An Atlas of Economics:

Teaching Tools for Navigating the "Big Picture"

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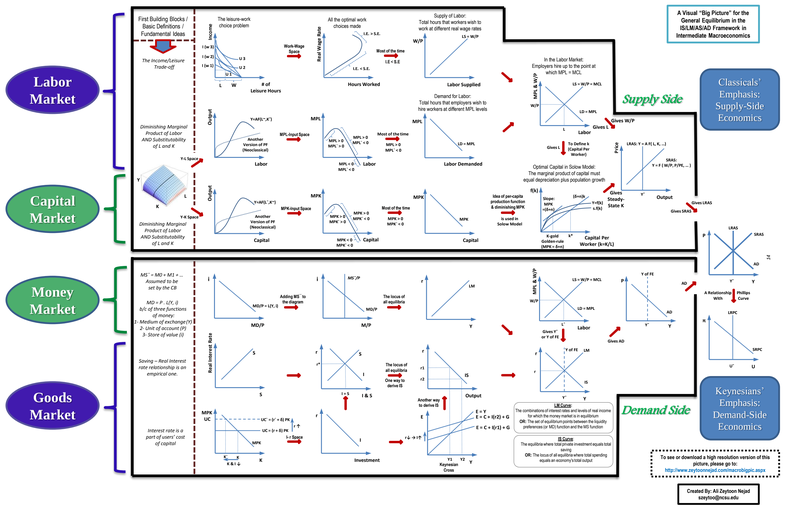
Figure 1) The Visual "Big Picture" of Macroeconomics



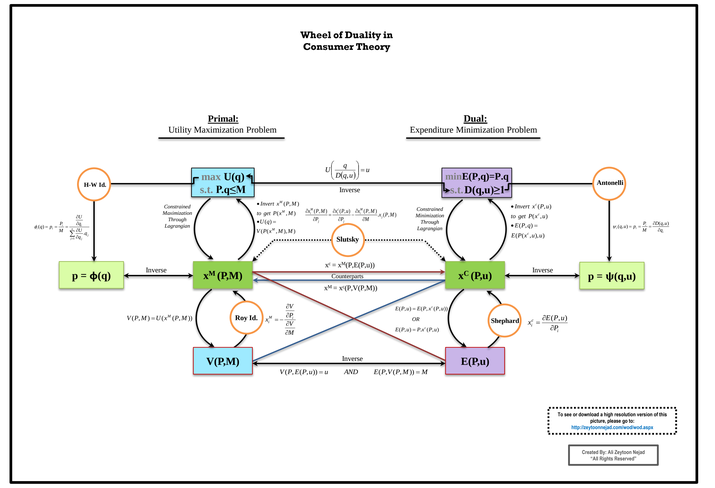
Abstract: The plurality and variety of concepts, variables, diagrams, and models involved in economics can be a source of confusion for many economics students. However, the existing literature on the importance of providing visual "big pictures" during the learning process suggests that furnishing students with a visual "big picture" that illustrates the ways through which those numerous, diverse concepts are connected to each other could be an effective solution for clearing up the mental chaos. With four practical examples, this poster introduces several visual "big picture" that can be used as teaching tools in intermediate macroeconomics and advanced microeconomics classes. These four visual aids represent the "big pictures" of general equilibrium in the IS/LM/AS/AD models in macroeconomics, as well as the wheel of duality in consumer theory and wheel of relationships in production theory. In her book called "Teaching at its Best", Nilson (2010) states that "structure is so key to how people learn and has such far-reaching implications for teaching." She mentions "without structure there is no knowledge." She believes "information" is nowadays available everywhere; however, what it is not so available everywhere is organized bodies of "knowledge". In a sense, the present poster is an attempt to take the latter approach to the teaching of economics in order to teach economic "knowledge", as opposed to economic "information", so that students can readily grasp the logical order of the concepts and the underlying complex structure of the theoretical material being discussed in the aforementioned courses. There is enormous potential with visualization to improve the quality of teaching and learning in economics which has not yet been fully employed. The present poster attempts to fill the mentioned gap to some extent by introducing four wisely designed visual aids that can be effectively used in the teaching of economics.

The Visual "Big Picture" of Macroeconomics

The primary purpose of figure 1 is to introduce a holistic, visual "big picture" of concepts and diagrams that are commonly discussed in the course of intermediate macroeconomics. Intermediate macroeconomics discusses numerous concepts and diagrams to finally show how aggregate supply (AS) and aggregate demand (AD) are derived in an economy. A further learning objective defined for the intermediate macroeconomics course is to enable students to investigate the overall effects of macroeconomic policies on AS and AD in the economy. In order to better attain the aforementioned objectives, the present graphic presents a visual "big picture" that can be applied as a complementary resource in intermediate macroeconomics classes.

This visual "big picture" logically connects twenty-seven macroeconomic diagrams which are usually introduced in the intermediate macroeconomics course, and also describes the general pattern and overall structure of the macroeconomics in terms of four separate markets in a visual way, namely the labor market, capital market, money market, and goods market. Finally, it is suggested that this visual "big picture" should be provided to students during the process of teaching intermediate macroeconomics courses so that they can readily grasp the logical order of the concepts and the complex underlying structure of the markets being discussed in this course.

Figure 2) The Wheel of Duality in Consumer Theory



The Visual "Big Picture" of Consumer Theory

Duality is the heart of advanced microeconomics. It exists everywhere throughout advanced microeconomics, from the beginning of consumer theory to the end of production theory. The complex, circular relationships among various theoretical microeconomic concepts involved in the setting of duality theory have led it to be called the "wheel of pain" by many graduate economics students. Put simply, the main aim of figure 2 is to turn this "wheel of pain" into a "wheel of joy". To be more specific, the primary purpose of this visual is to graphically decode the logical, complex relationships among a quartet of dual functions which present preferences as well as a quartet of demand-related functions in a visual manner.

The quartet of dual functions comprises the Direct Utility Function (DUF), Indirect Utility Function (IUF), Expenditure Function (EF), and Distance Function (DF). The quartet of demand-related functions consists of the Marshallian Demand Function (MDF), Hotelling-style Inverse Demand Function (HIDF), Hicksian Demand Function (HDF), and Antonelli-style Inverse Demand Function (AIDF).

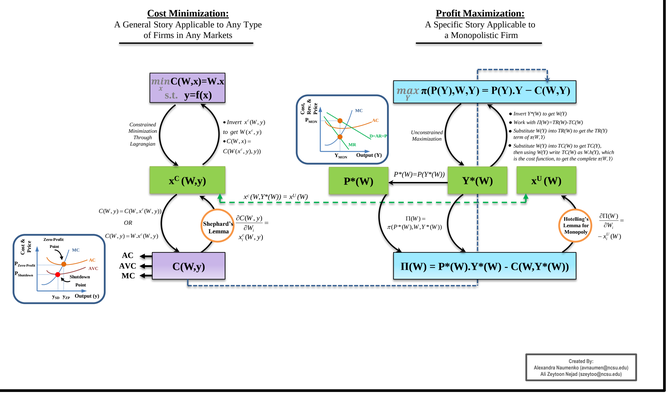
In total, the visual, comprehensive wheel of duality presented in this visual aid logically connects fourteen interrelatedly linked microeconomic concepts, and outlines how one can make sixteen microeconomically logical transitions among the aforementioned dual and demand functions, which are commonly discussed and applied in the context of duality in consumer theory.

The Visual "Big Picture" of Production Theory: Case of Monopoly

This section is to discuss the relationships between the cost-minimization and profit-maximization processes as well as their components for the monopolistic market structure. For the monopoly case, most of the elements and the overall structure remain similar to those of the perfect competition case; however, on the right column (the profit-maximization side) many items will change in form for a monopolistic firm compared with those of a perfectly competitive firm, mainly due to the incorporation of a downward-sloping demand curve that a typical monopoly usually face. Figure 4 summarizes all the operations, equations, and lemmas that help us make the aforementioned transitions in the monopoly case.

In any system of production, there are principally three major and distinct notions of optimality, which are as follows: technical optimality, input allocative optimality, and output scale optimality. Technical optimality is achieved when we specify a correct production function, and is formed primarily on the basis of input types and physical characteristics of inputs and output. A second notion of optimality is input allocative optimality, which is achieved by solving the cost-minimization problem, and is formed primarily on the basis of input prices. A third notion of optimality is output scale optimality, which is formed primarily on the basis of input and output prices, and in the monopoly case, on the basis of input prices and the output demand function. Figure 6 placed exhibits the processes through which we determine potential market outcomes of the two extreme market structures being examined in this poster.

Figure 4) Wheel of Relationships in Production Theory (Case of Monopoly)



The Visual "Big Picture" of Production Theory: Case of Perfect Competition

This section of the poster is to discuss the general relationship between the cost-minimization and profit-maximization processes mostly in a visual way. This section attempts to clarify the theoretical intricacies existing within production theory through the use of conceptual visualization. Monopoly and perfect competition are two polar cases of market structures, which are usually studied through conventional microeconomic analysis. However, market outcomes become much more tricky and complicated in intermediate cases, i.e. imperfect competition, primarily due to the possibility of strategic interactions amongst firms. Figure 5 depicts the spectrum of different types of market structures. Thus, we will mainly focus on the two extreme cases, leaving the imperfect competition case to be visually decoded in a separate paper in the near future. Therefore, our main task here is to show how cost and production theory and their components are related to one another for the two extreme cases of market structures. To do so, we have taken advantage of visualization techniques as well as mathematical equations and concepts.

Figure 3 exhibits the visual "big picture" of the cost and production theory for the perfect competition case. The column on left represents the cost-minimization problem, while the column on right represents the profit-maximization problem. This figure includes all the mathematical formulations and operations needed to make theoretically meaningful transitions among different functions existing in the wheel of relationships in cost and production theory.

Figure 5) Spectrum of Firm Types and Market Structures

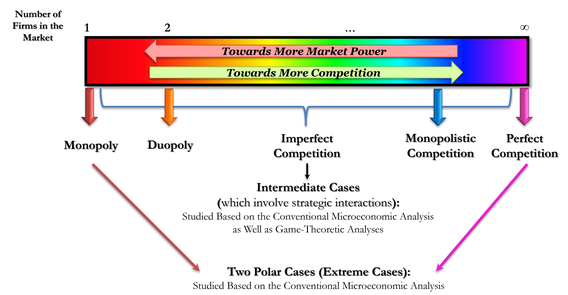


Figure 6) The Process of Determining the Potential Market Outcomes

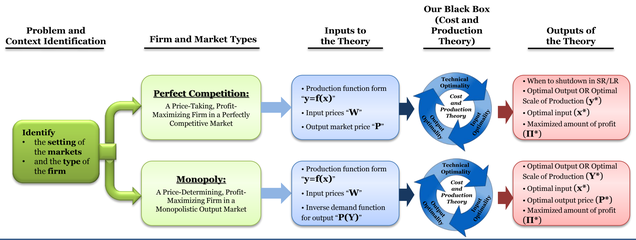
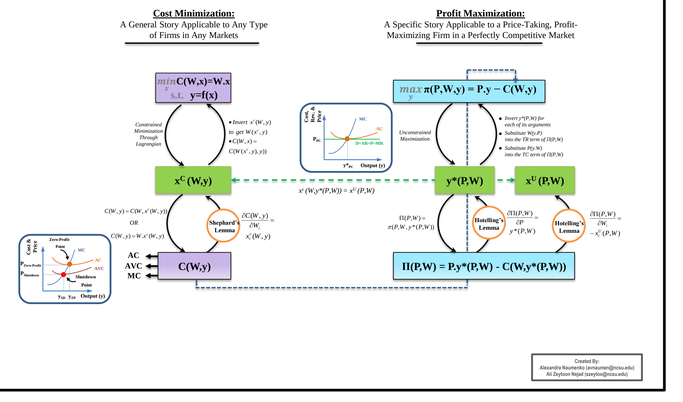



Figure 3) Wheel of Relationships in Production Theory (Case of Perfect Competition)