International Financial Remoteness and Macroeconomic Volatility

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Introduction

- Effect of financial integration on macroeconomic volatility predicted by theory is ambiguous

- Negative effect: Enhanced financial depth

  o Ease adjustment to shocks
  o Greater diversification of risk

- Positive effect

  o Increased specialization
  o More exposure to external shocks

- This paper introduces alternative indicator of international financial integration

    o Identify "financial remoteness" with physical distance from world financial activity

    o Log of great-circle distance to closest major international financial center (London, New York, Tokyo)

- We then search for, and find, an effect of this measure of remoteness on volatility

- Relationship can be interpreted as examination of joint hypothesis:

  o countries closer to major financial centers more financially integrated

  o financial integration reduces macroeconomic volatility

- Contrary to measures in literature, integration measure plausibly exogenous

  o Distances not influenced by policy

  o Invariant to macroeconomic shocks

  o Also run robustness check with largest countries in sample removed

    ▪ Little influence of individual small countries on location of major IFCs

    ▪ Regional dummies

- Results

  o Robustly positive and significant relationship between financial remoteness and volatility

  o 1 s.d. increase in financial remoteness increases output volatility by 15.4%

- Effect is robust, but some sensitivity

- Stronger positive effect than commonly found in literature

Literature

- Geography role in finance not obvious:

    o cost of transmitting assets to New York or Tokyo
      identical

    o But "gravity models" of financial flows perform
      well [Portes and Rey (2005)]

- One answer may be that information asymmetries increase with distance

  o Coval and Moskovitz (1999, 2001): Fund managers in U.S. invest more in and earn larger returns from more proximate firms

  o Malloy (2005) geographically proximate analysts tend to be more accurate

  o Petersen and Rajan (2002) borrower quality increases with distance

  o Berger (2005) larger banks lend greater distances

- Theoretical underpinnings for distance and financial intgration

  o Martin and Rey (2004,2006) international assets carry additional transaction costs

  o integration decreasing in physical distance

  o Rose and Spiegel (2007) cost of moving assets to offshore banks increasing in distance

  o Offshore banking share decreasing in distance

- Theoretical impact of financial integration on output volatility ambiguous

    o Increased specialization of production bundle [Kalemli-Ozcan, et al (2003)]

    o Financial depth helps smooth shocks[Caballero and Krishnamurthy (2001)]

    o Most models predict decline in consumption volatility [e.g. Mendoza (1994), Baxter and Crucini (1995) and Sutherland (1996)]

- Empirical evidence on financial integration and volatility mixed

  o Output volatility

    - O'Donnell (2001) positive relationship in non-OECD, negative relationship among OECD

    - Buch, et al (2005) no relationship

    - Prasad, et al (2003) negative from 1960-1999, but not in later periods

o Consumption volatility

- Bekaert, et al (2006) negative relationship

- Kose, et al, (2005) negative for *de jure* integration, insignificant for *de facto*

- Prasad, et al, (2003) no measurable correlation for ratio of consumption volatility to income volatility (consumption smoothing)

Empirical Methodology

- Default specification:

$$\text{Vol}_{i\tau} = \beta \text{IntFinRem}_i + \gamma_1 \text{DomFin}_{i\tau} + \gamma_2 \text{Inst}_{i\tau} + \gamma_3 \text{Open}_{i\tau} + \gamma_4 \text{Govt}_{i\tau} + \gamma_0 + \varepsilon_i$$

- $\text{Vol}_{i\tau}$ measure of business cycle volatility for country i over period τ,
- IntFinRem_i measure of international financial remoteness
- $\{\gamma\}$ set of nuisance coefficients,
- DomFin measure of domestic financial depth,
- Inst measure of domestic political-economy institutions,
- Open ratio of trade to GDP,
- Govt ratio of government spending to GDP, and
- ε other determinants of business cycle volatility (i.i.d).

- Coefficient of interest is β, effect of remoteness on volatility

- Estimate using OLS, with heteroskedasticity-corrected standard errors

- Variety of ways to measure volatility and key regressors

- Therefore choose reasonable indicators and do a lot of robustness checking

- Measures of business cycle volatility

  o s.d. of real GDP growth between 1994 and 2004

  o longer (27-) and shorter (5-year) periods

  o pooled data across five 11-year periods between
    1950 and 2004

  o also examine comparable *volatility of consumption*
    and the *lowest* GDP growth rate

  o de-trended cross-sections of volatility over entire
    sample (Baxter-King, Hodrik-Prescott)

- Measures of international financial remoteness

    o Natural log of great-circle distance to closest major financial center (London, New York, or Tokyo

        ▪ Mauritius and Lesotho are most remote

        ▪ Belgium and the Netherlands are the least
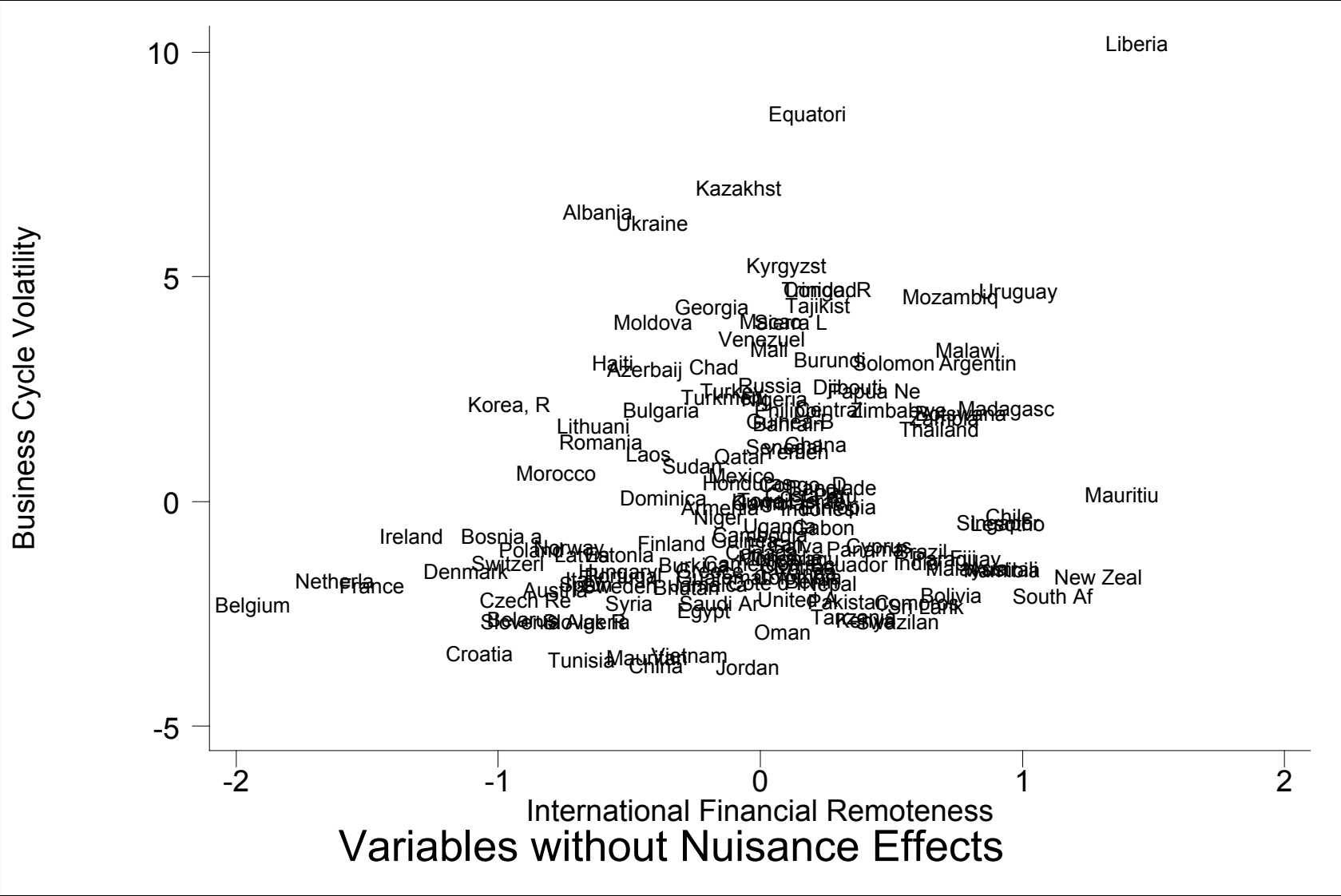
- 3 alternative measures

  o Distance to closest OFC

  o Distance to countries with large stocks of international debt or assets (CPIS data)

  o Distance to countries with large gross flows of capital exports (IFS data)

- Other controls

  o Financial depth, measured as domestic credit provided by banking sector as a share of GDP, or M3/GDP

  o Polity measure: autocracy vs. democracy

    ▪ Also executive constraints: unlimited authority to subordination

  o Trade openness

  o Government spending/GDP

Scatter-plot of Volatility against Remoteness

Business Cycle Volatility (y-axis): 0, 5, 10, 15

International Financial Remoteness (x-axis): 5, 6, 7, 8, 9

Key Variables, 1994-2004

Scatter-plot of Volatility against Remoteness, Residuals

Table 1:
International Financial Remoteness and Business Cycle Volatility

	Remoteness	Bank Credit %GDP	Polity2	Trade %GDP	Govt Exp %GDP	Obs.
Default (11-yr c/s, 1994-2004)	1.00** (.38)	.01 (.01)	-.12** (.04)	.007 (.005)	.05* (.02)	143
27-yr c/s, 1977-2003	.62* (.29)	.00 (.01)	-.16** (.03)	.003 (.003)	.044* (.018)	121
5-yr c/s, 2000-04	1.22** (.35)	-.01 (.01)	-.056 (.044)	.014 (.007)	-.007 (.025)	140
Pooled across 5 11-yr periods	.70** (.20)	.00 (.01)	-.12** (.02)	.009* (.004)	.038** (.011)	475
Drop countries <25 million pop.	1.14** (.39)	.01 (.01)	-.16** (.05)	.002 (.005)	.05 (.03)	106
Drop countries <10 million pop.	1.06* (.50)	.01 (.01)	-.16* (.05)	.002 (.005)	.06 (.03)	79
Drop countries >$20k GDP p/c	.93 (.48)	.01 (.01)	-.12** (.04)	.009 (.007)	.04 (.02)	121
Drop countries >$10k GDP p/c	.62 (.63)	.01 (.01)	-.12* (.05)	.016 (.009)	.03 (.03)	102
Drop >|2σ| outliers	.86** (.19)	-.001 (.003)	-.17** (.03)	.006* (.003)	.03* (.01)	77

Table 1 continued

	Remoteness	Bank Credit %GDP	Polity2	Trade %GDP	Govt Exp %GDP	Obs.
Add regional dummies	1.31** (.41)	.01 (.01)	-.13** (.04)	.005 (.005)	.017 (.020)	139
Drop East Asia, Pacific	.97* (.40)	.01 (.01)	-.15** (.04)	.008 (.005)	.04 (.02)	127
Drop Latin American/Caribb.	1.08** (.41)	.01 (.01)	-.12** (.04)	.008 (.005)	.05* (.02)	118
Drop Sub-Saharan Africa	.49 (.33)	-.023** (.006)	-.09* (.04)	.010** (.004)	.06 (.03)	98
Drop Central Asia Trans. Europe	1.26** (.39)	.01 (.01)	-.12** (.04)	.006 (.005)	.01 (.02)	115
Add log of latitude	.97* (.41)	.01 (.01)	-.13** (.04)	-.043 (.326)	.007 (.005)	139
Add landlocked, island dummies	1.14** (.43)	.01 (.01)	-.12** (.04)	.009 (.005)	.04 (.02)	139
Substitute M3, %GDP	.69 (.39)	-.00 (.02)	-.11** (.04)	.007 (.006)	.04* (.02)	135
Substitute Exec Constraint	.83* (.35)	.01 (.01)	-.53** (.13)	.007 (.005)	.05* (.02)	141
Substitute Min Growth Rate	-2.2** (.8)	-.01 (.02)	.12 (.09)	-.01 (.01)	-.06 (.05)	143

- Default specification results

  o Remoteness enters positively and significantly

  o Effect economically important:

    ▪ 1 s.d. increase in remoteness estimated to result in 15% increase in volatility

- Among conditioning variables, Polity enters with statistically and economically significant coefficient

    ▪ 1 s.d. increase in remoteness estimated to result in 17% increase in volatility

Robustness Checks

- Significance of positive β robust to

  o changing time period

  o dropping very large or small countries

  o removing outliers

  o adding regional dummies

  o dropping countries from various regions (except Sub-Saharan Africa)

o alternative measures of control variables

o alternative measures of volatility

- Insignificant with rich countries excluded, but coefficient still positive

- Overall, greater remoteness always associated with more business cycle volatility with similar magnitudes

  o Estimates not always significant

  o weaker than Polity, but stronger than other conditioning variables

Sensitivity Analysis

- Different measures of financial remoteness

    o Log of great-circle distance to closest OFC

    o Distance to closest of 8 countries with largest gross stocks of portfolio liabilities (CPIS)

    o Distance to closest of 10 countries with largest K-inflows

    o Corresponding equity and portfolio capital flow measures (IFS)

Table 2:
Different Measures of International Financial Remoteness

Distance to Closest:	Remoteness	Obs.
Offshore Financial Center	.58 (.30)	146
Eight Largest Gross Debtors (CPIS data set)	.72* (.31)	140
Ten Largest Gross Creditors (CPIS data set)	.71* (.31)	138
Ten Countries with Largest Gross Capital Outflows (IFS data set)	.78* (.32)	134
Ten Countries with Largest Gross Equity + Portfolio Capital Outflows (IFS data set)	.67* (.31)	134
Ten Countries with Largest Gross Capital Inflows (IFS data set)	.50* (.25)	134
Ten Countries with Largest Gross Equity + Portfolio Capital Inflows (IFS data set)	.60* (.30)	134

- We then repeat with averages, instead of closest

Table 2 continued

Average Distance to:	Remoteness	Obs.
Eight Largest Gross Debtors (CPIS data set)	.74 (.50)	140
Ten Largest Gross Creditors (CPIS data set)	.65 (.46)	138
Eight Largest Gross Debtors (CPIS data set), Weighted by liabilities	.93 (.60)	140
Ten Largest Gross Creditors (CPIS data set), Weighted by assets	.84 (.61)	138
Ten Countries with Largest Gross Capital Outflows (IFS data set)	.65 (.46)	134
Ten Countries with Largest Gross Capital Inflows (IFS data set)	.50 (.37)	134

- Results

  o Somewhat weaker than benchmark results, but always positive

  o Effect of distance to closest varies between 0.5 and 0.9

  o 6 of 7 significant at the .05 level

  o results for averages also always positive, but not significant

Table 3: Consumption instead of GDP

	Remoteness	Obs.			Remoteness	Obs.
Default (11-yr c/s, 1994-2004)	.98* (.40)	139		Add regional dummies	.95* (.42)	139
27-yr c/s, 1977-2003	.80* (.31)	117		Drop East Asia, Pacific	.81* (.40)	127
5-yr c/s, 2000-04	1.28** (.40)	136		Drop Latin American/Caribb.	.95* (.42)	118
Pooled across 5 11-yr periods	.90** (.24)	464		Drop Sub-Saharan Africa	.59 (.42)	98
Drop countries <25 million pop.	.99* (.40)	106		Drop Central Asia Trans. Europe	1.47** (.40)	115
Drop countries <10 million pop.	1.02 (.54)	76		Add log of latitude	.77 (.46)	139
Drop countries >$20k GDP p/c	.74 (.53)	121		Add landlocked, island dummies	1.31** (.43)	139
Drop countries >$10k GDP p/c	.45 (.64)	102		Substitute M3, %GDP	.59 (.43)	131
Drop >|2σ| outliers	1.39** (.21)	67		Substitute Exec Constraint	.91* (.38)	138

- Consumption volatility results

o Coefficients close to those for output volatility

o Statistically significant at 5% level

o Results reasonably robust

o Reassuring that we get similar results given sensitivity to model specification

- Entire sample of up to 55 years of annual data

    o De-trend by Baxter-King and H-P filters

    o Then compute s.d. of de-trended GDP

- Also do sensitivity checks

    o Sample limited to < 10 million population

    o Consumption volatility instead of GDP

    o Minimum de-trended growth instead of s.d.

Table 4: Full-Sample Analysis over 1950-2004

Regressand is Standard Deviation of:	Remoteness	Obs.
1st- differenced GDP	.39 (.23)	66
HP-filtered GDP	.37 (.37)	66
BK-filtered GDP	.54 (.28)	66
1ST-differenced consumption	.68** (.24)	66
HP-filtered consumption	.83* (.35)	66
BK-filtered consumption	.89* (.37)	66
1st-differenced GDP, Drop countries with <10 million pop.	.64* (.31)	34
HP-filtered GDP, Drop countries with <10 million pop.	.82** (.31)	34
BK-filtered GDP, Drop countries with <10 million pop.	.50 (.59)	34
Regressand is Minimum of:		
1st- differenced GDP Growth	-1.13 (.61)	66
HP-filtered GDP	-.75 (.96)	66
BK-filtered GDP	-1.34 (.79)	66

o Results

    o Consistently positive, but only 5 of 12 significant

    o Reason for caution

    o Do obtain significant positive coefficients for volatility of consumption growth

Table 5:
Time-Variation in the Effect of International Financial Remoteness

11-year periods	Remoteness	Obs.		5-year periods	Remoteness	Obs.
1950-1960	.54 (.31)	40		1960-1964	.29 (.39)	61
1961-1971	.24 (.24)	68		1965-1969	.23 (.24)	76
1972-1982	.16 (.33)	103		1970-1974	.47 (.31)	90
1983-1993	.72* (.28)	121		1975-1979	.25 (.38)	100
1994-2004	1.00** (.38)	143		1980-1984	.55 (.36)	107
				1985-1989	.61* (.26)	113
				1990-1994	.57 (.30)	122
27-year periods						
1950-1976	.17 (.28)	54		1995-1999	.62 (.32)	142
1977-2003	.62* (.29)	121		2000-2004	1.22** (.35)	140

- Time variation results

  o Effect of remoteness seems to rise over time in both economic and statistical significance

  o Supported in both 27-year period cross sections, and in 5-year periods

  o Impact of financial remoteness appears to be increasing over time, though technological barriers are falling

Conclusion

- Use distance as indicator of financial remoteness

- Search for impact on macroeconomic volatility

- Find that remoteness increases volatility

- Results robust to alternative measures of both financial remoteness and volatility

- Size of effect varies and not always significant

- Still, always positive and usually large

- Some caveats

    o Sensitive to exclusion of rich countries

    o Remoteness effect not as strong as institutions, measured by polity

    o Still, stronger results for international financial integration than most previous empirical studies

    o Remoteness effect comparable to domestic financial markets, openness, or government size

- Impact of financial remoteness appears to increase over time

    o Consistent with growing role for financial integration

        ▪ May explain weaker results in earlier studies

    o Alternatively, our measure may be more exogenous

o   Study only provides indirect evidence that remoteness affects volatility through impact on international financial integration

o   Therefore interpret results narrowly

- Evidence that geography matters

- Silent on merits (or lack thereof) of capital flow restrictions

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