

Course title: International financial regulation

Lesson 14. Individual bank runs and systemic risk

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Why Banks Fail?

- Banks are more Vulnerable, fragile and open to contagion
Compared to other commercial firms- Why?
 - Low capital to assets ratio (high leverage)-leaves little room for losses
 - Low cash to assets ratio- may require sale of earning assets to meet deposit obligation
 - High demand debt and short term debt to total debt (deposits) ratios- that brings high potential for a run- may require hurried assets sale at cheap prices
- Banking crises starts with run (mob of depositors appear at the bank and its branches, demanding their money)
 - To fulfil their demand, banks may call loans, may refuse to lend new credit or sell assets
- Having said all banks do not fail- then why some banks fail?

Introduction

- Some modern best known cases are:
 - Bankhaus Herstatt
 - Franklin National Bank
 - Banco Ambrosiano
 - Continental Illinois and Pen Square
 - Johnson Matthey Bankers
 - US Thrift Bank of New England
 - Baring
 - Bank of Credit and Commerce International (BCCI)

Banks Failures

- If not all banks are prone to failure then why study bank failure and bother about that?
- Bank failure or crashes are important to understand b/c crises spread (contagion disease)
- Indonesia, Thailand and Korea- Failure spread through out the banking system as sick institutions infected the healthy and dragged them down into insolvency.
- Banking crises not new- Italian, Dutch English, Scots, French, Austrians, Germans, Japanese and American—all faced the banking crises/failure.

Cost of Bank Failures

- The cost of bank failure in OECD as well as in developing countries is enormous. And sometime difficult to estimate
- Few examples are given below:

Country	Years	loss % of GDP
Norway	1987-90	4%
USA	1984-91	3%
Japan	1990-Cont.	Huge
Venezuela	1980-00	14%
Bulgaria	1980-00	14%
Mexico	1980-00	14%
Hungary	1980-00	10%

Barings (1995)

Background

- A well known British bank, very good in mergers and acquisition and quite powerful in emerging Far East market.
- About 1/3 employees based in Asia and more than half outside UK.
- The banking and market making arm of the bank (Baring Securities was a leading equity broker in Asia and Latin America)
- The fund management operation had a reputation for its expertise in Eastern Europe.

Barings (1995)

Reasons of Downfall

- Exposure in Far East was the main reason for Baring downfall (unlimited exposure in the derivative market).
- Mr Leeson was the culprit. He was head of the department, leading a team of 15 employees. Smart and manipulative person.
- He was an arbitrageur whose job was to spot differences in the prices of future contracts and profits from buying futures on one market and simultaneously selling them on another.
- Mr Leeson was suppose to earn benefit out of this business for subsidiary of Baring Securities.
- Margins in these types of contracts are small but volume traded large. Mr Leeson was supposed to have been trying to profit by spotting differences in the prices of Nikkei-255 future contracts listed on Osaka securities Exchange (OSE) and the Singapore Monetary Exchange (SIMEX). SIMEX attracts stock markets futures b/c Osaka exchange is subject to more regulation and hence is more costly.

Barings (1995)

- Rather than hedging his position Lessons seems to have decided to bet on the future direction of the Nikkei index.
- The move proved costly for Mr Leeson.
- Mr Leeson used a secret error account 88888 to hide trading losses and exaggerated his earnings to get maximum bonus.
- Baring London was deceived into thinking that Mr Leeson made profits from arbitrage.
- But losses were accumulating in the 88888 account.
- It was reported that more than $\frac{3}{4}$ profits was earned through this Mr Leeson business.
- All the time auditors failed to detect any wrongdoing.
- During the process of selling and buying Mr Lesson's action brought £827m losses.

Barings (1995)-Responsibles

- Low internal control in the area of risk management.
- Regulatory authorities share the blame. The SIMEX and Osaka exchange failed to act despite the rapid growth of contracts at Baring.
- BOE was also deficient in its supervision of Baring.
- BOE granted Baring solo status (mean Baring bank and Baring securities required to meet a single set of capital and exposure standard). It means BOE was supposed to supervise trading business of Baring (not a good idea, given the fact that it had no expertise in this area), hence depositors were exposed to trading losses.
- European rule of not taking more than 25% maximum equity capital exposure into single investment was ignored and BOE had not spotted this.
- Coopers and Lybrand (external auditors of Baring) failed to conduct comprehensive tests that would have detected large funding requests from Singapore.

Franklin national bank (1974)

Background

- 20th largest bank in USA.

Reasons of Downfall

- Large foreign exchange losses.
- Quick expansion.
- Unsound loans as a part of expansion strategy.

Story

- Refused by FR to take over another bank.
- Large depositor's withdrawal.
- Refused by other bank to lend.
- Borrowed \$1.75 billion from FR.
- Taken over by a consortium of seven European banks
- Did not fail completely due to deposit insurance.

Banco Ambrosiano(1982)

Background

- Italian bank based in Milan.
- Quoted on the Milan stock exchange.
- Subsidiary companies overseas.
- Luxembourg subsidiary called Banco Ambrosiano Holding (BAH)
 - 60% of this subsidiary owned by BA Milan.
- BAH active on the interbank market.
- Taking Euro currency deposits from international banks.
- Money from Euro currency was lent to non Italian companies in BA group.

Banco Ambrosiano(1982)

Reasons of Downfall

- Massive fraud by chairman of the bank.
- Chairman departed Milan for London after receiving a letter from BOI to reduce and explain overseas exposure.
- Deposit withdrawal after confidence lost due to chairman death in London after hanging on the bridge. Former Italian PM was also involved in fraud.
- Bank of Italy launched life boat operation. Seven banks provided money.
- Later declared bankrupt by Italian court and taken over by another bank. BAH also suffered from losses of deposits , but refused by bank of Italy to launch life boat operation. BAH defaulted on loans and deposits.Weak relation b/w senior management and Bank of Italy are considered the root cause of this bank failure.
- Significant supervisory changed after this failure.

Continental Illinois and Pen Square (1982)

Background

- Two American investment banks.
- Penn square energy loans passed to CI .
- Involved in heavy lending in real estate and energy sector.
- CI relying on overseas market to fund its loans portfolio
 - 60% of them were short term foreign deposits.

Reasons of Downfall

- Lack of procedures to vet new loans.
- Poor quality loans to US corporate sector and CI failed to classify bad loans as nonperforming.
- Rumours spread of difficulty faced by bank and bank run started, made it difficult to raise funds.

Continental Illinois and Pen Square (1982)

- US Comptroller of Currency intervened but it made the matter worse and bank borrowed money from Chicago Reserve Bank (CRB).
- Private life boat was organized, but not sufficient
- Run got worse and \$6b disappeared within few days.
- FDIC and Comptroller announced assistance.
- All CI directors were asked to resign in return.

Johnson Matthey Bankers (JMB) (1984)

Background

- An arm of Johnson Matthey, dealer in gold bullion.
- JM was the fifth largest gold dealer in London.
- Involved in lending to third world countries.

Reasons of Downfall

- Significant Loans exposure to a single country (Nigeria).
- Auditors did not show responsibility. They agreed with director presentation of accounts.
- Bank of England showed soft approach.
- Private auditors not given full authority to check. No communication between auditors and BOE. Return submitted by management not subject to independent audit.

Johnson Matthey Bankers (JMB) (1984)

- Lifeboat operation launched by BOE with the help of private banks. Use of “Too Big to Fail”. Lifeboat operation launched by BOE suggests regulator will be willing to accept too big to fail if the bank failure poses a real danger in term of widespread bankruptcies.
- JMB affair prompted the establishment of committee.
- The committee involved the Treasury, BOE, and external experts.
- Amendment of Banking Act (1987).

Bank of Credit and Commerce International (BCCI)

Background

- Founded by the Pakistani financier and incorporated in Luxembourg with small amount of capital \$2.5m (less than BOE \$5m requirements).
- Initially given the status of deposit taker but later on after amendment in banking act became full bank with authority to open branches across UK.
- When closed negative net worth of about \$7b.
- Customers included Manuel Noriega (Panamian dictator) and international terrorist Abu Nidal.

Reasons of Downfall

- Fraud and illegal dealings.
- BCCI bought a Colombian bank with branches in Medellin and Cali (centre for the cocaine trade and money laundering).
- International reputé for capital flight, tax fraud and money laundering.

Bank of Credit and Commerce International (BCCI)

- Indicated in Florida, raided by British customs and executive imprisoned in Florida for money laundering.
- BOE and pricewaterhouse failed to communicate with American regulatory authorities.
- Bingham report criticised BOE and pricewaterhouse.
- BOE set up a special investigation unit to look into suspected cases of fraud or financial malpractice as well as setting up a special legal unit.
- Amendment of Act (closing UK branches of an international bank if deemed necessary).
- Cross border supervision very important.

Summary

Bank Name	Derivative market exposure	Foreign exchange market exposure	Lack of internal control	Weak asset management	Overseas exposure	Lack of regulatory control	External auditor role	Unsound policies (bad loans, aggressive expansion etc.)	Management fraud
Baring	X		X	X	X	X	X		X
Franklin National Bank		X			X			X	X
Banco Ambrosiano					X	X			X
CI and Pen Square				X	X	X		X	
JMB					X	X	X	X	
BCCI						X	X		X

Common Lessons from Bank Failure Case Studies

- A number of qualitative conclusions can be drawn from the individual bank failure case studies.
- Bank may fail due to:
 1. Weak asset management
 - a. Low quality loans with inappropriate collateral arrangement.
 - b. Excessive exposure to one sector or single firm/country. This exposure overlooked by regulatory authorities.
 2. Inexperience with new products (FNB, Bankhaus Herstatt).
 3. Managerial inefficiency in term of herd instinct (Barings).
 4. Bank fraud and dishonesty (BA, FNB, BCCI)
 5. Supervisors, bank inspectors and auditors missed important signal of problem banks (JMB, BA, BCCI, Barings).
 6. Too big to fail may lead to moral hazard and resultant bank failure (JMB)

Competitive Issues in Banking

Outline

- Competitive issues in banking
 - Productivity measurement
 - Efficiency measurement
 - Economies of scale and scope
 - Test of competition in banking market
 - Contestable banking markets
 - Interest equivalence for non-price features
 - Qualitative tests for price discrimination and firms survival

Notes: For this topic, chapter 4 from the text book “Modern Banking in Theory and Practice” by Shelagh Heffernan John Wiley and Sons is a must reading.

Measuring of bank output

- Measurement of output of services produced by financial institutions has special difficulties b/c they are not physical quantities.
- Difficult to account for quality in a banking service.
 - i.e. ATM may improve the quality of payment services as well reduce the costs of transactions considerably but benefits are difficult to measure. Increase in frequency of transactions by a customer may increase the costs per customer. Hence difficult to measure the net benefits per customers.
- Two common approaches to measure banks outputs:
 - The production approach
 - The intermediation approach

Measuring of bank output

The production approach

- Banks are treated as firms for measuring output.
 - Banks use capital and labour to produce deposits and loan accounts and output is measured as: Number of accounts/number of transaction per account.
- Uses bank output as flows.

Problem

- How to weight each bank service in the computation of output.
- The method ignores interest costs.
- Difficult to compare data from different banks, thus making accurate measure of efficiency difficult.

Measuring of bank output

The intermediation approach

- This approach recognises intermediation as the core activity.
- Output is measured by the value of loans and investment.
- Cost is measured as operating costs (the cost of factor inputs such as labour and capital) plus interest costs.
- Bank output is treated as a stock.
- Neither the intermediation nor the production approach takes account of the multi-product nature of banking.
- Most bank productivity studies used intermediation approach.
 - because this has fewer data problems than with the production approach.

Next Step:

Productivity and Efficiency Measures

- Two types of productivity measures are used. Partial and Total
 - Partial measures are based on financial ratios. They show partial picture.
 - Assets per employee
 - Loans per employee
 - Profit per employee
 - Cost per employee
 - Admin. Cost as a % of total cost
 - Whereas, total measures take into account multiple nature of outputs and inputs in banking i.e.
 - Total Factor Productivity (TFP)

Productivity and Efficiency Measurement

Efficiency Estimation

- Empirical research is based on two methods of efficiency estimation
 1. Stochastic Frontier Analysis (SFA)
 2. Data Envelopment Analysis (DEA)
- DEA employs a efficiency ratio by using multiple inputs and outputs.
- DEA compares the observe output (y_{jp}) and inputs (x_{ip}) of several banks.
- It then identifies the relatively more efficient bank with the relatively less efficient bank.

$$E_p = \frac{\sum u_j Y_{jp}}{\sum v_i X_{ip}}$$

subject to $E_p \leq 1$ for all p and weights $v_i, u_j > 0$, p represents several banks

Productivity and Efficiency Measurement

Efficiency Estimation

$$E_p = \sum u_j Y_{jp} / \sum v_i X_{ip}$$

subject to $E_p \leq 1$ for all p and weights

$v_i, u_j > 0$, p represents several banks

- The model is run repetitively with each bank appearing in the objective function once to derive individual efficiency rating.
- The decision about efficiency or inefficiency is based on the following:
 - $E=1$ relative efficient, $E<1$ relative inefficient
- However, efficient does not mean top of the level efficient in absolute terms but efficient compared to other banks in the data set.

Productivity and Efficiency Measurement

Productivity Estimation

- Malmquist productivity index is a popular method to estimate TFP
- TFP is computed by taking into account efficiency change and technical change
- The Malmquist index will be able to determine levels of change in technical efficiency and change between time periods
- The Malmquist index is calculated as follows (as outlined in Fare et al, 1994).

$$m(u_t, x_t, u_{t+1}, x_{t+1}) = \left[\frac{d_0^t(u_{t+1}, x_{t+1})}{d_0^t(u_t, x_t)} \times \frac{d_0^{t+1}(u_{t+1}, x_{t+1})}{d_0^{t+1}(u_t, x_t)} \right]^{1/2}$$

This formula can be further decomposed into efficiency and technical change as follows

Productivity and Efficiency Measurement

$$m(u_t, x_t, u_{t+1}, x_{t+1}) = \frac{d_0^{t+1}(u_{t+1}, x_{t+1})}{d_0^t(u_t, x_t)} \left[\frac{d_0^{t+1}(u_{t+1}, x_{t+1})}{d_0^t(u_{t+1}, x_{t+1})} \times \frac{d_0^t(u_t, x_t)}{d_0^{t+1}(u_t, x_t)} \right]^{1/2}$$

Where the first part of the equation (that which lies outside of the parenthesis) represents efficiency change and the second part (contained within the parenthesis) represents technical change.

- The Malmquist index provides a measure of changes in total factor productivity (TFP) from year to year.
- The values are concentrated around 1, which implies no change.
- A TFP index value which is greater than 1 implies an improvement, while a value less than 1 implies a decrease in productivity.
- The efficiency change relates to how the firms performed relative to the production frontier.

Productivity and Efficiency Measurement

- An efficiency change index value which is greater than 1 implies that the firms are operating closer to the frontier than in the previous time period, while if the index figure is less than 1, the bank in question is operating further below from the frontier. The other component, technical change (TC), indicates a shift in the frontier.
- This can be affected by technology or also changes in the economic or regulatory environment. A technical change index value which is less than 1 means the frontier has shifted inwards, while a TC index value which is greater than 1 implies that the frontier has shifted outwards.
- Again, this index is a relative measure intended to indicate any movement in the frontier. A TC value of 1 indicates a static frontier in the relevant time period.

Productivity and Efficiency Measurement

- The Malmquist index can be estimated as a function of a set of distance functions, which, in turn, can be estimated using DEA. This is a methodology proposed, again, by Fare et al (1997).

The index requires 4 DEA models to be estimated, which respectively specify efficiency in the current time period, $d_0^t(u_t, x_t)$; efficiency in the next time period, $d_0^{t+1}(u_{t+1}, x_{t+1})$; efficiency of a firm operating in this time period relative to firms operating in the next time period, $d_0^{t+1}(u_t, x_t)$; and the efficiency of firms operating in the next time period relative to the frontier in this time period, $d_0^t(u_{t+1}, x_{t+1})$. The TFP index is then calculated using Equation (1), above.

• SFA is also used to estimate efficiency and productivity!

Empirical Studies on Productivity and Efficiency

- Numerous studies used DEA method to measure the efficiency of banks.
- Some selection of studies is given below:
 - Rangan et.al. (1988,90) used this approach by using the data on 215 US banks.They break down the efficiency score into technical inefficiency (wasted resources) and scale inefficiency (non-constant return to scale). Bank output was measured with intermediation approach. The study showed the efficiency score of 0.7 implying 30% wastage, all due to technical inefficiency.
 - Field (1990) applied DEA to a cross section of 71 UK building societies in 1981. The results were that 80% were found to be inefficient due to scale inefficiencies. Unlike Rangan ((1988,90) bank size was positive with TE.

Empirical Studies on Productivity and Efficiency

- Some selection of studies is given below:
 - Drake et.al. (1991) used DEA to building societies in 1988 after deregulation in 1987. 37% of these societies showed increase in their overall efficiency.
 - Humphrey (1992) measured productivity and scale economies using flow and stock measures of banking output. He applied both non-parametric growth accounting procedure and an econometric estimation of cost function. A structural model of bank production was used which incorporated both the production of intermediate deposit outputs as well as final loan outputs. He obtained two measures of total factor productivity by using 202 US banks.

Empirical Studies on Productivity and Efficiency

- Some selection of studies is given below:
 - Humphrey key findings were as follows:
 - Banking productivity had been flat (only 0.4% p.a. GR)
 - Real value of total assets: declined (the average TFP GR was -1.4% p.a)
 - The author identifies a number of possible reasons for decline in TFP. Some of these are:
 - Banks lost low cost deposit accounts, as corporate and retail customers switched to corporate cash management accounts and interest earning check accounts.

Economies of Scale and Scope

- There is an extensive literature on the degree to which scale economies exist in banking.
- The term economies of scale or scope are a long run concept when all the factor inputs, which contribute to a bank production process, can be varied.
- Assuming all factor inputs are variable, bank is suitable to exhibit scale economies mean equi-proportionate increase in factor inputs yields a greater than equiproportionate increase in output or the banks are operating on the falling portion of their average cost curve.
- Consider a bank with three factors of inputs capital (deposits), labour (the bank employee) and property in the form of branch network and 3 outputs like loans, investment and off balance sheet business .

Economies of Scale and Scope

- The economies of scale are said to exist if, as a result of doubling each of three inputs, the bank is able to more than double its outputs.
- Even this simple example is problematic in case of banks b/c all factor inputs are not variable. In short run it is really difficult to double inputs such as deposits.
- Even if inputs are doubled and loans are doubled, then risk portfolio is bound to change, a critical important consideration for a bank wanted to maximize shareholder value added.
- All this implies that it is really difficult to apply the concept of economies of scale in financial sector.
- Hence it negates the underlying concept of mergers and acquisition on the basis of hope of economies of scale and scope.

Economies of Scale and Scope

- Economies of scope exist if the joint production cost of producing two or more outputs is lower than if the products are produced separately.
- For example a bank offers three services to customers (deposits, loans and payment services). Then, if a bank can supply these services more cheaply through a joint production process than producing and supplying them independently, it is said to be enjoying economies of scope.
- From the strategic standpoint the question of whether or not economies of scale and scope are present in the banking is important.
- Evidence of economies of scale will mean large banks have cost advantage over small one.
- If cost complementarities are present, multiproduct banks will be more efficient than the financial boutiques.

Economies of Scale and Scope

- In term of empirical work, most of researcher uses cost function approach to measure SCALE and SCOPE economies i.e.
- This more general model specification of cost function, which focuses upon scale economies and technological change, is specified as $C(y_i, w_i, t)$:

$$\begin{aligned}
 \ln(C_i) = & \text{const} + \sum_{i=1}^3 \alpha_i \ln \tilde{y}_i + 1/2 \sum_{i=1}^3 \sum_{j=1}^3 \sigma_{ij} \ln \tilde{y}_i \ln \tilde{y}_j + \\
 & \sum_{m=1}^3 \beta_m \ln \tilde{w}_m + 1/2 \sum_{m=1}^3 \sum_{n=1}^3 \gamma_{mn} \ln \tilde{w}_m \ln \tilde{w}_n \\
 & + 1/2 \sum_{i=1}^3 \sum_{m=1}^3 \delta_{im} \ln \tilde{y}_i \ln \tilde{w}_m + \eta_T T + 1/2 \eta_{TT} T^2 + \sum_{i=1}^3 \eta_{Ti} T \ln \tilde{y}_i \\
 & + \sum_{m=1}^3 \eta_{Tm} T \ln \tilde{w}_m
 \end{aligned}$$

Economies of Scale and Scope

- Overall economies of scale are derived from differentiating the translog cost function with respect to output.

$$OES = \sum_i y_{it} MC_i / C(y_{it}, w_{it}, t) = \sum_i \delta \ln C / \delta \ln y_{it}$$

- Where MC_i is the marginal cost with respect to the i_{th} output and δ is the cost elasticity of the i_{th} output. If $OES > 1$, bank experiences diseconomies of scale, and increasing returns are apparent if $OES < 1$. If $OES = 1$ then, there is evidence of constant returns to scale.
- Scope economies are said to exist if:
 $C(y_{it}, w_{it}, t) < [c(y_{1t}, w_{it}, t) + c(y_{2t}, w_{it}, t) + c(y_{3t}, w_{it}, t)]$

Empirical Studies on Scale and Scope Economies in Banking

- Empirical studies of economies of scale and scope in financial institutions showed mixed results.

USA studies

- Shaffer and David (1991) examined the question of economies of scale for very large US multinational banks.
- Traditional translog cost function with two and three factors was used with and without hedonic terms (qualitative factors). In the absence of hedonic terms they found evidence of scale economies.
- In the translog equation with the hedonic terms included, scale was reduced from the level of without hedonic terms.

Empirical Studies on Scale and Scope Economies in Banking

- Humphrey (1992) obtained estimates of scale economies for US banks. The author used flow measure of output.
- His study results suggested diseconomies of scale.
- However, when alternatives measures of output were used, Humphrey found significant economies of scale for small banks, constant costs for medium sized banks and scale diseconomies in large banks.
- This study however raised an important question.
 - which measure of output should be used?
 - The author suggested that stock measure was more accurate than flow measure of output.
- The study overall results suggest there are slight economies of scale for small banks, but slight diseconomies for large US banks.

Empirical Studies on Scale and Scope Economies in Banking

- Numerous US studies have tested for economies of scope in banking with mixed results.
 - Gilligan and Smirlock (1984) study supported the hypothesis of economies of scope.
 - Mester (1987) concluded there was no strong evidence to either support or refute the presence of economies of scope.
 - Lawrence (1989) found cost complementarities (economies of scope) to be present.
 - Hunter, Timme and Yang (1990) found no evidence to support the presence of cost complementarities.

Empirical Studies on Scale and Scope Economies in Banking

British studies

- Hardwick (1990) tested for scale and scope economies using UK building societies data.
- The author employed multi-product statistical cost analysis.
- He tested for overall and product specific economies of scale by using a marginal cost approach.
- Overall economies of scale were found except for very large building societies. Significant diseconomies were found in the use of capital in large building societies. For small banks cost saving was attributable in the use of labour compared to capital.
- Hardwick did not find evidence either for or against economies of scope for large building societies.

Empirical Studies on Scale and Scope Economies in Banking

- However, he found significant diseconomies of scope for building societies with assets worth £1.5 billion.
- The results of the study virtually showed no case for diversification of building societies into broader banking market.
- Drake (1992) using a multi-product translog cost function found evidence for economies of scale for medium sized banks.
- He found no evidence to support the earlier Hardwick study of diseconomies of scale for building societies with assets in excess of £1.5 billion.
- Nor did Drake find economies or diseconomies of scope for the building society industry except for the group with assets in the range of £500m-5 billion which showed significant diseconomies of scope.

Empirical Studies on Scale and Scope Economies in Banking

European studies

- Altunbas and Molyneux (1993) examined the cost structure in four European countries (France, Germany, Italy and Spain).
- They found overall scale economies to exist in all four countries.
- Italy showed significant scale economies over all levels of output. In Spain they were present only for smallest banks. France showed significant scale economies over a range of bank sizes. In Germany diseconomies of scale were found at all assets levels.
- The presence of economies of scope results were mixed. In Spain significant economies of scope were evident for banks with assets of < \$1.5 billion. In France it is middle sized banks which showed economies of scope. Diseconomies of scope were found for all Italian banks. In Germany, largest banks showed scope economies, smaller banks showed scale diseconomies.

Empirical Model of Competition in Banking

The Structure Conduct Performance (SCP) model

- Since the Second World War, SCP model has been popular in industrial economies.
- Applied to the financial sector SCP says, “a change in the market structure or concentration of banks effects the way banks behave and performs”. There is a well-developed link b/w structure, conduct and performance.
- Market structure is determined by the interaction of cost (supply) and demand.

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