Running head : MACROECONOMIC DATA COLLECTION SIMULATOR

Building a Macroeconomic Data Collection Simulator on the Internet (Project Neo-Genesis Phase 2)

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Abstract

Since the internet have become popular to the public, a new simulation method, which involves a large number of people in the simulation process, has been enabled. In this paper, a macroeconomic data collection simulator on the internet, which can model a closed economic system by using such the simulation method, is proposed. The simulator provides a market system with its users; therefore, they can buy, produce and sell products. System administrators can coordinate the market by controlling four macroeconomic variables. With some extensions, the simulator can model an open economic system.

Project Neo-Genesis Phase 2
Building a Macroeconomic Data Collection Simulator on the Internet

In 1998, Blizzard Entertainment, a famous computer game producer, released StarCraft™, a real-time strategic simulation game. The game accompanied Battle.Net™, which could connect millions of gamers through the internet. Thanks to Battle.Net™, gamers can play StarCraft™ with human opponents; human-versus-human game play was very limited in the past due to poor network technology.

The StarCraft™ and Battle.Net™ provided the gamers with a simulated battle environment. Every day, on Battle.Net™, thousands of battle records and statistics were created. Blizzard Entertainment observed the results and applied a patch to StarCraft™ when a new exploit was discovered or some configurations were thought to be unfair. Figure 1 shows the abstract view of these relations.

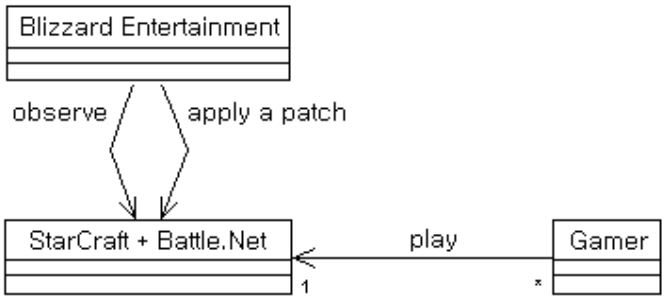

Figure 1. Associations betweem Blizzard Entertainment, StarCraft™ + Battle.Net™ and the games.

StarCraft™ was improved quickly with Battle.Net™ and human gamers. Unexpected exploits which resulted from the game bugs were discovered due to abnormal moves of human players; such exploits cannot be found with computer

players, since the computers are not programmed to perform such moves. Since slight changes in the game configurations caused recognizable changes in Battle.Net™, slightly unfair factors in the game were recognized and corrected.

From a general viewpoint, the gamers and StraCraft™ +Battle.Net™ can be generalized to a simulating environment and Blizzard Entertainment to an administrator of the environment. Figure 2 shows a typical simulation system. The major difference between the typical simulation system and the StarCraft™+Battle.Net™ system is whether humans participate in the simulation process. However, the latter kind of simulation system is a new method realized by the development of networking technology; therefore, much research is required to make the simulation method stable.

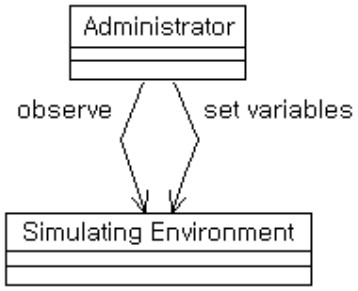

Figure 2. A typical simulation system.

In this paper, the macroeconomic data collection simulator is proposed using this simulation method. Current macroeconomic simulation systems simulate an economic model which consists of mathematical equations; they are statistically extracted from the real world. These model responds simultaneously to changes in

model configurations as mentioned in the economic theories. However, the responses are not simultaneous in the real world. The macroeconomic data collection system is intended to collect all data in a modeled market in which people participate (similar to Battle.Net™ example), and to process the data to produce macroeconomic indices reflecting the aggregated status of the market. Therefore, system administrators can use the system as a macroeconomic data collection simulator; administrators apply a set of policies to the system, and then observe the indeces to evaluate the effect of the policy set over time.

Preliminaries

Project Neo-Genesis Phase 1 System

Project Neo-Genesis(PNG) is aimed to create a virtual society on the internet which enables people to perform political and economic activities. The PNG Phase 1 System is the first step in achieving the PNG goal; it provides a market system on the internet which supports electronic product trade between its users. The market system is the foundation of the next phase. However, in the Phase 1 System, system administrators do not coordinate the market.

Enterprise Resource Planning system

An *Enterprise Resource Planning*(ERP) system helps business managers to

easily manage their enterprises by managing all management-relevant information electronically, and by providing adequate information on the decision-making process. With ERP systems, managers can monitor current enterprise status, make decisions with adequate information and transact business online with other enterprises.

Macroeconomics

Macroeconomics is defined as “the study of the behavior of the entire economy." (Samuelson & Nordhaus, 1995, p.399) The goal of macroeconomics is to achieve economic growth, price stablization and full employment of the state. The actors in the closed economy are households, businesses and a government; the government coordinates the economic environment, in which the households and the businesses perform economic activities. The government coordination on the economic environment is called policies. Monetary policies and fiscal policies are two different kinds of policies, which a government can use to control the money market and the product market. Monetary policies affect the money market; monetary policies cause changes in the money supply or the interest rates. Fiscal policies affect the product market; fiscal policies cause changes in government spending or taxation policies.

Component architecture

A *component* is an independently working software building block which can

be used to assemble larger software. The services of a component are accessible through the *interface* with its internal details hidden; a component is encapsulated. Components are executed in container software, which provides standardized component infrastructure.

A component *architecture* of a system identifies the major system parts and their associations. The parts in the architecture are usually components in component-based software. However, legacy systems, presentation layer and other packaged software are also considered as system parts. (Dodd, 2000)

System architecture

The transition from the PNG Phase 1 System to the Phase 2 System.

The PNG Phase 1 System is extremely limited. The Phase 1 System can only model a market in which no production occurs; hence, the Phase 1 System cannot be used as a macroeconomic simulator. In addition, the contribution of the Phase 1 System is small, because the systems which intermediate between an electronic product seller and a buyer already exist. Therefore, several additions to the Phase 1 System are needed. The Phase 2 system is built on the Phase 1 system.

The PNG Phase 2 System contains two new concepts compared to the Phase 1 System. The production concept is added; as a result, the new product assembly

procedure with existing products is supported in the Phase 2 System. The products are divided into two classes: components and end products. Components are products which are used to build other products, and the end products are products which can be used independently. The administration concept is added; system administrators can apply a set of economic policies to coordinate the market. The administrators act as the government of the Phase 2 System. The administrators can use monetary policies to adjust the money market, and fiscal policies to adjust the product market.

The Phase 2 System overview.

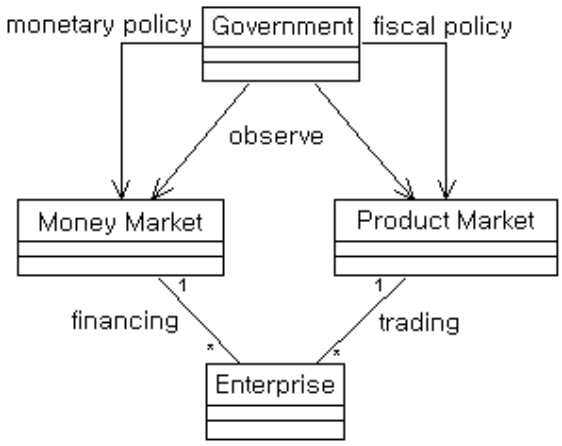

Figure 3. The PNG Phase 2 System overview.

The PNG Phase 2 System consists of a government, a money market, a product market and a large number of enterprises. System administrators act as the government. The product market is the same as the market in the Phase 1 System. The central bank and banks participate in the money market. Every user of the system participates in the

system as an enterprise.

In the Phase 2 System, every user owns an enterprise; therefore, aggregate user consumption is merged with aggregate enterprise investment. The users can use ERP system by default. These ERP systems are connected to the money market and the product market, so enterprises can execute financing, procurement, sales and marketing processes. The ERP systems in the Phase 2 System should be able to perform the following activities: planning and production of make-to-stock products, production of make-to-order products, component procurement, product sales, financing and marketing. To simplify the phase, extended functionalities of current state-of-art ERP systems such as supply-chain management, strategic enterprise management, and customer relationship management are not considered in the Phase 2 System.

The transaction records of the markets are collected and statistically processed to produce macroeconomic indices such as GDP and price level. System administrators can read the market trends by observing the indices. If the market behaves undesirably from the administrators' perspective, then the administrators might decide to carry out appropriate policies. In the Phase 2 System, the government can execute the following monetary policies on the money market: bank reserve requirements control, interest rates control, and open market operation. In addition, the government can execute fiscal

policies such as taxation policy control and government spending control on the product market. As a result, the government can control four macroeconomic variables of the Phase 2 System. The macroeconomic variables are the money supply, the interest rate, the tax revenues and the government expenditure. With these variables, the Phase 2 System can be used to simulate a large number of closed economy models.

Further development

The extended PNG Phase 2 System

To simplify the project, the PNG Phase 2 System is limited in many aspects. The Phase 2 System should be extended to give its users sufficient radius of action. Three different additions are needed to achieve the PNG goal. First, trade between different Phase 2 Systems must be supported. When foreign trade is enabled, users can access to the dramatically expanded component pool and product market; consequently, great economic growth of the system is expected. In addition, open economic models can be simulated with extended Phase 2 Systems, while the original Phase 2 Systems can only model closed economic system. The trade function will significantly enhance the macroeconomic simulator aspect of the system. Second, the ERP system must be extended to provide its users with the more integrated business environment. The extended ERP modules such as supply-chain management, strategic enterprise

management, customer relationship management, product data management and product quality management should be designed and realized. Last, the government decision-making system must be extended. In the original Phase 2 System, administrators are absolute monarchs; there is no system-provided channel for users to transmit suggestions to the administrators. Ultimately, the system support for various political structures such as direct or indirect democracy and republic is desirable in achieving the extreme goal of Project Neo-Genesis.

The PNG phase 3 system

The PNG Phase 2 System focuses only on computer software-related production and pays a small attention to general knowledge-production. This results from the fact that a copy of software is easier to trade than a piece of knowledge because it is harder to price knowledge-based products. In addition, it is extremely difficult to support regular knowledge manufacturing and trading procedures. However, support for regular knowledge productions is crucial because there are more knowledge based products to be produced and traded, such as research theses, books and documents, than there are software-related products. The goal of the PNG phase 3 system is to support regular knowledge productions and all functions of the extended Phase 2 System.

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Acknowledgements

Special thanks go to Prof. Yu, Pyung-il in dept. of social science and Prof. Park, Sang-Chan in dept. of Industrial Engineering at KAIST. Prof. Yu helped me building up the economic basis of the idea. Prof. Park guided me to the concepts of E-business and ERP systems.