The World Economy Annual Lecture 2015

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Why Doesn't Technology Flow from Rich to Poor Countries?

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The World Economy Annual Lecture 2015 was presented by one of the most highly cited economic growth researchers and University of Pennsylvania Professor, Jeremy Greenwood. Professor Greenwood's presentation was entitled "*Why Doesn't Technology Flow from Rich to Poor Countries*?" An intuitive summary of the presentation is given below.

The presentation sought to highlight the role of countries' financial systems with regards to the issue of technology adoption. Professor Greenwood utilized a contract model in a general equilibrium setting with financial intermediation to investigate this issue. He commenced his presentation with a quote:

> The financial superstructure of an economy accelerates economic growth and improves economic performance to the extent that it facilitates the migration of funds to the best user, i.e., to the place in the economic system where the funds will yield the highest social return. (Goldsmith, 1968).

Less developed countries have less credit to GDP than more developed ones. The efficiency of financial intermediation affects economic development through three paths – capital deepening, the reallocation of labour and capital across firms, and the choice of technology. As such firms in countries with poor financial institutions find it difficult to raise funds.

Empirical evidence indicates that countries with high interest rate spreads possess low capital-to-GDP ratios and those with high per-capita GDP tend to have high capital-to-GDP ratios. Furthermore, an observation of total factor productivity (TFP) shows that a high interest rate spread is associated with low TFP and high per-capita GDP is associated with high TFP. One explanation for such relationships is that financial systems are allocating funds to the most productive firms.

Additionally, evidence from poorer countries suggests that they utilize technologies that are different from those employed by richer countries. Firms in poorer countries tend to be smaller and their plants have lower TFP. Also, in richer countries, older plants account for more employment. Evidence from the United States, Mexico and India indicates that productivity in Mexico and India is only one-third and one-tenth respectively, of productivity in the United States. This evidence suggests that different technologies are being used.

Model Summary

In this model of contracting, there is borrowing and lending between financial intermediaries and firms. Firms are heterogeneous. Some offer a return structure of low risks for safe returns or high risks for high returns. Lenders do not know the profitability of firms. To try to find this out, intermediaries can monitor (or audit) firms. Monitoring is a costly activity, so

intermediaries must use it judiciously. Its efficacy depends on the efficiency of intermediaries, which varies across countries.

There is a simple production function where output is produced by capital, labour and country-specific total factor productivity (high and low). Firms can draw either a high or low technology shock. Information asymmetry exists in that there are different types of firms, and while intermediaries know firm types, intermediaries do not observe technology shocks unless they undertake a costly and successful audit.

Financial intermediaries borrow from consumers and lend to firms. Firms report a state (depending on the shock drawn) and payments to the intermediary are dependent on the type of state reported. Firms therefore have the incentive to cheat and report a false state. Banks only observe what firms report and if not satisfied with the reported state, they can choose to conduct audits. The success of an audit is not guaranteed.

Monitoring technology

Firms may get caught for false reporting. The odds of getting caught cheating are increasing in the amount of accountants conducting audits, increasing in the efficiency of the financial system, and decreasing in the size of the loan.

Contracting Problem

There is a capital cost to intermediaries, which is the return they must give to savers. The contract is designed so that it is always in the interest of the firm to tell the truth. Reports of bad states are punished. However, there is a limit to punishment as some firms will genuinely be in a bad state. Incentives to lie occur only in the high state and returns to lying are the difference between the returns on capital in the high and low states. To ensure that firms always tell the truth, contracts are designed so that the returns to firms from telling the truth are at least as good as the return from lying. All reported bad states are audited and all cheaters caught get maximum punishment; that is, all their output in the high state is taken away.

Competitive Equilibrium

Firms seek out the best intermediary so competition drives intermediaries to earn zero profits. As a result, contracts maximise value to firms subject to the condition that intermediaries earn zero profits on their lending activities.

Empirical Exercise

How much does Financial Development Matter?

Data show Luxembourg as possessing one of the most efficient financial systems. Endowing Turkey, for example, with Luxembourg's financial system would increase Turkey's output by 120 percent. Endowing the entire world with Luxembourg's financial system will increase world output by 65 percent. That is only a 35 percent reduction in the output gap between Luxembourg's and Turkey's outputs. This is because Turkey is poorer than Luxembourg for other reasons, such as lower levels of human capital. World TFP would increase by 74 percent.

Professor Greenwood concluded his lecture by saying that Goldsmith (1968) was exactly right. Send funds to firms that promise the highest returns. Financial systems play a role but it is not the sole driver of economic development.