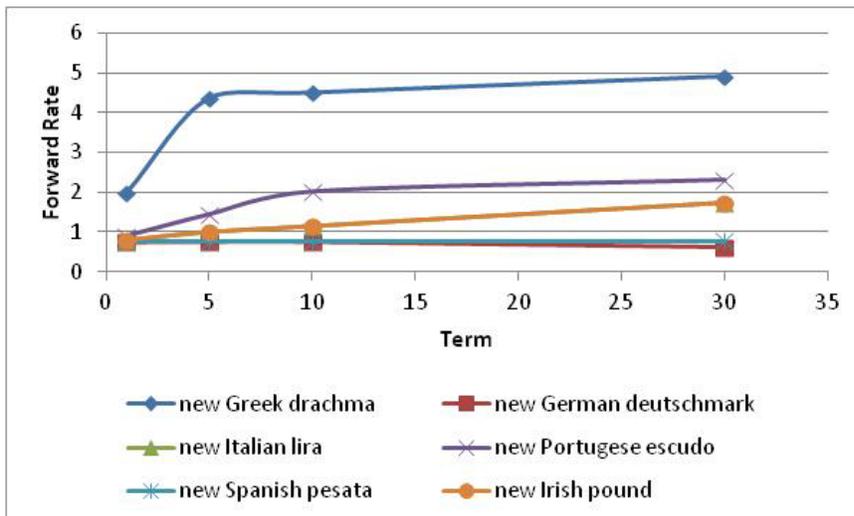


Figure 6: Hypothetical forward exchange rate curves for distressed EMU sovereigns and Germany on 9 December 2011. Source: BarraOne.

Forecasting Currency Risk in the New Regime

Greece may not be able to service its debt without a write-down or a redenomination, and the enormous interest rate spread between Greece over Germany is consistent with either outcome. Assuming that the spreads are driven by expectations of a future redenomination, a formal application of covered interest rate parity transforms these rates into hypothetical forward curves, whose properties are also consistent with a new Greek drachma. These properties include the separation of the hypothetical Greek drachma and German deutschmark forward curves over the course of 2011, the variable volatility of hypothetical 1-year drachma forwards,⁴ and the diminishing correlation between returns to the euro and to hypothetical 1-year drachma forwards.

It may be impossible to know in advance whether hypothetical forward rates of new EMU currencies against the US dollar are statistically credible proxies for new exchange rates. However, these hypothetical forward rates may provide a window into market expectations about risk drivers in the new financial regime that is emerging in Europe.

Acknowledgements

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⁴ Nominal interest rates of distressed sovereigns are sums of real rates and inflation rates. Covered interest rate parity projects this decomposition onto the hypothetical forward rates for a new Greek drachma. In the extreme case where the Greek economy shadows the German economy, the volatility of hypothetical drachma returns is attributable to purely monetary influences since real rates are driven by the business cycle.

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¹As of June 30, 2011, based on eVestment, Lipper and Bloomberg data.