An International Look at the Growth of Modern Finance

ONLINE APPENDIX

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A   Historic finance income share

Much of the data on financial intermediation value added share in GDP are from Smits, Woltjer, and Ma (2009). The sample is Belgium (BEL) 1835–1990, Spain (ESP) 1850–1958, Finland (FIN) 1860–1969, Italy (ITA) 1861–1913, The Netherlands (NLD) 1807–1913, and the United Kingdom (UK) 1855–1965. For all countries but the U.K. the data are nominal, so we simply divide financial intermediation value added by GDP to get the share. For the U.K. the data are volume indices; see below the calculation of the value added share based on volume indices and the value added share in 1970.

Various other historical statistical sources used are: Australia in 1861-1939 from Vamplew (1987); Canada in 1870-1926 from Urquhart (1993) and in 1926–1976 from Statistics Canada; Finland in 1860–1994 from Hjerppe (1996); Italy in 1958–1968 from Instituto Centrale di Statistica (various years); The Netherlands in 1921–1969 from Office Statistique des Communautes Europeennes (1966) and den Bakker and de Gijt (1990); Norway in 1910–1966 from the Central Bureau of Statistics of Norway, Historical Statistics 1968.

To calculate the value added share of finance in services value added we use data from Buera and Kaboski (2012), who rely on the same sources as we do.

U.K. finance income share in 1855–1965
The raw historic value added and GDP series for the U.K. in Smits, Woltjer, and Ma (2009) are volume indices (equal to 100 in 1913). To get the value added share in the U.K. we assume that the real unit cost of financial services, denominated in units of GDP (i.e. the nominal unit cost of financial services divided by the unit cost of GDP, or the GDP deflator) is constant from 1970 going backwards. This is consistent with Philippon (2012): the real unit cost of financial intermediation in the U.S. is relatively stable until the 1980s, and does not exhibit a trend. Essentially, we assume that the same holds for the U.K.

We divide the value added share of finance from the EU KLEMS series in 1970 (the first year in that data for the U.K.) $\phi^{EUKLEMS}$ by the ratio of quantity indices in 1965 (the last year in the

historic series for the U.K.) v^{fin}/v^{GDP} to get

$$
\begin{aligned}
\frac{\phi^{EUKLEMS}}{v^{fin}/v^{GDP}} &= \frac{\left(p^{fin}q^{fin}\right)/\left(p^{GDP}q^{GDP}\right)}{\left(100 \cdot q^{fin}/q^{fin}_{1913}\right)/\left(100 \cdot q^{GDP}/q^{GDP}_{1913}\right)} \\
&= \frac{p^{fin}}{p^{GDP}}\frac{q^{GDP}_{1913}}{q^{fin}_{1913}} \\
&= \pi \; .
\end{aligned}
$$

We then use π to compute the historic ϕ for 1855–1965:

$$
\phi^{historic}_t = \pi \cdot \frac{v^{fin}_t}{v^{GDP}_t} = \frac{p^{fin}}{p^{GDP}}\frac{q^{GDP}_{1913}}{q^{fin}_{1913}} \cdot \frac{100 \cdot q^{fin}_t/q^{fin}_{1913}}{100 \cdot q^{GDP}_t/q^{GDP}_{1913}} = \frac{p^{fin}q^{fin}_t}{p^{GDP}q^{GDP}_t} \; .
$$

The source data for the U.K. in Smits, Woltjer, and Ma (2009) comes from Feinstein (1972), which also has data on employment in finance and overall employment in 1861, 1871, 1881, 1891, 1901, 1911, 1920–1938 and 1948–1965. We compare the $\phi^{historic}_t$ value added share series to the employment share of finance computed from Feinstein (1972): both share a common trend. The $\phi^{historic}_t$ series is larger than the employment share (implying that value added per worker is higher in finance than on average). The ratio of the two series (equivalent to value added per worker in finance divided by GDP per worker) exhibits some variation: It is 1.66 in 1861, on average 3.5 in 1871–1911, and then continuously decreases from 2.37 in 1920 to 1.6 in 1965.

B   Financial deregulation index

We use data from Abiad, Detragiache, and Tressel (2008) to construct an index of financial deregulation. The index is constructed by combining seven dimensions of reform.

1. Credit controls: capture restrictions on the amounts of bank lending to specific sectors or ceiling on overall credit extended by banks.

2. Interest rate controls: capture the degree to which banks are restricted in setting rates (whether floor or ceiling interest rates exist and/or bind).

3. Entry barriers: capture barriers to entry into the financial system which may take the form of restrictions on the participation of foreign banks; restrictions on the scope of banks' activities; restrictions on the geographic area where banks can operate; or excessively restrictive licensing requirements.

4. Privatization: captures the degree to which the government is not involved directly in financial services (using thresholds of 50 percent, 25 percent and 10 percent of state ownership to differentiate between full state control and full liberalization, respectively).

5. Capital account restrictions: capture having multiple exchange rates for various transactions, as well as transactions taxes or outright restrictions on inflows and/or outflows.

6. Securities market development captures policies that governments use to encourage development of securities markets; these include auctioning of government securities, establishment of debt and equity markets and policies to encourage development of these markets (such as tax incentives or development of depository and settlement systems), and policies to promote the openness of securities markets to foreign investors.

7. Prudential regulation and supervision: captures whether a country adopted risk-based capital adequacy ratios based on the Basel I capital accord, and whether the banking supervisory agency is independent from the executive's influence and has sufficient legal power.

Each index originally ranges from 0 to 3, where 0 indicates the most restrictive regulations, except in 7, where 3 indicates the most restrictive regulation. The deregulation index is the sum of indices 1 to 6 minus index 7.

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Table A1: Income and Finance

	(1)	(2)	(3)
	Dependent Variable: Real GDP Per Capita		
Sample:	U.S.	14 Countries	
Era1 x (Log Fin. Output)	0.70***		
	(0.07)		
Era2 x (Log Fin. Output)	-0.78***		
	(0.25)		
Era3 x (Log Fin. Output)	1.52***		
	(0.07)		
Era4 x (Log Fin. Output)	0.93***		
	(0.14)		
Era1 x (Bank Loans/GDP)		0.81***	0.81***
		(0.05)	(0.18)
Era2 x (Bank Loans/GDP)		-0.54***	-0.54**
		(0.14)	(0.25)
Era3 x (Bank Loans/GDP)		2.04***	2.04***
		(0.07)	(0.44)
Era4 x (Bank Loans/GDP)		0.79***	0.79***
		(0.05)	(0.09)
Era fixed effects	Yes	-	-
Country x era fixed effects	-	Yes	Yes
Clustering S.E.s by year	-	Yes	Yes
Clustering S.E.s by country	-	No	Yes
Observations	139	1,606	1,606
R-squared	0.96	0.97	0.97

Test	Test P-values		
Ho: Era1 x (*) = Era3 x (*)	0.000	0.000	0.009
Ho: Era3 x (*) = Era4 x (*)	0.000	0.000	0.002

Notes: There are four eras: (1) Pre-1910, (2) 1910-1950, (3) 1951-1980, (4) Post 1980. Dummy variable Era# equals one for observations in era #, and zero otherwise. Financial output is from Philippon (2012). Real GDP per capita data are from Maddison (2010). Bank loans to the nonfinancial private sector and GDP (both nominal) are from Schularick and Taylor (2012). The sample of countries is: Australia, Canada, Switzerland, Germany, Denmark, Spain, France, Italy, Japan, The Netherlands, Norway, Sweden, U.K., U.S. Coulmn 1 reports OLS estimates with era dummies for the U.S. Columns 2 and 3 reports results for regressions with era speficic country fixed effects in a sample of 14 countries. The samples cover 1870-2008. In the Schularick and Taylor sample several observations of bank loans are missing in 1910-1950. In column 2 standard errors are clustered by year. In column 3 standard errors are clustered along two dimensions, country and year, using the methodology of Cameron, Gelbach and Miller (2011). Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A2: Financial Deregulation, 1973 to 2005

Country	(1) Reduction in Credit Controls	(2) Removal of Interest Rate Controls	(3) Removal of Entry Barriers	(4) Privatization	(5) Capital Account Liberalization	(6) Securities Markets Development	(7) Introduction of Prudential Regulation and Supervision	Deregulation Index (= sum of 1 to 6 minus 7)
Austria	0.75	3	3	3	2	2	3	10.75
Belgium	1.5	2	2	1	3	1	2	8.50
Canada	1	0	3	0	1	0	3	2.00
Denmark	1.5	3	2	1	2	2	3	8.50
Finland	1.5	2	1	0	3	2	1	8.50
France	3	2	2	2	2	1	3	9.00
Germany	0	0	2	0	1	1	2	2.00
Japan	1	3	3	0	1	2	2	8.00
Netherlands	0	0	0	0	3	2	3	2.00
Sweden	3	3	2	0	2	2	2	10.00
UK	1	1	2	1	2	1	3	5.00
USA	0.75	3	2	0	0	0	2	3.75
Average	1.25	1.83	2.00	0.67	1.83	1.33	2.42	6.50

Notes: The first seven columns report changes in the value of financial reform indices from 1973 to 2005. In columns 1-6 a positive value implies that the corresponding activity has undergone a reform and become more liberalized. The only index that captures more intervention is prudential regulation and supervision in column 7. Each index originally ranges from 0 to 3, where 0 indicates the most restrictive regulations, except in 7, where 3 inidcates the most restrictive regulation. The deregulation index in the last column is the sum of changes in indices 1 to 6 minus the change in 7. Data source: Abiad, Detragiache and Tressel (2008). Credit controls capture restrictions on the amounts of bank lending to specific sectors or ceiling on overall credit extended by banks. Interest rate controls capture the degree to which banks are restricted in setting rates (whether floor or ceiling interest rates exist and/or bind). Entry barriers capture barriers to entry into the financial system which may take the form of restrictions on the participation of foreign banks; restrictions on the scope of banks' activities; restrictions on the geographic area where banks can operate; or excessively restrictive licensing requirements. Privatization captures the degree to which the government is not involved directly in financial services (using thresholds of 50 percent, 25 percent and 10 percent of state ownership to differentiate between full state control and full liberalization, respectively). Capital account restrictions capture having multiple exchange rates for various transactions, as well as transactions taxes or outright restrictions on inflows and/or outflows. Securities market development captures policies that governments use to encourage development of securities markets; these include auctioning of government securities, establishment of debt and equity markets and policies to encourage development of these markets (such as tax incentives or development of depository and settlement systems), and policies on the openness of securities markets to foreign investors. Prudential regulation and supervision captures whether a country adopted risk-based capital adequacy ratios based on the Basel I capital accord, and whether the banking supervisory agency is independent from the executive's influence and has sufficient legal power.

Table A3: Descriptive Statistics

	Obs	Mean	Std. Dev.	Min	Max
Relative Skill Intensity	303	0.078	0.070	-0.021	0.296
Relative Wage Bill Share of Skilled	303	0.082	0.075	-0.043	0.287
Relative Wage	395	1.452	0.180	1.103	1.867
Skilled Relative Wage	303	1.322	0.192	0.880	1.743
Relative Skill Premium	303	0.900	0.090	0.714	1.130
Financial Deregulation	396	12.663	3.306	2.75	18
Relative ICT Share	341	0.103	0.113	0.00003	0.65

Notes: Skilled workers in all countries are comparable and attain at least a college or university degree. Relaitve skill intensity is the employment share (in full time equivalents) of skilled workers in finance minus their share in the rest of the economy. The relative wage bill share of skilled workers is the share in finance minus the share in the rest of the economy. The relative wage is the average wage in finance divided by the relative wage in the rest of the economy. The relative wage of skilled is the average wage of skilled workers in finance divided by the average wage of skilled in the rest of the economy. The relative skill premium is wages of skilled workers divided by wages of unskilled in finance, minus the same concept in the rest of the economy. Source: EU KLEMS. The financial deregulation index is constructed by combining seven dimensions of financial reform, using data from Abiad, Detragiache and Tressel (2008). See text and notes to Figure 13 for complete details. The relative information and communication technology (ICT) share is the difference between the ICT capital share in finance and the ICT share in the rest of the economy, using constant prices in 1995. Source: EU KLEMS. Data for Canada on this variable is not available from this source. ICT share data for the USA are from the Bureau of Economic Analysis, Fixed Assest Tables.

Table A4: Determinants of Skill Intensity and Wages in Finance

| Dependent variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Relative Skill Intensity		Relative Wage Bill Share of Skilled Workers		Relative Wage		Skilled Relative Wage		Relative Skill Premium	
Financial Deregulation, t-1	0.215***	0.086**	0.181***	0.094***	0.133**	-0.275***	0.147***	-0.243***	0.012	0.196***
	(0.027)	(0.035)	(0.026)	(0.034)	(0.055)	(0.069)	(0.049)	(0.062)	(0.047)	(0.068)
Relative ICT Share, t-1	0.297***	0.090***	0.316***	0.103***	0.262***	-0.188**	0.255***	-0.047	0.122***	0.289***
	(0.026)	(0.034)	(0.026)	(0.033)	(0.056)	(0.077)	(0.048)	(0.059)	(0.046)	(0.065)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	286	286	286	286	329	329	286	286	286	286
R-squared, within	0.641	0.743	0.645	0.749	0.180	0.386	0.254	0.496	0.045	0.166
Number of countries	11	11	11	11	11	11	11	11	11	11

Notes: All regressions include country fixed effects. Regressions in even columns include year fixed effects as well. All variables are standardized, so the coefficients are interpreted in terms of standard deviations (beta coefficients). Skilled workers in all countries are comparable and attain at least a college or university degree. Relative skill intensity is the employment share (in full time equivalents) of skilled workers in finance minus their share in the rest of the economy. The relative wage bill share of skilled workers is the share in finance minus the share in the rest of the economy. The relative wage is the average wage in finance divided by the average wage in the rest of the economy. The relative wage of skilled is the average wage of skilled workers in finance divided by the average wage of skilled in the rest of the economy. The relative skill premium is wages of skilled workers divided by wages of unskilled in finance, minus the same concept in the rest of the economy. Samples in columns other than (5) and (6) are constrained by availability of data on skilled workers. Source: EU KLEMS. The financial deregulation index is constructed by combining seven dimensions of financial reform, using data from Abiad, Detragiache and Tressel (2008). See text and Appendix for complete details. The relative information and communication technology (ICT) share is the difference between the ICT capital share in finance and the ICT share in the rest of the economy, using constant prices in 1995. Source: EU KLEMS. Data for Canada on this variable is not available from this source. ICT share data for the USA are from the Bureau of Economic Analysis, Fixed Assets Tables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Figure A1: Historical Finance Income Share in Services, 1850-2007
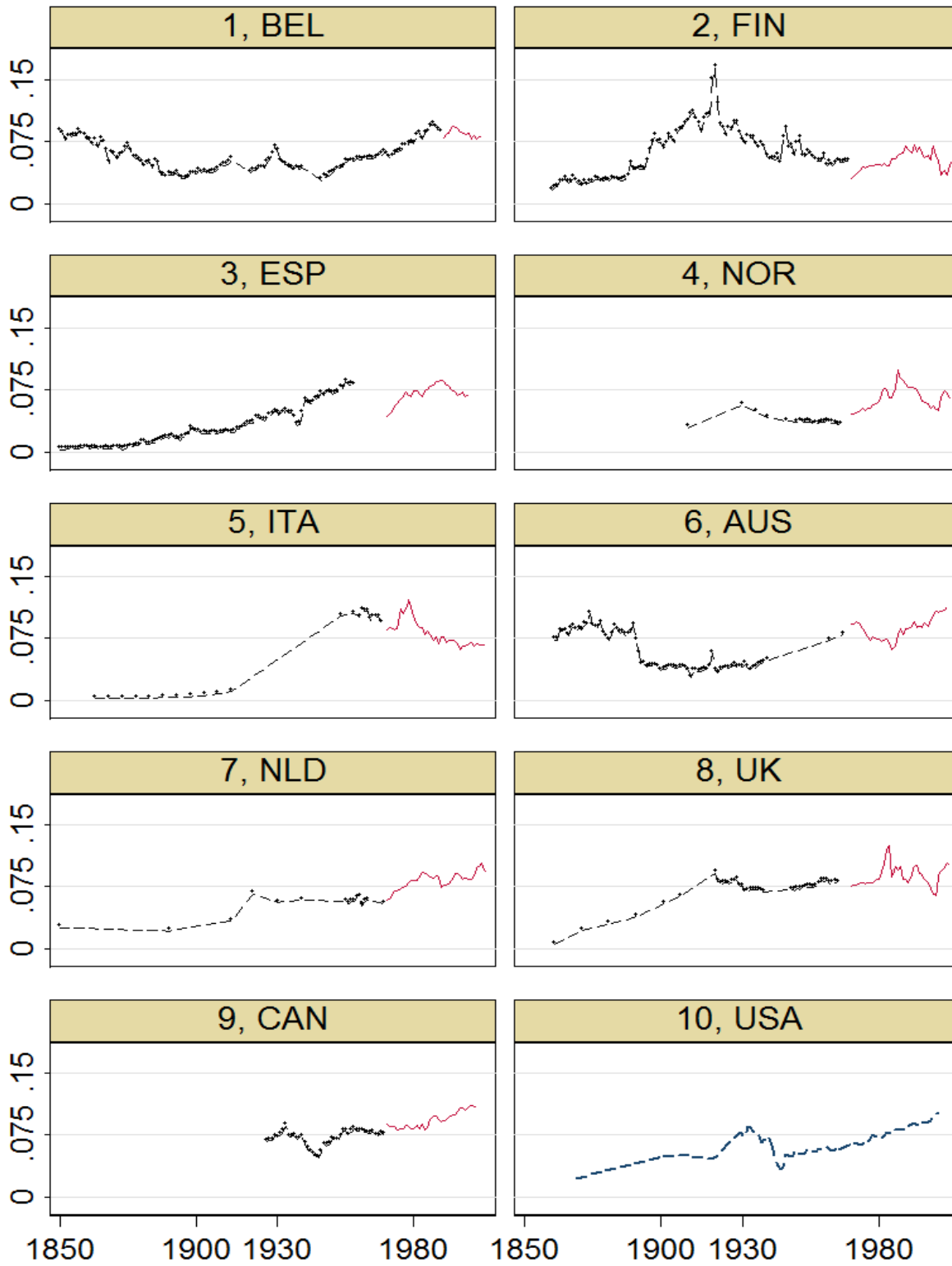
Notes: See notes to Figure 1 in the main text. Services value added are from Buera and Kaboski (2011), except for Finland, where data are from Hjerppe (1996).

Figure A2: Historical Finance Income Share and Real GDP per Capita, 1850-2007
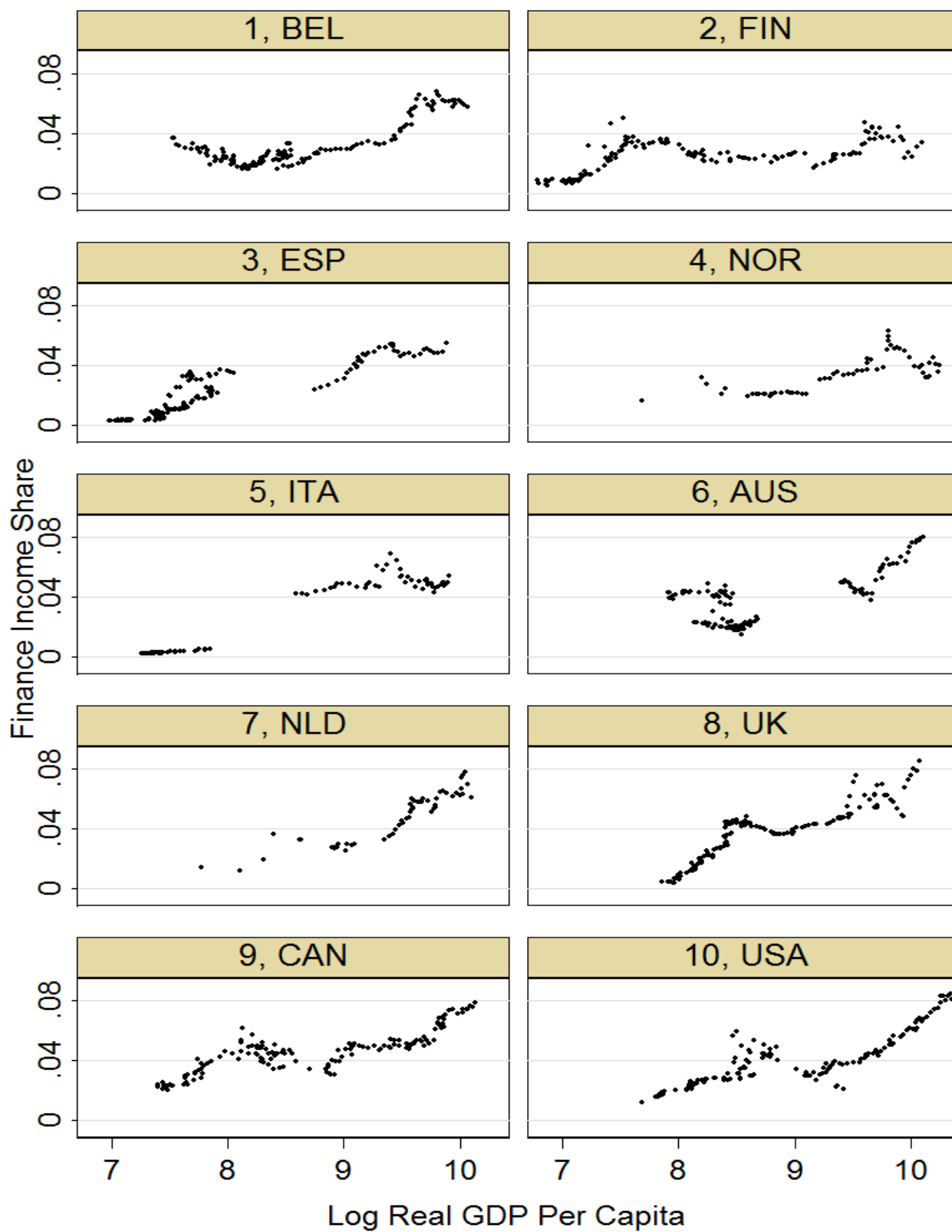
Notes: See notes to Figure 1 in the main text. Real GDP per capita (in 1990 prices) are from Maddison (2010).

Figure A3: Finance, Growth and Income in the U.S.
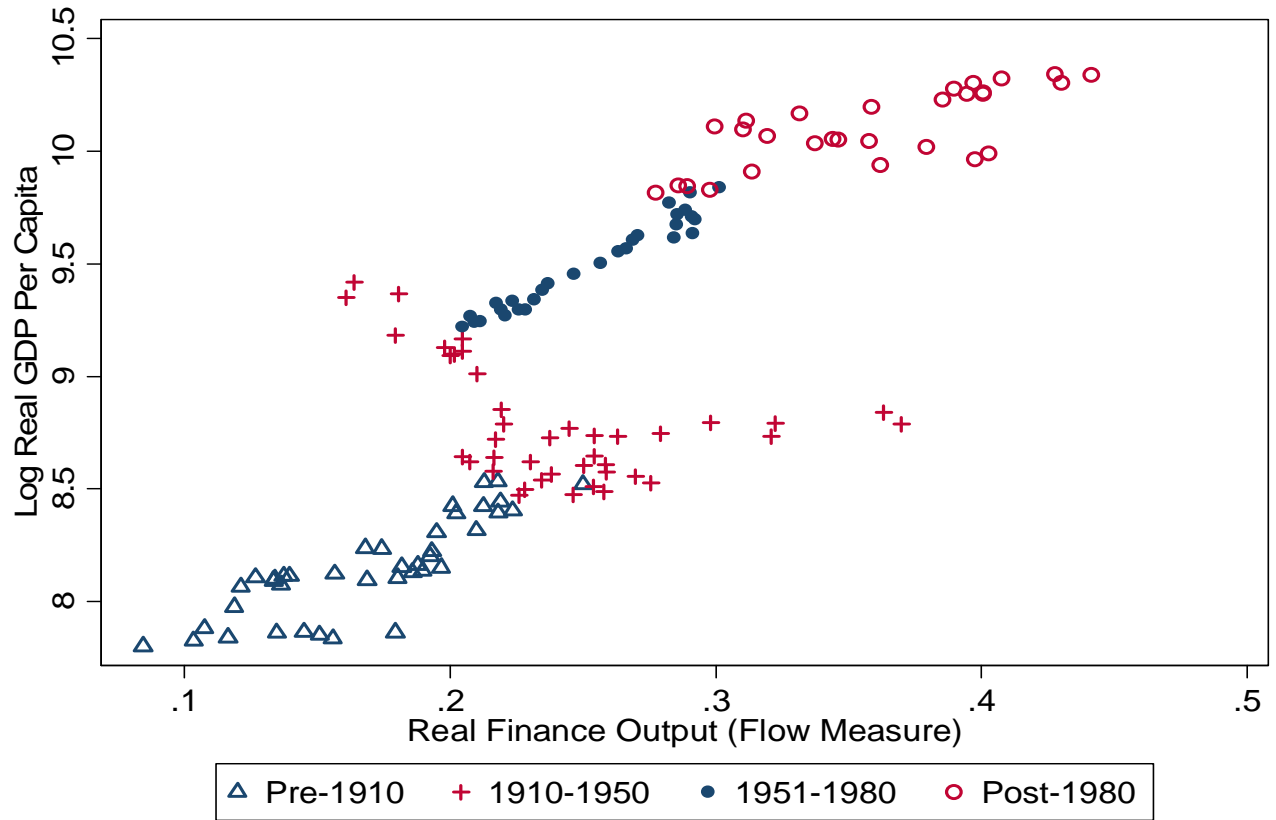
Notes: Each observation is a year. Real finance output (flow measure) is from Philippon (2012). Real GDP per capita is from Maddison (2010).

Figure A4: Financial Deregulation
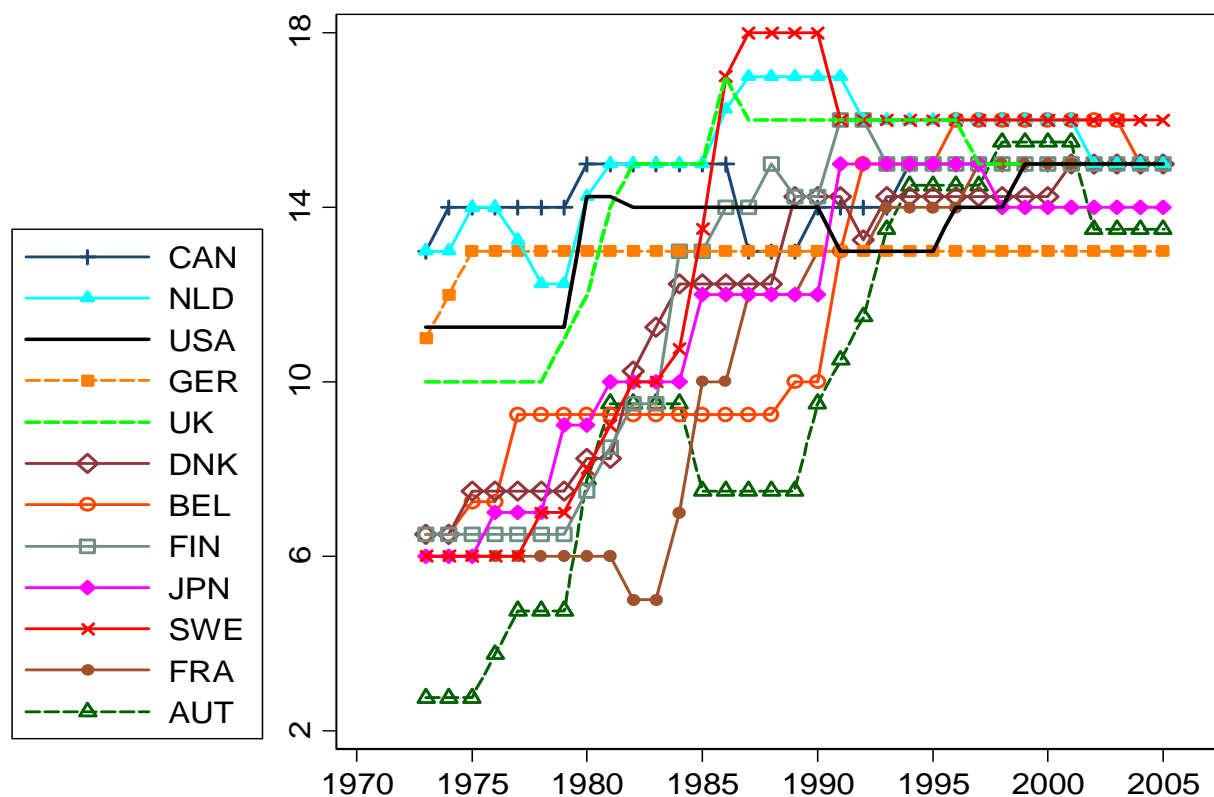
Notes: The figure reports an index of the degree to which financial markets are unregulated; higher values imply less regulation. The index is constructed by combining seven dimensions of financial reform, using data from Abiad, Detragiache and Tressel (2008). The seven dimensions are as follows. (1) Credit controls: capture restrictions on the amounts of bank lending to specific sectors or ceiling on overall credit extended by banks. (2) Interest rate controls: capture the degree to which banks are restricted in setting rates (whether floor or ceiling interest rates exist and/or bind). (3) Entry barriers: capture barriers to entry into the financial system which may take the form of restrictions on the participation of foreign banks; restrictions on the scope of banks' activities; restrictions on the geographic area where banks can operate; or excessively restrictive licensing requirements. (4) Privatization: captures the degree to which the government is not involved directly in financial services (using thresholds of 50 percent, 25 percent and 10 percent of state ownership to differentiate between full state control and full liberalization, respectively). (5) Capital account restrictions: capture having multiple exchange rates for various transactions, as well as transactions taxes or outright restrictions on inflows and/or outflows. (6) Securities market development captures policies that governments use to encourage development of securities markets; these include auctioning of government securities, establishment of debt and equity markets and policies to encourage development of these markets (such as tax incentives or development of depository and settlement systems), and policies to promote the openness of securities markets to foreign investors. (7) Prudential regulation and supervision: captures whether a country adopted risk-based capital adequacy ratios based on the Basle I capital accord, and whether the banking supervisory agency is independent from the executive's influence and has sufficient legal power. Each index originally ranges from 0 to 3, where 0 indicates the most restrictive regulations, except in 7, where 3 inidcates the most restrictive regulation. The deregulation index is the sum of indices 1 to 6 minus index 7.