

Book Review for “Capital and Knowledge: Dynamics of Economic Structures with Non-Constant Returns” by Wei-Bin Zhang

This recent paper by Wei-Bin Zhang provides a very extensive and careful treatment of important advancements in economic theory. The author’s work is extensive in that it studies a vast amount of economic issues that are in the center of discussion and controversy in the profession. The work is carefully carried out in that every model presented in the book shows clearly and in detail all the steps that are necessary for the derivation of the results. This latter point makes the book attractive both to the expert as well as the beginner student of economics.

The author set out a very optimistic goal for this book. He states “*The economic theory consists of separate, multiple sub-theories such as the general equilibrium economics, the neoclassical economics, the Keynesian economics and the Marxian economics. I believe that it is time to construct an integrated framework to include main ideas of these separate theories into a compact whole. The purpose of this book is to construct a compact framework to analyze how different economic forces interact over time.*” Indeed this is a very difficult task for any particular piece of work to accomplish, regardless of how thorough and how comprehensive it might be. I agree with the author that construction of a general theory of economics incorporating the different existing theories will be a huge contribution. I suspect that it will take years, if it is at all feasible, to successfully produce a unified theory. In my view, the book is a nice synthesis of the author’s previous and recent work that provides useful insights in the way economists ought to be thinking about certain economic problem.

The book is organized into ten chapters. Chapter 1 includes a very nice presentation of the prevalent theories in economics discussing in some detail the contributions of Adam Smith, Ricardo, Malthus, Marx and other more contemporary economists. This chapter also sets the tone for the remaining chapters suggesting that there is no general theory that unifies the existing theories into a comprehensive one. Chapters 2 and 3 are concerned with the one-sector growth model. The basic model developed in Chapter 2 serves as the spring board for advancing most of the authors theories in the rest of the book. Two extensions that are pursued in this chapter are including home capital, and endogenous time distribution between work and leisure in growth theory. Chapter 3 extends the basic model to allow for non-constant returns to scale. This is done by introducing a public sector in the model, and by letting factors like human capital knowledge and pollution to be

determined endogenously. An innovative model presented in section 3 (that I will discuss in more detail later) examines the dynamics of an economy with human capital and openness.

Chapters 4, 5 and 6 extend the one-sector growth model into multi-sector economies. In these three chapters the author proposes a number of interesting models of growth and income distribution in a multi-group environment that are not found in the “traditional literature.” Examples are, a model of agricultural and industrial sectors with local amenity, an extension of the standard Ricardian model to include endogenous technological progress and infrastructure, and growth with government redistribution policy. Chapter 7 is concerned with the difficult issue of economic evolution and unemployment dynamics. The author offers one- and two-sector growth models with endogenous unemployment and government intervention, thus combining the Kaldor-Pasinetti growth model with Keynesian economics.

Chapter 8 studies a model of growth in which there exists sexual division of labor. An interesting “Woman-at-Home” model is developed in which a family structure is proposed. Families are composed of four members; father, mother, son and daughter. Children go to school (to accumulate human capital), father always works outside the household, and mother stays home and is responsible for home-production. The framework of this model is attractive and should be considered in the more traditional growth models as well. Chapter 9 attempts to provide some insights on economic dynamics with preference change. Chapter 10 concludes by highlighting the main theme of this book. That is, more general economic theory ought to be built by successfully connecting interrelations among different components of economic systems.

Next, I spend some time discussing in more detail, one of the models constructed by the author which I found interesting and an important contribution to the literature. I will also spend some time with the preference structure that the author assumes in his basic model of Chapter 1 and incorporates/extends in the rest of the models.

I have found the model in the section (3.4) called “The Dynamics with Human Capital and Openness,” to be particularly interesting and innovative. The model examines conditions under which catastrophes due to slow opening, structural changes and social cycles, emerge along the development path. First, the author presents a modified neoclassical growth model that follows closely the basic model of Chapter 1. The main difference between the author’s model and the standard neoclassical growth model is the preference function that will be the subject of discussion later on. The model economy consists of one production sector that employs labor, physical capital

and human capital. The innovation of the model is that it introduces a law of motion for the openness of the system that is a function of political forces, consumption per capital, human capital and a positive adjustment speed parameter. Even though, the set of potential variables that influence openness is large and probably country-specific, the proposed function is promising.

Next, the author provides detailed analytical arguments securing the stability of the system and the existence of the equilibria (as he carefully does for all of his models). The model's most interesting results are obtained when we allow for slow opening of the economy. In particular, in the case where the adjustment speed of openness is slower than the adjustment speed of physical and human capital the author finds that there are three types of behavior that are not familiar in the traditional comparative statics analysis. These are: (a) sudden jump (catastrophe) (b) a reverse path to some point other than the original (hysteresis) (c) divergence. Further the author shows that when the adjustment speed of human capital is also slow (which is a reasonable assumption in many developing countries), social cycles appear in the system. In other words under certain condition, the economy will become more open and less open thus creating a system that oscillates around the stationary state (H_0, p_0) where H_0 and p_0 denote human capital and openness respectively. These results are obtained from a rich structure in which the speed and degree of openness is the outcome of economic decisions. As discussed in a previous book by Zhang, *Synergetic Economics* (1991), nonlinear phenomena in economic systems with instabilities can not be studied using traditional methods such as comparative statics.

I would like now to turn attention to an assumption that the author makes through out his models. This is the assumption on consumer preference. The author choose to describe consumer behavior in a different way than the standard neoclassical growth model. In particular, it is common in the standard neoclassical model to assume that households maximizes the intertemporal utility function

$$U = \int_0^{\infty} u[C(t)] e^{-\rho t} dt, \quad (1)$$

subject to the dynamic budget constraint of the type

$$\dot{K}(t) = Y(t) - C(t) - \delta K(t) \quad (2)$$

where ρ is the discount parameter, K is the stock of physical capital, Y is total output, C is aggregate consumption and δ is depreciation. The use of the utility function given by equation (1) has remained very popular, particularly with modern growth models. The popularity of this utility

function is based on its many nice features some of which I will discuss below. First, the utility is intertemporal; this formulation assumes that the consumer utility at time 0 is the weighted sum of all future flows of utility, $u(C)$. The function $u(C)$ relates the flow of utility to the quantity of consumption, C . We assume that $u(C)$ is well-behaved in that it is increasing in C and concave (i.e. $u'(c) > 0$, $u''(c) < 0$). The concavity assumption suggests that households prefer smooth consumption over time. The neoclassical utility function also satisfies the Inada conditions; $\lim_{C \rightarrow 0} u'(C) = \infty$ and $\lim_{C \rightarrow \infty} u'(C) = 0$. A nice feature of the intertemporal utility function stems from the rate of time preference parameter ρ , that is assumed to be positive ($\rho > 0$). The positive sign of ρ says that utility is valued less in the future than in the present. Although recent work on the concavity of consumption function by Christopher Carroll and others suggest richer functional forms, the standard intertemporal utility function is well respected and most commonly used.

The author chooses to use an alternative utility specification which in its simplest form is as follows:

$$U = u [C(t), K(t), [K(t) - S(t) - \delta K(t)]], \quad (3)$$

where S is household's savings. The first thing that comes to mind is that the proposed utility function is not intertemporal! In other words U is dependent on the temporary consumption level $C(t)$, temporary physical capital stock $K(t)$ and temporary savings $S(t)$. To give credit to the author, he provides an appendix on utility and preference theory trying to justify his choice of preference specification but, at least to me, it is not very convincing. It is fair to close our models using utility functions that possess nice mathematical features so that our system is able to produce closed form solutions. But it is also important that we preserve the economic intuition implied by these functions. I wonder whether the author's results in the various models he introduces hold when we incorporate the more traditional utility specification of equation (1).

In sum, I would like to commend the author for challenging existing theories and working towards the development of a unified theory of economics. He carried out an immense task that is covered in more than 400 pages in this book. The book will benefit anyone with interest in real economic issues facing modern economies.