



Teaching Macroeconomics with the Econland Simulation Game and Learning Platform

Despite the potential of simulation games to bring variety to the classroom and enhance student engagement, the teaching of macroeconomics is still dominated by the traditional lecture format. In response, Econland provides an online simulation game and learning platform that supports introductory macroeconomics courses at all levels. In the game, students run an economy by making monetary and fiscal policy decisions in order to optimize the country's economic performance through a seven-year business cycle. The platform also includes a range of learning resources that link the game to macroeconomic theory and to the real world. Use of Econland has been shown to improve both student engagement and performance.

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1. Introduction

The growing use of business simulation games in education is supported by enabling technologies, an increasing supply of relevant simulations, and an increase in online and blended learning programs. Instructors are realizing that online games can bring variety and energy to the classroom in comparison to traditional lectures or case discussions. Using simulations in class responds to a growing demand for experiential learning activities that make students engaged and active learners in the classroom. Improving student engagement is an increasingly relevant topic in education, particularly in the context of very low completion rates for Massive Open Online Courses (MOOCs), as well as high drop-out rates in online education and in higher education generally (Henrie, Halverson, & Graham, 2015).

Despite this need and opportunity to introduce innovative teaching practices in education, the use of simulation games in the teaching of macroeconomics is low. In response to this situation, the Econland simulation game and learning platform (www.econland.com) has been developed in order to support teaching of macroeconomics at the high school, advanced placement (AP), and university levels.

The remainder of this article provides a brief literature review, describes the learning objectives and functioning of Econland, and includes a discussion of effective teaching strategies.

2. Literature Review

Although simulation games are increasingly used in education generally, the most recent survey of teaching methods in undergraduate economics (Watts and Schaur, 2011) shows that economics teaching is still dominated by the lecture format, with traditional lectures accounting for 83 percent of class time. The same study finds that games, simulations, and experiments are almost never used in economics courses. Goffe and Kauper (2014) investigated why the lecture format prevails, finding that only one third of teachers think that students learn best from lectures. Another third used lectures because they are judged to be cost-effective and a final third were looking for alternatives to lectures. Allgood, Walstad and Siegfried (2015) emphasized the adoption costs that teachers incur when using new teaching methods, both in learning about the innovation and how best to use it, as an obstacle to innovation

Although there are some simulations available for teaching microeconomics, we could find no evidence of widely used simulations to support teaching of macroeconomics and almost no published research on their effectiveness. Woltjer (2005) and Snarr and Gold (2006) are among the few descriptions of macroeconomics simulations available in the literature. A review of the use of simulations in teaching economics by Porter, Rochelle and Ruffer (2004) identified just a few simulations used in macroeconomics, all of which now appear to be discontinued and unavailable. This is surprising since the study of macroeconomics lends itself well to the use of simulation models, particularly in the context of monetary and fiscal policy and the aggregate demand-aggregate supply (AD-AS) framework, which are both at the core of introductory macroeconomics courses. Simulations have the potential to bring these concepts to life, which is helpful because many students find them to be abstract and difficult to master (Snarr and Gold, 2006).

3. Target Audience and Learning Objectives

Econland is a simulation game and learning platform that has been developed in response to the need for innovative learning tools that engage people while learning macroeconomics. Its development has been enabled by the latest innovations in simulation software development and other web technologies. As such, Econland differs greatly from previously available macroeconomics simulation games.

The target audience of Econland includes anyone with an interest or need to learn macroeconomics. Users include university students taking an introduction or principles course, high school students preparing for AP tests, A-Levels, International Baccalaureate, or other exams, or professionals needing to learn key economic concepts and the consequences of economic policy decisions. The simulation can be adapted by the instructor to fit the appropriate level for each group of learners. It can be used equally well as part of face-to-face, online, or blended courses.

The simulation game is designed to support the most commonly used introductory macroeconomics course curricula throughout the world. Macroeconomics courses typically cover economic concepts such as Gross Domestic Product, unemployment, inflation, budget deficits, productivity and growth, AD-AS, and monetary and fiscal policy. When students reach the topics of AD-AS and monetary and fiscal policy, it is often a challenge for instructors to deliver the theory in an engaging way. Understanding which type of policy or event shifts which curve in which direction is something that does not come naturally to many students.

The simulation game brings economic policymaking to life for students by letting them understand the external economic environment, make monetary and fiscal policy decisions, and analyze the consequences of their decision making. At the same time, using Econland consolidates student understanding of underlying economic concepts taught during earlier stages of their macroeconomics course. The game is designed to bring all the major macroeconomics course topics together and to link them to the real world.

At a deeper level, Econland develops critical thinking and problems solving skills. It offers the opportunity to learn about modeling and system dynamics.

Econland supports the teaching of commonly used, existing macroeconomics curricula and does not require a revamp of the syllabus for the macroeconomics course. Several efforts are currently underway to redesign or adapt the economics curriculum (e.g. Rethinking Economics or the CORE project), but these endeavors are outside the scope of this simulation. Econland is also not aiming to replace other methods of instruction all together. It is simply designed to be a more engaging and effective way of teaching macroeconomics than traditional lectures alone.

4. Overview of the Simulation Game

In EconLand, students manage the economy of a medium-sized country. For a period of seven rounds (equivalent to years), players make economic policy decisions (both monetary and fiscal policy) for their country in order to make the population happy about the economy. The four decisions that students make during each round of the simulation game are:

1. Interest Rate

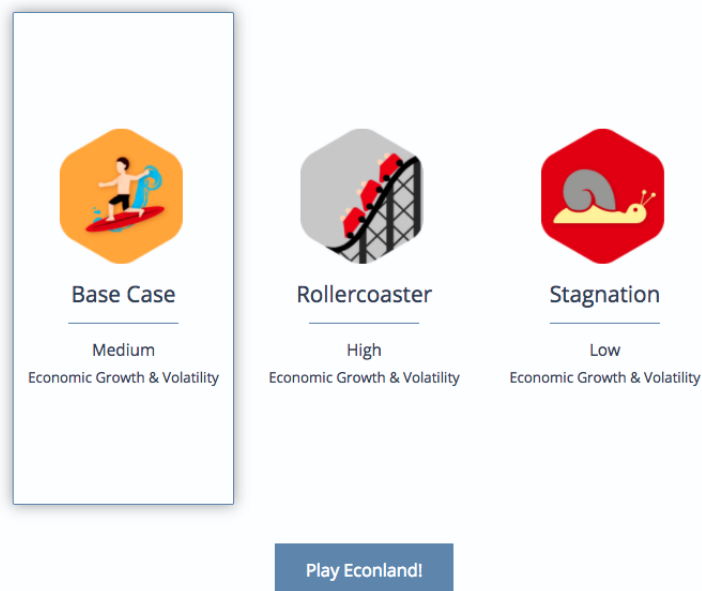
2. Income Tax Rate
3. Corporate Tax Rate
4. Government Spending

In terms of results, the population of Econland cares about their incomes, employment prospects, and cost of living. In addition, the government must keep its budget deficit under control. These factors are measured by the following four measures of economic performance:

1. GDP growth
2. Unemployment Rate
3. Inflation Rate
4. Budget Surplus (or Deficit), measured as a percentage of GDP

Decisions are made and results are obtained in the context of fluctuating global economic conditions. At the start of the game, players choose one of three scenarios for the volatility of the external economic environment: Base Case (average volatility of external economic conditions), Rollercoaster (high volatility) or Stagnation (low volatility). The Base Case scenario takes the student through a seven-year business cycle, with the world economy starting in a stable condition, then expanding, slowing down, contracting and stabilizing again. The Rollercoaster and Stagnation scenarios go through the same cycle, but in the Rollercoaster scenario the world economic growth during the expansion phase is more rapid and the subsequent global recession is more severe. The Stagnation scenario presents a case of continuously slow world economic growth with only mild fluctuations. Initially, students should choose the Base Case scenario. After they have played the game at least once, they can choose one of the other sce-

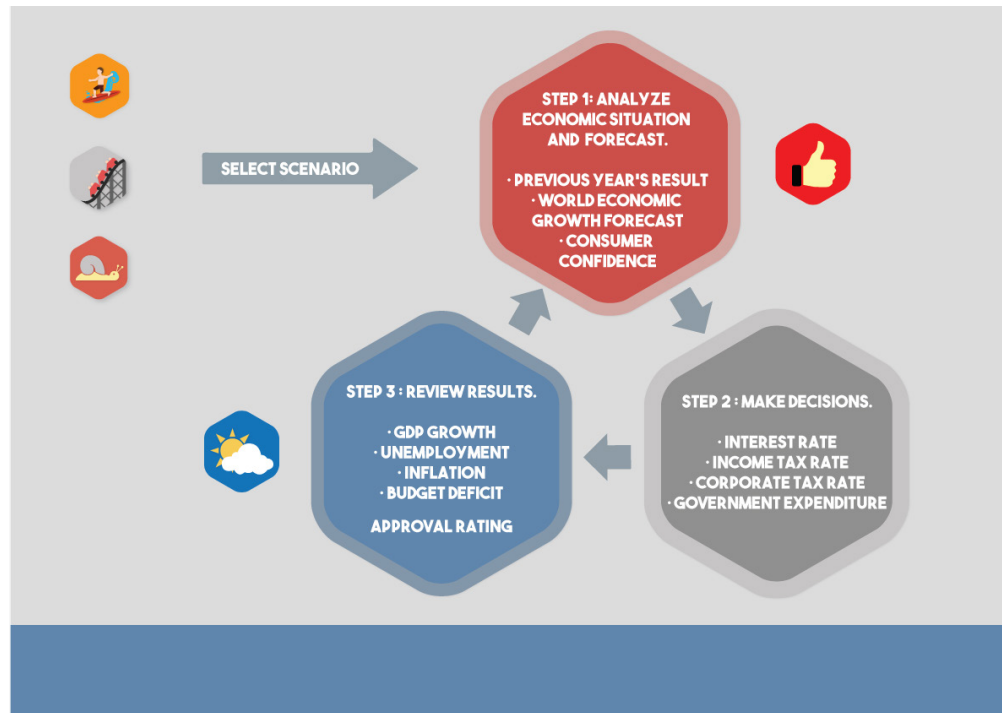
Figure 1 – Three Scenarios Available in Econland



narios, in order to introduce variety and a greater level of challenge to the simulation.

After choosing a scenario, players go through the analyze-decide-review cycle shown in Figure 2 for each of the seven years of the game.





Figure 2 – The Analyze-Decide-Review Cycle for Each Round



Each year, players receive information about the economic conditions facing the country. Players then make the four economic policy decisions (interest rate, income tax rate, corporate tax rate, and level of government spending) and analyze their results. Subsequently, they make their decisions for the next year and analyze their new results. The game lasts seven years, taking players through an entire business cycle of global economic expansion, then a slow down, and then renewed growth.

The aim of the game is to obtain the approval of the citizens by maximizing real GDP growth, while keeping the unemployment rate and the budget deficit as low as possible. Inflation also needs to be low, but should remain positive. Every round, zero, ten, or 25 "approval points" are given for each of the four results areas, as seen in Figure 3.

Figure 3 – “Approval” Points Awarded for Policy Choices

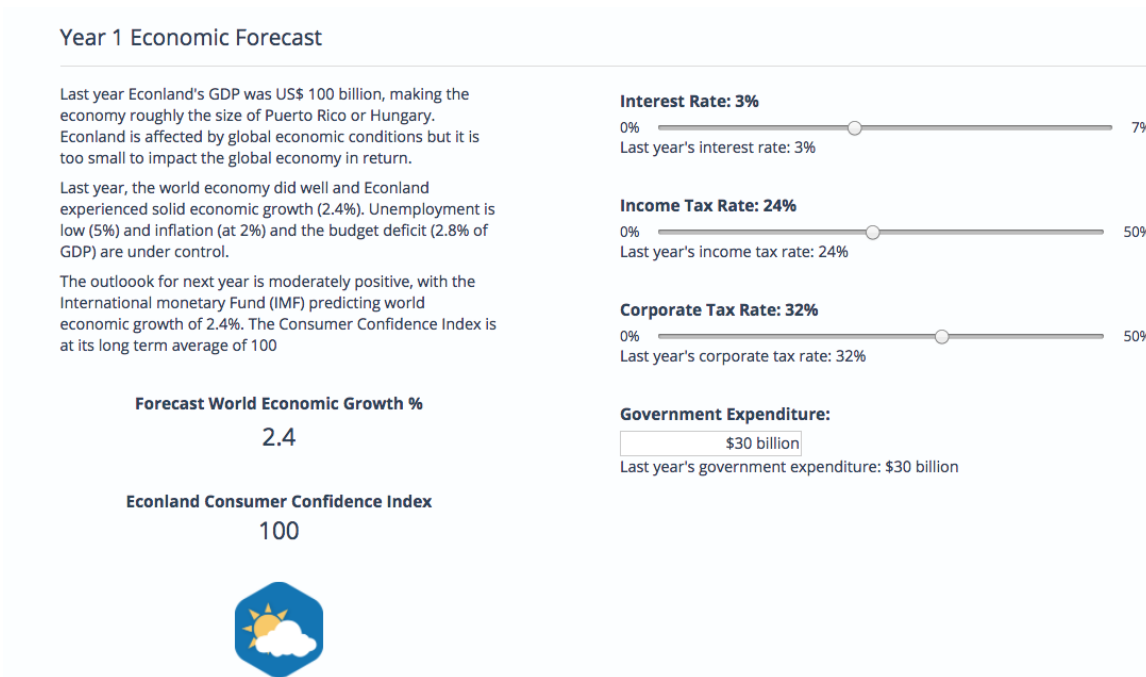
	 25 POINTS	 10 POINTS	 0 POINTS	 STARTING POSITION
REAL GDP GROWTH %	> 2.5%	> 1%	< 1%	US\$ 100 BILLION (GDP)
UNEMPLOYMENT RATE %	< 5%	< 8%	> 8%	5%
INFLATION RATE %	< 3%	< 5%	> 5% OR < 0%	2%
BUDGET DEFICIT (AS % OF GDP)	< 3%	< 6%	> 6%	3%

Taken together, the approval points for each round make up the overall approval rating (0 - 100 points) that the population gives to the government for its economic policies. The overall objective of the game is to end up with the highest possible average approval rating at the end of Year 7.

At the start of each round, players review the economic outlook for the next year. There is a brief narrative that explains economic developments for the year. The economic conditions are summarized in a world economic growth forecast and a Consumer Confidence Index. The changing world economic conditions are determined by the scenario that the student has chosen (Base Case, Rollercoaster, or Stagnation). The Consumer Confidence Index is determined partly by the forecast for the world economy and partly by the recent performance of Econland's economy. The economic outlook is summarized in a weather forecast picture (ranging from sunny to raining).

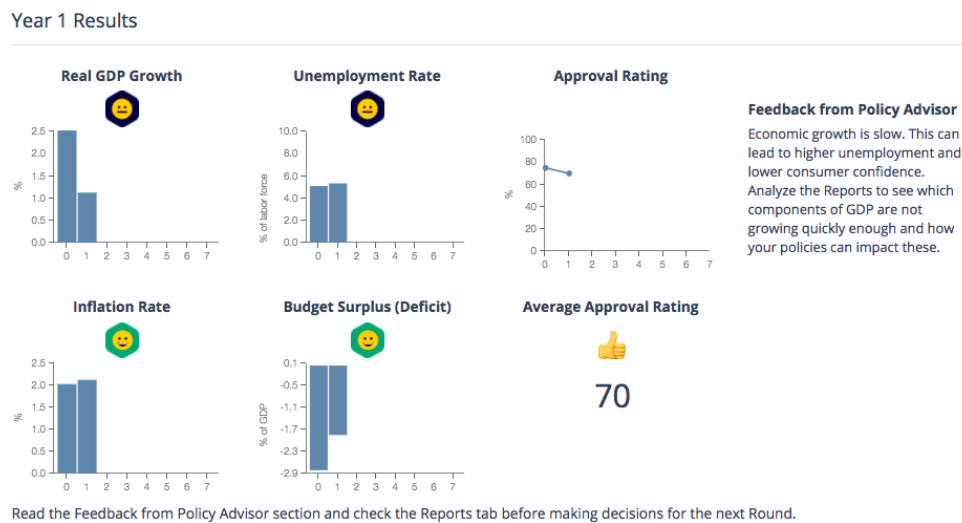
After reviewing their previous year's results and the economic conditions and outlook, students make four monetary and fiscal policy decisions (interest rate, income tax rate, corporate tax rate and government spending). On the decision page, a tooltip gives a brief explanation of the impact of each decision area on the economic result areas (shown in Figure 4).

Figure 4 – Economic Conditions in Year One in Econland



After submitting their decisions, players see a “Dashboard Page” that provides data on the results obtained in each of the four areas. The player can also see the total approval rating for the round and the average approval rating for all the rounds played up to that point. A policy advisor provides feedback that is specific to the decisions and results of the player in that particular round. Players need to take these feedback comments into account before making decisions for the next round. This information can be seen in Figure 5.

Figure 5 – Results and Policy Recommendations from Advisor



Make Decisions for Year 2

In addition, a “Reports Page” provides three tables with more detailed insights into the functioning of the economy, including data on the individual components of GDP, productivity growth, and other economic variables that help explain the results. This page is particularly important for instructors wanting to emphasize the international trade aspects of an economy, because it contains information on the level of exports, imports, the trade balance, and the exchange rate. Analyzing the data in these reports is key to making well-informed decisions in future rounds. Figure 6 shows these tables.

Figure 6 – Detailed Reports

Year 3 Results

Table 1: Real GDP and Its Components

	Year 0	Year 1	Year 2	Year 3
Consumption	59.5	67.5	73.5	80.7
Government Expenditure	30.0	32.0	32.5	32.5
Investment	10.0	10.1	11.4	13.2
Exports	25.0	25.6	26.3	27.2
Imports	25.0	28.4	30.9	33.6
Nominal GDP	99.5	106.8	112.8	119.9
Real GDP	100.0	104.1	106.1	108.5

Table 2: Other Macroeconomic Data

	Year 0	Year 1	Year 2	Year 3
Capital Stock US\$ Bn	100.0	100.1	101.5	104.5
Productivity growth %	0.0	0.1	1.4	3.0
Consumer Price Index	100.0	102.6	106.4	110.6
Exchange Rate Index	100.0	100.0	100.0	99.0
Income Tax Revenue US\$ Bn	23.9	24.6	25.9	27.6
Corporate Tax Revenue US\$ Bn	3.2	3.3	3.5	3.7
Government Budget Surplus (Deficit) US\$ Bn	-2.9	-4.1	-3.1	-1.2
Trade Balance US\$ bn	0.0	-2.8	-4.5	-6.4

Table 3: Economic environment, Decisions and Results

Students make seven rounds of decisions. When the game is finished, the students are able to see the game results ranked against any other previous games played and also access any of their previous runs. Instructors are able to view and access all games played by the students in their class.

Information on how to play the simulation game is available to students on the system in the form of a Student Guide, a Student Video, and explanations on the Game Info page.

5. Macroeconomics Learning Materials

In addition, the Econland platform contains a section with learning materials to support students in playing the game and in their studies. A brief theory section explains the AD-AS framework and the impact of monetary and fiscal policy. A glossary of terms explains all of the concepts used in the simulation game in way that is relevant for both the game and a macroeconomics course.

A separate section contains four other learning resources. First, students have access to videos that explain macroeconomic theory. Second, a weekly online economics newspaper (Econland News) contains articles that link the topics learned during an economics course to recent news items. This newspaper may be used as a resource for class discussions or student projects. Third, a discussion forum enables students to ask questions and find answers on topics related to economics education. Finally, a multiple-choice quiz with an extensive test bank of questions allows students to test their knowledge of the topics covered in the game. The questions are of a level commonly found in introductory macroeconomics courses.

6. Instructor Resources

Instructors have access to their own section on the platform. Here, instructors can adjust the parameters of the underlying simulation model by changing the values of the tax and government spending multipliers at different levels of overcapacity in the economy (as measured by the unemployment rate). In order to support instructors in their decision on the appropriate level of these multipliers, this section also contains a link to a study by the International Monetary Fund (IMF) that summarizes research on multipliers. Discussing the appropriate values for multipliers can be a useful exercise for slightly more advanced classes, as students and instructors may have different opinions regarding the relative effects of tax reductions or increases in government spending to stimulate the economy. Before starting a simulation exercise, the instructors should play the game several times and decide whether to change the values of the fiscal multipliers. First-time users will generally leave these multipliers at their default values.

The instructor section also provides access to complete information on all of the games played by the students in their class and to a Teaching Note. The Teaching Note contains guidance on the game, teaching tips, and information on all the variables in the model and their relationships. A brief video for instructors provides guidelines on how to teach using Econland.

7. Effective Teaching Strategies

The simulation game is best used during the second half of an introductory macroeconomics course, when the basic concepts have been covered and the topics of AD-AS and monetary and fiscal policy are being treated. Use of the simulation can be effective as an integrative exercise right up to the final class before the end of the course.

As with all business simulations, teaching with Econland should follow a “Brief-Play-Debrief” cycle. This is the case regardless of the level of the students or the format of the course (face-to-face, online, or blended).

In the “Brief” phase, instructors need to make sure that students are familiar with the concepts that are practiced in the game and with the rules of the game. A good way to start this

phase can be to ask participants what the main economic policy tools of a government are and to what objectives these tools may be used. Students will usually come up with the monetary and fiscal policy tools used in the simulation, as well as the four result areas of the game as the objectives of economic policy. When students suggest policy tools or result measures that are not part of the simulation game (e.g. open market operations as a monetary policy decision or reducing income inequality as a policy objective), then this provides an opportunity for the instructor to explain the limitations of the model and that, by its nature, every simulation model is a simplification of the real world. In order to make sure that the relevant topics and the game itself are understood, the teacher may log in and do a demo run of the first year of the game in front of the class and show the platform's theory section and glossary of terms. In a typical class of students who have some knowledge of monetary and fiscal policy, the "Brief" phase lasts around 15 minutes.

Once the briefing is complete, students can log in and start analyzing and making decisions. When playing the game for the first time, players should be advised to select the base case scenario. When students have played one full game (7 years), they may try to raise their score in the same scenario or play one of the two alternative scenarios (Rollercoaster and Stagnation). The play phase usually takes around 40 minutes in the first instance, allowing students to get an understanding of the game and to play it twice. When the game is well understood by the students, the instructor can encourage students to continue playing outside of class.

When the "Play" phase is complete, the teacher can debrief by facilitating a discussion about the learning points of the exercise. This can take place at different levels, depending on the time available and the level of the class. At a minimum, students should share how monetary and fiscal policy decisions, in combination with the external economic variables, resulted in the outcomes they obtained. A discussion can also be had on the mechanisms by which monetary and fiscal policy lead to their impact. This analysis can include the variables of capital stock, productivity, and exchange rates that are shown in the Reports Page (Figure 6). All elements of the class discussion enable the instructor to link the experience of the simulation back to the curriculum of the macroeconomics course.

A deeper discussion can be held about the model itself: Does it work in the way that participants expect? Are there important elements missing from either the decisions or the results section? Discussing the model in class can also be the start of a discussion on economic modelling more generally, including its purposes and limitations.

As a way to wrap up the "Debrief" phase, the instructor can point students again towards the additional learning resources. The quiz can be administered before or after use of the simulation game in order for students to practice or to test the students' knowledge. The other resources provide further support inside or outside the classroom.

Depending on the level of the students and the desired level of depth of the class, the use of Econland can be for the duration of just a single class session or can be extended over two or three class sessions. If the simulation is used during just one class, students may be encouraged to play the game again outside the class.

The subject of whether to include the simulation grade results as an element in students' grades is one of hot debate. Students sometimes need an incentive to participate fully in class exercises. However, the use of an engaging simulation game should probably not need additional incentives for active participation. Determining a component of the grade just on the basis of simulation game performance risks turning the exercise into winners and losers. If an instructor is keen to add a grading element to the use of the simulation game, alternatives to using the game scores would be to ask students to write a brief reflection on their learning from

the exercise or to administer a brief quiz at the end.

8. Impact

Econland has been used during the Fall 2016 and Spring 2017 semesters at a national university in the United Arab Emirates. Over 100 students played the simulation in ways that were similar to the recommended approach described in this paper. The author of the simulation supported various macroeconomics teachers in their use of Econland. A preliminary study of the impact of Econland on the levels of student engagement and student performance showed positive results (Rogmans, Zenker and Ellaboudy, 2017). Once the instructors experienced the benefits of using Econland in class, they showed a desire to keep on using it in future semesters.

In August 2017, Econland was published and is now available for instructors and their students. Instructors can get a trial account for free. The cost of a license for students enrolled in a high school, college, or university is US \$9 for unlimited use for a period of six months (www.econland.com).

9. Conclusion

Despite the obvious potential for macroeconomics courses to be supported by simulation games, there are very few simulations available today. Econland presents a simulation game and learning platform that can be used in introductory macroeconomics courses at all levels. By taking an active part in economic policy decision making, students get more engaged in their learning and begin to link different macroeconomics concepts to each other and to the real world. At a deeper level, students develop their critical thinking skills and learn to evaluate economic models, including their purposes and limitations.

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