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The Impact of a Disorderly Resolution of Global Imbalances on Global Wealth

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Partly reflecting structural advantages such as liquidity and strong investor protection, foreigners have built up extremely large positions in US (as well as other dollar-denominated) financial assets. This paper describes the impact on global wealth of an unanticipated shock to US financial markets. For every 10 per cent decline in the dollar, US equity markets, and US bond markets, total wealth losses to foreigners could amount to about 5 percentage points of foreign GDP. Four stylized facts emerge: (i) foreign countries, particularly emerging markets, are more exposed to US bonds than to US equities; (ii) over time US exposure has increased for most countries; (iii) on average, US asset holdings of developed countries and emerging markets (scaled by GDP) are very similar; and (iv) based on their reserves position alone, wealth losses of emerging market governments could on average amount to about $2\frac{3}{4}$ *percentage points of their GDP.*

(J.E.L.: F31, F32, F34, F37).

1. Introduction

The vast US current account deficit and the associated large positions that foreigners have amassed in US securities have garnered much attention from academics (Clarida, 2007; Forbes, 2008), policy makers (Bernanke, 2005; IMF, 2005), practitioners and the financial press (*The Economist*, 2005a, 2005b). The income streams coming off those large cross-border

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positions, as well as the impact of valuation changes on foreign positions, have also been the subject of much recent work.[1]

There are many structural reasons for this accumulation of positions in US securities. For portfolio equity investors, there are few countries in the world that protect the rights of outside investors more vigorously (Kho *et al*., forthcoming). For fixed income investors, US bond markets offer unparalleled depth and liquidity (Burger and Warnock, 2006). Notwithstanding the potential benefits, these large positions leave foreigners exposed to fluctuations in US asset prices, a point highlighted by recent dislocations in financial markets.

In this paper, I address one narrow but interesting question related to these valuation changes: how would a rapid unexpected decline in US financial market prices, a scenario that has been seen as a key risk associated with a 'disorderly' unwinding of global imbalances, impact the wealth of foreigners resident in a wide range of countries? Foreigners have accumulated large positions in US bonds and equities – roughly $5 trillion as of mid-2004 – but across countries there is considerable variation in this exposure. I trace out the composition of exposure to US securities markets and investigate its potential implications by studying the impact (in dollar terms and also as a share of investor-country GDP) of a disorderly adjustment in US markets. The particular scenario I study is an unexpected decrease in US bond and equity markets as well as in the dollar.

Taking into account the currency composition of foreigners' US holdings, I find that for every 10 per cent drop in US bond markets and in the exchange value of the dollar, foreigners' losses would amount to 2.5 per cent of foreign GDP.[2] If, in addition, US equity markets also declined by 10 per cent, foreigners would incur another 1.5 per cent (of GDP) in losses. Thus, for every 10 per cent decline in the dollar, US equity markets and US bond markets, foreign losses would amount to 4 per cent of foreign GDP. Foreigners also have dollar exposure through their positions in dollar-denominated bonds issued by foreign countries; bringing these holdings into the analysis puts the total loss at nearly 5 per cent of GDP.[3]

An investigation of the impact across more than 50 countries reveals that from 1994 to 2004 exposure to US securities markets increased (as a share of GDP) for almost every country in the sample. Moreover, while foreign countries, and especially emerging markets, are more exposed

[1] See Gourinchas and Rey (2007a,b), Curcuru *et al*. (2008a,b), Curcuru *et al*. (forthcoming), Lane and Milesi-Ferretti (2005, 2007), Tille (2003, 2008), and Benigno (2006).

[2] All effects in this paper are linear, so the reader can scale my estimates to reflect any desired scenario. Detailed spreadsheets corresponding to all tables in this paper, as well as some supplementary tables, are available at http://faculty.darden.virginia.edu/warnockf/Disorderly Resolution Tables.xls.

[3] Issuing dollar-denominated bonds, to the extent they are held by investors from other countries, would reduce a country's exposure to dollar depreciation. I do not focus on this channel, but rather focus on exposure through portfolio assets.

to US bonds than to US equities, on average the overall exposure (as a share of GDP) of developed countries and emerging markets is very similar. Emerging markets' exposure to US securities is primarily via their governments' reserves positions; in my disorderly scenario emerging market governments stand to take a hit equivalent to almost 3 per cent of their GDP.

Because no single data source is appropriate for this study, I utilize two datasets. The first, analysed in Section 2, measures foreign holdings of US securities as reported on the June 2004 comprehensive US benchmark liabilities survey (US Dept of Treasury 1005 figures). The US benchmark liabilities data are of extremely high quality, as they are collected at the security-level and thoroughly checked and cross-checked. They also include, at the country-level, the holdings of all foreigners, be they foreign official or private investors. However, as described in Griever *et al*. (2001) and Bertaut *et al*. (2006), liabilities data are subject to a custodial centre bias that owes to the use of third-country custodians. If, for example, a German resident holds a US corporate bond through a custodian in Luxembourg, the US survey will attribute the holdings to Luxembourg. This is due to the fact that the US survey can see only the first foreign address, which will not necessarily coincide with the address of the ultimate holder. This problem can be particularly acute for Luxembourg and other custodial centres.

The second data source, analysed in Section 3, is the IMF's December 2004 Coordinated Portfolio Investment Survey (CPIS). The CPIS data cannot match the US data in terms of overall quality, as few countries carry out the full-blown benchmark surveys that are necessary to accurately measure cross-border holdings. However, the CPIS compiles results from individual country's *asset* surveys, each of which should, by design, suffer less from the custodial centre bias. That is, if a country uses best practices and has a geographic ID matching the investor to a country (its country, in an asset survey) and a security ID (such as an ISIN or SEDOL) that identifies the country of the security, there should not be a custodial centre bias in the data. Unfortunately, most countries do not follow best practices. If we define best practices as conducting mandated surveys of both custodians and end-users at both the security and, for cross-checking purposes, aggregate levels, then only 4 of 63 countries followed best practices in 2001. That said, more and more countries should follow best practices over time – in part because of useful initiatives such as the G8 Action Plan to improve cross-border securities data – and the CPIS data are potentially a very useful resource.[4]

I utilize the CPIS data to compute implied US liabilities (the amount each country reports its residents own of US securities).[5] These CPIS-based

[4] The 4 countries that followed best practices as I have defined them were Hong Kong, Israel, Poland, and the United States (http://www.imf.org/external/np/sta/pi/01/MdTab1.htm). It is likely that a few more countries also submitted high quality data.

[5] Lane and Milesi-Ferretti (2006) also use CPIS data to compute implied liabilities.

implied liabilities are not directly comparable with the US liabilities data for two reasons: country-level CPIS data are of private investors' holdings, with foreign official positions reported only in aggregate, and not all countries submit data (China and Taiwan are two important omissions). But in broad terms the CPIS data can be used to supplement the analysis conducted using US benchmark data.

The reader should note that I am not arguing that the scenario I study is (or is not) likely to occur. Rather, I am interested in the following question: were an unanticipated 10 per cent decline in the dollar and US bonds and equities to occur, what would be the first-order ramifications on foreign wealth? One can take issue with various aspects of this particular scenario. For example, it can be forcibly argued that a symmetric, broad-based decline in the dollar is highly unlikely, as exchange rates around the world are not uniformly flexible. One could also argue that a simultaneous decline in the dollar and US stock and bond markets is unlikely. Indeed, evidence from a range of industrial country experiences in Gagnon (2005) suggests that if the dollar were to fall, US yields are unlikely to increase sharply. However, the US is in some sense different from the typical country; because foreigners have a sizeable impact on US bond markets (Warnock and Warnock, forthcoming), a scenario in which foreigners exit their large US bond positions could well produce a simultaneous increase in US yields and downward pressure on the US dollar. The reader should also note that I abstract from any impact this scenario might have on foreign markets.

2. Exposure to Long-term US Securities[6]

In this section, I use the June 2004 comprehensive benchmark survey of foreign holdings of US securities (Department of Treasury *et al*. 2005) to quantify foreign exposure to US securities and estimate the impact of a sudden decrease in the dollar and US bond and equity markets. I also utilize data from 1994 to depict the evolution of exposure to US securities. Finally, I incorporate data on foreign bonds denominated in dollars to ascertain foreigners' dollar exposure through third countries' dollar-denominated bonds.

2.1. Positions in US Securities in 2004

Table 1 forms the basis for this analysis. As of June 2004, foreigners held an estimated $5,056 billion in US long-term securities (bonds of

[6] I focus on long-term securities (that is, bonds and equities) and do not include other foreign investment such as foreign direct investment or banking positions.

Table 1: Foreign Positions in US Long-term Securities, June 2004[a]

	Foreign Holdings of US Long-term Securities (Million US Dollars)						
			Bonds				
	Total Holdings	Equities	Total	Treasury	Agency	Corporate	Share of Bonds (in per cent)
Developed countries	**3,443,553**	**1,416,156**	**2,027,397**	**843,511**	**303,814**	**880,072**	**59**
Euro Area	**1,367,630**	**526,284**	**841,346**	**155,645**	**140,917**	**544,784**	**62**
Austria	17,685	10,226	7,459	1,447	2,511	3,501	42
Belgium	302,679	18,089	284,590	13,979	48,959	221,652	94
Finland	7,486	4,505	2,981	876	505	1,600	40
France	102,330	61,627	40,703	14,305	1,753	24,645	40
Germany	182,773	75,551	107,222	42,108	20,508	44,606	59
Greece	2,256	1,237	1,019	742	29	248	45
Ireland	117,971	52,440	65,531	8,823	15,452	41,256	56
Italy	54,555	34,639	19,916	11,585	2,700	5,631	37
Luxembourg	360,243	130,038	230,205	35,049	30,963	164,193	64
The Netherlands	197,431	127,468	69,963	21,767	16,021	32,175	35
Portugal	4,946	2,436	2,510	1,206	602	702	51
Spain	17,275	8,028	9,247	3,758	914	4,575	54
Other Europe	**826,685**	**465,506**	**361,179**	**113,484**	**47,517**	**200,178**	**44**
Denmark	36,401	19,897	16,504	6,278	4,307	5,919	45
Iceland	815	640	175	42	57	76	21
Norway	57,549	28,569	28,980	14,709	3,497	10,774	50
Sweden	72,100	46,475	25,625	13,791	4,189	7,645	36
Switzerland	188,472	119,980	68,492	32,824	12,339	23,329	36
Great Britain	471,348	249,945	221,403	45,840	23,128	152,435	47
Other developed countries	**1,249,238**	**424,366**	**824,872**	**574,382**	**115,380**	**135,110**	**66**
Australia	67,766	46,619	21,147	4,932	9,207	7,008	31
Canada	276,206	209,518	66,688	16,676	6,080	43,932	24
Japan	898,100	162,408	735,692	552,118	99,845	83,729	82
New Zealand	7,166	5,821	1,345	656	248	441	19

Table 1: Continued

	Foreign Holdings of US Long-term Securities (Million US Dollars)						
			Bonds				Share of Bonds (in per cent)
	Total Holdings	Equities	Total	Treasury	Agency	Corporate	
Emerging markets	**1,612,565**	**447,201**	**1,165,364**	**569,914**	**298,099**	**297,351**	**72**
Latin America	**87,922**	**20,311**	**67,611**	**50,515**	**7,319**	**9,777**	**77**
Argentina	6,807	2,418	4,389	1,623	1,298	1,468	64
Brazil	15,377	1,091	14,286	13,170	396	720	93
Chile	8,848	3,248	5,600	3,748	1,061	791	63
Colombia	6,668	778	5,890	3,637	1,061	1,192	88
Mexico	39,577	9,340	30,237	24,920	1,611	3,706	76
Peru	1,018	551	467	114	168	185	46
Venezuela	5,924	1,867	4,057	1,884	961	1,212	68
Uruguay	3,703	1,018	2,685	1,419	763	503	73
Emerging Asia	**566,038**	**15,806**	**550,232**	**328,142**	**192,707**	**29,383**	**97**
China	322,810	2,523	320,287	189,181	114,903	16,203	99
India	12,717	456	12,261	12,185	15	61	96
Indonesia	8,380	322	8,058	5,129	2,793	136	96
Korea	81,787	941	80,846	43,119	33,858	3,869	99
Malaysia	10,074	1,269	8,805	7,408	1,274	123	87
Pakistan	0	0	0	0	0	0	
Philippines	5,190	919	4,271	3,143	839	289	82
Thailand	3,508	310	3,198	2,981	49	168	91
Taiwan POC	121,572	9,066	112,506	64,996	38,976	8,534	93

Financial centres	**807,427**	**333,778**	**473,649**	**144,143**	**80,296**	**249,210**	**59**
Hong Kong SAR	65,984	22,499	43,485	27,645	10,518	5,322	66
Singapore	113,703	71,536	42,167	24,667	4,615	12,885	37
Caribbean financial centres[b]	627,740	239,743	387,997	91,831	65,163	231,003	62
Emerging Europe	**29,766**	**952**	**28,814**	**20,029**	**8,295**	**490**	**97**
Czech	2,950	332	2,618	1,423	1,064	131	89
Hungary	959	72	887	491	108	288	92
Poland	8,431	153	8,278	7,438	820	20	98
Russia	8,706	213	8,493	2,186	6,289	18	98
Turkey	8,720	182	8,538	8,491	14	33	98
Other emerging countries	**121,412**	**76,354**	**45,058**	**27,085**	**9,482**	**8,491**	**37**
Israel	15,163	5,020	10,143	6,401	1,441	2,301	67
Morocco	0	0	0	0	0	0	
South Africa	2,192	1,917	275	150	22	103	13
African oil exporters[c]	1,301	768	533	333	159	41	41
Middle East oil exporters[d]	102,756	68,649	34,107	20,201	7,860	6,046	33
World	**5,056,118**	**1,863,357**	**3,192,761**	**1,413,425**	**601,913**	**1,177,423**	**63**
Of which: Reserves	1,320,000	134,000	1,186,000	923,000	216,000	47,000	90

Source: Author's calculations based on datasets described in the text.
[a]Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

greater than 1 year in original maturity and equities).[7] With 63 per cent of their holdings of US long-term securities being in bonds, foreigners are relatively more exposed to US bonds ($3.2 trillion in holdings) than to its equity market ($1.9 trillion).[8] Bond holdings are spread out over securities issued by the Treasury ($1.4 trillion), US agencies ($0.6 trillion) and US corporations ($1.2 trillion).

The greater exposure to bonds owes importantly to large foreign official positions, as at least until very recently foreign governments tended not to hold US equities (or US corporate bonds, for that matter). As seen at the bottom of the table, included in the country-level amounts are $1.32 trillion in reserves, 90 per cent of which are in debt securities.[9] For developed countries, if we omit the one developed country with large foreign official positions (Japan), holdings of equities and bonds are about equal. In contrast, for emerging markets the vast majority of holdings of US securities is in bonds (77 per cent for Latin America and 97 per cent for emerging Asia).

The largest bond positions are from Japan ($736 billion); China ($320 billion); the financial centres of the Caribbean ($388 billion), Belgium ($285 billion) and Luxembourg ($230 billion); and the UK ($221 billion). The largest equity positions are from the UK ($250 billion), the Caribbean financial centres ($240 billion) and Canada ($210 billion). Overall, Japan is by far the most exposed to US long-term securities.

2.2. The Impact of Declines in the Dollar and US Asset Prices

We next present the results of a simple exercise in which the dollar, US equity prices and US bond prices all fall by 10 per cent. The reader should note two things about this exercise. First, the exercise assumes that positions are not hedged against currency risk; to the extent that foreigners hedge some of their dollar exposure, the estimates should be considered an upper bound. Second, because in 2004 roughly 23 per cent of foreigners' holdings of US agency bonds and US corporate bonds were denominated in foreign currencies, the impact of the dollar decline on those positions is appropriately attenuated.

[7] The $5,056 billion amount is the sum of all countries listed in Table 1. Total foreign holdings amount to $5,418 billion. The difference owes to the holdings of 'Country Unknown' ($224 billion in holdings of bearer bonds by unknown foreigners), International Organizations ($53 billion), and $85 billion spread out over many small countries.

[8] This, coupled with the fact that US assets are weighted toward equities, highlights the venture capitalist nature of US cross-border positions first noted in Gourinchas and Rey (2007a).

[9] I cannot analyse country-level foreign official positions because country-level US data on the positions of foreign governments are not publicly available. Note that by reserves we are referring only to positions held in the US; foreign governments also hold dollar assets in, for example, London banks.

In dollar terms (not shown), Japan stands to suffer the most from a disorderly adjustment. Overall, in this scenario rest of the world financial wealth would decline roughly $1 trillion, of which $258 billion would owe to losses on reserves positions. Table 2 expresses the impact as a share of home country GDP.[10] Japan's loss (4.1 per cent of GDP) is above average by non-financial-centre standards, but is not exorbitant. Other non-FCs with large US exposure include Ireland (14.5 per cent);[11] Taiwan and the Netherlands (8 per cent); and Canada, Norway and Sweden (around 5 per cent to 6 per cent). China's exposure is comparable to Japan's at 4.3 per cent of GDP, and on average the exposure of emerging markets and developed countries is very similar. Overall, the hit to foreign wealth would amount to 4.0 per cent of foreign GDP, and 1.1 per cent of this would owe to losses on reserves positions.

Of course, a disorderly adjustment would impact US investors as well. At the end of 2004 US investors owned roughly $12.7 trillion in US securities;[12] an unexpected 10 per cent decrease in US equity and bond markets would lead to a decrease in wealth of $1,271 billion, or almost 11 per cent of US GDP. Partially offsetting this – assuming the disorderly scenario impacted US markets only (an unlikely scenario) – would be the $250 billion gain from the currency appreciation on US investors $2.5 trillion in foreign equity holdings.[13]

2.3. The Evolution of Exposure: 1994 to 2004

US liabilities data are also available for 1994 (among other years), so we can investigate the evolution of foreigners' direct exposure to US securities markets. Table 3 shows changes in positions from 1994 to 2004, with detailed data for 1994 presented in Appendix Tables A1 and A2. Overall, foreigners increased their holdings of US securities by $4 trillion over the ten-year period, with developed countries comprising roughly two-thirds of that increase and emerging markets the other third. Reserves positions increased by $1 trillion over the decade. By country,

[10] Other scale factors would also be relevant. Best would be to scale by financial wealth, but I do not have access to such data across a wide range of countries. For other purposes, one could also scale by the size of the trade balance.

[11] Actually, Ireland has become a financial centre. See Lane and Ruane (2006).

[12] These are the holdings of the US Personal Sector, defined as households, nonfarm noncorporate business, and farm business. Source: US Federal Reserve, Flow of Funds Table L.10. Some foreign securities are included in the figure, so this should be considered an upper bound estimate.

[13] The increase in US foreign assets, and concomitant improvement in the US net foreign asset position, has been analysed by Tille (2003). Note that US holdings of foreign-currency-denominated bonds are negligible (Burger and Warnock, 2007) at only one-tenth the amount of their foreign equity holdings. For evidence on the co-movements of major international markets, see Goetzmann *et al*. (2005) and Brooks and del Negro (2004, 2006).

Table 2: Impact on Wealth of Unanticipated Shocks, 2004 (In Per Cent of GDP)[a]

	Impact on Foreign Holdings of US Long-term Securities					
			Bonds			
	Total Holdings	Equities	Total	Treasury	Agency	Corporate
Developed countries	**−3.9**	**−1.7**	**−2.3**	**−1.0**	**−0.3**	**−0.9**
Euro Area	**−3.1**	**−1.3**	**−1.9**	**−0.4**	**−0.3**	**−1.2**
Austria	−1.3	−0.8	−0.5	−0.1	−0.2	−0.2
Belgium	−18.0	−1.2	−16.8	−0.9	−2.9	−13.0
Finland	−0.9	−0.6	−0.3	−0.1	−0.1	−0.2
France	−1.1	−0.7	−0.4	−0.2	0.0	−0.2
Germany	−1.5	−0.6	−0.8	−0.4	−0.2	−0.3
Greece	−0.3	−0.1	−0.1	−0.1	0.0	0.0
Ireland	−14.5	−6.8	−7.7	−1.1	−1.8	−4.8
Italy	−0.7	−0.5	−0.3	−0.2	0.0	−0.1
Luxembourg	−255.3	−98.2	−157.2	−26.5	−20.7	−110.0
The Netherlands	−7.5	−5.0	−2.5	−0.9	−0.6	−1.1
Portugal	−0.6	−0.3	−0.3	−0.2	−0.1	−0.1
Spain	−0.4	−0.2	−0.2	−0.1	0.0	−0.1
Other Europe	**−5.6**	**−3.3**	**−2.3**	**−0.8**	**−0.3**	**−1.2**
Denmark	−3.3	−1.9	−1.4	−0.6	−0.4	−0.5
Iceland	−1.5	−1.2	−0.3	−0.1	−0.1	−0.1
Norway	−5.1	−2.6	−2.5	−1.3	−0.3	−0.9
Sweden	−4.7	−3.1	−1.6	−0.9	−0.2	−0.4
Switzerland	−11.5	−7.5	−4.0	−2.1	−0.7	−1.3
Great Britain	−5.0	−2.8	−2.2	−0.5	−0.2	−1.5
Other developed countries	**−4.2**	**−1.5**	**−2.8**	**−2.0**	**−0.4**	**−0.4**
Australia	−2.5	−1.8	−0.7	−0.2	−0.3	−0.2
Canada	−6.3	−4.9	−1.4	−0.4	−0.1	−0.9
Japan	−4.1	−0.8	−3.3	−2.6	−0.4	−0.3
New Zealand	−1.8	−1.5	−0.3	−0.2	−0.1	−0.1
Emerging markets	**−4.3**	**−1.2**	**−3.0**	**−1.6**	**−0.7**	**−0.7**
Latin America	**−1.1**	**−0.3**	**−0.8**	**−0.6**	**−0.1**	**−0.1**
Argentina	−1.0	−0.4	−0.6	−0.3	−0.2	−0.2
Brazil	−0.6	0.0	−0.6	−0.5	0.0	0.0
Chile	−2.4	−0.9	−1.5	−1.0	−0.3	−0.2
Colombia	−1.6	−0.2	−1.4	−0.9	−0.2	−0.3
Mexico	−1.2	−0.3	−0.9	−0.8	0.0	−0.1
Peru	−0.3	−0.2	−0.1	0.0	0.0	−0.1
Venezuela	−1.4	−0.4	−0.9	−0.5	−0.2	−0.3
Uruguay	−6.4	−1.8	−4.5	−2.5	−1.2	−0.8
Emerging Asia	**−3.1**	**−0.1**	**−3.0**	**−1.9**	**−1.0**	**−0.2**
China	−4.3	0.0	−4.3	−2.7	−1.4	−0.2
India	−0.4	0.0	−0.4	−0.4	0.0	0.0
Indonesia	−0.7	0.0	−0.6	−0.4	−0.2	0.0
Korea	−2.6	0.0	−2.5	−1.4	−1.0	−0.1
Malaysia	−1.9	−0.2	−1.7	−1.4	−0.2	0.0
Pakistan	0.0	0.0	0.0	0.0	0.0	0.0
Philippines	−1.3	−0.2	−1.0	−0.8	−0.2	−0.1
Thailand	−0.5	0.0	−0.4	−0.4	0.0	0.0
Taiwan POC	−8.1	−0.6	−7.5	−4.5	−2.4	−0.5
Financial centres	**−14.2**	**−7.6**	**−6.6**	**−11.6**	**−5.8**	**−17.9**
Hong Kong SAR	−8.3	−2.9	−5.4	−3.6	−1.2	−0.6
Singapore	−24.2	−15.5	−8.7	−5.3	−0.9	−2.5
Caribbean financial centres[b]	–	–	–	–	–	–

Table 2: Continued

	Impact on Foreign Holdings of US Long-term Securities					
			Bonds			
	Total Holdings	Equities	Total	Treasury	Agency	Corporate
Emerging Europe	**−0.5**	**0.0**	**−0.5**	**−0.4**	**−0.1**	**0.0**
Czech	−0.6	−0.1	−0.5	−0.3	−0.2	0.0
Hungary	−0.2	0.0	−0.2	−0.1	0.0	−0.1
Poland	−0.8	0.0	−0.8	−0.7	−0.1	0.0
Russia	−0.4	0.0	−0.4	−0.1	−0.3	0.0
Turkey	−0.7	0.0	−0.7	−0.7	0.0	0.0
Other emerging countries	**−2.7**	**−1.7**	**−1.0**	**−0.6**	**−0.2**	**−0.2**
Israel	−2.7	−0.9	−1.8	−1.2	−0.2	−0.4
Morocco	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	−0.3	−0.2	0.0	0.0	0.0	0.0
African oil exporters[c]	−0.2	−0.1	−0.1	0.0	0.0	0.0
Middle East oil exporters[d]	−4.6	−3.1	−1.5	−0.9	−0.3	−0.2
World	**−4.0**	**−1.5**	**−2.5**	**−1.2**	**−0.4**	**−0.9**
Of which: Reserves	−1.1	−0.1	−1.0	−0.8	−0.2	0.0

Source: Author's calculations based on datasets described in the text.
[a]The shock is based on a simultaneous and unanticipated 10 per cent decline in the value of the dollar, 10 per cent fall in equity prices and 10 per cent fall in bond prices. It is assumed that 77 per cent of Agency and Corporate bond holdings are in US dollars, with the rest in foreign currency. Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

the emergence of Belgium and Luxembourg as major custodial centres is evident by their extremely large increases in US positions (a combined $628 billion increase from their $35 billion position in 1994). In emerging markets, China's ascension as a major holder of US securities is evident (a $305 billion increase from its $18 billion position in 1994). In dollar terms, the largest increases are attributable to Japan ($668 billion) and the Caribbean financial centres ($536 billion).

Figures 1 and 2 show graphically how the potential impact of a disorderly scenario has evolved between 1994 and 2004. Each graph depicts impact in 2004 (as a per cent of 2004 GDP) on the vertical axis and impact in 1994 (as a per cent of 1994 GDP) on the horizontal axis. On the solid line (a 45° line) impact in 1994 and 2004 is identical; for points above the solid line, exposure in 2004 exceeds that in 1994. In both figures, the bottom panels are identical to the top except they include outliers (Luxembourg in the bottom panel of Figure 1; Hong Kong, Singapore, the Caribbean, and Middle East oil exporters in Figure 2). Actual values that underlie each graph can be read from Tables 2 and A2.

Table 3: Change in Foreign Positions in US Long-term Securities, 1994–2004[a]

	Change in Foreign Holdings of US Long-term Securities (Million US Dollars)					
			Bonds			
	Total Holdings	Equities	Total	Treasury	Agency	Corporate
Developed countries	**2,701,919**	**1,117,414**	**1,584,505**	**549,027**	**241,625**	**793,853**
Euro Area	**1,166,817**	**453,070**	**713,747**	**61,548**	**129,559**	**522,640**
Austria	11,107	7,931	3,176	−863	1,895	2,144
Belgium	271,277	5,014	266,263	4,810	44,994	216,459
Finland	5,163	4,413	750	−296	−391	1,437
France	82,551	51,309	31,242	9,503	912	20,827
Germany	115,250	60,627	54,623	−3,984	18,529	40,078
Greece	1,428	829	599	362	26	211
Ireland	112,200	49,640	62,560	7,390	14,774	40,396
Italy	45,495	30,251	15,244	8,667	2,506	4,071
Luxembourg	356,314	128,038	228,276	34,084	30,546	163,646
The Netherlands	165,860	105,741	60,119	17,076	14,706	28,337
Portugal	3,840	2,318	1,522	500	386	636
Spain	−3,668	6,959	−10,627	−15,701	676	4,398
Other Europe	**586,643**	**328,204**	**258,439**	**52,060**	**36,107**	**170,272**
Denmark	33,243	18,168	15,075	5,636	3,883	5,556
Iceland	815	640	175	42	57	76
Norway	54,846	28,187	26,659	12,426	3,481	10,752
Sweden	65,287	43,030	22,257	10,806	3,971	7,480
Switzerland	130,987	80,020	50,967	22,603	11,832	16,532
Great Britain	301,465	158,159	143,306	547	12,883	129,876

Other developed countries	**948,459**	**336,140**	**612,319**	**435,419**	**75,959**	**100,941**
Australia	57,365	39,655	17,710	2,138	9,065	6,507
Canada	218,040	163,060	54,980	9,022	5,590	40,368
Japan	667,888	128,604	539,284	424,434	61,089	53,761
New Zealand	5,166	4,821	345	−175	215	305
Emerging markets	**1,317,377**	**368,368**	**949,009**	**420,656**	**265,355**	**262,999**
Latin America	**69,733**	**14,647**	**55,086**	**40,330**	**6,581**	**8,175**
Argentina	2,764	1,504	1,260	−1,301	1,257	1,304
Brazil	14,237	247	13,990	13,066	313	611
Chile	7,432	2,815	4,617	2,966	1,021	630
Colombia	4,125	333	3,792	1,715	1,000	1,077
Mexico	33,679	7,462	26,217	21,824	1,300	3,093
Peru	795	378	417	98	153	166
Venezuela	2,998	890	2,108	543	774	791
Uruguay	3,703	1,018	2,685	1,419	763	503
Emerging Asia	**489,368**	**13,450**	**475,918**	**262,155**	**185,319**	**28,444**
China	304,629	2,388	302,241	171,937	114,415	15,889
India	11,698	167	11,531	11,504	12	15
Indonesia	6,465	174	6,291	3,376	2,789	126
Korea	76,039	796	75,243	38,595	32,968	3,680
Malaysia	4,365	1,136	3,229	1,901	1,271	57
Pakistan	0	0	0	0	0	0
Philippines	2,573	575	1,998	917	826	255
Thailand	−3,331	179	−3,510	−3,713	48	155
Taiwan POC	86,930	8,035	78,895	37,638	32,990	8,267

Table 3: Continued

	Change in Foreign Holdings of US Long-term Securities (Million US Dollars)					
			Bonds			
	Total Holdings	Equities	Total	Treasury	Agency	Corporate
Financial centres	**659,941**	**283,371**	**376,570**	**93,908**	**60,226**	**222,436**
Hong Kong SAR	44,607	16,605	28,002	16,981	7,306	3,715
Singapore	79,613	63,402	16,211	3,939	2,123	10,149
Caribbean financial centres[b]	535,721	203,364	332,357	72,988	50,797	208,572
Emerging Europe	**25,764**	**763**	**25,001**	**16,321**	**8,261**	**419**
Czech	2,332	324	2,008	813	1,064	131
Hungary	829	55	774	379	108	287
Poland	5,496	119	5,377	4,582	820	−25
Russia	8,500	160	8,340	2,071	6,260	9
Turkey	8,607	105	8,502	8,476	9	17
Other emerging countries	**72,571**	**56,137**	**16,434**	**7,942**	**4,968**	**3,525**
Israel	11,404	3,874	7,530	5,054	1,166	1,310
Morocco	0	0	0	0	0	0
South Africa	2,110	1,846	264	145	19	100
African oil exporters[c]	1,301	768	533	333	159	41
Middle East oil exporters[d]	57,756	49,649	8,107	2,410	3,624	2,074
World	**4,019,296**	**1,485,782**	**2,533,514**	**969,682**	**506,980**	**1,056,852**
Of which: Reserves	1,011,000	101,000	910,000	663,000	205,000	42,000

Source: Author's calculations based on datasets described in the text.
[a]Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

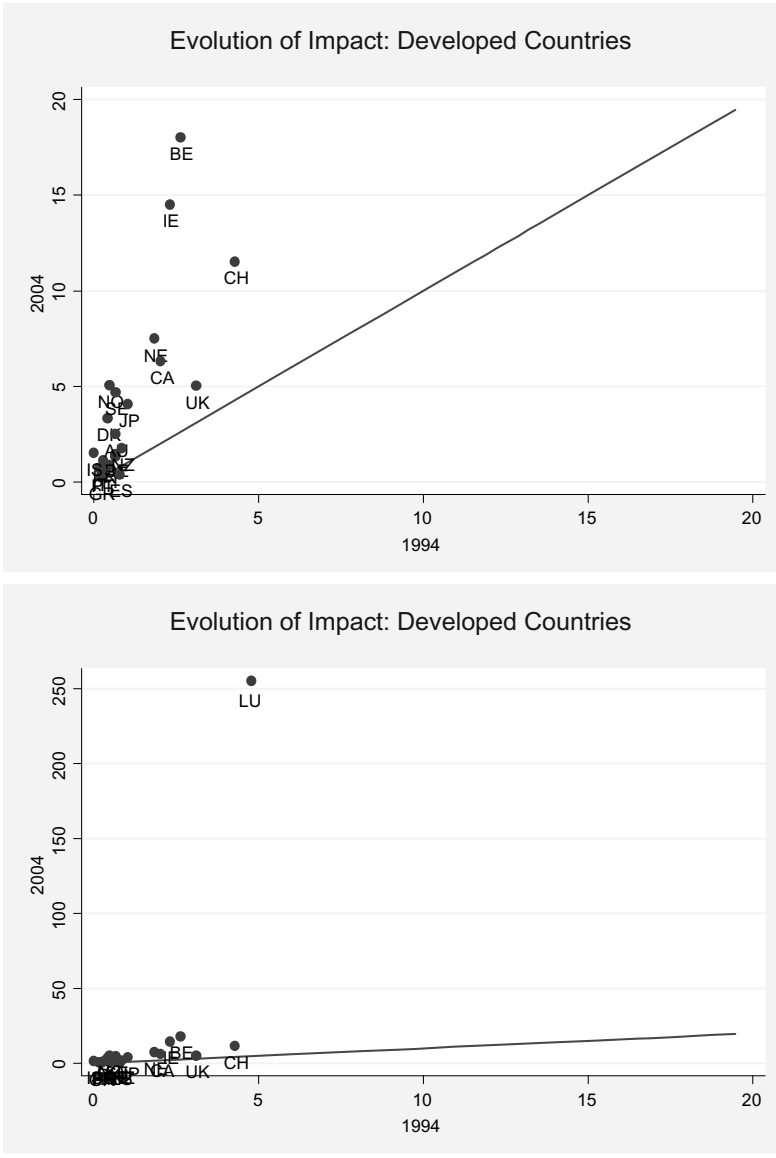

Figure 1: The Evolution of the Impact of a Disorderly Adjustment (Developed Countries)

Notes: The figures show the impact (expressed as a per cent of GDP) of a 10 per cent drop in the dollar, US equity markets and US bond markets in 2004 and 1994. For example, such a scenario in 2004 would lead to losses for Canadian investors of 6.3 per cent of GDP, whereas in 1994 the impact on Canada would have been 2.0 per cent of GDP. Excluded from the top figure is Luxembourg; the bottom figure is identical but includes Luxembourg (and has a different scale). Nearly all of the data points are above the 45° line, indicating that exposure to the US has increased over time.

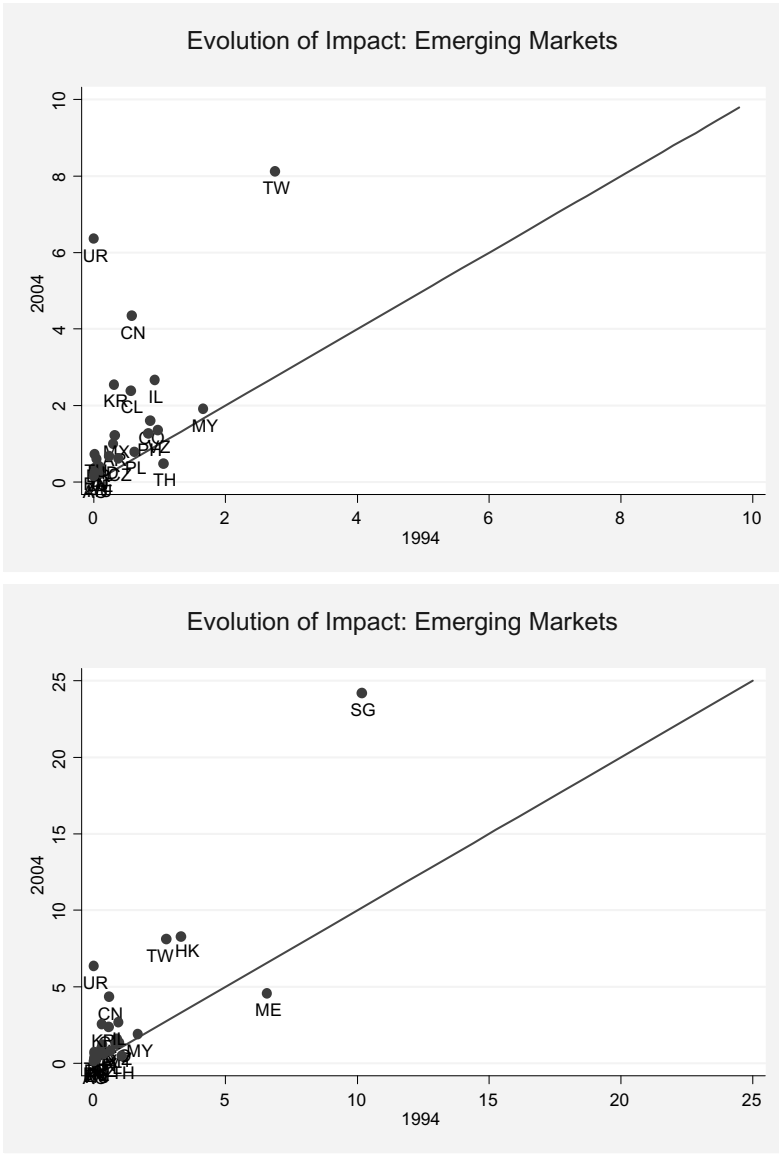

Figure 2: The Evolution of the Impact of a Disorderly Adjustment (Emerging Markets)

Notes: The figures show the impact (expressed as a per cent of GDP) of a 10 per cent drop in the dollar, US equity markets and US bond markets in 2004 and 1994. For example, such a scenario in 2004 would lead to losses for Taiwanese investors of 8.1 per cent of GDP, whereas in 1994 the impact on Taiwan would have been 2.8 per cent of GDP. Excluded from the top figure are financial centres (Hong Kong, Singapore and the Caribbean) and Middle East oil exporters; the bottom figure is identical but includes these countries (and has a different scale). Nearly all of the data points are above the 45° line, indicating that exposure to the US has increased over time.

The top panel of Figure 1 shows that the direct exposure to US security markets of almost every developed country has increased over the past decade; that is, almost every point lies above the solid line. To take one country as an example, the disorderly scenario in 2004 would lead to losses for Canadian investors of 6.3 per cent of GDP, whereas in 1994 – because Canadian positions were a smaller share of GDP – the impact on Canada would have been only 2.0 per cent of GDP.

A similar story is evident for emerging markets (Figure 2). Almost every country has increased its exposure to US security markets. For example, the disorderly scenario in 2004 would lead to losses for Taiwanese investors (including the Taiwanese government) of 8.1 per cent of GDP, whereas in 1994 the impact on Taiwan would have been 2.8 per cent of GDP.

2.4. Exposure to Dollar Bonds Issued by Third Countries

In this subsection I quantify foreigners' US dollar exposure through their holdings of dollar-denominated bonds issued by other countries. Table 4 shows, as of December 2003, the amount of dollar-denominated bonds outstanding by the *country of issuer*. Unfortunately, we do not have data that would allow us to disentangle exposure by country of investor. But Table 4 does enable us to see that of the outstanding $1.5 trillion in dollar-denominated bonds issued by non-US entities, US investors hold $0.5 trillion and non-US investors hold $1 trillion.[14] That is, to the $3.2 trillion in non-US exposure to dollar bonds from Table 1, we can add another $1 trillion. In the baseline disorderly scenario, this implies that non-US investors would take a roughly $200 billion hit if the price of dollar-denominated bonds and the dollar each fall by 10 per cent.

3. Another View of Exposure in 2004: US Liabilities Implied by CPIS Data

In this Section I turn to another prominent data source, the IMF's Coordinated Portfolio Investment Survey (CPIS) data.[15] After discussing important characteristics of the CPIS data, I present implied US liabilities positions and utilize them to form a second set of estimates of the impact of a disorderly resolution of global imbalances.

[14] A broader study of country exposure might include both assets and liabilities. In such a study, the $464 billion in dollar bonds that foreigners have sold to US residents would reduce exposure in that it would reduce the value of a country's liabilities.

[15] Recent work using the CPIS data include Lane (2006) and Lane and Milesi-Ferretti (2005).

Table 4: Stock of US Dollar-denominated Debt Issued by Foreign Entities, December 2003[a]

	Total Outstanding	Held by US Investors	Held by Foreign Investors
Developed countries	**1,071,711**	**357,591**	**714,120**
Euro Area	**445,969**	**101,380**	**344,589**
Austria	25,969	3,185	22,784
Belgium	3,150	1,641	1,509
Finland	8,987	3,851	5,136
France	67,821	19,608	48,213
Germany	95,651	11,332	84,319
Greece	2,261	237	2,024
Ireland	15,844	3,316	12,528
Italy	47,831	10,301	37,530
Luxembourg	31,359	11,377	19,982
The Netherlands	127,713	35,090	92,623
Portugal	2,585	126	2,459
Spain	16,798	1,316	15,482
Other Europe	**342,235**	**121,328**	**220,907**
Denmark	6,771	1,760	5,011
Iceland	1,156	95	1,061
Norway	19,095	6,619	12,476
Sweden	22,305	6,177	16,128
Switzerland	3,054	532	2,522
Great Britain	289,854	106,145	183,709
Other developed countries	**283,507**	**134,883**	**148,624**
Australia	85,882	22,609	63,273
Canada	159,489	108,249	51,240
Japan	34,603	2,488	32,115
New Zealand	3,533	1,537	1,996
Emerging markets	**447,401**	**106,487**	**340,914**
Latin America	**226,304**	**66,166**	**160,138**
Argentina	60,428	3,271	57,157
Brazil	73,000	17,925	55,075
Chile	12,399	7,507	4,892
Colombia	10,770	3,143	7,627
Mexico	46,451	26,211	20,240
Peru	5,012	2,912	2,100
Venezuela	14,837	4,666	10,171
Uruguay	3,407	531	2,876
Emerging Asia	**126,749**	**12,896**	**113,853**
China	9,682	632	9,050
India	3,390	181	3,209
Indonesia	2,995	480	2,515
Korea	46,315	3,888	42,427
Malaysia	18,115	3,717	14,398
Pakistan	0	0	0
Philippines	22,168	3,196	18,972
Thailand	5,114	652	4,462
Taiwan POC	18,970	150	18,820
Financial centres	**40,758**	**4,006**	**36,752**
Hong Kong SAR	25,797	1,301	24,496
Singapore	14,961	2,705	12,256
Caribbean financial centres[b]	0	0	0

Table 4: Continued

	Total Outstanding	Held by US Investors	Held by Foreign Investors
Emerging Europe	**41,008**	**10,985**	**30,023**
Czech	700	10	690
Hungary	1,350	274	1,076
Poland	5,277	811	4,466
Russia	18,970	8,121	10,849
Turkey	14,711	1,769	12,942
Other emerging countries	**12,582**	**12,434**	**148**
Israel	8,439	11,121	−2,682
Morocco	0	0	0
South Africa	4,143	1,313	2,830
African oil exporters[c]	0	0	0
Middle East oil exporters 4[d]	0	0	0
World	**1,519,112**	**464,078**	**1,055,034**

Source: Author's calculations based on datasets described in the text.
[a]In million US dollars. Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

3.1. The CPIS Data

As noted in the introduction, the CPIS data differs from US benchmark liabilities data along a number of dimensions. First, the CPIS is the IMF's compilation of a number of countries' *asset* surveys; 71 countries reported data to the IMF in 2004. For our purposes, this is a good attribute: Asset surveys are more informative than liabilities surveys in that they should not suffer from a custodial centre bias (described in the introduction). However, because so few countries actually conduct full-blown benchmark surveys to compile the data they submit to the IMF (only 4 out of 63 in 2001), the CPIS data is largely of unknown quality. Considering the substantial errors in early attempts to create bilateral US positions – see the Warnock (2001) revisiting of the well-cited Tesar and Werner (1995) results – there is reason to suspect that data errors might be substantial for countries that are measuring bilateral holdings for the first time and not following best practices.

Caveats aside, the CPIS data are a reasonable new resource whose quality will surely improve over time. CPIS data can be used to compute implied US liabilities by summing, across countries, the amount each country reports its residents own of US securities. These CPIS-based implied liabilities are not directly comparable with the US liabilities data for two reasons. First, country-level CPIS data should include only the positions of private foreigners, as it reports foreign official positions only in aggregate but not in the country-level data. In contrast, US benchmark

surveys include foreign official holdings with the holdings of private investors in the country-level data, but do not break them out separately at the country level. Thus, at the level of the individual country level, CPIS data should include only private investors while US data will include both private and foreign officials. Most developed countries' international reserves are not large relative to the holdings of their residents – Japan is the notable exception – so for these countries the CPIS and US data should be comparable. Developing countries have larger reserves positions, almost exclusively in bonds (not equities), so for these countries CPIS-reported bond holdings can vary substantially from data reported by US liabilities surveys.

CPIS data first became available as of the end of 1997. However, back then only 29 countries participated, so the 1997 data are not appropriate to construct implied liabilities. The next CPIS, in 2001, included 63 countries, and in 2004 the number increased to 71. In what follows, I use only the December 2004 CPIS data and compare it to the June 2004 US data.

3.2. CPIS Data: Implied US Liabilities and Impact of a Disorderly Resolution

Table 5 presents US liabilities as implied by asset positions reported by the countries that participated in the 2004 CPIS. I make one modification to the CPIS data. China and Taiwan, who had the second and third largest international reserves positions in 2004 (ECB, 2006), respectively, did not participate in the CPIS; I have added their estimated positions in US securities ($562.1 billion) to the 'Reserves' amount for emerging markets.[16]

The total amount of positions derived from the CPIS data is remarkably similar to those in Table 1. Overall CPIS-reported foreign positions in US securities total $4,875 billion as of December 2004, compared to $5,056 billion in Table 1 (as of June 2004). CPIS-reported reserves (with my additions of China and Taiwan) amount to $1.44 trillion, comparable to the $1.32 trillion reported in the US data.[17] The country-level data are also comparable if one recalls that reserves are included in the country-level data in Table 1 but only as aggregates in Table 5. Notable exceptions are in the Caribbean, where CPIS reported amounts are much less (as expected, if the CPIS does not suffer from such a severe custodial centre bias), and

[16] Chinese and Taiwanese positions were estimated as follows. At the end of 2004, according to ECB (2006) they had international reserves of $851.6 billion ($609.9 billion for China and $241.7 billion for Taiwan) and 66.0 per cent of all countries' reserves were in dollar assets. Assuming China and Taiwan had a similar currency composition and that all of their dollar reserves were in debt securities (although some are likely in bank deposits), I added .660 × $851.6 billion, or $562.1 billion, to emerging market's reserves.

[17] The difference likely owes to the 6-month separation in the survey dates.

Table 5: CPIS-Reported Foreign Positions in US Long-term Securities, 2004[a]

	(Millions of US Dollars Unless Otherwise Indicated)			
	Total	Equities	Bonds	Share of Bonds (in Per Cent)
Developed countries	**2,964,364**	**1,397,996**	**1,566,368**	**53**
Euro Area	**1,205,017**	**610,930**	**594,087**	**49**
Austria	23,025	8,865	14,160	62
Belgium	29,556	13,014	16,542	56
Finland	10,712	5,784	4,928	46
France	180,727	62,795	117,932	65
Germany	131,603	63,869	67,735	51
Greece	4,483	1,673	2,810	63
Ireland	172,616	91,809	80,807	47
Italy	98,293	35,233	63,060	64
Luxembourg	250,273	144,168	106,105	42
The Netherlands	254,239	171,583	82,656	33
Portugal	6,407	1,211	5,196	81
Spain	43,083	10,926	32,157	75
Other Europe	**780,665**	**372,273**	**408,392**	**52**
Denmark	35,946	17,490	18,456	51
Iceland	1,413	1,315	98	7
Norway	59,667	31,170	28,497	48
Sweden	74,061	53,887	20,174	27
Switzerland	96,354	54,902	41,452	43
Great Britain	513,224	213,509	299,714	58
Other developed countries	**978,682**	**414,793**	**563,889**	**58**
Australia	83,132	64,071	19,061	23
Canada	201,768	166,758	35,010	17
Japan	681,979	176,190	505,789	74
New Zealand	11,803	7,775	4,028	34
Emerging markets	**362,268**	**73,341**	**288,927**	**80**
Latin America	**26,302**	**13,953**	**12,349**	**47**
Argentina	12,149	6,436	5,713	47
Brazil	1,111	837	274	25
Chile	4,674	4,232	442	9
Colombia	1,356	165	1,191	88
Mexico	3,530	2,186	1,344	38
Peru	0	0	0	0
Venezuela	2,944	19	2,925	99
Uruguay	539	78	461	85
Emerging Asia	**15,070**	**2,679**	**12,391**	**82**
China	–	–	–	–
India	0	0	0	0
Indonesia	198	1	197	100
Korea	12,560	2,417	10,143	81
Malaysia	478	92	385	81
Pakistan	0	0	0	0
Philippines	1,467	140	1,327	90
Thailand	367	28	339	92
Taiwan POC	–	–	–	–
Financial centres	**291,526**	**46,532**	**244,994**	**84**
Hong Kong SAR	55,867	12,737	43,130	77
Singapore	27,881	10,488	17,393	62
Caribbean financial centres[b]	207,778	23,307	184,471	89

Table 5: Continued

	(Millions of US Dollars Unless Otherwise Indicated)			
	Total	Equities	Bonds	Share of Bonds (in Per Cent)
Emerging Europe	**5,555**	**517**	**5,038**	**91**
Czech	847	218	629	74
Hungary	180	133	47	26
Poland	126	126	0	0
Russia	4,109	23	4,086	99
Turkey	293	17	276	94
Other emerging countries	**23,816**	**9,660**	**14,156**	**59**
Israel	10,524	2,977	7,547	72
Morocco	0	0	0	0
South Africa	6,549	5,885	664	10
African oil exporters[c]	–	–	–	–
Middle East oil exporters[d]	6,743	798	5,945	88
Other[e]	**103,023**	**22,792**	**80,230**	**78**
Reserves[f]	**1,444,939**	**0**	**1,444,939**	**100**
Developed countries	413,825	0	413,825	100
Emerging markets[f]	1,031,114	0	1,031,114	100
World	**4,874,593**	**1,494,129**	**3,380,464**	**69**

Source: Author's calculations based on IMF's *Coordinated Portfolio Investment Survey.*
[a]In million US dollars. Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.
[e]Other includes all CPIS participants that are not listed above.
[f]Includes author's estimates for China and Taiwan POC as described in footnote 16.

Ireland, where CPIS amounts are surprisingly much greater than the US data.[18]

The CPIS data allows us to separate out and focus on international reserves. Reserves are reported in the CPIS only in aggregate, but I have estimated the portions attributable to emerging markets and developed countries.[19] Based on my calculations, of the $1,444 billion in reserve positions in US securities, emerging markets hold $1,031 billion.

Not surprisingly, given that the CPIS and US benchmark amounts are similar, the dollar impact of a disorderly adjustment is also similar at just less than $1 trillion, or 3.9 per cent of foreign GDP (Table 6).[20]

[18] This could owe to Ireland including foreigners' sizeable positions through Irish unit trusts in their CPIS data, although presumably this would impact US benchmark data as well.

[19] I calculate Japanese reserves as Japan's holdings of US bonds from Table 1 less its holdings of US bonds from Table 6. I then, using proportions from the IMF's reserves template, scale this up by 80 per cent to get an estimate of developed countries' reserves positions in US securities. Emerging markets' positions are then calculated as a residual.

[20] Based on US data (Tables 1 and 2), I assume that 90.6 per cent of foreigners' positions in US bonds are dollar denominated.

Table 6: CPIS Data: Impact on Wealth of Unanticipated Shocks, 2004 (In Per Cent of GDP)[a]

	Impact on Foreign Holdings of US Long-term Securities		
	Total Holdings	Equities	Bonds
Developed countries	**−3.4**	**−1.7**	**−1.8**
Euro Area	**−2.9**	**−1.5**	**−1.4**
Austria	−1.8	−0.7	−1.1
Belgium	−1.9	−0.9	−1.0
Finland	−1.3	−0.7	−0.6
France	−2.0	−0.7	−1.3
Germany	−1.1	−0.5	−0.5
Greece	−0.5	−0.2	−0.3
Ireland	−22.0	−11.9	−10.0
Italy	−1.3	−0.5	−0.8
Luxembourg	−185.1	−108.8	−76.3
The Netherlands	−9.8	−6.7	−3.1
Portugal	−0.8	−0.2	−0.7
Spain	−1.0	−0.3	−0.7
Other Europe	**−5.3**	**−2.6**	**−2.7**
Denmark	−3.3	−1.7	−1.7
Iceland	−2.7	−2.5	−0.2
Norway	−5.3	−2.8	−2.5
Sweden	−4.8	−3.6	−1.3
Switzerland	−5.9	−3.4	−2.5
Great Britain	−5.6	−2.4	−3.2
Other developed countries	**−3.3**	**−1.4**	**−1.9**
Australia	−3.1	−2.5	−0.7
Canada	−4.7	−3.9	−0.8
Japan	−3.1	−0.8	−2.2
New Zealand	−2.9	−2.0	−1.0
Emerging markets	**−1.0**	**−0.2**	**−0.8**
Latin America	**−0.3**	**−0.2**	**−0.1**
Argentina	−1.8	−1.0	−0.8
Brazil	0.0	0.0	0.0
Chile	−1.3	−1.2	−0.1
Colombia	−0.3	0.0	−0.3
Mexico	−0.1	−0.1	0.0
Peru	0.0	0.0	0.0
Venezuela	−0.7	0.0	−0.7
Uruguay	−0.9	−0.1	−0.8
Emerging Asia	**−0.1**	**0.0**	**−0.1**
China	–	–	–
India	0.0	0.0	0.0
Indonesia	0.0	0.0	0.0
Korea	−0.4	−0.1	−0.3
Malaysia	−0.1	0.0	−0.1
Pakistan	0.0	0.0	0.0
Philippines	−0.4	0.0	−0.3
Thailand	0.0	0.0	0.0
Taiwan POC	–	–	–
Financial centres	**−6.5**	**−1.9**	**−4.7**
Hong Kong SAR	−6.9	−1.6	−5.3
Singapore	−5.9	−2.3	−3.6
Caribbean financial centres[b]	–	–	–

Table 6: Continued

	Impact on Foreign Holdings of US Long-term Securities		
	Total Holdings	Equities	Bonds
Emerging Europe	**−0.1**	**0.0**	**−0.1**
Czech	−0.2	0.0	−0.1
Hungary	0.0	0.0	0.0
Poland	0.0	0.0	.
Russia	−0.2	0.0	−0.2
Turkey	0.0	0.0	0.0
Other emerging countries	**−0.5**	**−0.2**	**−0.3**
Israel	−1.8	−0.5	−1.3
Morocco	0.0	0.0	0.0
South Africa	−0.8	−0.7	−0.1
African oil exporters[c]	–	–	–
Middle East oil exporters[d]	−0.3	0.0	−0.3
Other[e]	**–**	**–**	**–**
Reserves[f]	**−1.1**	**0.0**	**−1.1**
Developed countries	−0.5	0.0	−0.5
Emerging markets[g]	−2.7	0.0	−2.7
World	**−3.9**	**−1.2**	**−2.7**

Source: Author's calculations based on IMF's *Coordinated Portfolio Investment Survey.*
[a]The shock is based on a simultaneous and unanticipated 10 per cent decline in the value of the dollar, 10 per cent fall in equity prices and 10 per cent fall in bond prices. It is assumed that all equity holdings and 90.6 per cent of bond holdings are in US dollars, with the rest in foreign currency. Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.
[e]Other includes all CPIS participants that are not listed above.
[f]Includes author's estimates for China and Taiwan POC as described in footnote 16.

A comparison of Tables 6 and 2 indicates that custodial centre bias is largely absent from the CPIS data, although the impact on Luxembourg is still implausibly large, and Ireland's impact is actually larger using the CPIS data. Overall, the CPIS data confirm that were the dollar, US equities and US bonds to unexpectedly fall by 10 per cent, foreign wealth would decrease by roughly 4 per cent of foreign GDP based on their direct holdings of US securities. Adding holdings of third-country dollar-denominated bonds (Table 4) again brings the total amount to roughly 5 per cent of GDP. Based just on their reserves positions, emerging market governments stand to take a hit equivalent to 2.7 per cent of GDP in such a scenario (Table 6).

4. Conclusion

Using two complementary datasets, this paper documents foreign countries' exposure to US securities markets. The analysis suggests that if we

were to witness a simultaneous, unexpected 10 per cent decrease in the US dollar, US equity markets and dollar-denominated bonds, foreigners would in sum lose roughly $1.2 trillion in financial wealth, an amount equivalent to almost 5 per cent of world (non-US) GDP. I present four stylized facts concerning exposure to US securities markets: (i) Foreign countries, especially emerging markets, are more exposed to US bonds than US equities; (ii) over the past decade US exposure has increased (as a share of GDP) for almost every country in my sample; (iii) on average, as a share of GDP the overall exposure of developed countries and emerging markets is very similar and (iv) based just on their reserves positions, emerging market governments stand to take a hit equivalent to 2.7 per cent of their GDP in such a scenario.

The reader will note that I have assumed no currency hedging. This is out of necessity, as data on the actual exposure of international investors is essentially non-existent. But, in addition, hedging on international securities positions appears to be minimal. For example, Levich *et al*. (1999) find that only 8 per cent of international equity positions and 14 per cent of cross-border bond positions are hedged against currency risk. Allowing for hedging of these magnitudes would do little to the top line results in this paper. The decline in wealth owing to declines on US equities would be 0.06 percentage points smaller (i.e. from the 1.55 per cent in Table 2 to 1.49 per cent), and that owing to declines in US bonds would be 0.16 percentage points smaller. Overall, the 4 percentage points decline in Table 2 would be reduced to 3.8. Indeed, even if we assumed 50 per cent of the US bonds positions were hedged against currency risk, and 25 per cent of equities positions (keeping the roughly 2:1 bond hedging to equity hedging ratio), the hit would be reduced only slightly to 3.26 per cent of GDP.

There are many useful extensions to this work. For example, scaling exposure by wealth instead of GDP is a worthwhile endeavour. Similarly, for certain purposes, one might want to scale by a country's trade balance. A more thorough analysis would include the impact of a disorderly scenario on investment income streams, as a dollar depreciation would also impact dividends and coupon payments.[21] Finally, folding into the analysis other types of positions – such as banking positions and foreign direct investment – could be worthwhile.

[21] See Higgins *et al*. (2005) for a study of US investment income streams.

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Appendix A

Table A1: Foreign Positions in US Long-term Securities, December 1994[a]

	Foreign Holdings of US Long-term Securities (Million US Dollars)						
			Bonds				Share of Bonds (in Per Cent)
	Total Holdings	Equities	Total	Treasury	Agency	Corporate	
Developed countries	**741,634**	**298,742**	**442,892**	**294,484**	**62,189**	**86,219**	**60**
Euro Area	**200,813**	**73,214**	**127,599**	**94,097**	**11,358**	**22,144**	**64**
Austria	6,578	2,295	4,283	2,310	616	1,357	65
Belgium	31,402	13,075	18,327	9,169	3,965	5,193	58
Finland	2,323	92	2,231	1,172	896	163	96
France	19,779	10,318	9,461	4,802	841	3,818	48
Germany	67,523	14,924	52,599	46,092	1,979	4,528	78
Greece	828	408	420	380	3	37	51
Ireland	5,771	2,800	2,971	1,433	678	860	51
Italy	9,060	4,388	4,672	2,918	194	1,560	52
Luxembourg	3,929	2,000	1,929	965	417	547	49
The Netherlands	31,571	21,727	9,844	4,691	1,315	3,838	31
Portugal	1,106	118	988	706	216	66	89
Spain	20,943	1,069	19,874	19,459	238	177	95
Other Europe	**240,042**	**137,302**	**102,740**	**61,424**	**11,410**	**29,906**	**43**
Denmark	3,158	1,729	1,429	642	424	363	45
Iceland	0	0	0	0	0	0	
Norway	2,703	382	2,321	2,283	16	22	86
Sweden	6,813	3,445	3,368	2,985	218	165	49
Switzerland	57,485	39,960	17,525	10,221	507	6,797	30
Great Britain	169,883	91,786	78,097	45,293	10,245	22,559	46

Other developed countries	**300,779**	**88,226**	**212,553**	**138,963**	**39,421**	**34,169**	**71**
Australia	10,401	6,964	3,437	2,794	142	501	33
Canada	58,166	46,458	11,708	7,654	490	3,564	20
Japan	230,212	33,804	196,408	127,684	38,756	29,968	85
New Zealand	2,000	1,000	1,000	831	33	136	50
Emerging markets	**295,188**	**78,833**	**216,355**	**149,258**	**32,744**	**34,352**	**73**
Latin America	**18,189**	**5,664**	**12,525**	**10,185**	**738**	**1,602**	**69**
Argentina	4,043	914	3,129	2,924	41	164	77
Brazil	1,140	844	296	104	83	109	26
Chile	1,416	433	983	782	40	161	69
Colombia	2,543	445	2,098	1,922	61	115	83
Mexico	5,898	1,878	4,020	3,096	311	613	68
Peru	223	173	50	16	15	19	22
Venezuela	2,926	977	1,949	1,341	187	421	67
Uruguay	0	0	0	0	0	0	
Emerging Asia	**76,670**	**2,356**	**74,314**	**65,987**	**7,388**	**939**	**97**
China	18,181	135	18,046	17,244	488	314	99
India	1,019	289	730	681	3	46	72
Indonesia	1,915	148	1,767	1,753	4	10	92
Korea	5,748	145	5,603	4,524	890	189	97
Malaysia	5,709	133	5,576	5,507	3	66	98
Pakistan	0	0	0	0	0	0	
Philippines	2,617	344	2,273	2,226	13	34	87
Thailand	6,839	131	6,708	6,694	1	13	98
Taiwan POC	34,642	1,031	33,611	27,358	5,986	267	97
Financial centres	**147,486**	**50,407**	**97,079**	**50,235**	**20,070**	**26,774**	**66**
Hong Kong SAR	21,377	5,894	15,483	10,664	3,212	1,607	72
Singapore	34,090	8,134	25,956	20,728	2,492	2,736	76
Caribbean financial centres[b]	92,019	36,379	55,640	18,843	14,366	22,431	60

Table A1: Continued

	Foreign Holdings of US Long-term Securities (Million US Dollars)						
			Bonds				Share of Bonds (in Per Cent)
	Total Holdings	Equities	Total	Treasury	Agency	Corporate	
Emerging Europe	**4,002**	**189**	**3,813**	**3,708**	**34**	**71**	**95**
Czech	618	8	610	610	0	0	99
Hungary	130	17	113	112	0	1	87
Poland	2,935	34	2,901	2,856	0	45	99
Russia	206	53	153	115	29	9	74
Turkey	113	77	36	15	5	16	32
Other emerging	**48,841**	**20,217**	**28,624**	**19,143**	**4,514**	**4,966**	**59**
Israel	3,759	1,146	2,613	1,347	275	991	70
Morocco	0	0	0	0	0	0	
South Africa	82	71	11	5	3	3	13
African oil exporters[c]	0	0	0	0	0	0	
Middle East oil exporters[d]	45,000	19,000	26,000	17,791	4,236	3,972	58
World	**1,036,822**	**377,575**	**659,247**	**443,743**	**94,933**	**120,571**	**64**
Of which: Reserves	309,000	33,000	276,000	260,000	11,000	5,000	89

Source: Author's calculations based on datasets described in the text.
[a]Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Table A2: Impact on Wealth of Unanticipated Shocks, 1994 (in Per Cent of GDP)[a]

	Impact on Foreign Holdings of US Long-term Securities					
			Bonds			
	Total holdings	Equities	Total	Treasury	Agency	Corporate
Developed countries	**−1.1**	**−0.5**	**−0.6**	**−0.4**	**−0.1**	**−0.1**
Euro Area	**−0.6**	**−0.2**	**−0.4**	**−0.3**	**0.0**	**−0.1**
Austria	−0.6	−0.2	−0.4	−0.2	−0.1	−0.1
Belgium	−2.6	−1.1	−1.5	−0.8	−0.3	−0.4
Finland	−0.5	0.0	−0.4	−0.2	−0.2	0.0
France	−0.3	−0.2	−0.1	−0.1	0.0	−0.1
Germany	−0.6	−0.1	−0.5	−0.4	0.0	0.0
Greece	−0.2	−0.1	−0.1	−0.1	0.0	0.0
Ireland	−2.3	−1.2	−1.2	−0.6	−0.2	−0.3
Italy	−0.2	−0.1	−0.1	−0.1	0.0	0.0
Luxembourg	−4.8	−2.5	−2.3	−1.2	−0.5	−0.6
The Netherlands	−1.8	−1.3	−0.5	−0.3	−0.1	−0.2
Portugal	−0.2	0.0	−0.2	−0.2	0.0	0.0
Spain	−0.8	0.0	−0.8	−0.7	0.0	0.0
Other Europe	**−2.6**	**−1.5**	**−1.1**	**−0.7**	**−0.1**	**−0.3**
Denmark	−0.4	−0.2	−0.2	−0.1	−0.1	0.0
Iceland	0.0	0.0	0.0	0.0	0.0	0.0
Norway	−0.5	−0.1	−0.4	−0.4	0.0	0.0
Sweden	−0.7	−0.3	−0.3	−0.3	0.0	0.0
Switzerland	−4.3	−3.0	−1.3	−0.8	0.0	−0.5
Great Britain	−3.1	−1.7	−1.4	−0.8	−0.2	−0.4
Other developed countries	**−1.1**	**−0.3**	**−0.8**	**−0.5**	**−0.1**	**−0.1**
Australia	−0.6	−0.4	−0.2	−0.2	0.0	0.0
Canada	−2.0	−1.6	−0.4	−0.3	0.0	−0.1
Japan	−1.0	−0.2	−0.9	−0.6	−0.2	−0.1
New Zealand	−0.9	−0.4	−0.4	−0.4	0.0	−0.1

Table A2: Continued

	Impact on Foreign Holdings of US Long-term Securities					
			Bonds			
	Total holdings	Equities	Total	Treasury	Agency	Corporate
Emerging markets	**−1.2**	**−0.3**	**−0.9**	**−0.6**	**−0.1**	**−0.1**
Latin America	**−0.3**	**−0.1**	**−0.2**	**−0.1**	**0.0**	**0.0**
Argentina	−0.3	−0.1	−0.2	−0.2	0.0	0.0
Brazil	0.0	0.0	0.0	0.0	0.0	0.0
Chile	−0.6	−0.2	−0.4	−0.3	0.0	−0.1
Colombia	−0.9	−0.2	−0.7	−0.7	0.0	0.0
Mexico	−0.3	−0.1	−0.2	−0.2	0.0	0.0
Peru	−0.1	−0.1	0.0	0.0	0.0	0.0
Venezuela	−1.0	−0.3	−0.6	−0.5	−0.1	−0.1
Uruguay	0.0	0.0	0.0	0.0	0.0	0.0
Emerging Asia	**−0.8**	**0.0**	**−0.7**	**−0.7**	**−0.1**	**0.0**
China	−0.6	0.0	−0.6	−0.5	0.0	0.0
India	−0.1	0.0	−0.1	0.0	0.0	0.0
Indonesia	−0.2	0.0	−0.2	−0.2	0.0	0.0
Korea	−0.3	0.0	−0.3	−0.2	0.0	0.0
Malaysia	−1.7	0.0	−1.6	−1.6	0.0	0.0
Pakistan						
Philippines	−0.8	−0.1	−0.7	−0.7	0.0	0.0
Thailand	−1.1	0.0	−1.0	−1.0	0.0	0.0
Taiwan POC	−2.8	−0.1	−2.7	−2.2	−0.4	0.0

Financial centres	**−14.8**	**−5.2**	**−9.6**	**−5.2**	**−1.9**	**−2.5**
Hong Kong SAR	−3.3	−0.9	−2.4	−1.7	−0.5	−0.2
Singapore	−10.2	−2.5	−7.7	−6.3	−0.7	−0.7
Caribbean financial centres[b]						
Emerging Europe	**−0.1**	**0.0**	**−0.1**	**−0.1**	**0.0**	**0.0**
Czech	−0.4	0.0	−0.4	−0.4	0.0	0.0
Hungary	−0.1	0.0	−0.1	−0.1	0.0	0.0
Poland	−0.6	0.0	−0.6	−0.6	0.0	0.0
Russia	0.0	0.0	0.0	0.0	0.0	0.0
Turkey	0.0	0.0	0.0	0.0	0.0	0.0
Other emerging countries	**−2.1**	**−0.9**	**−1.2**	**−0.9**	**−0.2**	**−0.2**
Israel	−0.9	−0.3	−0.6	−0.3	−0.1	−0.2
Morocco						
South Africa	0.0	0.0	0.0	0.0	0.0	0.0
African oil exporters[c]	0.0	0.0	0.0	0.0	0.0	0.0
Middle East oil exporters[d]	−6.6	−2.8	−3.7	−2.7	−0.6	−0.5
World	**−1.1**	**−0.4**	**−0.7**	**−0.5**	**−0.1**	**−0.1**
Of which: Reserves	−0.3	0.0	−0.3	−0.3	0.0	0.0

Source: Author's calculations based on datasets described in the text.
[a]The shock is based on a simultaneous and unanticipated 10 per cent decline in the value of the dollar, 10 per cent fall in equity prices and 10 per cent fall in bond prices. It is assumed that 77 per cent of Agency and Corporate bond holdings are in US dollars, with the rest in foreign currency. Aggregates include only those countries listed individually.
[b]Bahamas, Bermuda, British Virgin Islands, Cayman Islands, the Netherlands Antilles and Panama.
[c]Algeria, Gabon, Libya and Nigeria.
[d]Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Non-technical Summary

Foreigners have accumulated large positions in US debt and equity markets – roughly $5 trillion as of mid-2004. This accumulation is associated with vast US current account deficits and may well owe to structural reasons such as US markets' unmatched depth and liquidity as well as the vigorous protection of outside investors' rights. Regardless of the reasons behind the sizeable accumulation of US assets, the resulting large US positions leave foreigners exposed to fluctuations in US asset prices, a point made all the more obvious by recent dislocations in financial markets. An interesting question is, how would a rapid unexpected decline in US financial market prices, a scenario that has been seen as a key risk associated with a 'disorderly' unwinding of global imbalances, impact the wealth of foreigners resident in a wide range of countries?

Using two complementary datasets, this paper documents foreign countries' exposure to US securities markets. The analysis suggests that if we were to witness a simultaneous, unexpected, 10 per cent decrease in the US dollar, US equity markets and dollar-denominated bonds, foreigners would in sum lose roughly $1.2 trillion in financial wealth, an amount equivalent to almost 5 per cent per cent of world (non-US) GDP. I present four stylized facts concerning exposure to US securities markets:

(i) *On average, as a share of GDP the overall exposure of developed countries and emerging markets is very similar.* As of end-2004, the disorderly scenario would result in portfolio losses of 4.3 per cent of GDP in emerging markets and 3.9 per cent of GDP in developed countries.
(ii) *Foreign countries, especially emerging markets, are more exposed to US bonds than US equities.* Almost two-thirds of foreigners' holdings of US long-term securities are in bonds, with the $3.2 trillion in US bond holdings spread out over securities issued by the Treasury ($1.4 trillion), US agencies ($0.6 trillion) and US corporations ($1.2 trillion). By country, the largest bond positions are from Japan ($736 billion); China ($320 billion); the financial centres of the Caribbean ($388 billion), Belgium ($285 billion), and Luxembourg ($230 billion); and the UK ($221 billion).
(iii) *Emerging market governments' reserves positions would take a hit equivalent to 2.7 per cent of their GDP in the disorderly scenario.* The over $1 trillion in emerging-market reserves would produce portfolio losses of 2.7 per cent of GDP in the disorderly scenario.
(iv) *Over the past decade, US exposure has increased (as a share of GDP) for almost every country in my sample.* For example, the disorderly scenario in 2004 would lead to losses for Canadian investors of 6.3 per cent of GDP, whereas in 1994 – because Canadian positions were

a smaller share of GDP – the impact on Canada would have been only 2.0 per cent of GDP. Similarly, the disorderly scenario in 2004 would lead to losses for Taiwanese investors (including the Taiwanese government) of 8.1 per cent of GDP, whereas in 1994 the impact on Taiwan would have been 2.8 per cent of GDP.