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What do Banks do and Why are Bank Failures Costly?: Economics Nobel Laureates of 2022*

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On 10 October 2022, the Royal Swedish Academy of Sciences awarded the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2022 to three American economists, viz.,

(a) Ben S. Bernanke (Brookings Institution, Washington DC);

(b) Douglas W. Diamond (University of Chicago); and

(c) Philip H. Dybvig (Washington University, St. Louis)

for their research on "on banks and financial crises". Specifically, it was mentioned in the Nobel citation, "This year's laureates in the Economic Sciences... have significantly improved our understanding of the role of banks in the economy, particularly during financial crises. An important finding in their research is why avoiding bank collapses is vital."

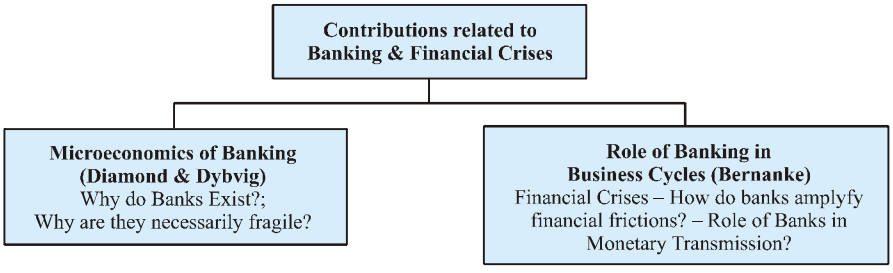
In this context, this Explainer gives a synoptic review of the research of these three economists.

A Classificatory Scheme

These researches can be grouped under two broad genres - microeconomics of banking and macroeconomic implications of banks in business cycles. While the work of Diamond and Dybvig falls in the first category, Bernanke's contribution can be located in the second category (Figure 1).

* This is based on a talk in an internal seminar at NIBM, Pune. Comments received from the participants of the seminar, in general, and Dr Sanjay Basu and Dr M Manickaraj, in particular, are gratefully acknowledged. Usual disclaimer applies.

Figure 1
Contribution of the Economics Nobel Laureates: A Taxonomy



We have learnt a lot from the literature of the microeconomics of banking. Probing into questions like why banks exist; or why they are necessarily fragile, this literature owes its origin in the 1983 classic joint paper of Douglas Diamond and Phillip Dybvig.

On the other hand, the research of Ben Bernanke can be broadly grouped under the topic of the influence of banks in the macroeconomics of business cycles. This literature probes into questions, such as how do banks amplify financial frictions?; or what is the role of banks in monetary transmission. Bernanke has a number of articles on this issue, of which the Nobel Committee has cited his 1983 empirical paper on the great depression that came out in American Economic Review.

The rest of this Explainer is devoted to these two distinct streams of research that were initiated nearly forty years ago. Annex 1 gives a short biographical and intellectual sketch of the three Nobel Laureates.

Microeconomics of Banking: Contributions of Diamond and Dybvig

To begin with, we turn to the basic model of Diamond-Dybvig's classic paper, titled "Bank Runs, Deposit Insurance, and Liquidity" (Journal of Political Economy, 1983) which has been specifically cited by the Nobel Committee. The model is couched in terms of a story.

Let there be an economy with only a single storable good. The story is couched in terms of three periods: 0, 1, and 2. Each Consumer is endowed with one unit of the commodity in period 0, which she wants to consume at t=1 or 2. When the consumer waits to consume at period 2, she may invest and may get 1+r amount of commodity in period 2, where r is the interest rate.

There are two types of consumers – *(a)* early / impatient consumer who consumes in period 1, and *(b)* late/patient consumer who consumes in period 2. Consumers do not know beforehand whether they are early or late consumers. For example, if the consumer faces a health issue, she will incur a hospital bill and then she may choose to withdraw her saving in the bank.

That is to say, if the investment gets interrupted in period 1, she gets her commodity back and get 1. Specifically, the outcome without a bank is that each agent gets 1 in period 1 if she interrupts investment and gets 1+r in period 2 if she does not interrupt. The sub-optimal equilibrium can be improved by setting up a bank to share risk, whereby a bank can pool liquidity risks and gives each consumer the average rate of return. The consumer is better off, because she likes to smooth consumption.

While a bank improves everyone's welfare, Diamond and Dybvig showed that there could be two equilibrium outcomes.

First, there could be a good equilibrium, wherein *(a)* consumers who don't face a shock, a fraction, will wait with consumption until period 2, because they get more in period 2; and *(b)* consumers who face a shock, do consume in period 1, and forego the rate of return from waiting.

Second, since the banking sector works in a fractional reserve system and if the bank works with a first come, first serve system (i.e., people first in the line for the bank get their deposits first) there can be another bad equilibrium, wherein when a patient consumer thinks that all patient consumers want to consume in period 1, then it is optimal to also queue in period 1. This gives the probability of at least some return (or payoff), whereas with waiting till period 2, there is nothing left.

The above story establishes the outcome of a Bank Run as an equilibrium outcome within a framework of the pursuit of self-interest and rationality and points out the essential unstable/ fragile nature of a fractional reserve-based banking system. The story of the model is brilliantly told in a youtube video titled "35 years later: Diamond-Dybvig model of bank runs" of an interview of Professor Philip Dybvig by Mark Taylor of Washington University (available at https://www.youtube.com/watch?v=5GUrBs7Zoek).

But how can we come out of it? Apart from having a central bank as the lender of last resort (and the ultimate savior of the banking system), one can think of various solutions to such a problem of instability in the banking sector.

First, a model of Narrow banking may be adopted wherein banks must hold an amount of liquidity equal to demand deposits, i.e., 100 per cent reserves (or banks can liquidate some assets in the case of unexpected withdrawals).

Second, banks may think in terms of suspension of convertibility (to establish a threshold above which the convertibility of deposits is suspended).

Finally, deposit insurance could be introduced whereby if the government guarantees the value of all deposits, the bad equilibrium disappears.

What is the message of the Diamond-Dybvig model? We can do no better than quote from Nobel Laureate and New York Times Columnist Paul Krugman, who made a number of

tweets in connection with this year's Nobel Prize in Economics. The combined versions of some of these tweets read as follows:

> *"If you're a normal human being, the paper might not look simple or even comprehensible. But trust me: they wrote down more or less the simplest possible model of what banking does, why it serves a useful purpose, but why it's vulnerable to self-fulfilling panics. The idea is that people want liquidity - ready access to their wealth if needed - but that productive investment requires tying up a lot of wealth in illiquid assets that can't be quickly converted into cash. Banks square this circle by offering people deposits that can be withdrawn at will, but investing most of the funds in illiquid loans to businesses etc. This normally works because not everyone needs cash at the same time. By reconciling the need for liquidity with the need for illiquid investments, banking makes society richer. But ... it creates the risk of crisis. If, for whatever reason, people lose confidence in banks, they will all try to withdraw funds at once. This can force banks into fire sales, and make fundamentally solvent institutions go bankrupt - and bank runs can be contagious."*

How much useful is the Diamond-Dybvig model to a real-world banker? Can we trivialize the model's importance as a tool? It is instructive to remind ourselves what economist Ariel Rubinstein, said about the veracity of an economic model:

> *"As economic theorists, we organize our thoughts using what we call models. The word "model" sounds more scientific than "fable" or "fairy tale" although I do not see much difference between them. ….. Being something between fantasy and reality, a fable is free of extraneous details and annoying diversions. In this unencumbered state, we can clearly discern what cannot always be seen in the real world. On our return to reality, we are in possession of some sound advice or a relevant argument that can be used in the real world. We do exactly the same thing in economic theory. A good model in economic theory, like a good fable, identifies a number of themes and elucidates them. We perform thought exercises that are only loosely connected to reality and that have been stripped of most of their real-life characteristics. However, in a good model, as in a good fable, something significant remains." (Ariel Rubinstein, "Dilemmas of an Economic Theorist", Econometrica, 2006).*

In essence, the Diamond-Dybvig model demonstrated two key characteristics of a bank. First, a bank does maturity transformation, i.e., it backs short-term liabilities with long-term illiquid assets. Second, banks issue liabilities that are payable on demand, i.e., bank deposits. The fact that the Federal Reserve Bank of Richmond in the US had organized a conference on the Diamond-Dybvig model in 2010 bears testimony to the importance of the model to the practical world.

Role of Banks in the Great Depression and Business Cycles

Given that the Nobel Committee cited Bernanke's 1983 paper titled "Non-monetary Effects of the Financial Crisis in the Propagation of the Great Depression", a brief digression on the great depression may be apposite here. Spanning over 1929 through 1939 the great depression

is synonymous with a major fall in US stock prices culminating in what is famously known as "Black Tuesday", the stock market crash of October 29, 1929. Such a stock market crash in the US quickly got transmitted to other parts of the world, leading to a major contraction in output and employment. Why and how did it happen?

There are two competing explanations of the phenomenon of the great depression. The Keynesian explanation runs in terms of the inherent instability of the capitalist system giving rise to the key role of the activist fiscal and monetary stimulus in times of depression. On the other hand, Milton Friedman and Anna Schwartz in their monetary explanation, showed that the Federal Reserve's monetary policies were largely to blame for the severity of the Great Depression. In some sense, Bernanke's work emerged as a synthesis of both these approaches. While accepting Friedman's basic hypothesis about the mismanagement of the US Fed in handling the great depression, Bernanke showed the crucial role of banking institutions in the great depression and implicitly advocated a role of monetary (and fiscal policies). In fact, in 2002, Bernanke (then a Fed governor) commented in a speech given in honour of Friedman's 90th birthday: "I would like to say to Milton and Anna: Regarding the Great Depression, you're right. We did it. We're very sorry."

What was Bernanke's thesis on the great depression? First, during the great depression, there were a huge number of bank failures. Illustratively, the percentages of operating banks which failed in each year from 1930 to 1933 inclusive were 5.6 per cent, 10.5 per cent, 7.8 per cent, and 12.9 per cent. In fact, because of the failures and mergers, the number of banks operating at the end of 1933 was only just above half the number that existed in 1929. Also, banks that survived experienced heavy losses. Such defaults and bankruptcies touched all sectors, e.g., about half of all residential properties were mortgaged at the beginning of the Great Depression. Specifically, Bernanke (1983) showed, "in addition to its effects via the money supply, the financial crisis of 1930-33 affected the macroeconomy by reducing the quality of certain financial services, primarily credit intermediation". Thus, the banking problems of 1930-33 disrupted the credit allocation process by creating large, unplanned changes in the channels of credit flow.

But why did the invisible hand of the market economy fail? According to Bernanke, "The solution to this paradox lies in recognizing that economic institutions, rather than being a "veil," can affect costs of transactions and thus market opportunities and allocations. Institutions which evolve and perform well in normal times may become counterproductive during periods when exogenous shocks or policy mistakes drive the economy off course". This clearly calls for a case of intervention by the public authorities (i.e., the central bank) in saving banks at the time of a crisis, even in an otherwise pure capitalist system.

More importantly, the later work of Bernanke (jointly with Alan Blinder of Princeton University) that came out in 1988 in the American Economic Review showed that the introduction of another asset, viz., bank loans creates complications in the way economists think about the propagation of monetary policy. They showed that there could be a strong case of monetary policy affecting the real economy via the cost and availability of credit, and the key to this "credit channel" of monetary policy transmission is the existence of imperfect substitutability

of bank loans and bonds for some borrowers. Illustratively, small borrowers may not be able to tap the corporate bond market, and for them, bank credit is indeed special. It is pertinent to quote from Bernanke's 1983 *American Economic Review* article:

> *"The present paper builds on the Friedman-Schwartz work by considering a third way in which the financial crises (in which we include debtor bankruptcies as well as the failures of banks and other lenders) may have affected output. The basic premise is that, because markets for financial claims are incomplete, intermediation between some classes of borrowers and lenders requires nontrivial market-making and information gathering services. The disruptions of 1930- 33 …..reduced the effectiveness of the financial sector as a whole in performing these services. As the real costs of intermediation increased, some borrowers (especially households, farmers, and small firms) found credit to be expensive and difficult to obtain. The effects of this credit squeeze on aggregate demand helped convert the severe but not unprecedented downturn of 1929-30 into a protracted depression."*

Thus, it seems that the research of Bernanke, the young academic of the early 1980s, did provide a solid foundation for the policy marking of mature Bernanke, the US Fed Chairman, during the period of the global financial crisis of 2008-2009. In retrospect, it seems that the adoption of quantitative easing in the US since 2007 owes a lot to Bernanke's research on the great depression and bank failure.

Some Concluding Observations

What do the works of 2022 Economics Nobel Laureates teach us? In some sense, these works answer two crucial questions, viz., *(a)* why do banks exist?; and *(b)* why is bank failure very costly? Specifically, banks play a major role in propagating the real effects of business cycles, and unlike a firm producing a real good (say, a car manufacturing company), banks are fragile by their very construction and, thus, financial crises/bank failures have real effects. Hence, public policy interventions are necessary to save these. The existence of deposit insurance is just one way out of stopping a bank run. Thus, notwithstanding the critiques like "Privatization of Profits and Socialization of losses" during the global financial crisis, it possibly made sense to rescue the banks in a crisis time. Effectively, in some sense, this line of research tends to establish a link between Main Street and Wall Street.

To conclude, we can do no better but quote from a recent issue of the *Economist* Magazine (October 10, 222):

> *"The three laureates' central insight was that banks are not the neutral intermediaries between savers and borrowers that other economic models had assumed. Instead, they offer vital services to the wider economy: gathering information on borrowers, providing a liquid means of saving and deciding to whom to extend credit. From this insight flows an important conclusion: because banks are crucial to the economy, they are also dangerous".*

Annex
A brief biographical and Intellectual Sketch of the Three Nobel Laurates

Douglas Diamond did his Bachelor's degree in economics from Brown University in 1975 and Master's degrees and a PhD in economics from Yale University. His professional life primarily revolved around Chicago Booth School from 1983 till date. Since 2000 he is Merton H. Miller Distinguished Service Professor of Finance at Booth School of Business, University of Chicago. Apart from his joint work with Professor Dybvig, he has made a substantial contribution to banking that includes his 1984 path-breaking paper on *(i)* "Financial Intermediation and Delegated Monitoring," (Review of Economic Studies); *(ii)* his joint work with Raghuram Rajan on bank capital ("A Theory of Bank Capital," Journal of Finance, December 2000), or *(iii)* on liquidity risk ("Liquidity risk, liquidity creation and financial fragility: A theory of banking", Journal of Political Economy, 2001); and *(iv)* on bank regulation ("Banking and the Evolving Objectives of Bank Regulation," Journal of Political Economy, 2017, with Anil Kashyap and Raghuram Rajan).

After a stint at Yale University (1981 - 1988), **Philip H. Dybvig** is associated with Washington University (1988 - till date) in St Louis. Since 1990, Dybvig is Boatmen's Bancshares Professor of Banking and Finance in Olin School of Business. Apart from his classic 1983 joint paper with Diamond, he has worked on diverse themes of corporate finance, that include: "Consensus on Diverse Corporate Boards" (Review of Financial Studies, 2009, with N. Baranchuk); "The Fallacy of Large Numbers, and a Defense of Diversified Active Managers" (Journal of Applied Finance, 2005); "Employee Reload Options: Pricing, Hedging, and Optimal Exercise" (Review of Financial Studies, 2003, with M. Loewenstein); "Duesenberry's Ratcheting of Consumption: Optimal Dynamic Consumption and Investment Given Intolerance for any Decline in Standard of Living" (Review of Economic Studies, 1995).

Ben Bernanke, a graduate of Harvard University, did his PhD in Economics from the Massachusetts Institute of Technology (MIT) in 1979. His thesis adviser was Stanley Fischer, who later became the Deputy Managing Director of the IMF and Governor of the Bank of Israel. Apart from Fischer, Rudiger Dornbusch, and Robert Solow (a Nobel Prize winner) were on his thesis advisory committee. After an initial stint at Stanford Graduate School of Business during 1979 - 1985, Bernanke was a Professor of Economics and Public Affairs at Princeton University during 1985 - 2002. He had a long policy-making role, first as a member of the Federal Reserve Board during 2002 - 2005, followed by the Chairman of the Council of Economic Advisers of the US President during 2005 - 2006 and then finally as Chairman of the US Fed during 2006 - 2014. After he relinquished his position as Fed Chairman, he became a Distinguished Fellow in Residence, Economic Studies at the Brookings Institution, a Washington-based Think Tank - a role he is continuing till date. Apart from his major work on probing the role of banks during the great depression, Bernanke had a number of major contributions. His theoretical work in the credit channel on monetary policy transmission (e.g., "Credit, Money, and Aggregate Demand - with Alan Blinder, published in American

Economic Review, 1988; or "The Financial Accelerator and the Flight to Quality," with Mark Gertler and Simon Gilchrist, published in Review of Economics and Statistics, 1996) enhanced our understanding of monetary policy transmission that is often treated as a black box. He also gave birth to a distinct methodological innovation in contemporary macro-econometrics. His 1986 article titled "Alternative explorations of the money-income correlation" in the Carnegie-Rochester Series on Public Policy has given birth to a class of econometric model named Structural vector autoregression (SVAR) models. Later in 2005, his article (with Jean Boivin) in the Quarterly Journal of Economics innovated Factor-augmented Vector Autoregressive Approach (FVAR). These models are distinct improvements over the original vector autoregression models of Christopher Sims, a Nobel Laureate in 2011 (whereby a group of variables is attempted to be understood primarily in terms of their lagged values).