

## **An Electronic course in macroeconomic: a prototype text and course**

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### *ABSTRACT*

This paper explores the problems and potentials of teaching a college-level economics course by computer using an electronic text supplemented with an electronic lab. The course is currently under development at the University of Minnesota, Duluth. The current prototype course uses a paper text with a computer simulation model of the U.S. and world economies and a self-correcting laboratory with individually developed lessons. Each lesson has an infinite number of self-generated quizzes each with ten questions. Eventually, the course will have an electronic text coupled with a video lecture series. The paper will explore briefly the potential cost savings to the institution of this mechanism for learning and teaching.

### **Introduction**

This paper explores the problems and potentials of teaching a college-level economics course by computer using an electronic text supplemented with an electronic laboratory. Such a course is currently under development at the University of Minnesota, Duluth. The current prototype uses a paper text with a computer simulation model of the U.S. and world economies. Embedded in the laboratory are 15 individually developed lessons. Each lesson provides the student with a virtual experience of a major macroeconomic concept with a self-correcting quiz. The quiz is computer-generated and computer-corrected based on a particular time period and the computer simulation of the economic activity of that period. These quarterly time periods are based on the historic simulation of the economy from 1985 through 1996 and forecasts from 1997 and the future. Thus each lesson has an almost infinite number of questions that may be asked and answered. The paper text is currently being transposed into an electronic text supplemented with video encrypted lectures. This paper will explore the potential of this mechanism for learning, teaching and the cost of delivery.

### **1. The Market**

In 1997, about seven million students will be attending a four-year university or college in the United States. Of this number an estimated 1,300,000 students will enroll in at least one macroeconomics course at the lower division and 400,000 will enroll in a macroeconomics course at the upper division in a given year. From these estimates the market for macroeconomic text material is estimated to be \$140,000,000 annually serving 1,700,000 students each acquiring about \$80 worth of text material. The traditional paper texts are expensive to produce and ship. Estimates suggest that the average textbook publisher spends \$30 for printing and binding costs and another \$2 for shipping and handling costs. In aggregate, publishers spend an estimated \$54 million per year to get this text material to the market. If such a text were provided electronically, say on a CD-ROM or

shipped over the Internet, the production and shipping costs would be dramatically reduced. At present, an electronic text packaged on CD-ROM with shipping comes to about \$2.00 a unit in bulk. If the entire market were served by electronic texts, the industry would save \$50 million per year in production costs. Some of this saving could be passed on to the consumer as lower prices, but a significant portion of this savings could be retained by the industry as profit.

The collegiate institutions are also likely to be interested in developing a course around these electronic materials. If the market projection for macroeconomics is accurate, then these institutions will have hired 5667 FTE faculty members to teach 34,000 three-credit semester courses in macroeconomics. It is assumed that the 1,700,000 students generate 5,100,000 student credit hours (SCH) a year based on a three-semester credit course. If each faculty member earns \$50,000, the total cost of providing these courses is estimated to be \$ 283 million. The estimated tuition fees generated by these courses at \$100 per SCH and 5.1 million SCH is \$510 million. The new technology is likely to reduce the amount of time that a faculty member spends in the classroom lecturing by one class per week or one third. However, the new technology may also increase the out-of-class time spent answering questions by one sixth. The net time saved of one sixth of the total time spent on teaching these classes represents 945 FTE faculty positions. If the new technology is simply labor saving, the cost savings to the institutions amounts to \$47,225,000 per year. These savings could be used for more pressing academic problems in higher education.

This in and of itself might be sufficient reason for both publishers and collegiate institutions to be interested in developing an electronic course material and a partial electronic text. But suppose the electronic course has the potential of being a higher quality product relative to the traditional course. The electronic course can be coupled with an electronic text and computer simulation laboratory, automated tests, and Internet Web sites to make the course a multimedia learning activity. If this electronic course is developed and marketed correctly, the course has the potential for significantly improving the current learning experience.

## **2. Pedagogical Potential**

When studying about the national economy most students have had little direct experience with actual national economic problems, such as inflation or unemployment and recession. The business cycle is not an easy concept to grasp. Therefore, almost all principle and intermediate macroeconomic courses begin with an introduction to these problems through a description of the business cycle followed by an introduction to national income accounting. Often these courses will have an introduction to the micro foundations of macro economics. Most courses will then introduce one of the major macro-economic models to analyze the causes of the business cycle. These courses often conclude by discussing monetary and fiscal policy issues aimed at reducing the impact of the cycle on society. Professors struggle to help students understand these ideas, partially because students have no direct experience with these events and no way of acquiring such experience. The introduction of a computer-driven Electronic Macroeconomic Text coupled with a simulation laboratory used to simulate the U.S. national economy and its major institutions can help students gain this knowledge and experience in a matter of weeks. Through the use of the electronic text coupled with the simulation laboratory a student can rapidly move from reading about the economy to experiencing the business cycle. Until now, large-scale general equilibrium models were used to forecast or simulate the U. S. economy over any period of time. These

models were only available and used by major consulting firms, major banks, the Federal Reserve Banking System, and the U.S. government to forecast changing economic conditions and simulate shifting policy options. With the electronic text and forecast simulation capability this is available to students with access to IBM or Macintosh computers. Simply and realistically, the student may read about various aspects of the national economy and then use the simulation model to observe changes in various economic conditions, the impact of monetary and fiscal policy, and their implications on financial, product and labor markets for various sectors of the economy. .

The introduction of an electronic text coupled with a computer simulation model provides the target students with an experience similar to that which they receive in the natural sciences in a laboratory. The students are able to test the economic theories that they are reading about in their text and hearing about in their lectures against the computer simulated real world economy. Each student is required to observe economic data in the same format as it will appear to them in the real world, analyze, answer questions, write reports, draw graphs, and suggest and test economic policies suggested by those data. The use of the computer simulation model is only limited by the knowledge and imagination of the instructor and student in this laboratory activity. Students are introduced directly to the complexities of the multiplier, business investment demand, money creation, commercial banking and monetary policy to mention a few.

### **3. Conclusions**

Such an electronic course has two major advantages; it is less expensive and provides the potential for better pedagogy. If fully implemented, an electronic course could save as much as \$97 million a year nation-wide in providing macroeconomic material to university students. Second, the course will develop, electronically, the two most widely understood macro-models using a scientific approach. In this context, the remainder of the electronic course is divided into four major parts. The first part is an introduction to the scientific approach and economic observation, i.e. national income accounting. The second part, the Keynesian model, develops a numerical model illustrating the basic theories of the Keynesian system with appropriate laboratory exercises. The course will develop some simple dynamics to help understand how the system works through time. Third, the course will review the attempts to verify this model empirically. In this section, a number of studies will be reviewed which have modified the Keynesian model or attempted to refute the model. Finally, the course will simulate on the computer the development of some recent and current macroeconomic problems. These problems will stem from the discussions and analysis previously suggested by the electronic text. Out of the forecast of recurring business fluctuations, the economist will be able to recommend some policy prescriptions which may help alleviate some of the economic hardships caused by these business fluctuations.

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