Geographic Factors in Currency Depreciation

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In a blog six years ago, in 2011, I argued that the Euro was inherently unsound, and that in connection with the recurrent crises in Greece, we cannot apply a sharp dose of financial orthodoxy and once and for all put Greece and other southern countries on a firm footing, but rather the slippage will occur indefinitely. In my blog I stated:

> **However I have a further objection [to the question of economic heterogeneity]**, which to my mind is extremely serious: I feel that when you have an economic area operating under a market economy, wealth will always flow from the periphery to an economic centre of gravity. This leads to lower inflation at the centre and a depreciation of currencies at the periphery. This is apparent in Europe, and we also see for example in the Antipodes that the New Zealand Dollar slowly but inexorably depreciates against the Australian Dollar, and likewise the Canadian Dollar against the US Dollar.

http://martinse.livejournal.com/tag/zz-greece-and-the-euro

As I felt at the time, the deficit in Greece, among other countries, has not gone away: and indeed concern about economic heterogeneity spans the political spectrum from left to right in this country. Subsequent events may however lead to complacency: there is a recovery in the Eurozone, but then all market economies have cycles, and Portugal seems to show the way via Keynesian-style policies to avoid austerity, but with its geographical position, are these macro-economic measures also short-term?

1. The Statistical Evidence

But now I feel it time to look at the statistical evidence. The following graph relates the depreciation of various mainly Western countries' currencies against the Deutsche Mark, versus the distance of the capitals from Frankfurt. The period is 1963-1999, the eve of the Euro:
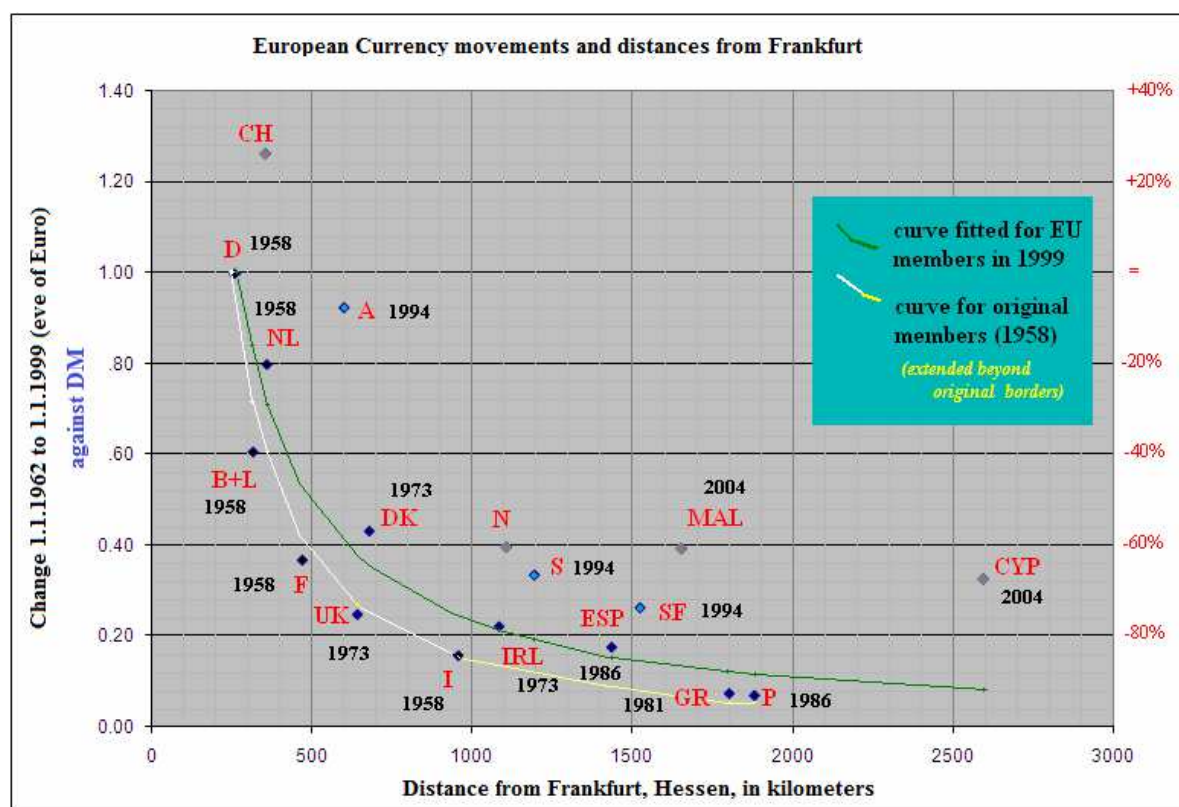
Two curves are shown, the green fitted to all countries in the EU in 1999, on the eve of the Euro, and the white one fitted to the original signatories to the Treaty of Rome in 1958. (SF is Finland.) Germany is not part of the fit, since the rise against itself would have to be +0% and the distance perhaps zero. Where the curve goes through +0% could be an average distance within Germany from Frankfurt, either in geographic, population or economic terms. Here it is around 250-265m, reasonably consistent with my own calculation of 215km for the mean, which would go up to 260km with re-unification, though this latter covers only the last nine years of this period.

A centre of gravity is a well-known concept: if you put a suitcase on a rack, it will fall off if the centre of gravity lies off the edge of the rack. Where this centre will be depends on the contents: if it is empty you may calculate the CoG quite straightforwardly. Likewise one can calculate a geographic centre of gravity for countries – though methods differ slightly. In Germany most of the calculations give various towns or villages in Thüringen, East Germany – and the Ribble Valley, Yorks, has been nominated for the United Kingdom, and the square in front of Notre Dame for Paris!

http://webs.schule.at/website/europa/Europa_centre_en.htm

So the analogy of the contents gives us a parallel with economic centres, and an economic centre of a region does have such a pull and I believe problems occur if it is ignored.

Now these curves are perhaps the simplest curve fit, a log-linear fit, discussed further in the Technical Appendix. Let us look at the example of two countries, one which is twice the distance of the other from Frankfurt, at least at the capitals. We have Italy, where Rome is 959km from Frankfurt, whereas Paris is 471km. And Athens is 1804km from Frankfurt, almost twice that of Rome. Let us look at the change in currency values for Greece and Italy: in 1962, the Drachma was worth 20.83 Lire, but in 1999 it was worth only 6.42 Lire, well below half its previous value. The white curve, extended as yellow beyond the original six signatories, gives a halving time of 25 years for countries where one country is half the distance of the other from Frankfurt. In 1987, the Drachma was worth 9.80 Lire, just under half its 1962 value. Both currencies lie close to this curve.

In fact we have a very straightforward idea: **double the distance, halve the strength**. For the green curve the halving rate is roughly 33 years.

Now clearly there is not enough data to refute the hypothesis of halving times related to distances from a centre of gravity. There are indeed irregularities. But we may also note that the graph suggests that the Netherlands exert a pull on Belgium, and also Spain on Portugal, since in each case one is above the curve line and the other below, or much closer to the curve line.

The graph also shows that the more recent a country's accession to the EU, the less their currencies have fallen. The date of accession is shown next to each point, and indeed all countries acceding after the first six in 1958 – with the exception of the UK - have depreciations above the white line, and countries that acceded 1994 onwards are well above both lines. This suggests that the greater the economic integration, the greater the gravitational pull, though in the case of the UK it is difficult to gaue the effect of the channel.

Thus one has to be careful with these figures: before accession, their circumstances will be varied.

Now what we can see here is that all the countries that have had deficit difficulties, i.e. the 'pigs' - Portugal, Ireland, Italy, Greece and Spain – are those at the bottom of the chart. It doesn't matter that they are on or above one of the curves, and Spain and Ireland are above both curves: a deficit is a deficit. It is clear that the pressures to devalue in the latter half of last century are still there, and that all the things that devaluation is meant to avoid will still happen in the new Euro environment.

So if what I say is correct, then we cannot put Greece and other southern countries on a firm footing once and for all – whether through austerity or through Keynesian methods - but **rather the slippage will occur indefinitely**.

It is clear that economic union cannot really happen effectively until the wealth of the EU starts to converge, but within the present scenario, the inequalities will in fact worsen, and it has to be the case that if an economic union needs intermittently to mercilessly punish its weakest members, there has to be something wrong with the underlying philosophy of that economic union.

2. Forecasting crises

I have in this short paper tried to look at currency movements, since the problems of the Eurozone directly relate to currencies. Clearly more detailed analyses are required. For example the volatile movements between 1973-83 led to halving rates of around 12-14 years, returned to more like 40-50 years in the remainder of the century. But this suggests that the following depreciations against the Deutsche Mark might have occurred from 1999-2013:

country	distance from Frankfurt(km) [German av'ge 260km]	predicted change 1999-2013 (50-year halving rate)	predicted change 1999-2013 (75-year halving rate)	actual change 1983-99
France	471	-15.3%	-10.5%	-11.2%
Italy	959	-30.6%	-21.6%	-40.0%
Ireland	1,086	-33.0%	-23.4%	-30.1%
Spain	1,437	-38.0%	-27.3%	-34.2%
Greece	1,804	-41.9%	-30.3%	-50.6%
Portugal	1,883	-42.6%	-30.9%	-58.4%

Now we have only done the figures where there is only one economic centre, noting the Netherlands and Spain in passing. But while I hope I have drawn attention to the effects of location on currency movements, similar exercises may well be possible for population and economic movements.

3. Other works

I shall now briefly look at other works, which I believe complement my work, though they have not attempted to formalise regional effects, at least in a quantitative manner.

3.1 Immanuel Wallerstein and the semi-periphery

My work has important parallels with that of Immanuel Wallerstein (http://www.iwallerstein.com/), where he breaks down the world's countries into three economic groups, the core, the periphery and his new idea, the semi-periphery. We may note that within the EURO, the so-called PIGS – Portugal, Italy, Greece and Spain - fall into the semi-periphery category. My own analysis shows the geographical influences of the core on the periphery.

It may well be the case that Britain is putting itself in the semi-periphery by neglecting manufacturing and putting itself too much into dependency on the finance sector.

Looking further at his links links, we may note Commentary No. 280, May 1, 2010. *Is Europe Imploding?* Here he argues that the Greek crises are not that complex:

 "… The Greek problem is the problem of spread. Will Greece's difficulties not be replicated – are they not already being replicated – elsewhere in Europe? Can the euro survive? The Belgian problem presents however an even greater problem of spread. If Belgium comes apart, and both parts are then members of the EU, will not other states consider coming apart?"

 "…Of the two threatened implosions, the one symbolized by Greece is easier to solve. It basically only requires that Germany realize that its needs are better met by European protectionism than by German protectionism."

3.2 Bruno Amoroso and polycentric development

In his book *On globalization: Capitalism in the 21st century* (Amoroso, B. 1998/2003), he looks at some alternative ideas to globalisation: a 'polycentric view'. He sadly passed away at the turn of this year, but his colleague J. Jesperson at Roskilde, Denmark, is continuing their critical work on the Euro (Amoroso&Jespersen (2014) in Danish).

3.3 Duo Qin and dynamic analyses

What my own analysis does not do is consider pairs of countries such as Australia and New Zealand, or US and Canada. Duo Qin and her colleagues in He, Xinhua, Duo Qin and Yimeng Liu (2011), have taken pairs of countries have applied log-linear fits over time. One can indeed take the data and get a rough indication but with dynamic data DOLS (Dynamic Ordinary Least Squares) is required. They take currency movements at intervals such as a year or quarters, as the dependent variable, on inflation and movements in exchange reserves.

To merge both my analyses and theirs would lead to hopeless problems of identification (bias from mutual dependencies). However a separate analysis of inflation on geographic factors as well as currency depreciation would lead to comparable regressions, and a difference in parameters due to location would suggest how movements in exchange reserves relate to location, which is very much part of my agenda.

4. Conclusion

I believe this all suggests that a fixed currency across Europe is impractical, and that counter-productive austerity measures, e.g. against Greece, will make things even worse.

Thus the Single Market is unwieldy – with one country, Germany, acting as a centre of gravity and attracting funds to enable greater development in the core rather than at the periphery.

For this reason even reliance on Keynesian-style measures – or other measures pertaining to trade cycles – will only address economic difficulties in the short-term.

Personally I would suggest that we need a European Environmental Community, divided into regions which pursue co-development, rather than the neo-colonialism of the core, and common currencies not going outside such regions.

References

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He, Xinhua and Qin, Duo and Liu, Yimeng (2011) *Exchange rate misalignments: A comparison of China today against recent historical experiences of Japan, Germany, Singapore and Taiwan.* Bank of Finland Institute of Economies in Transition.
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Technical Appendix

I. The curve fit

The two curves are in fact log-linear fits, and if we reproduce the above graph in 'log space', we get the following picture:
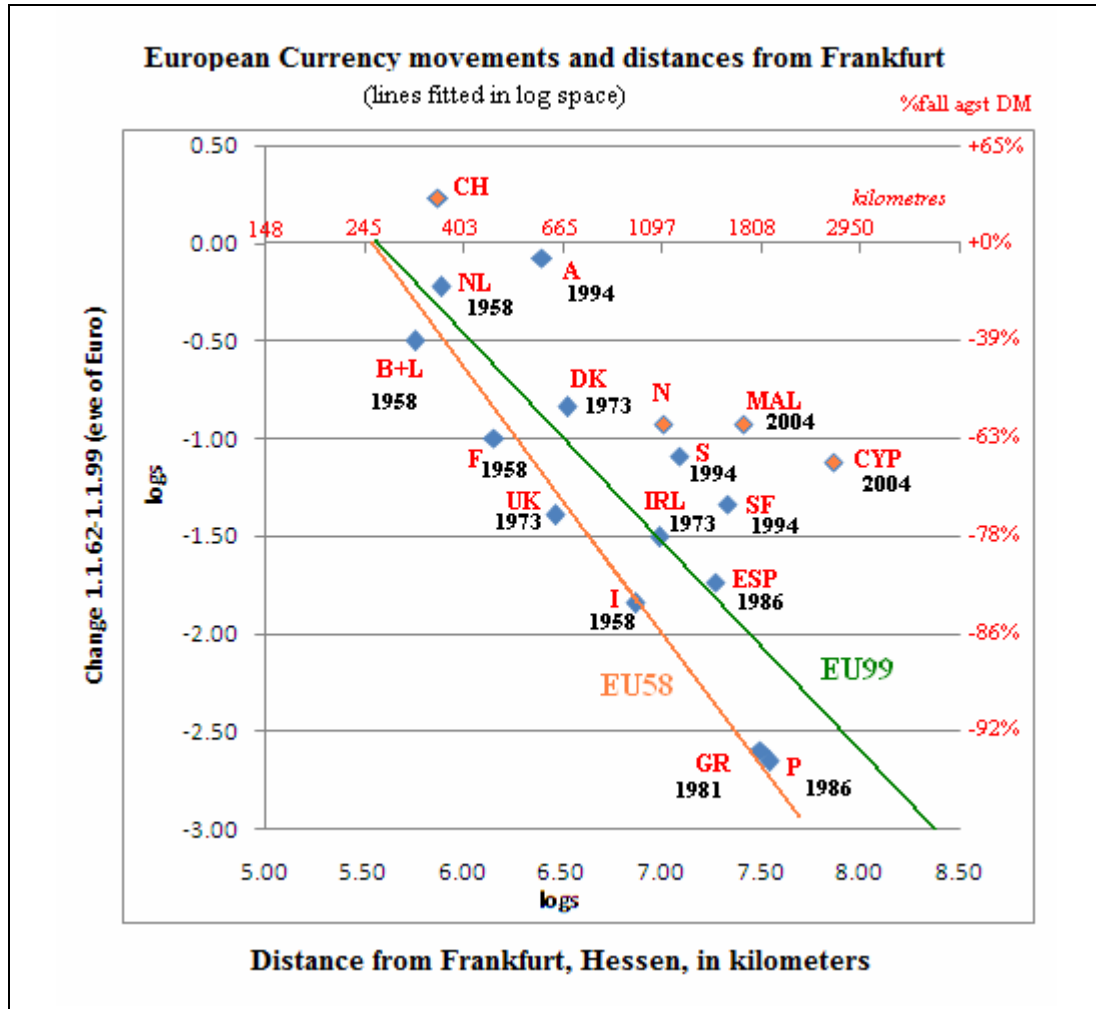

At the top, I have put the kilometre distances, 148-2950km, and at the bottom the corresponding logs, which go up smoothly in 0.5's. Likewise I show the percentage appreciation/depreciation on the right in red, from -92% at the bottom to +65% at the top. The relating change figures, from 0.08 (-92%) to 1.65 (+65%) have corresponding logs which are shown on the left. Again these are constant steps.

The usefulness of log space with currencies is that if we want to show percentages of what is expected, a percentage such as 80% will be roughly the same size anywhere on the graph, and not small if the actual figure is small.

II. Estimation of average distance from Frankfurt within Germany

My estimation of the mean distance from Frankfurt within Germany takes the distance from Frankfurt of the Land capitals and weights them by Land areas in square kms. We can estimate both pre- and post-unification figures in this way: 215 and 258km respectively. The median is probably higher but more difficult to calculate. Which is more relevant requires a more refined theory.

The picture to the right shows the FRG with Land capitals in red, and a distance estimated by eye for the Land's centre of gravity in blue. Frankfurt is shown in orange. The eye estimation would be more valid for a nationwide estimate, whether for West Germany only, or for the re-united country.
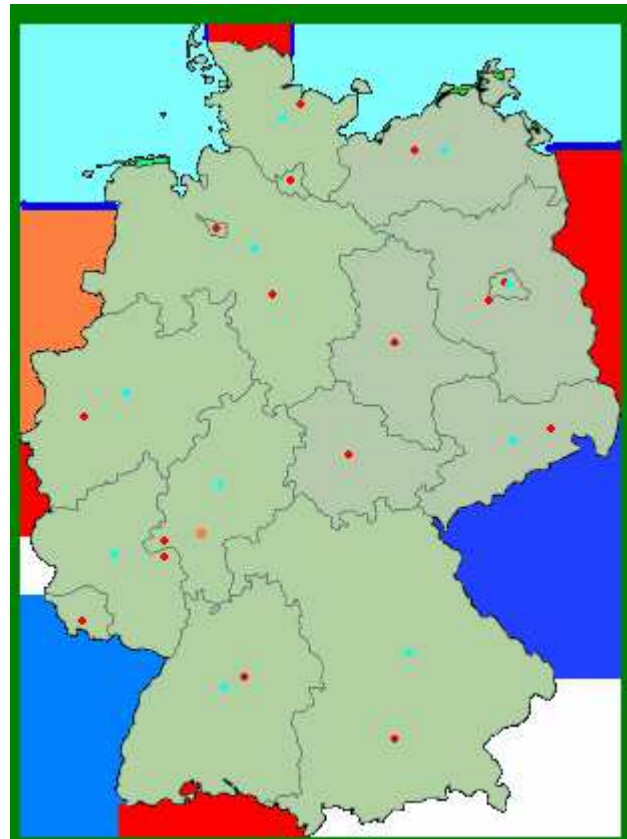
Capitals further (3):
Munich (Bavaria, area $\quad$ 34kkm^2),
Dresden (Sax, $\quad$ 18.4 kkm^2),
Kiel (Schleswig-Holstein, $\quad$ 16kkm^2)

Same (7):
Berlin (892km^2),
Hamburg (755km^2),
Bremen (419km^2),

Düsseldorf (NRW, $\quad$ 34kkm^2),
Stuttgart (Baden-W'berg, $\quad$ 36kkm^2),
Magdeburg (Sachsen-Anhalt, 20kkm^2),
Erfurt (Thuringia, $\quad$ 16kkm^2),
Saarbrücken (Saarland, $\quad$ 2.6kkm^2)

Capitals closer (6):
Hanover (Lower Saxony, $\quad$ 48 kkm^2),
Potsdam (Brandenburg, $\quad$ 29kkm^2),
Schwrin (M'bg-Vorpommern,23kkm^2),
Wiesbaden (Hesse, $\quad$ 21 kkm^2),
Mainz (Rh-Pf, $\quad$ 20 kkm^2)

However my view is that they cancel out.