Financial Intermediation and Macroeconomic Efficiency

Yves Kuhry

Université Louis Pasteur, Strasbourg

Laurent Weill

Université Robert Schuman, Strasbourg

Introduction 1/2

- Two key findings on the determinants of economic development in the last decade:
  - Factor accumulation is not the dominant engine of growth (Easterly and Levine, 2001; Caselli, 2005).
  - Positive impact of financial development on growth, and especially of the development of financial intermediaries (Levine et al., 2000).

  => Interest to investigate the role of financial development on productivity for a better understanding on the cross-country differences in economic development.

Introduction 2/2

- **Aim of the paper:** to investigate the relationship between financial intermediary development and productivity.

- **Contributions:**
  - Productivity measured with frontier efficiency techniques.
  - We test which dimension of financial intermediary development matters for productivity.
  - We use the generalized method-of-moments (GMM) dynamic panel estimators to address potential endogeneity.

Outline of the presentation

- Background
- Methodology
- Data and variables
- Empirical results

Background 1/3

- **How does financial intermediary development influence productivity ?**

- The financial system provides several functions that reduce information, enforcement, and transactions costs in financing decisions and transactions (Levine, 2005).

- All functions affect the reduction of the costs of financing decisions or the promotion of technological innovation.

Background 2/3

Those functions are:

1. Producing ex ante information about possible investments and providing a better allocation of capital.
2. Monitoring firms and exerting corporate governance.
3. Pooling savings: reducing of transaction and information costs.

=> All these arguments support the view that financial intermediary development should raise productivity.

Background 3/3

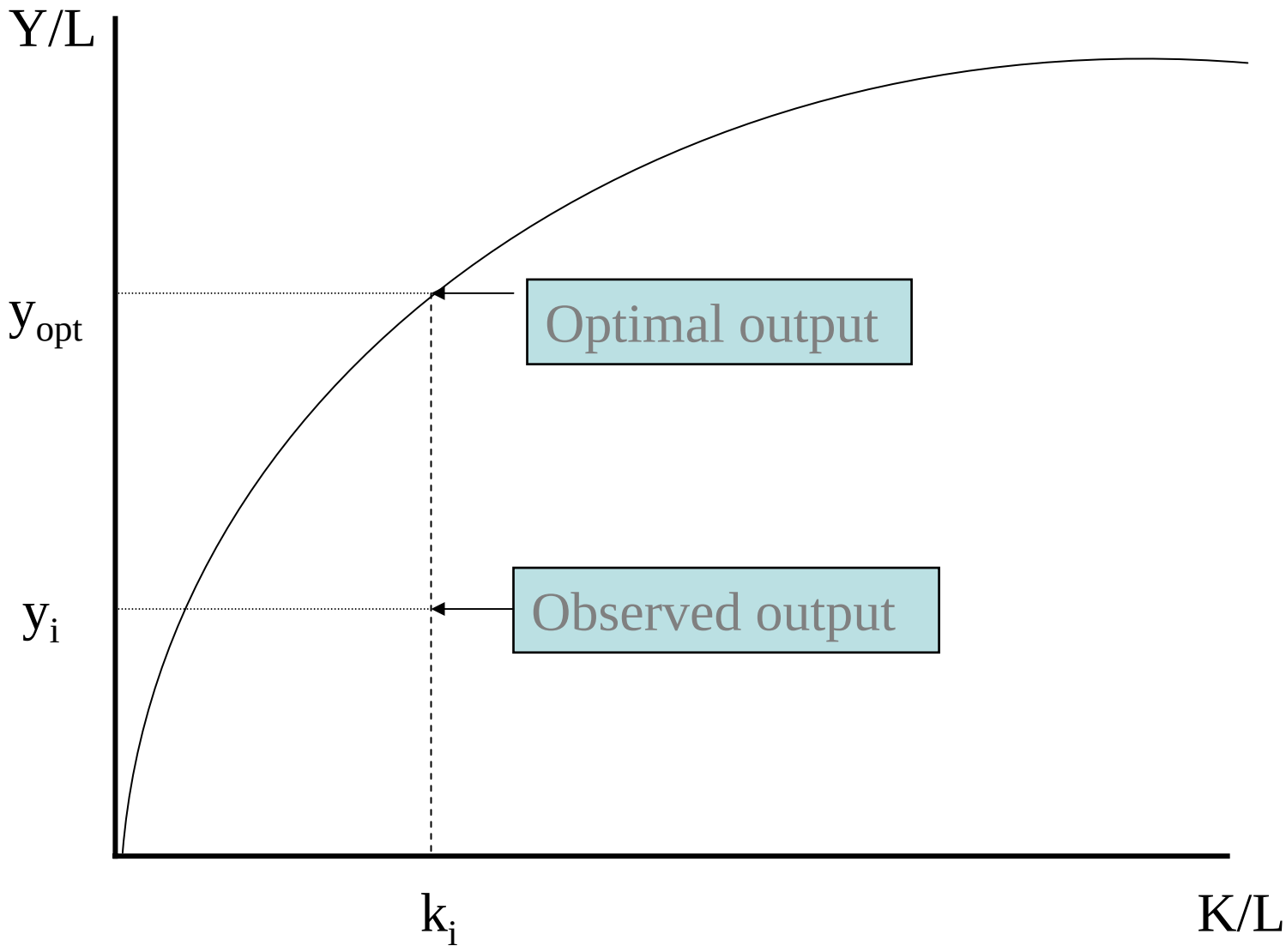
- Some counterarguments however emphasize the fact that financial liberalization may increase the probability of financial crises and thus hamper growth.

- Theoretical arguments: Rajan (1994) and Dell-Aricia and Marquez (2006) show that financial liberalization can lead to a greater volatility of output growth, and may even reduce output growth.

- Empirical arguments:
  - De Gregorio and Guidotti (1995): negative link between financial development and growth for Latin American countries for 1960-1985.
  - Ranciere and Loayza (2005): negative short-term link for a wide sample of countries for 1960-2000.

Methodology: measuring efficiency 1/5

- **Frontier efficiency techniques.**
- The best performance is unknown.
- Instead, each country is compared with the best-practice countries.
- The efficiency score measures the distance from the efficiency frontier.
- Technical efficiency measures how close a country's production is to what a country's optimal production would be for using the same bundle of inputs.


Y/L
y_{opt}
Optimal output
y_i
Observed output
k_i
K/L

Methodology: measuring efficiency 3/5

- Several frontier efficiency techniques (SFA, DEA…).
- Application of the **stochastic frontier approach** to estimate the efficiency frontier.
- Key assumption: output deviates from the optimal output by a random disturbance and an inefficiency term.
- Cobb-Douglas functional form for the production frontier.
- We assume constant returns-to-scale.
- Robustness of the macroeconomic efficiency frontiers to the choice of frontier technique and the nature of returns-to-scale (Weill, 2006).

Methodology: measuring efficiency 4/5

- Production frontier:

$$\ln(Y/L)_{it} = \alpha_0 + \alpha_1 \ln(K/L)_{it} + \alpha_2 \ln (H/L)_{it} + \varepsilon_{it}$$

- Error term: $\varepsilon_{it} = v_{it} - u_{it}$
  - v_{it} : a random disturbance, reflecting luck or measurement errors. Assumed to have a normal distribution.
  - u_{it} : the inefficiency term. Assumed to have a half-normal distribution.

Methodology: measuring efficiency 5/5

Why measuring productivity with stochastic frontier approach?

1. **Synthetic indicators of performance:** they allow to include several input dimensions in the evaluation.
2. **Relative measures of performance:** each country is compared to the best-practice countries.
3. **Disentangles efficiency from good and bad luck:** TFP measures assess performance by the whole residual from the production function, despite exogenous events may also affect this residual.

   SFA does not.

Methodology: dynamic GMM estimators 1/2

- Application of the dynamic panel GMM techniques (Arellano and Bond, 1991, Arellano and Bover, 1995) to check the consistency of the positive link between financial intermediary development and efficiency.
- Applied by Levine, Loayza and Beck (2000) and Beck and Levine (2004).
- Benefits:
  - Permits the use of instrumental variables for all regressors: answer to the potential endogeneity of regressors and the simultaneity bias between financial intermediary development and efficiency.
  - Controls for the omitted variable bias created by unobserved country-specific effects.

Methodology: dynamic GMM estimators 2/2

- System panel estimator (Arellano and Bover, 1995, Blundell and Bond, 1998).
- It presents certain problems when applied to samples with a small number of cross-sectional units.
- To address these problems:
  - We consider a one-step estimator.
  - We use a period with a greater number of countries.
  - We include a limited number of control variables at a time.

Data and variables 1/3

- Sample of 41 countries for 1991-1995.
- Macro data:
  - **Output (Y):** GDP in purchasing power parity dollars.
    From the Penn World Tables 5.6.
  - **Physical capital (K)**: aggregate investment, which is a measure of capital stock based on a perpetual inventory method.
    From Easterly and Levine (2001).
  - **Labor (L)**: number of workers.
    From Easterly and Levine (2001).
  - **Human capital (H)**: total number of years of schooling in the working-age population over 15 years old.
    From the Barro-Lee (2000) dataset.

Data and variables 2/3

- Control variables from Beck et al. (2000)'s dataset:
  - **Trade Openness**: ratio of trade to GDP.
  - **Inflation Rate**: logarithm of (1+inflation rate) to limit the influence of extreme values of the inflation rate.
  - **Government Size**: ratio of government expenditures to GDP.

Data and variables 3/3

- Financial intermediary development variables from Beck et al. (2000)'s dataset:
  - **PrivateCredit**: the ratio of the volume of credit to private companies to GDP.

    Information on the size of the financial industry and on who benefits from credit.
  - **LiquidLiabilities**: liquid liabilities to GDP.

    Information on financial depth.
  - **CommercialCentralBank**: the ratio of commercial banks assets to the sum of commercial banks and central bank assets.

    Information on who grants credit.

Results with PrivateCredit

	(1)	(2)	(3)
Intercept	0.618*** (0.00)	0.798*** (0.00)	0.689*** (0.00)
Private Credit	**0.291** (0.03)**	**0.125* (0.07)**	**0.258*** (0.01)**
TradeOpenness	0.001 (0.57)		
InflationRate		-0.360** (0.05)	
GovernmentSize			-0.004 (0.99)
Sargan test	20.58 (0.72)	57.00*** (0.00)	28.29 (0.29)
AR1 test	-3.21*** (0.01)	-3.90*** (0.00)	-3.01*** (0.01)
AR2 test	1.39 (0.16)	1.01 (0.32)	1.61 (0.11)

Results with LiquidLiabilities

	(1)	(2)	(3)
Intercept	0.585*** (0.00)	0.823*** (0.00)	0.823*** (0.00)
LiquidLiabilities	**0.253 (0.15)**	**0.068 (0.43)**	**0.307** (0.03)**
TradeOpenness	0.001 (0.44)		
InflationRate		-0.359** (0.02)	
GovernmentSize			-0.985** (0.04)
Sargan test	21.25 (0.68)	64.92*** (0.00)	19.45 (0.78)
AR1 test	-2.84*** (0.01)	-4.07*** (0.00)	-3.10*** (0.01)
AR2 test	1.48 (0.14)	1.03 (0.31)	2.18** (0.03)

Results with CommercialCentralBank

	(1)	(2)	(3)
Intercept	0.499*** (0.00)	0.713*** (0.00)	0.788*** (0.00)
CommercialC.	**0.248 (0.15)**	**0.175 (0.22)**	**0.233*** (0.03)**
TradeOpenness	0.002 (0.13)		
InflationRate		-0.350** (0.05)	
GovernmentSize			-1.042* (0.08)
Sargan test	29.94 (0.23)	63.56*** (0.00)	27.34 (0.34)
AR1 test	-3.21 (0.01)	-3.67*** (0.00)	-3.21*** (0.01)
AR2 test	0.67 (0.50)	0.56 (0.58)	0.35 (0.73)

Results: comments

- **Results:**
  - Positive coefficients for all three financial intermediary development variables.
  - The significance of the coefficients differs according to the control variable.
  - PrivateCredit is the most robust financial intermediary development measure influencing efficiency.
- **Main conclusion:**

  Financial intermediary development exerts a positive impact on efficiency.

Conclusion

- New empirical evidence on the finance-growth nexus.
- **Financial intermediary development fosters efficiency after controlling for potential endogeneity and omitted variables bias.**
- Credit to private sector / GDP is the most robust measure related to efficiency.
- Normative implications: to support the development of financial intermediation.
- Extensions: to investigate the role of the development of financial markets, both alone and with financial intermediary development.