

# A Teaching Strategy on How to Use an Online Simulation to Teach Money Creation and Money Supply

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## Overview

On the Internet many good educational economics simulations are available. Unfortunately, teaching strategies on how to use these simulations are rare. Therefore, the author developed a teaching strategy that demonstrates how “*MoneySupply*”, an interactive online simulation, can be used to improve the teaching of *money creation* and *money supply*. The goal is to make these concepts more intuitive for students. The “*MoneySupply*” simulation was also developed by the author and is currently available at <http://moneysupply.tk/>.

The objective of this teaching strategy is to help the students to develop the following skills:

- Skill 1: Understand how private banks can create money
- Skill 2: Understand the importance of inter-bank loans
- Skill 3: Understand how private banks and the central bank together produce M1
- Skill 4: Understand the money multiplier concept

## Getting Started

The start-up costs for the instructor are minimal. The “*MoneySupply*” simulation runs directly from an Internet browser and requires no installation.

The “*MoneySupply*” simulation is based on a simplified accounting framework similar to the one that is used in many economics textbooks. Before students use the simulation, the instructor should introduce the related terminology, the bank and the non-bank sector, as well as the accounting framework.

### Skill 1: Understand How Private Banks Can Create Money

In the classroom the instructor uses the “*Basic*” scenario (see Figure 1). In step 1 she demonstrates that when the central bank buys securities from a bank and credits the payment to the bank's central bank account, reserves are created. In step 2 the instructor shows the bank originating a loan of \$100 credited initially to the customer's checking account. It is important to point out to the students that whenever a

loan is created the funds are initially credited to a checking account and even when they are transferred to another account they still stay as deposits.

Step 3 shows the process cannot be indefinitely repeated when banks have to hold required reserves. When “Adjust Required Reserve” button is clicked, the required reserves are adjusted (10% of deposits) leaving no excess reserves for further money creation. As a trial the instructor can originate another loan to show that the bank is unable to fulfill reserves requirements.

The screenshot shows a simulation interface with the following components:

- Navigation Bar:** Money Creation, Money Multiplier, Federal Reserve Empirical Data, Webinars, Instructional Plan, About/Disclaimer.
- Central Bank Section:**
  - Assets: CB Loans, Securities (+\$10)
  - Liabil.: Currency, Req. Reserves, Excess Reserves
  - Req. Reserve Ratio = 10%
  - Dropdown: Basic (one private bank, no cash withdrawals)
  - Reset button
- 1st Savings Bank Section:**
  - Assets: Excess Reserves, Req. Reserves (+\$10), Interbank Loans, Securities (-\$10), Loans (+\$100)
  - Liabil.: Inter Bank Loans, CB Loans, Deposits (+\$100)
- U.S. Loan Bank Section:**
  - Assets: Excess Reserves, Interbank Loans, Securities, Loans
  - Liabil.: Interbank Loans, CB Loans, Deposits
- Non-Bank Sector Section:**
  - Assets: Currency, Deposits (+\$100), Securities
  - Liabil.: Loans (+\$100)
- Bank Sector Section:**
  - Assets: Excess Reserves, Req. Reserves (+\$10), Securities (-\$10), Loans (+\$100)
  - Liabil.: CB Loans (+\$100), Deposits
- Control Panel:**
  - Central Bank buys securities for \$10 working with 1st. Savings Execute (Step 1)
  - 1st. Savings originates loan of \$100 with non-bank Execute (Step 2)
  - Adjust Req. Reserves (Step 3)

**Figure 1: Three Steps to Simulate the Basic Scenario**

## Skill 2: Understand the Importance of Inter-Bank Loans

To introduce this skill the instructor chooses the “Intermediate” scenario. He provides one bank with \$10 reserves as before and originates a \$100 loan for the other bank. After clicking “Adjust Required Reserve” students can see that one bank has a shortage of reserves, while the other bank has excess reserves. Now the instructor can execute the third action that allows one bank to give a loan to the other bank. It is important to point out to the students that this scenario is common in the banking system and that the federal funds market is an essential part of money supply.

## Skill 3: Understand How Private Banks and the Central Bank Together Produce M1

The “Advanced” scenario introduces currency and shows how private banks can provide their customers with cash. Students will learn that banks need reserves in order to fulfill customers’ cash demands. As before a bank gets supplied with reserves (\$20) and originates a loan of \$100. Now the instructor explains that bank customers demand to withdraw \$10 in cash from their deposits. Since the bank

cannot produce cash, it has to withdraw the cash from its central bank account. The instructor again can show all resulting entries in the accounting system by clicking a few buttons. As a result students will learn that not only required reserves drain a bank's reserves but also cash withdrawals.

For simplicity purposes the amounts used in the simulation are usually multiples of \$10 or \$100 dollars. When clicking the "Empirical Data" tab, the instructor can show the actual amounts in the US economy in exactly the same accounting framework students used before. The application automatically draws the most recent data from the Federal Reserve's database.

In addition a graph can be displayed showing the composition of the monetary base and the value for M1 for selected time ranges (2003 to most recent). This way, students see how dramatically the monetary base has increased in recent years and which role mortgage backed securities played in this process.

#### **Skill 4: Understand the Money Multiplier Concept**

To foster the 4<sup>th</sup> skill the instructor can reiterate that both reserve requirement and non-banks' demand for cash drains reserves thus limit money creation. This leads to the question about the maximum M1 banks can produce with a given amount of reserves. The tab "*Money Multiplier*" will help answering this question but it is recommended to derive the money multiplier first algebraically in class before using the "*Money Multiplier*" simulation.

In the first time period banks are provided with a certain amount of reserves. Then banks will originate loans that are equal to their excess reserves. After the "*Adjust Currency and Required Reserves*" button is clicked, students can see how currency demand and reserve requirements drain excess reserves. In the second period banks again originate additional loans equal to their now reduced excess reserves and "*Adjust Currency and Required Reserves*". This process can be repeated period by period. After 3 periods an optional button allows to simulate the next 100 periods at once. Afterwards, the system reaches equilibrium and student can see that the values in the accounting framework equal the ones predicted by the money multiplier formula.

Again students should use the "*Empirical Data*" tab to see the actual US data. Both the chart and the accounting framework can be used by students to calculate reserve ratios, currency ratios, and the maximum of M1 that banks can create. These exercises will demonstrate why many economists are concerned about the current size and composition of the monetary base.