

Globalisation, Productivity Growth and Employment-A Cross Country Analysis

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Introduction and Summary



- Globalization and financial development have affected growth processes across countries.
- Reexamine empirical tests of existing theories and models.
- Focus: Cross country-growth, convergence, and explanatory variables.
 - GDP per capita, GDP per worker, TFP, Employment
- Findings: Statistically significant evidence that countries farther from the frontier catch up, and that financial development and globalization support this catching up.

Background and Existing Questions



- Workhorse Solow model limited in scope.
- We would like to address questions like:
 - Can we disentangle how trade has impacted direct technology transfer versus technology embodied in new capital goods?
 - Can we quantify the effect of skill mismatch in accounting for cross country growth differences?
 - Can we distinguish between the role of R&D in producing new technologies to foster growth versus adopting existing foreign technology?
 - What complementary investments are required to implement the latest technology and what is the finance sector's role in this?
 - How have trade and finance affected “convergence clubs”?

Modeling Approach

- Cross country-growth regressions:

$$Y_{it} = \alpha Y_{it-1} + \beta X_{it} + u_i + \varepsilon_{it} \quad (2)$$

- i : country
- t : time
- Y_{it} : macro variable of interest
- α : reflects speed of convergence
- X_{it} : explanatory variables of interest
- u_i : country specific effect (drops when taking first difference of (2):

$$\Delta Y_{it} = \alpha \Delta Y_{it-1} + \beta \Delta X_{it} + \Delta \varepsilon_{it} \quad (3)$$

- $\varepsilon_{it} \sim N(0, \theta^2)$

- Estimating equation:

$$\Delta Y_{it} = \alpha \Delta Y_{it-1} + \beta \Delta X_{it} + \Delta \varepsilon_{it} \quad (3)$$

- Econometric problems
 - error correlated with regressor.
 - Controls likely endogenous.
- Solution: Dynamic Panel Data Methods
 - Arellano and Bond (1991)
 - Caselli, Esquivel, Lefort (1996) (CEF96)

Econometric Issues: Aside

- How DPDM ‘solves’ the econometric problems.
- Assumptions:
 - No serial correlation in errors.
 - Stock variables in the control set are predetermined.
 - Flow variables in the control set are not predetermined for ε_{it} but are for ε_{it+1} .
- As a result:
 - When estimating effects on $Y_2 - Y_1$ as a function of $Y_1 - Y_0$ and explanatory variables, Y_0 and the stock variables in X_0 are valid instruments.
 - In the next period, Y_0 , the stock and flow variables in X_0 , Y_0 , and the stock variables in X_1 , and Y_1 are valid instruments....
 - Taken from CEF96.

Data and summary statistics

• Total 35 countries, 1990-2014

Table -!: summary Statistics on the performance of the sample countries(38) during 1990 to 2014.

| Variable | Obs | Mean | Std. Dev. | Min | Max | | |
|----------|-----|----------|-----------|-----------|----------|---------|---|
| -----+ | | | | | | gdpppe | GDP per effective employment |
| gdpppe | 950 | 28445.63 | 16827.37 | 2458 | 68374 | | |
| fdgdppe | 912 | 1.538338 | 3.393527 | -17.76066 | 17.5902 | pcgdp | Per capital GDP |
| pcgdp | 950 | 19127.82 | 17524.11 | 399.3269 | 69094.74 | | |
| fdpcgdp | 912 | 2.15925 | 3.271447 | -14.38515 | 18.62113 | tdop | Trade openness |
| tdop | 949 | 69.10239 | 57.21661 | 13.75305 | 439.6567 | | |
| -----+ | | | | | | dcp | Domestic credit private sectors provided by the financial institution |
| dcp | 948 | 100.8296 | 62.35658 | 6.69741 | 373.7896 | | |
| tfp | 950 | .9789493 | .0964521 | .5910667 | 1.236055 | tfp | Total Factor Prod. |
| imports | 944 | 34.24833 | 26.631 | 4.631322 | 209.3877 | | |
| fdinif | 948 | 2.980203 | 5.303416 | -5.647104 | 88.09634 | imports | Imports |
| ncf | 950 | 4576123 | 8117277 | 43525.46 | 6.56e+07 | fdinif | Net inflow FDI |
| -----+ | | | | | | ncf | Net capital formation |
| fdi | 949 | 16069.84 | 32871.23 | -28293.89 | 314007 | fdi | Foreign direct invest. |
| hc | 950 | 2.730694 | .5987706 | 1.327254 | 3.734285 | hc | Human capital (years of schooling and returns to educ.) |
| ----- | | | | | | | |

- Summary: Within this set of countries, there are significant differences in these performance measures. (Basically OECD countries, +/-)

Results: Output Levels

Dependent Variable PCGDP

| pegdp | Coef. | z | P> z |
|--------|-----------|--------|-------|
| L1. | .8859625 | 126.28 | 0.000 |
| tdop | 11.72707 | 5.82 | 0.000 |
| tfp | 9302.775 | 17.60 | 0.000 |
| rpcgdp | 70.37314 | 4.98 | 0.000 |
| _cons | -7835.984 | -15.21 | 0.000 |

Sargan Test: $\chi^2(279) = 729.1117$
 Prob > $\chi^2 = 0.0000$

Wald $\chi^2(4) = 37499.71$
 Prob > $\chi^2 = 0.0000$

Dependent Variable PCGDPPE

| gdpppe | Coef. | z | P> z |
|--------|-----------|-------|-------|
| L1. | .8124322 | 61.39 | 0.000 |
| tdop | 21.60443 | 6.65 | 0.000 |
| tfp | 8448.69 | 8.65 | 0.000 |
| rgdppe | -338.2322 | -2.92 | 0.004 |
| _cons | -2693.651 | -2.59 | 0.010 |

Sargan test of overidentifying restrictions:
 $\chi^2(279) = 525.8419$
 Prob > $\chi^2 = 0.0000$

Wald $\chi^2(4) = 11494.17$
 Prob > $\chi^2 = 0.0000$

| | |
|--------|--|
| gdpppe | GDP per effective employment |
| pcgdp | Per capital GDP |
| tdop | Trade openness |
| tfp | Total Factor Prod. |
| rpcgdp | Relative positions of the countries as compared to the GPF |
| rgdppe | GDP per persons employed such that the highest US GDP per persons employed has been taken as GPF |

- Conclusion: Relative position in GPF helps account for growth differences.
 - Globalization as well.

Results: Output Growth

Dependent Variable: Log difference of PCGDP

| pcgdpld | Coef | z | P> z |
|---------|-----------|-------|-------|
| pcgdpld | | | |
| L1. | .1363232 | 3.65 | 0.000 |
| lrpegdp | .0762798 | 6.29 | 0.000 |
| ltdop | .0171303 | 1.77 | 0.077 |
| ltfp | .3344811 | 9.58 | 0.000 |
| _cons | -.1240152 | -2.68 | 0.007 |

Sargan test of overidentifying restrictions:

$$\begin{aligned} \text{chi2}(256) &= 525.1298 \\ \text{Prob} > \text{chi2} &= 0.000 \end{aligned}$$

$$\begin{aligned} \text{Wald chi2}(4) &= 143.67 \\ \text{Prob} > \text{chi2} &= 0.0000 \end{aligned}$$

| lrgdppe | Coef. | z | P> z |
|---------|-----------|--------|-------|
| lrgdppe | | | |
| L1. | .6798207 | 43.23 | 0.000 |
| rgdppe | -.0514322 | -11.71 | 0.000 |
| tfp | .2716964 | 9.56 | 0.000 |
| tdop | .0007487 | 7.67 | 0.000 |
| _cons | 3.077404 | 19.26 | 0.000 |

Sargan test of overidentifying restrictions

$$\begin{aligned} \text{chi2}(281) &= 679.6165 \\ \text{Prob} > \text{chi2} &= 0.0000 \end{aligned}$$

$$\begin{aligned} \text{Wald chi2}(4) &= 12989.10 \\ \text{Prob} > \text{chi2} &= 0.0000 \end{aligned}$$

| | |
|--------|--|
| gdpppe | GDP per effective employment |
| pcgdp | Per capital GDP |
| tdop | Trade openness |
| tfp | Total Factor Prod. |
| rpcgdp | Relative positions of the countries as compared to the GPF |
| rgdppe | GDP per persons employed such that the highest US GDP per persons employed has been taken as GPF |

- Conclusions: Globalization, distance to GPF, and technology positive and significant contributors to growth.
- Coefficient on rpcGDP supports Gerschenkron hypothesis that countries further from GPF will grow faster.

Results: Employment Growth

Table-5: GMM estimates of Employment growth (sample period= 1990-2014; sample size=20 countries)

Dependent Variables log difference of Total employment

| ltmpd | Coef. | z | P> z |
|----------|-----------|-------|-------|
| ----- | | | |
| ltmpd | | | |
| L1. | .4270899 | 10.06 | 0.000 |
| | | | |
| lrd | -.0084215 | -1.96 | 0.050 |
| ltdop | .0286231 | 4.72 | 0.000 |
| fdiofgdp | .0009343 | 2.47 | 0.014 |
| lgdp | -.0002534 | -0.04 | 0.964 |
| ----- | | | |

Sargan test : Wald chi2(5) = 185.31
 Prob > chi2 = 0.0000

chi2(252) = 324.7424
 Prob > chi2 = 0.0013

| | |
|----------|--------------------------|
| ltmpd | Employment |
| lrd | Research and Development |
| ltdop | Trade openness |
| fdiofgdp | FDI to GDP ratio |

- **Conclusions:** R&D has a negative impact on employment growth. Intuition: R&D improves technology and technology is labor saving.
- Globalization is an overall positive for employment growth.

Conclusions

- Large economic disparities between countries persist after globalization.
- Distance from frontier matters, i.e. strong evidence of catching-up effect.
- Trade, financial development, R&D, are important in accounting for this catching up effect.
- Evidence of Gerschenkron hypothesis using latest econometric methods and current data.
- Encouraging growth requires more than just adopting latest technologies, this should be supported by financial development and complementary investments in human capital.

Discussion (1)

- No disputing the motivating questions in the paper:
 - “What explains the large disparities in the level and growth of per capita income across countries since globalization?”
 - “Why does tech. differ across countries? Is it due to the inappropriateness, or the lack of absorptive capacities, or the inadequate supply of skilled labor force in the technologically laggard countries?”
 - “Why does employment and emp. growth vary across countries?”
- It is an interesting exercise to integrate latest data on globalization, tech., and financial development to understand these patterns.
- But, it is important to have in mind some issues of the growth regressions approach.
 - According to Durlauf, Johnson, Temple (2005): at least 145 different regressors are reported to be statistically significant in published studies.
 - Useful guide to rule out really bad theories, but hard to use this approach to differentiate most competing theories and many interesting questions on growth.
- Data comment: PWT data excludes capital services. Large body of work arguing that capital quality accounts for a significant portion of the original Solow residual.