



Economic Policy Papers

Innovation and Growth with Frictions

EXECUTIVE SUMMARY

The generation and implementation of new ideas are major factors in economic performance and growth. If some people are better at research and others at development, there emerges a role for an “idea market,” where technology transfers reallocate knowledge to those best able to develop and apply it. Financial institutions can facilitate this reallocation by providing credit for these transfers.

However, the idea market is rife with frictions. These include so-called search-and-bargaining problems. Another obstacle is credit friction: If a debtor reneges, it is not always easy to repossess information or otherwise prevent its use.

These obstacles lead to several monetary policy implications. First, policymakers should strive for low inflation, since that encourages investment in liquidity, which is crucial for exchanging ideas when credit is imperfect. Second, policymakers should encourage financial intermediation, since that facilitates efficient reallocation of liquidity. Fiscal policy has a role, too, but in terms of lessons for central bank policy, sound money and sound banking are engines of economic growth.

Monetary policy that provides sound banking and sound money can spur growth through innovation

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Introduction

It is commonly understood that the generation and implementation of new ideas are major factors in economic performance and growth, and conventional wisdom has it that financial institutions facilitate the process.¹

Here I summarize recent work by Chiu, Meh and Wright (forthcoming) that analyzes these issues in a framework where decisions to innovate and implement new technologies take center stage. Based on the premise that some people are better at research and others at development, their theory incorporates a market for ideas, where technology transfers reallocate knowledge to those best able to use it.

This leads to several novel policy implications, including these two: First, monetary policy should strive for low inflation, because that encourages individuals to invest in liquid assets, and liquidity is important when exchanging information. Second, policy should encourage active financial intermediation, because that facilitates the reallocation of liquid assets—and, hence, of ideas—to more productive uses. In a nutshell, sound money and sound banking are engines of economic growth.

The market for ideas

When individuals come up with ideas, should they try to implement them on their own, or should they sell them to entrepreneurs who are better at bringing them to fruition? Most economists agree that because individuals differ in skills and abilities, an economy will prosper more when some people specialize in research and others in development.² However, the market for ideas is rife with frictions that impede reallocation from researchers to developers and thus slow the advance of knowledge. The idea market is “thin” (too few sellers and buyers to easily find compatible trading partners), and participants in it bargain strategically over each trade.

A small market with strategic bargaining implies that there are costs that are hard for a researcher to recoup. Why? Economists call it the “hold-up” problem. Suppose you come up with an idea and then meet an entrepreneur who has comparative advantage at making it work. He or she offers to pay for your idea, but less than you hoped. You ask for more, arguing that you should be compensated for the cost of generating the idea. A shrewd entrepreneur counters that this cost is “sunk”—already paid and irreversibly so—and, hence, as any economist would agree, irrelevant to the negotiations.

Addressing underinvestment in ideas

Sunk costs and hold-up problems are pervasive in economics. Individuals who successfully invest in research and then bargain to sell their ideas foresee these problems and tend to underinvest relative to what is socially optimal.³ To overcome this friction, economists generally agree that such research should be publicly subsidized.

Underinvestment due to hold-up frictions is particularly harmful for innovation. This is because better technologies not only increase profit for the firms developing them, they also increase productivity, employment, wages and the general welfare of workers. Underinvestment in innovation is especially problematic because knowledge is a public good—in the longer run, as it comes into the public domain through patent expiration, anyone can use it.⁴

Economists say that markets usually undersupply public goods because producers consider only their own costs and benefits, but not those of society as a whole (since producers don’t incur or profit from them). To address this problem, Chiu, Meh and Wright develop several tax-subsidy schemes that restore efficiency to the idea market—efficiency that considers public as well as private benefits.

But they find an interesting complication in thin markets. In such markets, there can be either too little or too much participation by either sellers or buyers. In labor markets, for example, firms make costly investments to enter, and they weigh these costs against their private benefits—the probability of hiring workers times the implied profit. But they don’t consider the costs and benefits of others. These so-called search

externalities yield inefficiency unless wages are set just right, and taxes or subsidies are generally required to do so.

The idea market is similar. Participants account for their own costs and benefits but not their impact on others, exactly as in the labor market. Chiu, Meh and Wright go the extra step of finding tax-subsidy schemes that balance the failure of markets to allocate public goods against their failure to necessarily deliver efficient entry.

Credit imperfections

As mentioned earlier, there are also payment and credit frictions. Any market using credit cannot work perfectly if debtors can renege on their obligations. This is less true for secured (collateralized) lending because lenders can repossess collateral (a car or house, for example) in the event of debt nonpayment. This is easier to do than to “repossess” an idea or information.⁵

These frictions imply a role for assets. If someone wants your idea because of their expertise in developing related ideas, it facilitates the transaction if they can pay you up front.⁶

What sorts of assets can be used to facilitate such transfers? “Liquid assets” can be used in the sense that they are available to finalize deals when needed on short notice. Cash is perhaps the most liquid asset, but not the only one. Bonds can be used directly or converted into cash on short notice. This is less easy for other assets—shares in a corporation or partnership in a Havana nightclub. There are trade-offs between liquidity and return. Since liquidity is valuable to those who may need it to close deals, they are willing to pay for it, which lowers their return (payoff over cost) on liquid assets.

The role of monetary policy

Monetary policy affects this trade-off. At higher inflation, currency has a lower return, and that can lower the yield on other liquid assets. Just like a tax on good X raises the price of good Y when they are substitutes, inflation as a tax on currency raises the price of money substitutes.

Low inflation reduces the cost of liquidity embodied in currency and, hence, the cost of liquidity generally. Therefore, in addition to institutions like property rights and corrective tax-subsidy schemes for externalities and public goods, monetary policy has a key role in economic growth. Low inflation keeps down the cost of liquidity and thereby encourages trade when credit is imperfect credit, as in the market for ideas.

The role of financial institutions

There are two aspects relating to the role of financial institutions in the idea for markets, one simple and the other more subtle. The former is that financial institutions help reallocate liquidity to those with too little—for example, a potential buyer who finds

someone with a great idea that perfectly matches his or her expertise—from those with a liquidity surplus (someone without such an opportunity).

Financial intermediation is crucial in such situations because those with excess liquidity perhaps cannot find, or cannot trust, those with too little, but they can perhaps find and trust their bankers. Intermediation can also help by reducing the hold-up problem, not on sellers who invest resources to generate ideas, but on buyers who invest in liquidity by holding lower-return assets. Buyers always have the option of not trading and keeping their assets, but since low-return assets are not good saving vehicles, that is not much of a strategic threat. Financial intermediation provides a more credible threat, not to hold the assets, but to deposit them at interest, with intermediaries paying interest because they charge those short of liquidity for loans.

Conclusion

In summary, low inflation encourages investment in liquidity, and financial intermediation helps get it into the hands of the right individuals. Both policies encourage specialization in research and development, and specialization enhances efficiency when the market for ideas functions well. Through this channel, sound money and sound banking contribute to economic growth. Some of these concepts are long-standing—Adam Smith knew well that specialization enhanced efficiency; he famously illustrated this by describing division of labor in a pin factory—but it is worth revisiting them in the context of modern economic theory and policy discussions.

*Economic Policy Papers are based on policy-oriented research produced by Minneapolis Fed staff and consultants. The papers are an occasional series for a general audience. **The views expressed here are those of the authors, not necessarily those of others in the Federal Reserve System.***

Endnotes

¹ See, for example, Acemoglu (2009).

² As Katz and Shapiro (1986) note: “Inventor-founded startups are often second-best, as innovators do not have the entrepreneurial skills to commercialize new ideas or products.”

The Economist (2005) observes: “The patent ... leads to a degree of specialization that makes business more efficient. Patents are transferable assets, and by the early 20th century they had made it possible to separate the person who makes an invention from the one who commercializes it. This recognized the fact that someone who is good at coming up with ideas is not necessarily the best person to bring these ideas to market.”

Similarly, Lamoreaux and Sokoloff (1999) write: “The growth of the U.S. economy over the nineteenth century was characterized by a sharp acceleration of the rate of inventive activity and a dramatic rise in the relative importance of highly specialized inventors as generators of new technological knowledge. ... The evolution of a market for technology played a central role in these developments.”

³ Those who don’t anticipate hold-up problems don’t stay in business for long.

⁴ Most commodities are “rival” in the jargon of economists—the benefit to one person of using them is reduced when others use them; think of a wrench or a chair. But a “public good” like knowledge can be used by many without reducing its benefit to others who use it; think of algebra or poetry. (Of course, it may initially reduce the profit of the researcher or developer, which is why subsidization is required.)

⁵ If someone uses your credit for research that develops an idea and fails to pay you back, can you repossess the idea? You have some recourse, depending on intellectual property rights, patent protection and other institutions, but technology transfer seems especially subject to credit frictions.

⁶ While a joint venture, equity share or other arrangements are possible, they are often inferior. People sharing profits are less willing to contribute time and effort to projects. Another reason: Innovators have an advantage in coming up with ideas, making it desirable to send them “back to the drawing board” rather tying them up in development. These are clear advantages to finalizing technology transfers by handing over assets.