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Table IAI. Equity Indices

This table presents an overview of the equity indices used in our analysis. The data come from four sources: Global Financial Data (GFD), the International Monetary Fund's (IMF) *International Financial Statistics*, Bloomberg, and the Jordá, Schularick, and Taylor MacroHistory database (JST).

Country	Years	Source	Equity Index
Argentina	1950-2018	GFD	Buenos Aires SE General Index (IVBNG)†
Australia	1950-2018	GFD	Australia ASX All-Ordinaries (w/GFD extension)
Austria	1950-2018	GFD	Austria Wiener Boersekammer Share Index (WBKI)
Belgium	1950-2018	GFD	Brussels All-Share Price Index (w/GFD extension)
Brazil	1950-2018	GFD	GFD Indices Brazil Bolsa de Valores de Sao Paulo (Bovespa) †
Canada	1950-2018	GFD	Canada S&P/TSX 300 Composite (w/GFD extension)
Chile	1975-2001	GFD	Santiago SE Indice de Precios Selectivos Acciones
Chile	1999-2018	IMF	Selective Price Index (IPSA)
Colombia	2001-2018	IMF	Index of prices on the Bogotá Stock Exchange
Czech Republic	1997-2018	IMF	PX-50 index
Denmark	1950-2018	GFD	OMX Copenhagen All-Share Price Index
Finland	1950-2018	GFD	OMX Helsinki All-Share Price Index
France	1950-1989	JST	Stock prices (nominal index)
France	1987-2018	GFD	Paris CAC-40 Index
Germany	1950-1961	JST	Stock prices (nominal index)
Germany	1959-2018	GFD	Germany DAX Price Index
Greece	1952-2018	GFD	Athens SE General Index (w/GFD extension)
Hong Kong	1964-2018	GFD	Hong Kong Hang Seng Composite Index (w/GFD Extension)
Hungary	1994-2018	GFD	Vienna OETEB Hungary Traded Index (Forint)
Iceland	2002-2018	IMF	Index of the 15 largest and most traded Icelandic companies of the OMX
India	1950-2018	GFD	Bombay SE Sensitive Index (w/GFD extension)
Indonesia	1977-2018	GFD	Jakarta SE Composite Index
Ireland	1950-2018	GFD	Ireland ISEQ Overall Price Index (w/GFD extension)
Israel	1991-2019	Bloomberg	TA-125 (last price)
Italy	1950-2018	GFD	Banca Commerciale Italiana Index (w/GFD extension)
Japan	1950-1986	JST	Stock prices (nominal index)
Japan	1984-2017	GFD	Japan Nikkei 500 Index
Korea	1962-2018	GFD	Korea SE Stock Price Index (KOSPI)
Luxembourg	1999-2019	Bloomberg	LUXXX Index (last price)
Malaysia	1973-2018	GFD	Malaysia KLSE Composite
Mexico	1950-2018	GFD	Mexico SE Indice de Precios y Cotizaciones (IPC)
Netherlands	1950-2018	GFD	Netherlands All-Share Price Index (w/GFD extension)
New Zealand	1950-2018	GFD	New Zealand SE All-Share Capital Index
Norway	1950-1971	JST	Stock prices (nominal index)
Norway	1969-2018	GFD	Oslo SE All-Share Index†
Peru	1988-2016	IMF	Share price index of the Lima Stock Exchange (industrials and mining)
Portugal	1950-2018	GFD	Oporto PSI-20 Index
Russia	1993-2018	GFD	Russia Moscow Index (MOEX) Composite
Singapore	1961-2018	GFD	Singapore FTSE Straits-Times Index
South Africa	1960-2018	IMF	All ordinary shares listed on Security Exchange South Africa
Spain	1950-1989	JST	Stock prices (nominal index)
Spain	1987-2018	GFD	Madrid SE IBEX-35
Sweden	1950-2018	GFD	Sweden OMX Affarsvarldens General Index
Switzerland	1950-2018	GFD	Switzerland Price Index (w/GFD extension)
Thailand	1975-2018	GFD	Thailand SET General Index
Turkey	1986-2018	GFD	Istanbul SE IMKB-100 Price Index
United Kingdom	1950-2018	GFD	UK FTSE All-Share Index (w/GFD extension)
United States	1950-2018	GFD	S&P 500/Cowles Composite Price Index (w/GFD extension)

† Return index

Table IAII. House Price Indices

This table presents an overview of the house price indices used in our analysis. The data come from three sources: the Bank of International Settlements' (BIS) *Property Price Statistics*, the OECD's *Household Prices* database, and the Jordá, Schularick, and Taylor MacroHistory database (JST).

Country	Years	Source	Variable
Australia	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Australia	1970-2018	BIS	Real residential property prices
Austria	2000-2018	BIS	Real residential property prices
Belgium	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Belgium	1970-2018	BIS	Real residential property prices
Brazil	2001-2018	BIS	Real residential property prices
Canada	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Canada	1970-2018	BIS	Real residential property prices
Chile	2002-2018	BIS	Real residential property prices
Colombia	1988-2018	BIS	Real residential property prices
Czech Republic	2008-2018	BIS	Real residential property prices
Denmark	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Denmark	1970-2018	BIS	Real residential property prices
Finland	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Finland	1970-2018	BIS	Real residential property prices
France	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
France	1970-2018	BIS	Real residential property prices
Germany	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Germany	1970-2018	BIS	Real residential property prices
Greece	1997-2017	OECD	Real residential property prices
Hong Kong	1979-2018	BIS	Real residential property prices
Hungary	2007-2018	BIS	Real residential property prices
Iceland	2000-2018	BIS	Real residential property prices
India	2009-2018	BIS	Real residential property prices
Indonesia	2002-2018	BIS	Real residential property prices
Ireland	1970-2018	BIS	Real residential property prices
Israel	1994-2018	BIS	Real residential property prices
Italy	1950-2018	BIS	Real residential property prices
Japan	1950-1957	JST	House prices (hpnom) normalized by consumer price index (cpi)
Japan	1955-2018	BIS	Real residential property prices
Korea	1975-2018	BIS	Real residential property prices
Luxembourg	2007-2018	BIS	Real residential property prices
Malaysia	1988-2018	BIS	Real residential property prices
Mexico	2005-2018	BIS	Real residential property prices
Netherlands	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Netherlands	1970-2018	BIS	Real residential property prices
New Zealand	1970-2018	BIS	Real residential property prices
Norway	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Norway	1970-2018	BIS	Real residential property prices
Peru	1998-2018	BIS	Real residential property prices
Portugal	1988-2017	OECD	Real residential property prices
Russia	2001-2018	BIS	Real residential property prices
Singapore	1998-2018	BIS	Real residential property prices
South Africa	1966-2018	BIS	Real residential property prices
Spain	1971-2018	BIS	Real residential property prices
Sweden	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Sweden	1970-2018	BIS	Real residential property prices
Switzerland	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
Switzerland	1970-2018	BIS	Real residential property prices
Thailand	1991-2018	BIS	Real residential property prices
Turkey	2010-2018	BIS	Real residential property prices
United Kingdom	1950-1970	JST	House prices (hpnom) normalized by consumer price index (cpi)
United Kingdom	1968-2018	BIS	Real residential property prices
United States	1950-1972	JST	House prices (hpnom) normalized by consumer price index (cpi)
United States	1970-2018	BIS	Real residential property prices

Table IAIII. Debt Sample Overview

This table presents an overview of the sources for business debt (Panel A) and household debt (Panel B) used in our analysis. The data come from three sources: the International Monetary Fund's (IMF) *Global Debt Database*, the Jordá, Schularick, and Taylor Macro-History database (JST), and the Bank of International Settlements' (BIS) *Total credit statistics*.

Panel A: Business Debt Sources

Country	Years	Source	Variable
Argentina	1994-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Australia	1950-1979	JST	Total loans to business (tbus)
Australia	1977-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Austria	1995-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Belgium	1950-1982	JST	Total loans to business (tbus)
Belgium	1980-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Brazil	1994-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Canada	1961-1971	JST	Total loans to business (tbus)
Canada	1969-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Chile	2002-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Colombia	1996-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Czech Republic	1995-2016	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Denmark	1951-1996	JST	Total loans to business (tbus)
Denmark	1994-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Finland	1950-1972	JST	Total loans to business (tbus)
Finland	1970-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
France	1958-1979	JST	Total loans to business (tbus)
France	1977-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Germany	1950-1972	JST	Total loans to business (tbus)
Germany	1970-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Greece	1994-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Hong Kong	1990-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Hungary	1969-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Iceland	1970-2016	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
India	1998-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Indonesia	2001-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Ireland	2002-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Israel	1992-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Italy	1950-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Japan	1950-1966	JST	Total loans to business (tbus)
Japan	1964-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Korea	1962-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Luxembourg	2002-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Malaysia	2006-2016	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Mexico	1994-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Netherlands	1990-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
New Zealand	1990-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Norway	1975-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Peru	2001-2016	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Portugal	1979-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Russia	1998-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Singapore	1991-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
South Africa	2008-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Spain	1950-1982	JST	Total loans to business (tbus)
Spain	1980-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Sweden	1961-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Switzerland	1950-2001	JST	Total loans to business (tbus)
Switzerland	1999-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
Thailand	1991-2017	BIS	Credit to Non-financial corporations from all sectors
Turkey	1986-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
United Kingdom	1950-1968	JST	Total loans to business (tbus)
United Kingdom	1966-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)
United States	1950-1952	JST	Total loans to business (tbus)
United States	1950-2017	IMF	Loans and debt securities by non-financial corporations (nfc_ls_data)

Panel B: Household Debt Sources			
Country	Years	Source	Variable
Argentina	1994-2017	IMF	Loans and debt securities by households (hh_ls_data)
Australia	1950-1979	JST	Total loans to households (thh)
Australia	1977-2017	IMF	Loans and debt securities by households (hh_ls_data)
Austria	1995-2017	IMF	Loans and debt securities by households (hh_ls_data)
Belgium	1950-1982	JST	Total loans to households (thh)
Belgium	1980-2017	IMF	Loans and debt securities by households (hh_ls_data)
Brazil	1994-2017	IMF	Loans and debt securities by households (hh_ls_data)
Canada	1956-1971	JST	Total loans to households (thh)
Canada	1969-2017	IMF	Loans and debt securities by households (hh_ls_data)
Chile	2002-2017	IMF	Loans and debt securities by households (hh_ls_data)
Colombia	1996-2017	IMF	Loans and debt securities by households (hh_ls_data)
Czech Republic	1995-2016	IMF	Loans and debt securities by households (hh_ls_data)
Denmark	1951-1996	JST	Total loans to households (thh)
Denmark	1994-2017	IMF	Loans and debt securities by households (hh_ls_data)
Finland	1950-1972	JST	Total loans to households (thh)
Finland	1970-2017	IMF	Loans and debt securities by households (hh_ls_data)
France	1958-1979	JST	Total loans to households (thh)
France	1977-2017	IMF	Loans and debt securities by households (hh_ls_data)
Germany	1950-1972	JST	Total loans to households (thh)
Germany	1970-2017	IMF	Loans and debt securities by households (hh_ls_data)
Greece	1994-2017	IMF	Loans and debt securities by households (hh_ls_data)
Hong Kong	1990-2017	IMF	Loans and debt securities by households (hh_ls_data)
Hungary	1964-2017	IMF	Loans and debt securities by households (hh_ls_data)
Iceland	1970-2016	IMF	Loans and debt securities by households (hh_ls_data)
India	1998-2017	IMF	Loans and debt securities by households (hh_ls_data)
Indonesia	2001-2017	IMF	Loans and debt securities by households (hh_ls_data)
Ireland	2002-2017	IMF	Loans and debt securities by households (hh_ls_data)
Israel	1992-2017	IMF	Loans and debt securities by households (hh_ls_data)
Italy	1950-2017	IMF	Loans and debt securities by households (hh_ls_data)
Japan	1950-1966	JST	Total loans to households (thh)
Japan	1964-2017	IMF	Loans and debt securities by households (hh_ls_data)
Korea	1962-2017	IMF	Loans and debt securities by households (hh_ls_data)
Luxembourg	2002-2017	IMF	Loans and debt securities by households (hh_ls_data)
Malaysia	2006-2016	IMF	Loans and debt securities by households (hh_ls_data)
Mexico	1994-2017	IMF	Loans and debt securities by households (hh_ls_data)
Netherlands	1990-2017	IMF	Loans and debt securities by households (hh_ls_data)
New Zealand	1990-2017	IMF	Loans and debt securities by households (hh_ls_data)
Norway	1975-2017	IMF	Loans and debt securities by households (hh_ls_data)
Peru	2001-2017	IMF	Loans and debt securities by households (hh_ls_data)
Portugal	1979-2017	IMF	Loans and debt securities by households (hh_ls_data)
Russia	1998-2017	IMF	Loans and debt securities by households (hh_ls_data)
Singapore	1991-2017	IMF	Loans and debt securities by households (hh_ls_data)
South Africa	2008-2017	IMF	Loans and debt securities by households (hh_ls_data)
Spain	1950-1982	JST	Total loans to households (thh)
Spain	1980-2017	IMF	Loans and debt securities by households (hh_ls_data)
Sweden	1950-2017	IMF	Loans and debt securities by households (hh_ls_data)
Switzerland	1950-2001	JST	Total loans to households (thh)
Switzerland	1999-2017	IMF	Loans and debt securities by households (hh_ls_data)
Thailand	1991-2017	BIS	Credit to Households and NPISHs from all sectors
Turkey	1986-2017	IMF	Loans and debt securities by households (hh_ls_data)
United Kingdom	1950-1968	JST	Total loans to households (thh)
United Kingdom	1966-2017	IMF	Loans and debt securities by households (hh_ls_data)
United States	1950-1952	JST	Total loans to households (thh)
United States	1950-2017	IMF	Loans and debt securities by households (hh_ls_data)

Table IAV. Cumulative and Incremental Probabilities of Crisis Onset at Different Horizons

The table presents results of three crisis prediction models:

$$y_{i,t\to t+h} = a_i + \beta \times \textit{High Debt Growth}_{it} + \delta \times \textit{High Price Growth}_{it} + \gamma \times \textit{R-Zone}_{it} + \epsilon_{it}$$

where $y_{i,t\to t+h} \in \left\{Crisis_{i,t+1 \text{ to } t+h}, Crisis_{t+1 \text{ to } t+h} - Crisis_{t+1 \text{ to } t+h-1}, CrisisStart_{i,t+h}\right\}$. $CrisisStart_{i,t}$ is an indicator variable equal to one if a crisis begins in year t in country i, $Crisis_{i,t+1 \text{ to } t+h} = \max\{CrisisStart_{i,t+1}, ..., CrisisStart_{i,t+h}\}$ is an indicator variable equal to one if a crisis has occurred in country i between year $t+1$ and $t+h$, *High Debt Growth* $\equiv 1\{\Delta_3(Debt/GDP)_{it} > 80^{th}$ percentile$\}$ is an indicator variable equal to one if three-year debt growth is the in the highest quintile, while *High Price Growth* $\equiv 1\{\Delta_3 \log(Price_{it}) > 66.7^{th}$ percentile$\}$ is an indicator variable equal to one if three-year price growth is in its highest tercile. The red zone is the intersection of high price growth and high debt growth: *R-Zone* $\equiv$ *High Debt Growth* $\times$ *High Price Growth*. We run the regression on both the business sector, using business debt and equity prices to define the indicators (Panel A), and the household sector, using household debt and house prices to define the indicators (Panel B). In Panel A1 and B1 t-statistics are based on Driscoll and Kraay (1998) standard errors with lags of zero, three, five, and six years for prediction horizons one, two, three, and four years, respectively. In Panel A2, A3, B2, and B3, t-statistics are based on standard errors clustered by year. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively, using Kiefer and Vogelsang (2005) corrected p-values. Reported coefficients and R^2s are in percent.

Panel A: Business Sector

Panel A1: Predicting $Crisis_{t+1 \text{ to } t+h}$ (Baseline Regression)

	Univariate Regressions									Multivariate Regressions						
Horizon	β	t-statistic	R^2	δ	t-statistic	R^2	γ	t-statistic	R^2	β	t-statistic	δ	t-statistic	γ	t-statistic	R^2
1	6.9	[2.3**]	1.6	0.4	[0.1]	0.0	9.0	[1.1]	1.1	5.3	[2.1**]	-0.4	[−0.2]	5.3	[0.8]	1.9
2	11.6	[3.0***]	2.5	4.8	[0.9]	0.7	17.9	[2.1*]	2.3	9.5	[2.5**]	3.8	[0.8]	7.8	[1.3]	3.6
3	16.8	[3.3***]	3.8	10.5	[1.4]	2.4	33.7	[3.3***]	6.1	11.5	[2.7**]	7.4	[1.1]	19.4	[2.8**]	7.8
4	15.6	[2.7***]	2.8	10.7	[1.5]	2.1	33.0	[3.1**]	4.8	10.3	[2.2*]	7.6	[1.2]	19.4	[2.6**]	6.2

Panel A2: Predicting $Crisis_{t+1 \text{ to } t+h} - Crisis_{t+1 \text{ to } t+h-1}$

	Univariate Regressions									Multivariate Regressions						
Horizon	β	t-statistic	R^2	δ	t-statistic	R^2	γ	t-statistic	R^2	β	t-statistic	δ	t-statistic	γ	t-statistic	R^2
1	6.9	[2.3**]	1.6	0.4	[0.1]	0.0	9.0	[1.1]	1.1	5.3	[2.1**]	-0.4	[−0.2]	5.3	[0.8]	1.9
2	4.7	[2.4**]	0.8	4.4	[1.1]	1.1	8.9	[1.8*]	1.1	4.2	[1.9*]	4.1	[1.2]	2.6	[0.6]	2.0
3	5.2	[2.6***]	1.0	5.7	[1.5]	1.9	15.8	[2.1**]	3.6	2.0	[1.0]	3.6	[1.1]	11.5	[1.8*]	4.2
4	-1.1	[−0.9]	0.1	0.3	[0.2]	0.0	-0.7	[−0.3]	0.0	-1.1	[−0.8]	0.2	[0.2]	0.0	[0.0]	0.1

Panel A3: Predicting $Crisis_{t+h}$

	Univariate Regressions									Multivariate Regressions						
Horizon	β	t-statistic	R^2	δ	t-statistic	R^2	γ	t-statistic	R^2	β	t-statistic	δ	t-statistic	γ	t-statistic	R^2
1	6.9	[2.3**]	1.6	0.4	[0.1]	0.0	9.0	[1.1]	1.1	5.3	[2.1**]	-0.4	[−0.2]	5.3	[0.8]	1.9
2	4.7	[2.4**]	0.8	4.4	[1.1]	1.1	8.9	[1.8*]	1.1	4.2	[1.9*]	4.1	[1.2]	2.6	[0.6]	2.0
3	5.5	[2.8***]	1.1	6.2	[1.6]	2.1	17.1	[2.5**]	4.0	1.9	[1.0]	3.9	[1.2]	12.7	[2.1**]	4.7
4	-0.3	[−0.2]	0.0	1.7	[1.1]	0.2	2.7	[0.9]	0.1	-0.9	[−0.6]	1.2	[0.8]	2.5	[0.8]	0.2

Panel B: Household Sector

Panel B1: Predicting $Crisis_{t+1 \text{ to } t+h}$ (Baseline Regression)

	Univariate Regressions									Multivariate Regressions						
Horizon	β	t-statistic	R^2	δ	t-statistic	R^2	γ	t-statistic	R^2	β	t-statistic	δ	t-statistic	γ	t-statistic	R^2
1	7.3	[2.2**]	1.8	3.6	[1.7*]	0.7	11.2	[2.2**]	2.7	2.4	[1.6]	0.4	[0.3]	8.9	[1.8*]	2.8
2	15.1	[2.8**]	4.1	6.0	[1.4]	1.0	20.5	[2.7**]	4.9	7.3	[2.2**]	0.4	[0.2]	14.1	[2.4**]	5.5
3	20.5	[3.3***]	5.6	8.1	[1.5]	1.4	28.6	[3.4***]	7.0	9.1	[2.3**]	0.0	[0.0]	20.9	[3.2***]	7.6
4	23.7	[3.9***]	6.2	8.5	[1.5]	1.3	29.6	[4.1***]	6.2	14.2	[2.5**]	0.8	[0.2]	17.1	[2.0*]	7.4

Panel B2: Predicting $Crisis_{t+1 \text{ to } t+h} - Crisis_{t+1 \text{ to } t+h-1}$

	Univariate Regressions									Multivariate Regressions						
Horizon	β	t-statistic	R^2	δ	t-statistic	R^2	γ	t-statistic	R^2	β	t-statistic	δ	t-statistic	γ	t-statistic	R^2
1	7.3	[2.2**]	1.8	3.6	[1.7*]	0.7	11.2	[2.2**]	2.7	2.4	[1.6]	0.4	[0.3]	8.9	[1.8*]	2.8
2	7.7	[2.3**]	2.0	2.4	[0.9]	0.3	9.3	[1.8*]	1.9	4.9	[1.7*]	0.0	[0.0]	5.1	[1.1]	2.3
3	5.5	[1.9*]	1.1	2.1	[1.0]	0.2	8.1	[2.3**]	1.5	1.8	[0.7]	-0.4	[−0.2]	6.9	[2.7***]	1.6
4	3.2	[1.1]	0.4	0.4	[0.2]	0.0	1.0	[0.5]	0.0	5.1	[1.1]	0.8	[0.3]	-3.9	[−0.8]	0.6

Panel B3: Predicting $Crisis_{t+h}$

	Univariate Regressions									Multivariate Regressions						
Horizon	β	t-statistic	R^2	δ	t-statistic	R^2	γ	t-statistic	R^2	β	t-statistic	δ	t-statistic	γ	t-statistic	R^2
1	7.3	[2.2**]	1.8	3.6	[1.7*]	0.7	11.2	[2.2**]	2.7	2.4	[1.6]	0.4	[0.3]	8.9	[1.8*]	2.8
2	7.7	[2.3**]	2.0	2.4	[0.9]	0.3	9.3	[1.8*]	1.9	4.9	[1.7*]	0.0	[0.0]	5.1	[1.1]	2.3
3	6.1	[2.1**]	1.3	2.6	[1.2]	0.4	9.7	[2.6***]	2.1	1.5	[0.5]	-0.4	[−0.2]	8.8	[2.7***]	2.1
4	4.9	[1.7*]	0.8	1.6	[0.8]	0.1	4.1	[1.8*]	0.4	5.2	[1.0]	1.0	[0.4]	-1.0	[−0.2]	0.9

Table IAVI. Bootstrapped P-Values and Bias Estimates

This table presents p-values for coefficient estimates from our main crisis prediction model at the three-year horizon

$$Crisis_{i,t+1\ to\ t+3} = a_i + \beta \times High\ Debt\ Growth_{it} + \delta \times High\ Price\ Growth_{it} + \gamma \times R\text{-}Zone_{it} + \epsilon_{it}.$$

We show the p-values calculated using standard asymptotics, fixed-b asymptotics as in Kiefer and Vogelsang (2005), and p-values calculated using the block bootstrap procedure described in Section IV. For the bootstrap we draw 100,000 samples with block sizes drawn from a geometric distribution with success probability 0.125. We show the p-values for coefficient estimates obtained from univariate regressions (corresponding to columns (3.1), (3.2) and (3.4) in Table IV), and p-values for coefficient estimates obtained from multiple regressions (corresponding to column (3.3) in Table IV). All t-statistics are calculated using Driscoll and Kraay (1998) standard errors with five lags. Panel A and B present results for the business sector and household sector, respectively.

Panel A: Business Sector						
	Univariate Regressions			Multivariate Regressions		
	β	δ	γ	β	δ	γ
Coefficient estimate	18.8	9.9	35.4	13.4	6.9	19.1
t-statistic	[3.7]	[1.4]	[3.5]	[2.7]	[1.1]	[2.7]
$P(>\|t\|)$ asymptotic	(0.000)	(0.155)	(0.001)	(0.008)	(0.269)	(0.008)
$P(>\|t\|)$ fixed-b	(0.050)	(0.203)	(0.006)	(0.022)	(0.315)	(0.016)
$P(>\|t\|)$ bootstrap	(0.017)	(0.089)	(0.027)	(0.073)	(0.202)	(0.011)
Bias in Coefficient Estimate	-1.4	-1.0	-3.6	-0.5	-0.3	-2.9
Coefficient Estimate (bias adj.)	20.2	10.9	39.0	13.9	7.2	22.0
Panel B: Household Sector						
	Univariate Regressions			Multivariate Regressions		
	β	δ	γ	β	δ	γ
Coefficient estimate	20.7	6.9	27.8	11.7	-0.5	17.7
t-statistic	[3.0]	[1.3]	[3.0]	[2.0]	[-0.2]	[2.4]
$P(>\|t\|)$ asymptotic	(0.003)	(0.182)	(0.002)	(0.044)	(0.864)	(0.015)
$P(>\|t\|)$ fixed-b	(0.005)	(0.183)	(0.004)	(0.047)	(0.999)	(0.007)
$P(>\|t\|)$ bootstrap	(0.011)	(0.114)	(0.030)	(0.047)	(0.880)	(0.036)
Bias in Coefficient Estimate	-0.9	-0.4	-1.5	-0.4	0.1	-1.2
Coefficient Estimate (bias adj.)	21.6	7.4	29.2	12.1	-0.6	18.9

Table IAVII. Sensitivity of Main Crisis Prediction to Cutoff and Sample Period

The table presents coefficient estimates and t-statistics of our main crisis prediction model

$$Crisis_{i,t+1 \text{ to } t+3} = a_i + \beta \times High\ Debt\ Growth_{it} + \delta \times High\ Price\ Growth_{it} + \gamma \times R\text{-}Zone_{it} + \epsilon_{it},$$

where $Crisis_{i,t+1 \text{ to } t+h}$ is an indicator variable that takes the value of one if a crisis has occurred in country i within three years of time t, $High\ Debt\ Growth_{it} \equiv 1\{\Delta_3(Debt/GDP)_{it} > C_D\}$ is an indicator variable that takes the value of one if three-year debt growth in country i is higher than C_D, while $High\ Price\ Growth_{it} \equiv 1\{\Delta_3 \log(Price_{it}) > C_P\}$ is an indicator variable that takes the value of one if three-year price growth in country i is above C_P. The red zone variable is the intersection of high price growth and high debt growth: $R\text{-}Zone_{it} \equiv High\ Debt\ Growth_{it} \times High\ Price\ Growth_{it}$. The indicator variables are defined using a range of cutoffs for debt growth (C_D varies across columns) and price growth (C_P varies across rows), and the model is tested with both a univariate (left) and a multiple regression specification (right). We test the model on our full sample, a pre-2000 sample where we exclude data after 1999 (last prediction year is 1996), and a post-2000 sample where we exclude data prior to 1997 (last prediction year is 2012). We run the regressions on both the business sector, using business debt and equity prices to define the indicators (Panel A), and the household sector, using household debt and house prices to define the indicators (Panel B). t-statistics are based on Driscoll and Kraay (1998) standard errors with five lags. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively, using Kiefer and Vogelsang (2005) corrected p-values.

Panel A: Business Sector

Price Growth Cutoff (C_P)	Univariate Regressions: Coefficient (γ)					Univariate Regressions: t-statistic					Multivariate Regressions: Coefficient (γ)					Multivariate Regressions: t-statistic				
	Debt Growth Cutoff (C_D)																			
Full Sample	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15
9	17.2	17.2	28.3	33.7	42.2	2.6**	2.3**	2.8**	2.6**	3.3***	11.6	7.4	16.4	17.8	28.3	2.1*	1.1	1.8	1.6	2.8**
18	18.1	19.6	31.4	37.6	49.5	2.4**	2.5**	3.2***	3.2***	4.9***	12.2	10.4	19.1	21.7	35.2	2.0*	1.8	2.6**	2.3**	4.6***
27	19.3	21.5	33.7	39.6	57.9	2.3**	2.7**	3.3***	3.1***	6.1***	11.5	11.1	19.4	21.2	43.5	1.9*	2.1*	2.8**	2.1*	4.9***
36	17.5	21.4	32.1	37.9	53.4	2.0*	2.5**	3.1***	3.1***	5.8***	6.1	9.2	15.9	18.0	36.0	1.0	1.8	2.3**	2.2*	4.5***
45	15.7	20.6	31.3	45.4	58.3	1.8	2.1*	2.7**	3.3***	5.4***	5.8	10.0	16.9	29.6	43.1	0.9	1.5	2.1*	3.0**	4.5***
Pre-2000 Sample	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15
9	18.8	21.7	38.8	47.3	53.7	2.6**	2.3*	3.1**	2.3**	2.1*	20.4	17.5	32.0	32.4	39.0	2.9**	1.8	2.5**	1.4	1.7
18	17.3	21.0	35.3	44.4	49.4	2.1*	2.1*	2.6**	2.2*	1.9	18.5	17.4	25.9	26.2	32.0	2.1*	1.8	2.0*	1.3	1.5
27	16.0	21.8	34.0	41.4	49.4	2.2*	2.3*	2.8**	2.0*	1.9	16.7	19.1	23.2	20.8	33.9	2.3*	2.3*	2.2*	1.1	1.6
36	15.8	20.7	34.2	36.2	38.5	1.9*	2.0*	2.6**	1.9	1.5	15.6	15.5	22.5	12.2	15.3	2.0*	1.8	1.9	0.8	0.8
45	13.8	20.5	32.1	43.5	36.7	1.5	1.5	1.9	1.8	1.3	10.8	13.4	17.2	20.8	11.6	1.3	1.2	1.1	1.0	0.5
Post-2000 Sample	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15
9	11.6	10.1	16.3	19.1	28.8	1.1	1.0	1.3	1.6	2.4	1.6	-0.4	5.8	7.7	19.7	0.2	-0.1	0.8	1.1	2.3
18	14.4	14.6	23.2	26.4	40.3	1.2	1.3	1.7	2.0	4.0**	4.5	5.0	12.6	15.2	30.3	0.5	1.0	1.9	2.3	4.0**
27	17.7	17.8	27.6	32.1	56.0	1.4	1.6	2.0	2.2	9.8***	5.8	6.1	14.7	18.5	44.8	0.6	1.3	2.2	2.5*	6.3***
36	13.8	17.6	24.4	31.8	53.5	1.0	1.5	1.7	2.3*	8.4***	-0.7	7.5	12.0	20.1	43.6	-0.1	1.4	1.8	2.7*	5.9***
45	12.1	16.0	24.5	37.3	58.5	0.9	1.2	1.6	2.5	8.7***	3.9	11.0	17.9	31.8	54.1	0.4	1.7	2.1	3.5**	8.8***

Panel B: Household Sector

Price Growth Cutoff (C_P)	Univariate Regressions: Coefficient (γ)					Univariate Regressions: t-statistic					Multivariate Regressions: Coefficient (γ)					Multivariate Regressions: t-statistic				
	Debt Growth Cutoff (C_D)																			
Full Sample																				
	2	5	8	11	14	2	5	8	11	14	2	5	8	11	14	2	5	8	11	14
1	9.7	17.3	20.5	21.4	26.5	1.9*	2.4**	2.9**	3.0**	3.0***	6.2	11.2	7.6	-5.8	-16.8	1.4	1.8	1.0	-0.7	-1.9
7	10.5	18.8	23.0	23.6	29.5	1.8	2.4**	3.0***	3.1***	3.0**	12.0	15.7	15.2	4.0	0.7	2.2*	2.6**	2.6**	0.6	0.1
13	14.3	22.7	28.6	28.2	35.3	2.2**	2.8**	3.4***	3.6***	3.9***	14.4	18.9	20.9	10.8	11.2	2.7**	3.1***	3.2***	1.8	1.2
19	16.1	24.8	29.5	29.2	32.0	2.4**	2.9**	3.3***	3.1***	3.7***	16.9	19.2	17.8	8.7	1.0	2.6**	3.1***	2.7**	1.3	0.1
25	18.6	29.4	33.8	32.3	37.5	2.7**	3.6***	3.7***	3.2***	4.2***	21.5	24.2	21.0	10.4	8.9	3.4***	4.2***	2.5**	1.3	1.2
Pre-2000 Sample																				
	2	5	8	11	14	2	5	8	11	14	2	5	8	11	14	2	5	8	11	14
1	6.1	16.0	31.1	38.3	46.8	1.0	1.6	3.2**	3.0**	7.4***	4.9	21.6	35.5	33.5	-1.0	0.7	2.0*	4.0***	3.2***	-0.3
7	6.7	18.2	33.1	42.8	53.9	0.9	1.6	3.3***	3.6***	11.2***	8.3	22.3	33.0	44.5	53.6	1.3	2.1*	3.7***	4.8***	8.3***
13	11.8	27.4	45.9	50.1	53.9	1.3	2.3*	5.6***	4.4***	11.2***	12.4	30.9	47.4	49.4	50.8	1.8	2.7**	6.6***	6.1***	6.0***
19	12.4	26.0	43.6	50.5	58.4	1.4	2.1*	4.4***	3.5***	5.1***	14.5	25.5	37.4	40.1	11.4	1.4	2.1*	4.5***	3.1**	0.5
25	14.4	29.7	52.8	58.6	58.4	1.5	2.3*	5.1***	4.5***	5.1***	19.9	29.4	45.0	37.4	12.0	1.8	2.3*	3.5***	2.0*	0.6
Post-2000 Sample																				
	2	5	8	11	14	2	5	8	11	14	2	5	8	11	14	2	5	8	11	14
1	13.9	16.8	14.2	14.7	17.8	2.0	2.2	2.1	2.8*	2.6*	12.7	2.9	-3.9	-13.3	-13.4	2.1	0.5	-0.8	-1.7	-1.1
7	14.7	18.5	17.1	18.0	22.8	2.0	2.3	2.5	3.2**	3.0*	24.8	13.5	8.1	2.2	11.5	2.6*	2.0	1.7	0.3	1.2
13	16.3	19.9	21.2	23.2	29.9	2.3	2.6*	3.0*	4.2**	4.5***	20.2	13.7	11.5	9.8	18.1	2.5	2.3	3.0*	1.7	1.8
19	18.9	22.6	20.9	21.6	25.4	2.6*	2.8*	2.7**	3.2**	4.5***	15.1	11.9	3.0	-1.4	2.6	2.2	2.5*	1.0	-0.3	0.2
25	22.3	27.7	23.6	23.5	29.9	3.4**	4.0**	3.6***	3.5**	5.3***	16.0	16.1	-0.3	-4.8	4.7	3.6**	5.1***	-0.1	-0.6	0.4

Table IAVIII. Crisis Prediction with Global R-Zones (Leave-One-Out)

The table presents results of the regression model

$$Crisis_{i,t+1 \text{ to } t+h} = a_i^h + \gamma^{Bus,h} \times Local\ R\text{-}Zone_{it}^{Bus.} + \xi^{Bus,h} \times Global\ R\text{-}Zone_{it}^{Bus.} + \gamma^{HH,h} \times Local\ R\text{-}Zone_{it}^{HH} + \xi^{HH,h} \times Global\ R\text{-}Zone_{it}^{HH} + \epsilon_{it}^h,$$

where $Local\ R\text{-}Zone_{it}^{Bus.}$ is an indicator variable capturing episodes of high business debt growth and equity price growth, while $Local\ R\text{-}Zone^{HH}$ is an indicator variable capturing episodes of high household debt growth and house price growth. $Global\ R\text{-}Zone_{it}^{Bus.}$ measures the fraction of countries excluding country i in the business red zone at time t, while $Global\ R\text{-}Zone_{it}^{HH.}$ measures the fraction of countries excluding country i in the household red zone at time t. t-statistics are reported in brackets and based on Driscoll and Kraay (1998) with lags of zero, three, five, and six years for prediction horizons one, two, three, and four years, respectively. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively, using Kiefer and Vogelsang (2005) corrected p-values. Reported coefficients and R^2s are in percent.

	Dependent Variable											
	Crisis within 1 year			Crisis within 2 years			Crisis within 3 years			Crisis within 4 years		
	(1.1)	(1.2)	(1.3)	(2.1)	(2.2)	(2.3)	(3.1)	(3.2)	(3.3)	(4.1)	(4.2)	(4.3)
Local R-Zone$^{Bus.}$ ($\gamma^{Bus,h}$)	4.0		1.7	9.8*		7.0	23.4**		19.5**	23.5**		18.8*
	[1.0]		[0.5]	[1.9]		[1.4]	[2.9]		[2.3]	[2.6]		[2.1]
Global R-Zone$^{Bus.}$ ($\xi^{Bus,h}$)	53.7*		47.1	86.9***		54.0*	110.4***		72.6	101.9***		33.8
	[1.8]		[1.4]	[4.0]		[1.9]	[4.7]		[1.8]	[5.6]		[1.3]
Local R-Zone^{HH} ($\gamma^{HH,h}$)		7.5**	6.6**		12.5***	10.9**		17.7***	14.9**		15.6***	13.9***
		[2.4]	[2.3]		[2.9]	[2.6]		[3.4]	[2.9]		[4.0]	[3.6]
Global R-Zone$^{HH.}$ ($\xi^{HH,h}$)		24.6	5.4		53.4**	29.9*		72.8***	37.7**		92.8***	72.6***
		[1.4]	[0.8]		[2.7]	[1.9]		[4.8]	[2.5]		[7.2]	[5.0]
R^2 *(within)*	6.1	4.8	7.3	9.3	10.3	12.5	14.3	14.4	19.0	10.7	16.1	18.1
Observations	1,258	1,107	1,084	1,258	1,107	1,084	1,258	1,107	1,084	1,258	1,107	1,084

Table IAIX. Crisis Prediction with Global R-Zones (GDP weighted)

The table presents results of the regression model

$$Crisis_{i,t+1 \text{ to } t+h} = a_i^h + \gamma^{Bus,h} \times \textit{Local R-Zone}_{it}^{Bus.} + \xi^{Bus,h} \times \textit{GDP Weighted Global R-Zone}_t^{Bus.} + \gamma^{HH,h} \times \textit{Local R-Zone}_{it}^{HH} + \xi^{HH,h} \times \textit{GDP Weighted Global R-Zone}_t^{HH} + \epsilon_{it}^h,$$

where $\textit{Local R-Zone}_{it}^{Bus.}$ is an indicator variable capturing episodes of high business debt growth and equity price growth, while $\textit{Local R-Zone}^{HH}$ is an indicator variable capturing episodes of high household debt growth and house price growth. $\textit{GDP Weighted Global R-Zone}_t^{Bus.}$ measures the fraction of countries in the business red zone weighted by their GDP at a given point in time, while $\textit{GDP Weighted Global R-Zone}_t^{HH.}$ measures the fraction of countries weighted by their GDP in the household red zone at a given point in time. t-statistics are reported in brackets and based on Driscoll and Kraay (1998) with lags of zero, three, five, and six years for prediction horizons one, two, three, and four years, respectively. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively, using Kiefer and Vogelsang (2005) corrected p-values. Reported coefficients and R^2s are in percent.

	Dependent Variable											
	Crisis within 1 year			Crisis within 2 years			Crisis within 3 years			Crisis within 4 years		
	(1.1)	(1.2)	(1.3)	(2.1)	(2.2)	(2.3)	(3.1)	(3.2)	(3.3)	(4.1)	(4.2)	(4.3)
Local R-Zone$^{Bus.}$ ($\gamma^{Bus,h}$)	4.4		2.0	8.4		6.3	22.8**		19.8**	21.4**		18.5**
	[0.8]		[0.4]	[1.4]		[1.1]	[2.6]		[2.3]	[2.3]		[2.1]
Weighted Global R-Zone$^{Bus.}$ ($\xi^{Bus,h}$)	60.2**		62.6*	124.0**		100.6*	142.6***		101.4*	151.8***		91.5**
	[2.0]		[1.9]	[2.7]		[2.0]	[3.7]		[2.1]	[6.2]		[2.9]
Local R-Zone^{HH} ($\gamma^{HH,h}$)		11.2**	9.0***		15.9***	12.0***		20.0***	14.6**		16.4***	11.9***
		[2.5]	[2.6]		[3.4]	[3.0]		[3.7]	[3.0]		[3.7]	[3.2]
Weighted Global R-Zone$^{HH.}$ ($\xi^{HH,h}$)		0.4	-8.6*		22.0	7.6		40.8**	24.9*		62.6***	47.3***
		[0.1]	[-1.9]		[1.2]	[0.6]		[2.3]	[2.0]		[4.1]	[3.8]
R^2 *(within)*	4.2	2.7	5.9	9.4	6.5	11.4	12.9	11.0	17.3	11.3	13.9	18.3
Observations	1,258	1,107	1,084	1,258	1,107	1,084	1,258	1,107	1,084	1,258	1,107	1,084