C HISTORY, GRAVITY AND INTERNATIONAL FINANCE[52]

It is sometimes argued in policy discussions on the future of the international monetary system that an evolution towards multipolarity is unlikely owing to strong persistence effects which benefit the incumbent currency, i.e. the US dollar. How strong these effects are remains subject to debate, however.

This special feature quantifies persistence effects in international financial investment patterns. Using unique data on foreign bond holdings of US investors in the early 1940s, and comparing them with investment patterns in 2010, the special feature documents a "history effect" in which the pattern of holdings seven decades ago continues to influence holdings today, which plausibly reflects fixed costs of market entry and exit, together with endogenous learning. It shows that up to 15% of the cross-country variation in US investors' foreign bond holdings today is explained by holdings 70 years ago. This effect is twice as large for bonds held by US investors that are denominated in currencies other than the dollar.

These findings help quantify the extent to which the role of the dollar as a global investment currency today is partly a legacy of this earlier era when it dethroned sterling as the leading international currency. They also complement the results presented in the 2012 edition of this report on the existence of significant inertia effects in international currency use which, however, were shown not to be insurmountable. The present special feature aims to deepen these earlier results by looking more closely at potential sources of inertia. In so doing it points to fixed costs and endogenous learning as two potential sources of inertia in the use of international currencies, alongside well-known network externality effects.

I INTRODUCTION

It is sometimes argued in policy discussions on the future of the international monetary system that an evolution towards multipolarity is unlikely owing to strong persistence effects which benefit the incumbent currency, i.e. the US dollar. The proximate source of these effects as well as how strong they are remains subject to debate, however. How large, for instance, are persistence effects in international financial investment patterns?

One particularly relevant development in this context is growing interest in the geography of international finance. The direction and determinants of cross-border financial stocks and flows have been intensely studied in recent years using so-called "gravity models" (e.g. Aviat and Coeurdacier, 2007). In this approach, bilateral trade in assets is posited to increase with country size and to decline with transaction costs and information asymmetries, as captured by geographic distance and related variables.[53] Attention so far has focused on recent decades, which usefully highlights the recent progress of financial globalisation, but says nothing about longer-term historical forces that may also influence patterns of international investment.

This special feature aims to address this shortcoming and quantifies the role played by history in shaping the patterns of international financial investment. In so doing, it also aims to shed light on one manifestation of persistence effects in the international monetary and financial system

52 Prepared by Livia Chiţu and Arnaud Mehl.
53 See e.g. Portes and Rey (2005); Ahearne, Griever and Warnock (2004); Eichengreen and Luengnaruemitchai (2006); Lane and Milesi-Ferretti (2008a) and (2008b); Coeurdacier and Martin (2009); Forbes (2010); Okawa and van Wincoop (2012).

as well as on their potential sources. It presents estimates from a gravity model of international investment based on data on US investors' holdings of foreign bonds in 88 countries seven decades ago. It documents a "history effect" in which the pattern of holdings seven decades ago continues to influence holdings today. 10% to 15% of the cross-country variation in US investors' foreign bond holdings is explained by holdings 70 years ago. This plausibly reflects fixed costs of market entry and exit together with endogenous learning, namely the propensity of international investors to continue to invest disproportionally in assets in which they have already invested in and are accustomed to. This history effect is shown to be twice as large for bonds denominated in currencies other than the dollar, suggesting the existence of even higher fixed costs of initiating US foreign investment in such currencies. Overall the findings presented in this special feature point to fixed costs and endogenous learning as two potential sources of inertia in the use of international currencies, alongside well-known network externality effects.

This special feature reviews the theoretical motivations in Section 3.2, presents the empirical results in Section 3.3 and provides some concluding remarks in Section 3.4.

2 THEORETICAL MOTIVATIONS

Why might past investment influence current investment? One answer is fixed costs. The theoretical and empirical literature on so-called beachhead and hysteresis effects (Baldwin, 1988; Dixit, 1989; Baldwin and Krugman, 1989) has shown that transitory shocks resulting in market penetration can permanently impact patterns of trade if firms incur fixed costs when entering new markets but cannot easily recoup them when they exit.[54] When coupled with endogenous learning, as described in the study by Van Nieuwerburg and Veldkamp (2009), the cumulative impact of passing shocks can be more powerful still. A shock that leads a firm to penetrate a market can then give it the incentive and ability to learn more about the market in question, amplifying the initial informational advantage.

Intuition suggests that what is true of international trade is also true of international investment. Financial firms face fixed costs when investing in the ability to assess the creditworthiness of foreign bonds. They face set-up costs when seeking to market the foreign bonds of a country or countries to domestic investors. This was plausibly true of US banks at the middle of the 20th century, the case analysed in this special feature.

Commercial banks had been prohibited from establishing foreign branches under the provisions of the National Banking Act.[55] When the ban on foreign branching was then lifted by the Federal Reserve Act of 1913, US banks had to sink the costs of setting up foreign branches in order to gather intelligence on foreign markets and underwrite the bond issues of foreign borrowers. They had to sink the costs of setting up store-front brokerages and other marketing tools to sell those bonds to investors (Eichengreen, 1989). The foreign market penetration of US banks was uneven,

54 For instance, it is observed that Japanese firms that entered US markets in the early 1980s, when the dollar had significantly appreciated, did not abandon their sunk investments when the dollar fell in the wake of the Plaza agreement of 1985. Once firms had invested in marketing, R&D, reputation, distribution networks, etc., they found it profitable to remain in US markets even at a lower exchange rate (Dixit, 1989). Stricto sensu, hysteresis is when a transitory shock has permanent effects. In our case, however, what is necessary is only that a transitory shock has highly persistent effects that are still perceptible after decades. With limited data, the two cases are, of course, difficult to distinguish.

55 Unlike federally chartered banks, trust companies could branch abroad, and those which set up foreign offices did so mainly in order to gather information on foreign bonds, which were attractive assets to add to their portfolios since these matched the maturity of their liabilities to their trustees. Some state charters also allowed state banks to branch abroad, although few, if any, ever did. See Eichengreen and Flandreau (2010).

however. US banks focused disproportionately on Latin America and western Europe, leaving the British Commonwealth and Empire, along with parts of Scandinavia and eastern Europe, to their UK rivals. That structure was then essentially frozen by the Second World War, post-war capital controls and new restrictions on foreign branching imposed by the destination countries during the Bretton Woods period. It is thus plausible that the geography of international investment carved out in the interwar period could have had an unusually long-lived legacy.[56]

Fixed costs need not be large to have persistent effects on the geography of bilateral asset holdings; they only need to be *different* across countries. This is the implication of asymmetric information in the literature on endogenous learning. In the model of Van Nieuwerburg and Veldkamp mentioned above, even a small informational advantage associated with domestic assets can cause significant home bias. The informational advantage reduces the perceived riskiness of domestic assets, which encourages investors to hold more of them. This in turn induces investors to learn even more about such assets, making them still more attractive. Endogenous learning thus amplifies the initially small information advantage. Analogously, lower initial fixed costs of investing in some countries may significant tilt investment towards those countries over time; moreover, this pattern may persist and be amplified over time by endogenous learning.

This idea might also extend to currency choice. When deciding to invest in bonds denominated in foreign currencies, domestic investors will have to learn not just about the creditworthiness of the foreign issuer but also about the characteristics of its currency; additional frictions may also come into play, such as the absence of liquid markets to hedge currency risk.

Ideally, one would have direct measures of these fixed costs, including differences in brokers' fees between domestic and foreign investments, differences in tax treatment, and policy-related costs (e.g. those associated with limits to foreign investment and capital controls). Unfortunately, no study has been able to provide a comprehensive measure of direct costs in investing in foreign assets, not even for the contemporary period, much less for earlier historical eras (Coeurdacier and Rey, 2011). It is thus necessary to make inferences about their importance from indirect evidence.

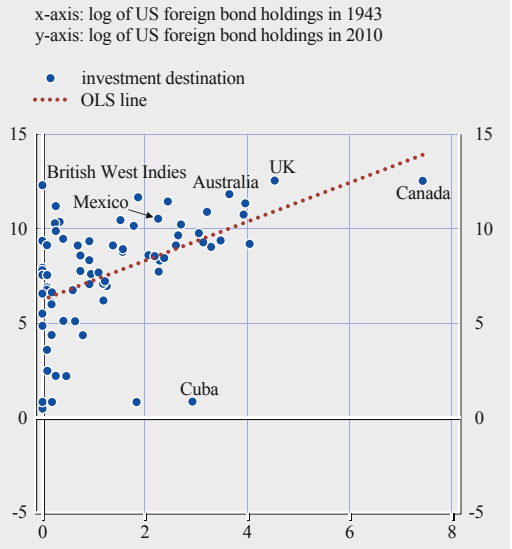
3 EMPIRICAL ESTIMATES

To indirectly estimate the importance of fixed costs and endogenous learning effects, Chițu, Eichengreen and Mehl (2013) estimate a standard gravity model akin to the specification proposed in, for example, Coeurdacier and Martin (2009) and Okawa and van Wincoop (2012). They use past holdings of a country's bonds as an indicator that investors have sunk the costs of acquiring information about this particular class of investment. They estimate a gravity model of international investment using unique data on US investors' holdings of foreign bonds in 88 countries seven decades ago, a period for which uniquely detailed information exists. These data stem from a detailed survey of US foreign investments conducted by the US Treasury during the Second World War for the purpose of gleaning information that might prove useful in subsequent peace negotiations and help US residents to obtain compensation for foreign assets confiscated or destroyed during wartime (see US Treasury, 1947). For about half of the countries in the sample,

56 There is also the counterargument that subsequent events overwhelmed the influence of earlier investment patterns. An example is Cuba, a country with close economic links to the United States until 1959 and with which US investors had developed significant economic interests and held relatively large numbers of bonds. After the Cuban revolution, however, the new government expropriated foreign investors. This explains why US investors today hold negligible amounts of Cuban bonds, although they used to hold large ones in the past. Which argument is of more general applicability is, of course, an empirical question.

information was also available as to whether foreign bonds were denominated in dollars or other currencies.

Chart 30 US foreign security holdings: 1943 versus 2010



Sources: Chițu, Eichengreen and Mehl (2013).
Notes: The chart plots the logarithm of US foreign bond holdings in 1943 against the logarithm of the corresponding holdings in 2010 in the respective investment destination country. The data for US foreign bond holdings in 1943 are from US Treasury (1947). The data for US foreign bond holdings in 2010 are from US Treasury et al. (2011).

The results are strongly supportive of a "history effect". Chart 30 juxtaposes the logarithm of US foreign bond holdings surveyed in 1943 against the logarithm of 2010 holdings. The correlation between current and lagged holdings is striking. This is confirmed when gravity estimates for US foreign bonds holdings in 2010 are considered (see Table 9). Indeed, even after controlling for the arguments of the standard gravity model (distance and size), bilateral trade (a traditional complement to bilateral financial investment) and informational frictions (proxied by common language, legal origin, and past colonial status), this correlation is statistically significant, robust and economically important. Not only do 1943 holdings help to predict 2010 holdings, but their effect is large. In the OLS estimates, a 1% increase in US holdings in a country 70 years ago is associated with higher holdings of about 1% in the same country today. The adjusted-$R2$ jumps from roughly 35% to 50% when the 1943 holdings are added (compare the estimates reported in columns 1 and 2 with those in columns 3 and 5 respectively). In other words, the pattern of 1943 holdings explains about 15 percentage points of the allocation by US investors of their current foreign bond holdings. The result is unchanged when excluding offshore centres and including common language, colony and legal system dummies (columns 4 to 10). It remains essentially unchanged in significance and economic magnitude if one controls for omitted variables (as in columns 7 and 8) and outliers (as in columns 9 and 10). These findings also extend to other securities besides bonds.[57]

The causal interpretation of the effect is buttressed by the observation that it continues to hold after instrumenting lagged holdings with dummies that aim to capture the effects of the disintegration of the gold standard and of the sovereign defaults of the 1930s, which contributed to the growing segmentation of global financial markets during the Great Depression. The same result is found for capital flows in the other direction; in other words, the history effect holds for foreign investments in US securities as well as for US investments abroad.[58]

To what extent does the history effect matter for international currency choice? As mentioned above, one might expect sunk costs and therefore the history effect to be even larger for bonds issued in currencies other than the dollar. US investors will have to learn not just about the creditworthiness of the foreign issuer but also about the characteristics of its currency; additional frictions may also come into play, such as the absence of liquid markets to hedge currency risk.

57 Detailed results are not reported here for reasons of space but are available in Chițu, Eichengreen and Mehl (2013).
58 The same results are obtained when the dependant variable is substituted with a measure of foreign investment bias like that proposed by Bekaert, Siegel and Wang (2012).

Table 9 Testing for a "history effect" – baseline empirical estimates

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Excl. offshore centres	(5) Full sample	(6) Excl. offshore centres	(7) Full sample	(8) Excl. offshore centres	(9) Full sample	(10) Excl. offshore centres
Log (distance from US)	1.125**	1.400	1.510***	1.931***	1.531***	1.375**	-0.338	-3.901**	-1.369	-2.119
	(0.553)	(1.991)	(0.559)	(0.686)	(0.475)	(0.566)	(1.897)	(1.894)	(1.251)	(1.416)
GDP size	0.064	0.155	-0.037	-0.003	-0.057	0.014	-0.073	0.000	-0.094	-0.065
	(0.175)	(0.169)	(0.097)	(0.108)	(0.093)	(0.105)	(0.111)	(0.136)	(0.116)	(0.113)
Log (trade with US)	1.592***	1.889***	1.331***	1.121***	1.329***	0.964***	1.229***	0.567*	1.052***	0.760**
	(0.263)	(0.363)	(0.262)	(0.280)	(0.265)	(0.274)	(0.329)	(0.296)	(0.281)	(0.301)
1943 bond holdings			0.845***	1.012***	0.948***	1.090***	1.232***	1.471***	1.063***	1.069***
			(0.185)	(0.185)	(0.178)	(0.186)	(0.282)	(0.266)	(0.207)	(0.207)
Common language dummy		0.225			0.694	-1.051	1.080	-1.370	1.352*	0.930
		(1.208)			(1.171)	(1.808)	(1.205)	(1.559)	(0.745)	(1.005)
Cuba-Philippines dummy		-0.730			-4.190***	-6.334***	-4.977**	-9.246***	-3.971**	-11.742***
		(1.803)			(1.459)	(0.835)	(2.124)	(1.253)	(1.565)	(2.809)
Common legal origin dummy		-0.023			-0.880	0.902	-0.628	1.798	-0.474	0.304
		(1.244)			(1.179)	(1.742)	(1.232)	(1.516)	(0.895)	(1.112)
Regional effects	NO	YES	NO	NO	NO	NO	YES	YES	YES	YES
Constant	-15.801***	-20.454	-17.848***	-20.049***	-18.029***	-14.018**	-1.114	35.114**	9.362	18.196
	(5.571)	(18.305)	(5.510)	(6.765)	(4.817)	(5.490)	(17.375)	(16.865)	(11.846)	(13.472)
Observations	74	74	73	61	73	61	73	61	73	59
Adjusted R^2	0.355	0.352	0.483	0.513	0.508	0.551	0.511	0.605	0.609	0.658
log likelihood	-170.5	-165.0	-159.8	-133.8	-156.3	-129.7	-152.0	-121.4	.	.

Sources: Chițu, Eichengreen and Mehl (2013).
Notes: The table reports gravity estimates for US foreign bond holdings in 2010 (columns 1 and 2) augmented with the lag of these holdings in 1943 (columns 3-10). The estimates for the full sample and excluding offshore financial centres are obtained using simple OLS (columns 1, 3-6), OLS and regional effects (columns 2, 7 and 8) as well as robust-to-outlier (columns 9 and 10) estimation. The regional effects aim to capture unobserved investment destination effects, as suggested in Okawa and van Wincoop (2012). The eight regions (Asia, Central America, Europe, North America, South America, Oceania; West Indies; Africa is the base region) follow the classification of US Treasury (1947). Bilateral trade with the US is instrumented with transport costs, its square as well as the number of landlocked countries in the country pair as in Aviat and Coeurdacier (2007). Robust-to-heteroskedasticity standard errors are reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

This hypothesis is explicitly tested in Table 10, which provides estimates of the history effect separately for dollar and non-dollar bond holdings (columns 2 to 5 and columns 7 to 10 respectively). These equations are estimated on a subset of 41 countries for which data on the currency of denomination of foreign bond holdings is available in both 1943 and 2010. Columns 1 and 6 report pro memoria simple gravity model estimates as benchmarks against which to gauge the new results. The history effect is prominent for both dollar and non-dollar bonds, but it is more important for non-dollar bonds, as the preceding arguments suggest. The estimated elasticity of today's holdings relative to lagged holdings is 0.8-1.1 for dollar bonds but close to 1.6 for non-dollar bonds. Moreover, the adjusted R^2 increases by roughly 30 percentage points for non-dollar bonds, as opposed to 15 percentage points for dollar bonds. On balance, therefore, the history effect is about twice as large for non-dollar bonds, indicative of larger sunk costs giving rise to stronger persistence, in line with theoretical priors.

4 CONCLUDING REMARKS

This special feature has shown that history plays a role in the geography of international finance. Using unique data on US investors' holdings in 1943, it has documented a "history effect" in which US bilateral holdings 70 years ago help to explain the allocation of US holdings around the world today. This effect is statistically significant, robust and economically important even after controlling for the arguments of the standard gravity model. It is interpreted in terms of the path dependence effects arising from sunk costs of market entry and exit coupled with endogenous learning. The estimates suggest that a 1% increase in US holdings in a country 70 years ago is associated with holdings of some 1% higher in the same country today. They suggest that 10 to 15% of the cross-sectional variance of today's holdings is attributable to the effect of the holdings 70 years ago. These findings are robust to an array of sensitivity checks.

Earlier studies had shown that the geographical component of cross-border financial flows and holdings is substantial – that international financial markets are not frictionless but segmented by market size, informational asymmetries and familiarity effects. More recent studies have established the importance of complementarities between trade in goods and trade in assets. This special feature has shown that history also matters and that historical patterns persistently weigh on the geography of bilateral asset holdings.

Table 10 Testing for a "history effect" – dollar versus non-dollar bonds

	US dollar bonds					non-US dollar bonds				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log (distance from US)	0.349	0.602	0.476	-0.218	-1.884	2.923***	3.185***	3.463***	-0.192	-1.353
	(0.682)	(0.571)	(0.741)	(2.017)	(1.435)	(0.944)	(0.766)	(0.770)	(2.597)	(0.873)
GDP size	-0.035	-0.019	0.011	0.215	0.160	-0.046	-0.141	-0.184**	-0.189	-0.314***
	(0.121)	(0.081)	(0.095)	(0.146)	(0.156)	(0.232)	(0.084)	(0.078)	(0.167)	(0.100)
Log (trade with US)	1.511***	1.213***	1.108**	1.347*	0.231	1.689***	1.053***	1.184***	1.243**	2.517***
	(0.375)	(0.364)	(0.427)	(0.733)	(0.302)	(0.441)	(0.383)	(0.421)	(0.444)	(0.177)
1943 bond holdings		0.813***	0.783**	1.128**	1.155***		1.551***	1.571***	1.649***	0.753***
		(0.272)	(0.308)	(0.412)	(0.237)		(0.319)	(0.356)	(0.452)	(0.143)
Common language dummy			2.420**	1.171***	1.267			-0.599	-0.776***	8.310***
			(0.886)	(0.262)	(1.671)			(0.636)	(0.211)	(1.622)
Cuba-Philippines dummy			-3.148***	0.970	0.086			-1.113	-0.061	-9.787***
			(0.990)	(1.482)	(2.678)			(0.685)	(1.676)	(2.087)
Common legal origin dummy			-1.058	1.859*	2.261			-0.030	0.317	-9.048***
			(1.536)	(0.971)	(1.924)			(1.737)	(2.248)	(1.637)
Regional effects	NO	NO	NO	YES	YES	NO	NO	NO	YES	YES
Constant	-8.516	-9.377	-7.592	-2.303	20.100	-32.547***	-31.181***	-34.471***	-3.049	-11.218
	(7.218)	(5.995)	(7.862)	(21.364)	(13.589)	(9.148)	(6.446)	(6.288)	(23.562)	(7.528)
Observations	38	37	37	37	36	38	37	37	37	35
Adjusted R^2	0.317	0.475	0.466	0.537	0.681	0.391	0.718	0.698	0.718	0.956
log likelihood	-85.78	-78.52	-77.02	-69.26	.	-88.85	-72.17	-71.61	-65.20	.

Sources: Chițu, Eichengreen and Mehl (2013).
Note: The table reports gravity estimates for US foreign dollar and non-dollar holdings in 2010 augmented with the lag of these holdings in 1943. The estimates for the full sample are obtained using simple OLS (columns 1 to 3 and 6 to 8), OLS and regional effects (columns 4 and 9) as well as robust-to-outlier (columns 5 and 10) estimation. The regional effects are as in Table 1 and bilateral trade is instrumented as explained in the notes to that table. Robust-to-heteroskedasticity standard errors are reported in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Importantly, it has also shown that the history effect is twice as large for non-dollar bonds, which is interpreted as reflecting larger sunk costs and endogenous learning effects for US financial investments in currencies other than the dollar. These findings shed light on one manifestation of persistence effects in the international monetary and financial system as well as on their potential sources. They underscore how the role of the dollar as a global investment currency today is partly a legacy of this earlier era when it dethroned sterling as the leading international currency. They also point to fixed costs and endogenous learning as two potential sources of inertia in the use of international currencies, alongside well-known network externality effects.

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