

Abstraction vs. Idealization: Comparison between Endogenous Growth Theory and Post Keynesian Growth Theory¹

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1. Introduction

Post Modernism dies hard. Incommensurability and the (problematically) ensued relativism² lend support to social scientists shying from theory-choice across paradigms³. No exceptions when it comes to economics. Midst a variety of schools of thought that embrace different visions of reality and value premises, theory-choice across paradigms seems untenable. Looking at the contending growth theories of Neoclassicists, Neo-Marxists and Structuralists, Dutt (1992) concludes that different theories endorse different assumptions to close the system and hence generate different conclusions. He also suggests that here is no supremacy concerning different assumptions (or, means of closing the system) and therefore no external critique could be seriously made. Moreover, since different assumptions can be rephrased in a way that is not contradictory to one another, competing theories may have more potential to be reconciled than we have thought. This view is not unusual. Bardhan (1988) forcefully states, “Within the lines of mutual communication between contending schools largely blocked by years of misunderstanding and jargon-monering, easy ‘victories’ are often unilaterally claimed and hailed after setting up essentially a straw man to represent the opposing viewpoint and comfortably shooting it down. I happen to believe that the differences between the more sophisticated versions of alternative approaches, even though substantial, are narrower than is generally perceived” (40).

We disagree with this view. Substantive theories can take on sophisticated nuances and highly logical rigor. A wide-range of variables included in one theory may overlap with those in alternative theories. Furthermore, increasing robustness of the theory may attenuate the importance of some unrealistic and heuristic assumptions. All this might shrink the gap between alternative theories and make theory-choice difficult or even undesirable. However, theories are grounded on and not detachable from their paradigmatic root. In other words, paradigm-specific

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² Epistemic relativism and judgmental relativism should be distinguished. The former results from the nonexistence of immediacy between reality and knowledge of it. Knowledge thus is fallible and historically contingent. However, epistemic relativism does not invalidate the adjudication between theories based on their geo-historical relevance and explanatory power (Bhaskar 1978; Collier 1994; Lee 2002, 792). The latter, on the other hand, means that knowledge is equally valued and fallible since it is situational, highly “private” and contingent upon the “unexamined first principle” (or “Themata”). It thus is not possible to adjudicate between theories located in different paradigms. In our view, incommensurability refers to the situation where theories are based on incompatible premises instead of uncommunicability as in the Kuhnian sense. Incommensurability may lead to epistemic relativism but by no means justifies judgmental relativism (Bhaskar 1978, also see Collier 1994).

³ Paradigm is to be understood as chosen frameworks within which theories are built. As Dow says, a framework embodies a set of values, a conceptualization of reality and an array of methodologies (Dow 2002)

theories must stand on different ontologies and theorizing principles. The revelation of the differences in ontology enables one to distinguish one paradigm-specific theory from the other. Moreover, the comparison of different theorizing principles sheds light on the testing of the viability of competing theories that are differently oriented.

In this paper, we look into contending growth theories, represented by the Endogenous Growth Theory (EGT) and the Post Keynesian Growth Theory (PKGT), and attempt to show the differences between them at the level of the ontology and theorizing principles. The divergences at the substantive theory level will also be examined in the light of the Methodological comparison. It is our argument that such comparisons and contrasts enhance our understanding of the theories and provide us with the necessary condition for theory-choice and -evaluation. We do not deny the difficulties evolved in the paradigmatic-choice.⁴ This, however, is by no means unapproachable. Following Bhaskar, Ardebili (2002) constructs a Structure of Scientific Practices and proposes the criterion for the paradigm choice. That is, each paradigm can be judged/selected historically based upon whether one paradigm generates progressive or degenerative knowledge for society. Then the paradigm-choice resolves the problem of judgmental relativism at the theory level. Somehow straightforward (while less rigorous) criteria are suggested by Eichner (1983). He argues that a scientific economic theory should satisfy the coherence test, the correspondence test, the comprehensiveness test, and the parsimony test⁵. In any case, our purpose here is modest and we will concentrate on making comparisons/contrasts between theories with regard to each paradigm as a whole. We suppose this lays the base for theory-choice across paradigms.

The structure of the paper is organized as follows. In the first section, we sketch out the fundamental conceptualization of reality in EGT and PKGT, respectively. In the second section, we elaborate two different underlying principles of theorizing, namely, idealization and abstraction. The third section substantiates these two different theorizing principles in association with EGT and PKGT. This is followed by the fourth section, which contains an examination of the substantive theories of EGT and PKGT. The last section presents some concluding remarks.

2. No theory without ontology

Ontology, or the “world view”, refers to the conceptualization of reality. It is the corner stone for theory-building. “[A]ll methods have ontological presuppositions or preconditions, that is conditions under which their usage is appropriate. To use any research method is immediately to presuppose a worldview of sorts (Lawson 2003, 12). Although social scientists often unwittingly conceal their ontology, it cannot be denied that theorization (the systematic understanding of a

⁴ See Peacock (2000) for a controversial but illuminating discussion about the impossibility in making theory choice when theories are located in different paradigms.

⁵ The coherence test involves testing the internal logical consistency of a theory; The correspondence test is to examine “whether the conclusions which follow from a theory are confirmed by what can be observed empirically of the real world” (207); the comprehensiveness test is to assess “whether the theory is able to encompass all the known facts pertaining to the class phenomena under study” (208); and finally, the parsimony test is to evaluate “whether any particular element in the construction of a theory, including one of its underlying assumptions, is necessary to account for what can be empirically observed” (208-9).

subject matter) is based on one's fundamental vision of what reality is. In this sense, "no theory without ontology" (Archer 1995). Moreover, different ontologies lend different theorizing principles (a matter of epistemological choices) to theorists.

There is a fundamental difference in terms of ontology between heterodox and the mainstream neoclassical economists. To start, heterodox economists decisively distinguish reality as it is (the intransitive domain) and our knowledge/perception of reality (the transitive domain), as alleged by Lawson (1992) and many critical realists (e.g. Dow 1998; Fleetwood 1999). In other words, reality does have a hermeneutic component, that is, social reality is concept – and activity – dependent, but on the other hand, social reality exists independently of our knowledge of it. Social reality is composed of structure and agency. Structure is real and efficacious. It constrains and enables agency actions. Structure influences, and even partly constitutes the nature of human agency. On the other hand, agency is reflective and active. It acts within a structural and relational context, while its actions reproduce, elaborate and transform the structure (Lawson 1992; cf. Archer 1995 for a pervasive account of "taking time" to analyze the interplays between structure and agency). In summary, heterodox economists embrace a stratified, structured, and open ontology. Social reality is "structured" in that "actual events and states of affairs are produced by equally real underlying structures, mechanisms, powers and tendencies." It is also open in that "actual phenomena are typically conjointly determined by numerous often countervailing mechanism" (Lawson 1997b, 6).

By stark contrast, the mainstream is trapped in the "epistemic fallacy", "*being*" is reduced to the knowing of it and the statements about *being* are taken as statements about knowledge. Put it alternatively, the mainstream economists are reluctant to approach invisible reality beyond the empirical, perceptible level. They are rather concerned with epistemic appraisal, e.g. epistemological assessment of whether rational basis is acquired for accepting or rejecting theories (Lawson 1997a). "... [T]hat matters of ontology can always be re-phrased in epistemological terms. It is this misconceived epistemological reductionism that underpins the perseverance with (deductivist) formalistic modeling..." (Fleetwood 1999, 129). The flat, closed, and atomistic perception of reality leads to the mainstream's obsession with the formalistic-deductive modeling, which in turn, reinforces its epistemic fallacy because clarity, rigor and mathematical tractability requires certain perception of reality.

Standing firmly on such a shallow, skewed conception of reality, the 'new growth theory' or EGT has emerged out of the old growth theory (OGT) since 1980s. The "newness" of the theory vis-à-vis the old theory rests mainly on the fact that it "endogenizes" the technological and saving parameters within the system. To be specific, the EG models include such variables as capital per worker, labor, stock of knowledge and so on. Assumptions about the behaviors and evolutions of such variables are laid out as initial conditions. Next, formalistic deductive methods are employed to plot a steady growth rate as the equilibrium path of the long-term trend of the economic system. Therefore, despite all the nuances, the EGT unwaiveably clings to the "old mission" that modelizes growth as "general equilibrium in dynamics"⁶ of the economy. As

⁶ The EG theorists subscribe to the steady rate of growth analysis, which amounts to the acceptance of determinate equilibrium (be it equilibrium or multiple equilibria). Equilibrium here refers to the Arrow-Debreu-Mackenzie vintage of general equilibrium. Equilibrium can be also conceptualized as a *methodology* of neoclassical economics that hinges upon gravitation towards pre-defined long run positions. That is, equilibrium is defined and can be

Nelson (1998) succinctly puts it, the main agenda of EGT is to “hold the modeling as close as possible to the canons of general equilibrium theory” (499). The presumption of the existence of an equilibrium path of growth indicates that the economic system is closed at both intrinsic and extrinsic levels. The intrinsic closure condition ensures that the determinants are stable and interacting in a deterministic way. The causes normally produce the same outcome; and the same outcomes are normally resulted from the same causal factors. In other words, variables within the model are not expected to interact in a way that generates emergent properties and jeopardize the constancy of parameters and of the model specification. On the other hand, the extrinsic closure condition ensures that variables outside the system would not interfere with the causal variables that are functioning within the system. That is, variables that are left out of the model may interfere systematically as an accidental, exogenous or external “shocks” that can be dealt with separately. In particular, if the short run balance of the system is confounded by random disturbances due to imperfections, in the long run, autonomous adjustment would move the system back to equilibrium and, importantly, the adjustment process would not affect the deterministic equilibrium *per se*. In other words, the system is path independent⁷ (see Setterfield 1998 for a trenchant critique). The combination of the two conditions ensure atomistic factors operate in isolation and in a deterministic way so that determinate equilibrium can be obtained. Furthermore, the closed system implies stability of the system (Beed and Beed 1996), ‘regularity of the behavior’ (Bhaskar 1978, 253), ‘homogeneous/unchanging/uniform’ environment’ (Lawson 1997, 218), and a unitary operating mechanism in the system (Mearman 2005, 9). The conceptualization of closed-system reality allows EG theorists to draw universal laws of motions (mechanical equilibrium growth) by means of deductive and formalistic methods. In a nutshell, from the outset, EGT has committed itself to an established theoretical vision and a priori theorizing direction inherited from OGT that is concerned with general equilibrium in dynamics (Solow 1956; Cass 1965; Koopmans 1965).

By contrast, the Post Keynesian evolutionary growth theory, pioneered by the Harrod (1939) and Domar (1946), has highlighted the knife-edge growth path. It does not assume a steady growth path but attempts to show what are the necessary conditions to reach steady growth and whether these conditions are automatically endowed by the system. The thrust of the argument is that steady growth is rather an incidental outcome and the economy is inherently featured by self-reinforcing rather than -dampening fluctuations⁸. PKGT has been further developed by neo-Keynesians (e.g. Robinson 1956, 1962; Kaldor 1957, 1961), followers of Kalecki and Steindl (e.g. Rowthorn 1981; Dutt 1984, 1987; Lavoie 1995), and neo-Ricardians (e.g. Vianello 1989, 1996)⁹. Given all the nuances of these strands, we shall focus on the Kaldor–Kalecki–Steindl

reached given the initial conditions; there is no path dependency which renders equilibrium itself changeable (cf. Kaldor 1934; Setterfield 1998).

⁷ Proponents may argue that the notion of increasing returns endorsed by EGT implies path dependence because it means that not only quantity of output increases as accumulation continues but productivity also increases. However, all these changes are still quantitative in nature and do not encompass qualitative variations. Moreover, “increasing returns” contains too much flavor of determinateness. See Section 5 for a substantive comparison between increasing return and cumulative causation.

⁸ This knife-edge image is an outcome of two factors, first, there is no inherent tendency for the actual growth rate to equalize the natural (i.e. full employment) rate of growth; and second, once insufficient (excess) effective demand leading to under- (over-) utilized capacity, adjustments would only broaden the discrepancy between aggregate demand and supply, or between the actual and warranted rates of growth.

⁹ In addition, one could find theories of transformational growth à la Nell (1992) and Traverse analysis, e.g. Halevi and Kriesler (1992).

thesis. Compared to the neoclassical tradition, the Kaldor–Kalecki–Steindl model departs radically from the formalistic-deductive approach. It approaches toward reality and extracts information about behavior patterns, “stylized facts”, institutions (Harcourt 1995) and other economic, social and political factors like wage bargaining between capitalists and workers. Along this line, growth is not a mechanistic, supply-side driven steady phenomenon or an outcome of optimizing behavior. Rather, growth is conceptualized in a real world context that is packed with uncertainty, interrelatedness, and dynamic interactions between structure and agency. Essentially, PKGT is based upon the open system ontology which implies ‘no constant conjunctions of events’ (Bhaskar 1989, 16), ‘short-lived or non-existence of regularities’ (Sayer 1992, 122), ‘no event regularity’ (Lawson 2003, 79, 223-224), ‘complexly co-determined outcomes’ (Collier 1994, 62), and possibility of multiple operating mechanisms (Mearman 2005, 9). PKGT, consequently, jettisons the attempts of using exclusively deductive methods to formalize reality as event regularity generated by universal laws.

3. Theorizing principles: idealization and abstraction

As stated above, the choice of methodologies presupposes the ontology; in turn, the choice of theorizing methods feeds back to the conceptualization of the subject matter. On the one hand, the mainstream’s ontology (problematically re-phrased in epistemological terms) allows it to use formalistic-deductive methods since the system is closed and the atomistic variables operate in a functional pattern without generating unpredictable emergent properties. On the other hand, the conviction in formulating formalistic-deductive models feeds back to the perception of reality and perpetuates the manner of theorization by which the social reality can be idealized and negotiated into the modelization.

Lawson ridicules theoretical idealization as “highly artificial” or “bogus” abstraction that is characterized by the uses of “convenient fictions” (Lawson 1997a, 233) to comply with the requirement of mathematical tractability and to retain the validity of general equilibrium principle. Stated alternatively, to reach the end of equilibrium path and to keep mathematical tractability, orthodox economists have to sufficiently idealize the reality by making ad hoc, heuristic, and intractable assumptions (Guala and Salanti 2003). These assumptions presume that economic phenomenon or their components “exist and operate in isolation from the involvement and interference of aspects of situations in which they arise” (Runde 1998, 17). There are at least two forms of idealization. The first is to use “limit types”, which are characterized as perfect, complete or absolute in some (limiting) sense” (Lawson 1997a). It is a form of idealization because these “types” are generally “fictions” as the product of deformation of the real into something that is a mere idea.¹⁰ The second form is the use of *ceteris paribus* assumption, assuming away interdependences and interactions between factors and pretending that factors functioning in isolation in order to achieve determinate equilibrium.

Some orthodox economists boldly lay bare their efforts of idealization. As Solow admits, “my purpose was to examine what might be called the tight-rope view of economic growth and to see where more *flexible assumptions* about production would lead in a *simple* model” (1956, 91, our

¹⁰ The typical idealized conceptions are, for example, perfect foresight, perfect competition, complete preference ordering, infinitely living agents and so on.

italics). Elsewhere, he again says that the special assumptions made in EGT (e.g. about technology, the nature of research activity, the formation of human capital and others) “have been chosen for *convenience*, because they make a difficult analytical problem more transparent. There is no reason to assume that they are descriptively valid, or that their implications have significant robustness against equally plausible variations in assumptions” (1991, 412, our italics). We are once again reminded of Friedman’s (in)famous remarks on economic methodology, which proclaim that assumptions are always heuristic in nature and what matters is the predictive power of the theory, “the more significant the theory the more unrealistic the assumptions” (Friedman 1953). It is under this instrumentalist umbrella, orthodox economists comfortably idealize the social reality, deform it into a universal-law generating construct, closed and formalistic model, and pretend that it could yield meaningful predictions. The predictive exercise is conducted at the expense of the reflective and explanatory power of theories. It is not our purpose to provide an outright critique at this stage. Suffice it to say that *the law and the prediction may work in the idealized reality*; however, the social reality in which we live does not lend itself to or respond to such theoretical and hypothetical manipulations.

Post Keynesians object to idealization and opt for theoretical *abstraction*. There is a controversy whether abstraction entails omission or even distortion between theory and reality (e.g. Dow 2004; Guala and Salanti 2003). We here show our appeal to Lawson’s view;

To abstract does not mean to treat something as though it exists in isolation. Rather it is to concentrate on an aspect of something, momentarily leaving other aspects out of view; abstraction is always from (the rest of) something (usually referred to as the concrete). However, there is no necessary reason for distortion to be involved, no reason to suppose that what is not under focus does not exist or must be described in any way other than it is (Lawson 2004)¹¹.

Sayer also elucidates that;

[W]e need a way of *individuating* objects, and of *characterizing* their attributes and relationships [...] it must ‘abstract’ from particular conditions, excluding those which have no significant effect in order to focus on those which do. Even where we are interested in wholes we must *select and abstract their constituents* (Sayer 1992, 86; our italics).

Both Lawson and Sayer, among other critical realists, reveal that reality is stratified and open, multiple causal mechanisms are counteracting or reinforcing each other and interactively generate events. Therefore, it is impossible to comprehend the totality of economic system all on one go. Abstraction, however, facilitates identifying the defining features of the event (e.g. what are the properties without which the event would not be what it is?) and uncovering the primary causal mechanism(s) “for a particular purpose or from a particular point of view” (Runde 1997). In the course of abstraction, assumptions serve to focusing our attention on certain aspects of the defining properties and primary mechanisms but not to isolating the explanatory variables from the totality from which they are abstracted.

¹¹ Lawson holds that abstraction involves two stage processes. The first stage abstraction occurs at the actual level, abstraction serves to identifying particular aspects or moments of social reality; the second stage is to “abstract the essential”, “which captures the ‘retroductive’ move from the realm of manifest relations to their conditions of existence in deeper social structure” (Brown et. al. 2002).

4. Abstraction and idealization: PKGT vs. EGT

We are faced at every turn with the problem of organic unity, of discreteness, of discontinuity – the whole is not equal to the sum of the parts, comparisons of quantity fail us, small changes produce large effects, the assumptions of a uniform and homogenous continuum are not satisfied (Keynes 1972, 262).

Now, let us focus on comparing EGT and PKGT in terms of their theorizing principles and methods. The EG theorists follow OGT forerunners, insisting that growth falls into the “market” category; it is a supply-side phenomenon and an outcome of rational agents’ optimizing behavior. The commitment of EGT is to rectify the unresolved inconsistencies of general equilibrium in OGT, while the general equilibrium framework is not subject to questioning. Rather than get acquainted with reality and extract from it more information based on which genuine theory can be built; orthodox economists engage in the construction of more and new layers around the core, universal laws existing in OGT by erecting new, unverified assumptions and perfecting mathematical formulation.

OGT has attempted to explain “potential growth”, based on the assumptions of flexible coefficients of production, constant returns to scale, and decreasing marginal return to capital (Solow 1991). According to the theory, price adjustment ensures the equalization between saving and investment. Given the diminishing marginal return to capital, the economy would converge onto steady growth. At this steady rate, growth is determined by natural growth of population (full employment is always realized) and by exogenous technology.

OGT have mainly confronted two problems. First, OGT presumes exogenous technological progress and population growth determining the growth rate. This on the one hand undermines the predictive power of the theory and fails to be verified by empirical evidences. On the other hand, the exogeneity of technology is not compatible with the optimizing behavior of individual agents and, hence, impairs the coherence of the theory. Second, empirical evidences overwhelmingly show that sustained growth and divergence between countries’ growth rates, as recognized by Solow (1991). This forcefully challenges OGT, in particular such assumptions as diminishing marginal productivity of capital and constant returns to scale. It is such empirical and theoretical straightjacket that paves way for EGT to emerge.

Essentially, EGT revitalizes the role of optimizing agents and the role of technological progress that is now endogenously determined at the initiative of individuals. Stripping all the nuances, EGT comes down to two core assumptions. The first is agential rationality and the second is technological externality that compensates diminishing return to capital¹² while does not conflict with agential rationality.

Agential rationality is indispensable for the validity of EGT. In the human capital model, uncertainty is replaced by probabilistic risk that lends possibility for individuals to maximize

¹² As Lucas claims, “What lesson can we draw from the failure of the neoclassical model? ... The villain is the Law of Diminishing Returns. It is this feature that makes it hard to get sustained growth ... we have to find a way to repeal this view, theoretically” (Lucas 1997, 68).

expected return by allocating an initial stock of “human capital” between producing output and accumulating human capital. For example, in Aghion and Howitt (1992), a Poisson distribution is used to capture the stochastic nature of technological advance. Agents, thus, can calculate the probability of success of the research efforts and make rational decisions about research efforts¹³. Moreover, agency in this model is formulated as immortal representative agent rationally maximizing expected utility. The assumption of agential rational optimization of utility, however, can not help but clash with the social reality. First, the premise of rationality substantially removes “endogeneity” in the sense that individuals are not free to make choices to make a difference. In other words, constrained by rationality, individuals are deprived of the capability to make genuine choices even if they can still “act”. They act in between given endowments and known ends while do not have the volition to change the trajectory from the beginning to the end. Therefore, “conventional economics is not about choice, but about acting according to necessity. Economic man obeys the dictates of reason, follows the logic of choice” (Shackle 1961, 272; quoted in Fontana 2001, 721). Agents have no choice, volition or creativity; they could merely mechanically select the most rational course of action. Second, maximization of utility is the end of rational agents. Utility is a function of time preference and elasticity of substitution between present and future consumption. “Economic man” indulges in the intertemporal selection of consumption goods basket in a social, institutional vacuum until the optimal combination yielding maximum utility is obtained. This leads us back to the distasteful notion of “homogeneous globule of desire of happiness” (Veblen 1898). A little reflection would tell that it is hard, if not impossible, to locate this type of agent in the real world because it is essentially an economic toy to facilitate formalistic modeling that attempts to reach certain desired results.

Second, the positive effects of technological progress on productivity and growth diffuse mainly in the mechanistic form of externality. The special assumptions about externality are stunningly heuristic. Externality reconciles the inconsistency between increasing returns to scale and the optimization strategy of agency. If increasing returns takes place at the micro level, it cannot be explained why “idea production sector” would ever be able to maximize returns from producing new ideas¹⁴. Yet, externality occurs at the macro level as an unintentional gain given the non-rivalry nature of new ideas (Romer 1990, 97); in other words, “... a finite number of firms whose production and accumulation decision affects positively and unintentionally the technology of all firms” (D’Agata and Freni 2003, 39). It thus preserves individual rationality and compensates for diminishing marginal return. The caveat is that the increasing returns from externality at the macro level must exactly compensate for the diminishing return at the micro level; otherwise, the economy either explodes or stagnates¹⁵. The EG theorists do not hesitate to assume that

¹³ However, the eradication of uncertainty renders “innovative” R&D meaningless. Innovation implies the creation of something “new”, e.g., new production skills, new products, new marketing strategies and so on. If these innovations can be perceived in a probabilistic manner by the rational agency, then how much novelty can such innovations contain? If these innovations cannot be foreseen as a determinate process, then how much rationality can agency possess?

¹⁴ The “idea production function” includes the rate of idea production as dependent variable and the number of researchers and the knowledge stock of “production workers” as independent variables. Romer’s model ultimately takes great resemblance to OGT, in which labor is an exogenous non-producible variable (knowledge stock is a producible input) that determines the rate of growth.

¹⁵ In fact, to get rid of the “scale effect” (constant returns to scale) of innovative effort, Jones (1995) gives a multiplicative specification of the “idea production function” with a negative externality-related parameter.

unintentional externality meet all the desirable properties. Moreover, technological progress proceeds in a continuous, smooth and linear pattern. The accumulation of knowledge and output is exclusively in the manner of quantitative accretion. In the absence of uncertainty and Schumpeterian “creative destruction”, history does not really matter; neither do institutions play a role¹⁶.

In a nutshell, EGT retains the general equilibrium explanation of endogenous growth by making *ad hoc* assumptions that cannot find counterparts in the real world. In EGT, growth is conceptualized as an isolated, mechanistic and smooth process. Only supply-side variables, for example, technology, productivity, the size of labor force matter because supply always creates demand and, thus, Say’s Law revives. Agential optimizing behavior, coupled with mechanical progress of technology, endogenizes the determination of growth rate. Growth follows a deterministic equilibrium path (either a unique equilibrium or multiple equilibria)¹⁷. Arguably, “real department” of the economy falls into the equilibrium category while the “monetary department” deals with business cycle and fluctuation.

PKGT stands to the opposite. In this theory, growth is embedded in an economic, social, and political totality and a structurally interrelated process. Supply-side is one half of the picture. The demand side has far-reaching influences on growth. Human agency are not optimizing given the existence of fundamental uncertainty and their socio-economic nature. Agency behaviors are largely dependent upon past experiences, conventions, rules of thumb, and socio-economic status. Technological evolution is a dynamic and institutionalized phenomenon. Finally, time and history matter and growth is path dependent. It particularly follows a “creative destruction” manner and undergoes cumulative structural transformation. Cyclical fluctuation is thus a norm rather than exception.

PKGT makes assumptions regarding to the parallel variables as in EGT to facilitate abstraction. First, Post Keynesian theorists are fully aware of the existence of fundamental uncertainty in the real world. Fundamental uncertainty is not equivalent to probabilistic risk because what matters is not only what probability one can come up with but also the weight of confidence that one puts on his/her calculation. Nor is uncertainty a synonym for imperfect information because in the former case both parties “simply do not know” rather than one has more information than the other. Given this, optimization is simply not possible since one is not able to exhaust all the possibilities or not confident on the calculation of probabilities. However, uncertainty does not mean that human agency is deprived of willingness or capacity of making real choices and actions.

¹⁶ Arguably, EG theories recognize that the imperfect market allows for externality that generates more social gains than private costs. As a result, private production of ideas cannot reach optimum at the social level. This lends room to government policy (e.g. tax reduction or subsidy) to promote more private production of ideas. However, the role of institutions is still very limited and confined to the sphere of rectifying market failure. This is fundamentally different from the heterodox tradition in which market cannot at all be disembedded from social institutions and relations.

¹⁷ Notably, EGT allows for multiple equilibria, indicating that the final outcome is indeterminate depending on the “direction which happens to be adopted initially” (Kaldor 1934, 131-2). However, equilibrium may be determinate because all the possible equilibrium positions can be still deduced from the initial condition (ibid.). In other words, “...systems with multiple equilibria simply *select* between otherwise predetermined final outcomes on the basis of initial conditions; they do not *create* their own set of possible final outcomes in the course of their evolution” (Setterfield 1998, 530, italics his).

On the contrary, human agency is “reflective, purposive, promotive and innovative” (Archer 1995) and actively engages in social actions. Agency could choose to act in one way or the other and this choice is real and efficacious, because once agencies make the decision they transmute and create a new path. In other words, “it is the evolution of a complex interaction of decisions [real choices and actions] rather than the unfolding of a natural path toward an ideal equilibrium” (Fontana 2001, 724). Moreover, agencies act in a social and institutional context. Social agencies are different from individual agents in the sense that the former occupy certain positions which enable and constrain their choices and actions. Entrepreneurs may behave differently from speculators because they enter into different social positions that give them different power and liabilities. Social agencies are by no means “homogeneous globule of desire of happiness” but act, interact, and react driven by unique motivations and facilitated by specific “tools” and generate particular outcomes. Last but not the least, because future is uncertain and rigorous calculation is unattainable or even not desirable, human agencies may rely on “animal spirit” when making strategic decisions (e.g. investment, see Commendatore, et. al. 2003). More importantly, agencies are socially and institutionally constructed, they would resort to institutions (rules, relations, and conventions) that emerge out of a social, economical, political and cultural context to obtain information and justifications for their choices (see, for example, Runde and Mizuhara 2003).

In any case, reality predicates that in theorizing uncertainty can not be assumed away. Yet, depending on the question in view and the level of abstraction, uncertainty can be locked up and long-term expectation is frozen momentarily in order to, for example, plot out short-term determinations. In Kregel’s (1976) words, assumptions are made to “tame the real world” by “locking up elements *without ignoring* them”¹⁸. This is the essence of abstraction. While idealization involves transforming something real into something that only exists in the realm of ideas, abstraction is the way looking at the same real phenomenon from different points of view, treating some specific aspects as out of focus but not out of existence (Runde 1997, 20). Importantly, the same aspects that are out of focus can be the center of analysis depending on the plane of abstraction and the question of interest. Therefore, the conclusion about one question and at one level of abstraction can not be universally applicable. Knowledge must be historically and contextually specific.

Second, Post Keynesians also pay special attention to technological progress, which is by no means an unintentional outcome of optimizing behavior in their view. Technological progress proceeds in a social and institutional context as historical time unfolds. On the one hand, institutions matter. Technological progress coupled with imitation and emulation can create externality and improve productivity and capacity at the aggregate level. However, this process can be thwarted by, for example, lock in effect (David 1985; Setterfield 1995). On the other hand, time and history matter. Technological changes are path dependent. “The presence and future cannot be understood without reference to the past. “How variables behavior depends on

¹⁸ Kregel convincingly illustrates that Keynes adopts three different analytical approaches (static equilibrium, stationary equilibrium, and shifting equilibrium) by making different assumptions with respect to short- and long-term expectation in order to deal with different *quaesitum*. Yet, these assumptions are not unrealistic. “One need not assume that the world is different from what it actually is and then try to find the conditions required for that other world to actually exist, but rather one may simply look at the actual world in a number of sates with different orderings of that actual world, so as to analyze particular effects within it” (Kregel 1976, 222).

what has gone before. History matters. In contrast to ‘equilibrium theory’ where the exogenous variables are given and assumed unchanging through time and where anything can therefore be predicted with certainty in advance” (Thirlwall 1987, 326). The mere course of changes and adjustment would alter the equilibrium path that is otherwise presumably determined by the initial condition. Therefore, technological progress constitutes one of the forces that invalidate equilibrium approach.

Moreover, technological progress does not take place in isolation. Technological progress and the ensuing capacity and productivity improvement cannot be sustained without sufficient effective demand. Setterfield (1998) convincingly states that “[e]ffective demand determines whether growth and change become self-propagating in a cumulative fashion.”, again, “[n]ew demand must exist in each round of process of cumulative causation to support the additional output that can be produced as result of induced technological progress” (525; also see Ricoy 1987, 733).

Framing growth theory in a demand-led context is not merely adding one variable as “effective demand”; rather, the nature of the model is fundamentally altered. As Filho (2001) argues that the demand-led growth models “offer...a more broad and complex analysis of economic growth [than neoclassical growth models]” (18). “Rather than imposing one structure a priori”, he further argues,

Keynesian models admit various closures, leaving for the analyst the determination of the institutional and technological features of the case under investigation. On the distributive side the labor share of income may be stable or unstable in isolation, as well as procyclical (the Marxian closure) or countercyclical (the Kaldorian closure). On the demand side the income-capital ratio may also be stable or unstable in isolation, as well as positive (the wage-led closure) or negative (the profit-led closure) function of the labor share of income. (ibid., 18)

In sum, the demand-led growth model in the Post Keynesian tradition explains not only interaction between investment, consumption, and net export, but also explains the business fluctuation and the accumulation of capital with respect to specific social conflict, cultural, and institutional context (ibid., 6, 18). Furthermore, the demand-led growth model is able to explain persistent involuntary unemployment, under-utilization of productive capacity, the size of labor force, and technological progress.

According to Eichner’s criteria for the validity of theory, PKGT has at least better correspondence and comprehensiveness, not to mention it is more realistic in its assumptions and implications than EGT. For instance, when investment as a function of the profits rate and the leverage ratio is taken into as a driving force of the capitalist economy, it can effectually and directly be applied to current sluggish growth rate in many capitalist economies. When net export is taken into account as a driving force, the model gives us better understanding of the growth of small open economies. When autonomous consumption is taken into account as a driving force, it might well explain the growth of developed countries like the U.S. It drives home the assertion that PKGT does not close the system arbitrarily using idealized assumptions to derive universal laws of growth. PKGT abstracts from social reality and identifies the defining feature and primary mechanism governing growth, focusing on effective demand, investment, technology, income distribution, labor market dynamics and various social, institutional

interactions. This may not allow for formalistic-deductive modeling yet preserves the conformity of theory with reality and hence strengthens relevance and explanatory power of their theory.

5. A further examination of the substantive theories: EGT vs. PKGT

The coefficients arrived at are apparently assumed to be constant to be constant for 10 years or for a longer period. Yet, surely we know that they are not constant. There is no reason at all why they should not be different every year (Keynes 1973, 285).

Guided by the Methodological comparison, we can now put forward an analysis at the theoretical level of the EGT and PKGT, looking specifically at how idealization renders theories implausible.

To reiterate, EGT relies on the increasing returns to scale (derived from the accumulation of human capital and externality of technological progress) to maintain continuously steady rate of growth and non-convergence between different countries' growth rates. Arguably, EGT embraces the insights of cumulative causation á la Kaldor (1970, 1985) and Myrdal (1957); both depict the “polarization process” that accounts for why growth is concentrated in some regions while absent in others. Following Dixon and Thirlwall (1975), and Setterfield (1994), one can formulate cumulative causation¹⁹ in growth within an open economy context in a set of equations below:²⁰

$$\dot{q}_{jt} = r_t + \alpha_j \dot{Y}_{jt} \dots\dots\dots(1.1)$$

$$\dot{P}_{jt} = \dot{W}_{jt} - \dot{q}_{jt} \dots\dots\dots(1.2)$$

$$\dot{X}_{jt} = \beta_j (\dot{P}_{wt} - \dot{P}_{jt}) + \gamma_j \dot{Y}_{wt} \dots\dots(1.3)$$

$$\dot{Y}_{jt} = \lambda_j \dot{X}_{jt} \dots\dots\dots(1.4)$$

Where dots indicate rates of change, q is the growth of productivity, r is exogenous factor influencing productivity growth, Y is the growth of output, P and W represent price and wage, X is the growth of output as a function of price differential and foreign country's income, α is the Verdoorn coefficient, β is the combination of price elasticity and cross elasticity of demand for exports, γ is the income elasticity of demand for exports, and λ is the elasticity of output growth with respect to export growth (if $\lambda=1$, export is a constant proportion of output), subscriptions j

¹⁹ Cumulative causation as an evolutionary process involves variety, mutation, adaptation and continuous selection. Consequently, by no means can the following set of equations capture the complexity and evolutionary nature of cumulative causation. Here we are attempting to show the tip-of-iceberg of the complexity of the issue in order to illustrate the implausibility of taking too many resemblances between increasing returns and cumulative causation. Also see note 19 below.

²⁰ By framing our discussion in this section into mathematical equations, we aims at an internal critique and show that formalistic modeling based on law-like, unrealistic assumptions is likely to be fallacious. It may not be inappropriate to use mathematical formulation as a means of conveying messages and communicating; yet, it is certain that the conclusion must be interpreted with great care and modest ambition. The mainstream often errs in confusing the tools and means with the ends and in generating universal laws of motion from deductive models.

and w represent home country and foreign country respectively, and t denotes time periods. Equation 1.1 indicates that productivity growth is a function of past growth, equation 1.2 shows that productivity growth feeds into price changes (inflation occurs when wage growth exceeds productivity growth; we here leave out profit-led inflation) and equation 1.3 shows that price changes influence export growth and finally equation 1.4 demonstrates that export growth feeds back to output growth. The set of equations illustrates that growth in the initial period breeds productivity gains via the Verdoorn Law (equation (1.1)). Skipping the substitution procedure (see Appendix), we arrive at

$$\dot{Y}_{jt} = \lambda_j \alpha_j \beta_j \dot{Y}_{jt-1} + \lambda_j (\gamma_j - \alpha_w \beta_j) \dot{Y}_w \dots \dots \dots (2.1)$$

This yields a general solution to the difference equation (2.1) as,

$$\dot{Y}_{jt} = A(\lambda_j \alpha_j \beta_j \dot{Y}_{jt-1})^t + \frac{\lambda_j (\gamma_j - \alpha_w \beta_j)}{(1 - \lambda_j \alpha_j \beta_j)} \times \dot{Y}_w \dots \dots \dots (2.2)$$

Now, if we assume that $|\lambda_j \alpha_j \beta_j| < 1$, then the system will converge so that a solution for the determinate, steady-state relative growth equilibrium can be found:

$$\frac{\dot{Y}_j}{\dot{Y}_w} = \frac{\lambda_j (\gamma_j - \alpha_w \beta_j)}{(1 - \lambda_j \alpha_j \beta_j)} \dots \dots \dots (2.3)$$

However, if the assumption above does not hold, i.e. $|\lambda_j \alpha_j \beta_j| = 1$, then the determinate, relative growth equilibrium will not exist. Setterfield (1994) aptly elaborates different possible results depending on the assumptions. Suffice it here to know here that once $|\lambda_j \alpha_j \beta_j| = 1$, relative growth will be contingent on the initial conditions. Moreover, even if the solution of (2.3) does exist, it may not be determinate. In other words, once the parameters are allowed to change and the changes in the parameters are *faster* than the adjustments of the value of the variables, then equilibrium itself will be altered.

More importantly, the changes in the parameters *need not* be exogenous. Stated alternatively, exogenous changes of the parameters could rule out determinate equilibrium, which is not incompatible in EGT; however, once the parameter changes are endogenous, the notion of steady growth and the method of equilibrium analysis of EGT can not be sustained.

The endogenous changes in the parameters can come from two sources, the first is the impacts of effective demand on λ_j and the second is the impacts of growth on α_j . Now, we go back to the system of equations, adding the follows:

$$\lambda_j = k_j(\dot{Y}_{j0}, \dot{Y}_{j1}, \dots, \dot{Y}_{jt-1}) \dots \dots \dots (1.5)$$

$$\alpha_j = h_j(\dot{Y}_{j0}, \dot{Y}_{j1}, \dots, \dot{Y}_{jt-1}) \dots \dots \dots (1.6)$$

Then the relative growth rate of j and w all depend on the changes of λ_j and α_j , which, can be seen from equations (1.5) and (1.6), are endogenous within the system. By including these two

equations, one can perceive how cumulative causation differs from increasing return and how endogenous parameter changes render convergence accidental.

Equation (1.5) illustrates the impacts of changes in effective demand on the elasticity of output growth with respect to export growth (which can be seen as a trade multiplier in a dynamic fashion). If domestic effective demand is low, the value of the elasticity is reduced. The increase in export growth would transmit into higher output growth yet by a smaller degree. A case could be that the lack of domestic effective demand leads to excess capacity, which then checks investment expansion and hence fails to boost output growth as it could have been the case. However, investment decision is also greatly affected by expectation of future return and by conventions, which may offset the retarded effect of excess capacity. Further, expectation and conventions are, to a large extent, influenced by past experience (e.g. the past growth of output that is consistent with the expectation of future demand when output is being produced). Therefore, one could argue that effective demand could be affected by past growth experience through the latter's impacts on expectation and conventions and hence investment decisions²¹.

Secondly, the coefficient of productivity will also change endogenously depending on the impacts of growth on technology. This is what the institutional factor of technological "lock-in" comes in. Suppose that one country has established a production structure based on certain technological foundations and expanded in a cumulative way. Now, as the expansion proceeds, the readjustment costs can be increasingly high if the old technology is to be replaced by a new one. The costs could come from the capital equipments that are built exclusively for the old technology, and they could also result from the interrelatedness of productive components. In any case, if the readjustment costs prevent the decision makers from adopting new technologies, the dynamic cumulative causation process can be delayed or halted. Consider if $\Delta\alpha_j < 0$, then the denominator of equation (2.3) will increase, which means that country j now grows relatively slower than country w .

The import of studying Methodological issue is that it sheds great light on the examination of substantive theories. Drawing from the implications from Methodological comparison, we illustrate in this section that the typical EG model adopts the principle of idealization to shore up closure condition to facilitate formalistic-deductive modeling whereby achieving the law of equilibrium growth. However, the idealization nature of the modeling puts the solution/outcome on a very shaky ground that does not weather through the challenges coming from the real world experiences.

6. Conclusion

“Simply referring to endogenous productivity, monopoly, institutions, money and finance, the patterns of growth and cycles, conflict, inequality, etc. is no longer sufficient to defend radical political economy against the neoclassical orthodoxy. The latter can accommodate them all and more. It is more a matter of going back to *methodological first principles*, and placing the social,

²¹ Of course, Keynes asserts that long-term expectation, the most important determinant of investment, is not so much affected by the recent and current economic situations. Here, we only wish to argue that cumulative past experience would have impacts on current investment decision-making. To clarify, we indeed plot a conditional rather than functional relation.

the historical and the forces within the economy at the forefront in order to be able to combat both methodological individualism and the analytical strategy of creeping endogeneity” (Fine 2000, 262).

Spelling out the distinction between idealization and abstraction, we clarify the fundamental differences in EGT and PKGT at the Methodology level and the substantive level. EGT employs the principle of idealization, constructing unrealistic and heuristic assumptions to negotiate reality into formalistic models and derive universal laws that conform to their theoretical visions. By contrast, PKGT adopts abstraction as a theorizing principle which captures the defining feature and primary mechanisms underpinning growth in the specific historical and institutional context. Surely, the clarification of these differences does not in and of itself justify a paradigmatic choice. Yet, it does show the implausibility of reconciling or blending these two different theories.

Tentatively, we contend that one may evaluate and select one paradigm or theory in terms of its relevance, coherence, and correspondence to the reality. As we have seen, PKGT is superior to the EGT on the basis of the criteria that Eichner (1983) has suggested. When it comes to policy implications, the criteria entail greater significance. As Mitchell reminds us, “[c]areful deliberation and thorough realistic research are certainly called for before we assume the responsibility of giving advice in the name of our science” (1944, 50). If theories are to be chosen to contribute to the real world policy formulation, PKGT presents itself as a better alternative to EGT. It seems that PKGT qualifies more for this task given its persistent attempt to approaching toward ever changing social reality.

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