Macroeconomics Policy Simulation Game

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While games and interactive applications are created for most fields of study, macroeconomics to this day has been relatively left out. To increase student interest in the field of macroeconomics and to increase student engagement in class and after, I created an original macroeconomics simulation game. Introductory Macroeconomics instructors can use it to supplement traditional class outlines to increase student engagement, collaboration, and make learning a more fun and memorable experience.

Check out the game at: https://valentinas500.shinyapps.io/MPSG/
Use the following credentials: [Username: "user10", Password: "pencilN10"].

Register to use the game in your class by contacting me at: vrudys@fordham.edu

1. INTRODUCTION

Games can be very useful in creating a fun, engaging and memorable learning experience, especially in subjects that many students find less-than-exciting. Therefore, I created a Macroeconomics Policy Simulation Game (MPSG) in which teams of students run countries balancing interest rates and inflation, managing government spending, debt levels and taxation, analyzing exchange rates, capital flows and international trade. While playing this game students learn major topics from Introductory Macroeconomics course: supply and demand, international trade, nation's income, inflation, GDP growth, unemployment, purchasing power parity as well as fiscal and monetary policy.

With simple yet modern visuals and design elements, MPSG is perfect for engaging current and future generations of students learning in the increasingly virtual environment. Learning macroeconomics with the help of games can (a) increase student motivation, (b) foster collaboration between students, (c) foster more memorable learning, and (d) promote critical thinking skills.

First, students wish to be entertained. Von Ahn and Dabbish (2008) noted that people play games not because they are personally interested in solving a particular economic or business problem but because they want to be entertained. Learning through games entertains students while actively teaching students the principles of the field of study. Prensky (2003) found that students may be more interested in choosing courses that incorporate business simulation games. Not only that students are more entertained, they are likely to be more motivated. Motivation is an indispensable condition to successful learning, and educational simulation games can increase the motivation to learn (Randel, Morris, Wetzel, and Whitehill (1992), Terrell and Rendulic (1996), Prensky (2003)).

Second, playing games in teams promotes collaboration. Students are more engaged in classes that utilize games (Auman, 2011) creating more opportunities for teamwork. This leads to enhanced motivation and comprehensibility of the subject, as well as sustainable positive learning experiences (Otto, 2014).

Third, students retain information much better if they reflect and practice compared to if they just listen (Felder & Brent, 2009). MPSG promotes learning by suggesting information to read, and video clips to watch, and by asking teams to apply that information in the game.

Moreover, additional sources of information coupled with team interaction gives students multiple avenues to learn course material. This leads to the sharing of perspectives and understanding that promotes critical thinking skills (Windschitl, 1999; McKinney & Graham-Buxton, 1993; Pray Muir & Tracy, 1999).

MPSG game is appropriate for a wide variety of course outlines and student demographics. It is designed to be easy to use and provide most of the necessary information within the game. The game is also customizable. Class instructor can opt to include AI teams and alter the number of periods of the game and the frequency of periods. To my knowledge, MSG is the first multi-period multiplayer online game that is designed to be used to supplement an introductory macroeconomics course.

2. GAME DESIGN

There are 10 teams each running a fictional country for a specified number of turns. Each turn taking

place once or twice a week represents one year. Teams make new decisions adjusting their monetary and fiscal policies to keep their economies stable and growing. Each country is small and thus do not affect the overall international economic conditions. Thus, decisions of a team do not affect any other teams.

As students play the game, they touch upon many of the subjects typically studied in Introductory Macroeconomics course. The main topics that are covered in the game are gross domestic product, GDP growth, productivity, unemployment, international trade and finance, interest rates and inflation, personal and corporate taxation, government debt, supply and demand, purchasing power parity and other. Students learn about how fiscal and monetary policies affect aggregate demand, interest rates, inflation, international trade and government debt.

2.1. Sequence of Events

The sequence of events in the game is as follows.

First, led by the class instructor, students are assigned to teams or students are allowed to choose their teammates. After all students are assigned to a team or after a registration deadline passes, each team member receives login and password information via email. This allows each member to access their team's portal.

Before each deadline students meet and discuss the next decision. One designated teammate submits the decision. Submission must be accompanied by a short reasoning for the decision.

Once the deadline passes, the results are reported and students can log in to view updated information about what happened, and start discussing the next move.

2.2. Game Engine

To be able to enjoy MSG game, students must understand the core principles of how their decisions affect outcomes. How each decision affects interest rates, inflation, exchange rates, consumption, investment, net exports and ultimately the national income informs students' decisions. Below selected relationships are presented without revealing parameter values.

Inflation (π_t) is determined by previous inflation (π_{t-1}), change in GDP (Δy_t), growth in money supply (Δm_t).

$$\pi_t = \alpha_1 \pi_{t-1} + \alpha_2(1 - \Delta y_t) + \alpha_2 \Delta m_t$$

Interest rate (r_t) is a formula of previous interest rate (r_{t-1}), change in national income (Δy_t), and has a lower bound of zero.

$$r_t = \beta_1 \max\{r_{t-1} - \beta_2(\Delta m_t - (1 - [y_{t-2}/y_{t-1} - 1])), 0\}$$

Items such as consumption, investment, exports, government spending, public debt and other items are described in a similar fashion, except with more complicated equations.

In this game, teams make decisions on monetary and fiscal policies. For monetary policy, teams must make decisions about the reserve ratio, discount rate and the increase (or decrease) of money supply through open market operations. Fiscal policy covers the spending of federal government as well as personal income and corporate taxation. Each team must balance between running sustainable policies and promoting employment and economic growth.

The team with the highest GDP after a dedicated number of turns is declared the winner. If instructor wishes to give students a grade, student decision explanations should be also taken into account.

2.3. Game Visuals

The game is built as an interactive website with for distinct tabs or pages. They are the Rules page, World Economy page, Domestic Economy page, and Submit Decision page.

2.3.1. Rules Page

The Rules page introduces the game and the basic rules of the game to the players. It is intended to be read only once at the beginning of the game. It is the same for all players and does not change over the course of the entire game.

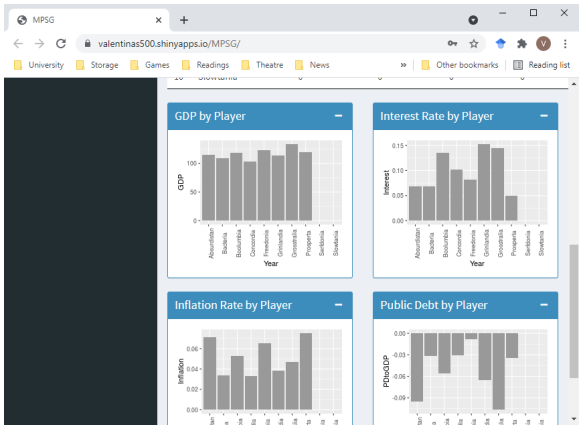
2.3.2. World Economy Page

In the World Economy page, students find current information about their competitors. All key statistics such as the components of the gross domestic product, inflation and interest rates, debt levels as well as unemployment numbers are found in this section. Moreover, certain decisions such as the personal income and tax rates are also available to everyone. Information is presented in tables and figures.

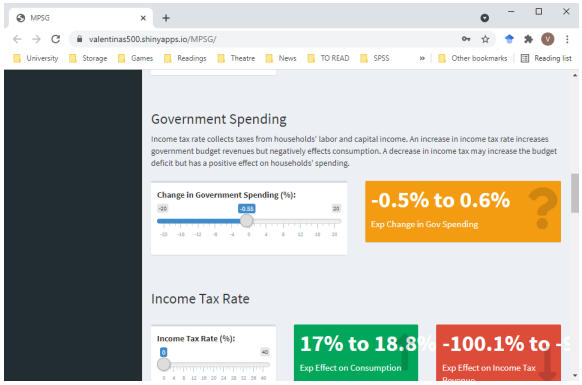
Since key information is revealed about all teams, this page is identical to all. Every turn, this page is updated with current information.

2.3.3. Domestic Economy Page

Domestic economy page shows detailed specific information about the country of the student (each team only sees their own country) and gives approximation of what may happen to a set of decisions. A team player can input their decisions and see what approximate outcome may happen. This allows students to better understand how their monetary and fiscal decisions affect macroeconomic variables of interest. Every turn, this page is updated.

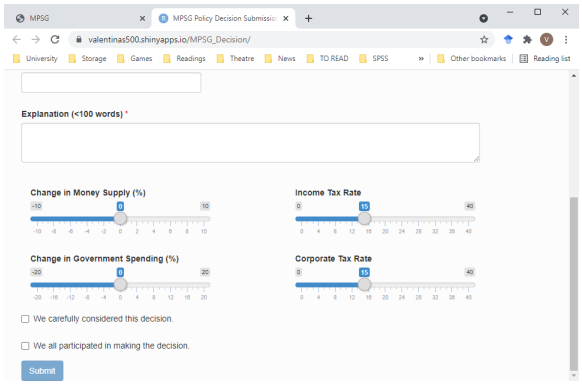


In addition, explanations of what affects what are given to guide players decision-making.



2.3.4. Submit Decision Page

Students final menu option is used to submit their decision before the deadline. Once students discuss and decide on their decision, one person in each team who chooses to be responsible for filling in the form writes in the team's name, all team members names, agree that all participated in the decision-making, and then enter the monetary and fiscal variables they all agreed on.



2.4. Ease of Use

The interactive website-based game has a very simple, attractive and easy-to-use structure. The login and gameplay does not require any complicated applications, devices or any technology knowledge.

The game is really easy to use for instructors as well. To accommodate different class outlines, the game can be played over a longer period of time with less frequent decision deadlines or shorter period with more frequent decision deadlines/turns. All the results are stored, and provided to the professor by email after each turn. A score for each team within specified range can be given after each turn, or for the whole game.

3. CONCLUSION

Economics professors often face a lack of student engagement. To foster student motivation and engagement, and increase student collaboration in Introductory Macroeconomics classes, I developed Macroeconomics Policy Simulation Game. It is a fun and engaging new tool that helps create a modern and memorable learning environment by supplementing otherwise usual in-class and after-class learning activities. The accessibility and ease-of-use of the game allows instructors from a wide range of institutions to successfully adopt it to their courses.

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