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Working Paper

Broadening the application of hysteresis in economics: Institutions, policy lock-in, psychology, identity, and ideas

FMM Working Paper, No. 92

Provided in Cooperation with:

Macroeconomic Policy Institute (IMK) at the Hans Boeckler Foundation

Suggested Citation: Palley, Thomas I. (2023) : Broadening the application of hysteresis in economics: Institutions, policy lock-in, psychology, identity, and ideas, FMM Working Paper, No. 92, Hans-Böckler-Stiftung, Macroeconomic Policy Institute (IMK), Forum for Macroeconomics and Macroeconomic Policies (FMM), Düsseldorf

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FMM WORKING PAPER

No. 92 • August 2023 • Hans-Böckler-Stiftung

BROADENING THE APPLICATION OF HYSTERESIS IN ECONOMICS: INSTITUTIONS, POLICY LOCK-IN, PSYCHOLOGY, IDENTITY, AND IDEAS

Thomas Palley¹

ABSTRACT

This paper argues for broadening the application of hysteresis to institutions, policy lock-in, psychology, identity, and economic ideas. Hysteresis is an element of historical processes, and the real world is historical. That explains why hysteresis is pervasive and important. Hysteresis should be a fundamental building block of political economy. Expanding its application in economics is both an opportunity and a challenge. The opportunity is that it provides a means for incorporating political, sociological, and psychological forces which economics tends to neglect. That will enrich economics and can also provide a mutually enriching bridge to other social sciences. The challenge is introducing such concerns raises questions about the character of economics' knowledge claims, which is likely to trigger resistance from economists.

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Broadening the application of hysteresis in economics: institutions, policy lock-in, psychology, identity, and ideas

Abstract

This paper argues for broadening the application of hysteresis to institutions, policy lock-in, psychology, identity, and economic ideas. Hysteresis is an element of historical processes, and the real world is historical. That explains why hysteresis is pervasive and important. Hysteresis should be a fundamental building block of political economy. Expanding its application in economics is both an opportunity and a challenge. The opportunity is that it provides a means for incorporating political, sociological, and psychological forces which economics tends to neglect. That will enrich economics and can also provide a mutually enriching bridge to other social sciences. The challenge is introducing such concerns raises questions about the character of economics' knowledge claims, which is likely to trigger resistance from economists.

Keywords: Hysteresis, institutions, policy lock-in, psychology, identity, ideas.
JEL ref.: B40, E10, E12, E32, P50

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July 2023

1. Introduction: the significance of hysteresis

This paper explores the construct of hysteresis, which has gradually made its way into economics. Perhaps the earliest reference to the relevance of hysteresis for economics is Georgescu-Roegen (1971, p.123-126), which was expanded on by Elster (1976). Thereafter, the construct lay substantially dormant until it was revived in the 1980s by Blanchard and Summers (1987) and Cross (1988). The revival was spurred by the macroeconomic debate regarding the natural rate of unemployment, and that continues to be a major focus of application.

In the spirit of Elster (1976), the paper argues for further expansion of the domain of application of hysteresis which is relevant for a wide range of socio-economic phenomena. That includes the evolution of institutions and policy regimes. The paper begins by arguing hysteresis

is an element of historical processes. Since the real world is historical, that renders hysteresis elemental. Additionally, it explains why hysteresis is so prevalent. The implication is hysteresis should be a fundamental building block of political economics, being an essential mechanism whereby socio-economic factors impact economic outcomes and vice versa.

Incorporating hysteresis into economics is both an opportunity and challenge. The opportunity is that it provides a way of incorporating important political, sociological, and psychological concerns that economics has tended to neglect. Thoughtful economists have been aware of that gap, but the discipline has lacked a methodological framework for satisfactorily addressing the complex character of those concerns. Hysteresis provides that framework. In doing so, it promises to provide a bridge to other social sciences. The challenge is incorporating those concerns raises questions about the character of the knowledge claims of economics, which is likely to trigger resistance from economists.

The structure of the balance of the paper is as follows. Section 2 discusses the meaning of hysteresis. Section 3 explores some meta-theoretical implications of hysteresis, particularly as concerns historical processes. Section 4 briefly reviews some existing applications of hysteresis, focusing on macroeconomics and growth theory. Section 5 makes the argument for broadening the application of hysteresis. Section 6 discusses the challenge hysteresis poses to economics. Section 7 concludes the paper.

2. The meaning of hysteresis

Hysteresis is a construct developed in physical chemistry, and it captures the idea that a substance can be irreversibly changed if it crosses a threshold. For instance, in metallurgy the atomic bonds within a piece of virgin metal can be irreversibly weakened by bending and flexing.

That notion of irreversible change of properties can be productively applied in economics. In that regard, two types of hysteresis can be distinguished: one-way hysteresis and two-way hysteresis. Amable et al. (1995) describe those two cases as strong-hysteresis and weak-hysteresis, respectively. Their logic is illustrated in Figures 1.a and 1.b.

Consider an economic variable (Y) that is affected by an impact variable (X). There are two economic regimes, with the impact of X being larger in regime 2. Figure 1.a describes the case of one-way hysteresis. The economy remains in regime 1 if X is less than a critical threshold value X^+ . If X exceeds the threshold, the economy shifts irreversibly to regime 2. The system is characterized by one-way hysteresis because it never reverts to regime 1 even if X drops back below the threshold value.

Figures 1.a and 1.b illustrating one-way and two-way hysteresis.

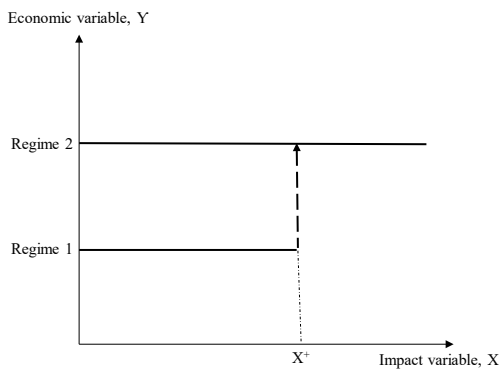


Figure 1.a. One-way hysteresis.

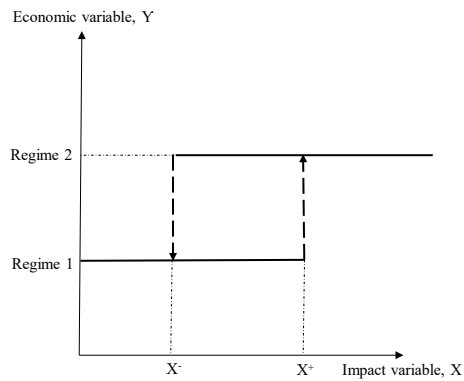


Figure 1.b. Two-way hysteresis.

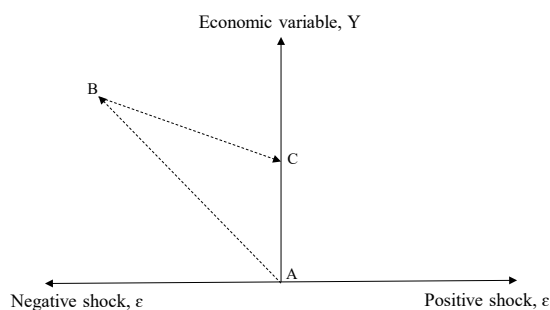
Figure 1.b represents the case of two-way hysteresis. As before, if $X > X^+$, the system switches from regime 1 to regime 2. However, now there is also a lower threshold (X^-) below which the system switches back to regime 1. Thus, if the system is in regime 2 and $X < X^-$, the

system reverts to regime 1. With one-way hysteresis, the system is subject to irrevocable regime change. With two-way hysteresis, the system can switch between regimes, contingent on the evolution of X .

One-way hysteresis has application to irreversible historical developments whereby the initial regime can never be recovered. Two-way hysteresis is relevant for phenomena such as boom – bust cycles in which the economy shifts between “boom” and “bust” regimes, and behavior differs across the two regimes. Anticipating some of the discussion to come, hysteretic phenomena can exhibit different patterns of regime duration. Some phenomena may cross switch points relatively frequently, whereas others seldomly cross switch points. The former might correspond to “cyclical hysteresis” and concerns cyclical variables: the latter might correspond to “epochal hysteresis” and concerns state variables (e.g., institutional variables).

Figures 1.a and 1.b illustrate hysteresis for the case where the system undergoes a discrete break (at points X^+ and X^-) and jumps to a new regime. Figure 2 shows a different form of hysteresis in which there is no change of regime, but the system displays irreversibility in that it does not revert to point A. The broken lines correspond to adjustment paths in response to a shock (ϵ).

Figure 2. An example of hysteresis in a system with regime continuity.



There are two interpretations of Figure 2. The first interpretation has the system being shocked and the shock is subsequently fully reversed. The system is initially at point A and the opening shock moves it to point B. Thereafter, the shock is fully reversed but the system only moves back to point C. That pattern corresponds to hysteretic Keynesian models in which A, B, and C are all points of equilibrium.

The second interpretation has the system being subject to a temporary shock that then disappears. Point A is the pre-shock initial equilibrium. Point B is the temporary equilibrium resulting from the shock. Point C is the post-shock equilibrium after the system has had time to fully adjust. That pattern corresponds to hysteretic mainstream (New Classical and New Keynesian) models in which only points A and C are points of enduring equilibrium.

Figure 2 also illustrates the difference between hysteresis and random walks or unit roots, a distinction that is highlighted by Amable et al. (1994) and Dutt (2005). In a unit root model, an initial shock would move the economy from A to B, where it would remain. If the shock were

reversed, the economy would move back to A. That is not hysteresis. Some mainstream economics (see for example Cerra et al., 2020; Blanchard and Summers, 1987) mischaracterizes random walks and unit roots as hysteretic. Those processes exhibit ‘lasting persistence’ (i.e., the economy stays at B until shocked again), but that is not synonymous with hysteresis.

A key feature of the current paper is its emphasis on the distinction between persistence versus irreversibility. Persistence is a characteristic of slow adjustment processes. Lasting persistence is a feature of unit root processes. Irreversibility refers to changes that are hysteretic and it is the defining characteristic of hysteresis.

The above examples illustrate the principle of hysteresis, and they also illustrate its richness and challenging nature. As regards richness, they show that there are multiple ways in which hysteresis can operate. As regards challenges, they show that the operation of hysteresis will depend on the underlying economic theoretical perspective.

Additionally, hysteresis poses a problem for economists’ comparative statics methodology, which assumes both continuity and reversibility. First, a hysteresis-inducing shock may move the system to a new regime where the response to the shock is different from initial conditions. It is as if the system undergoes an endogenously generated structural break. Second, reversal of that shock does not restore the initial conditions. Hysteresis always imposes an element of irreversibility. Those twin features complicate the system analytically.

Most importantly, as argued below, irreversibility has serious political economic and policy implications and consequences. It is irreversibility that makes hysteresis so interesting and relevant.

3. Meta-theory: hysteresis and history

Economists have largely engaged hysteresis via specific applications. However, it is relevant for

larger meta-theoretical concerns regarding history and equilibrium that were a concern of Cambridge (UK) economists in the 1960s and 1970s, as part of their general dissatisfaction with orthodox economics. Joan Robinson (1972, 1973, 1974) framed her critique of equilibrium analysis as being inconsistent with the historical process that characterizes the real world. Kaldor (1972, 1981) was also critical of equilibrium analysis, and he sought to introduce history through the phenomenon of cumulative causation.

Cambridge (UK) economists developed their arguments before the idea of hysteresis was introduced to economics, and therefore did not include it as part of their critique. Setterfield (1995, 1997) was early to recognize and argue that hysteresis was important for characterizing historical processes, and therefore needed to be incorporated in economic growth models – including models with cumulative causation and technological lock-in.

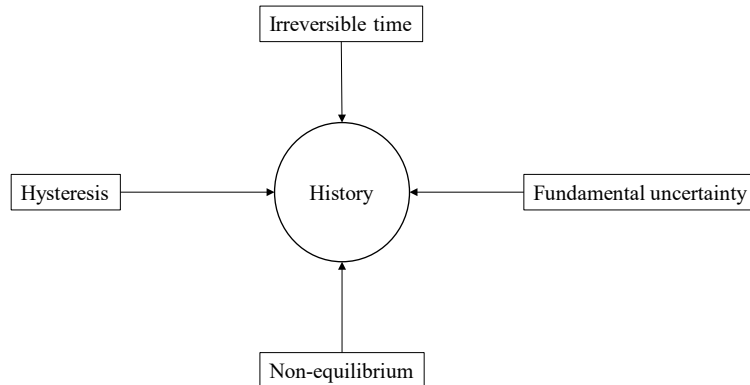
Robinson's work is tantalizing in its critique of equilibrium, but it is also frustrating. First, it is spread across many articles, and she never provides a comprehensive systematized account of what constitutes a historical process. Second, her critique of equilibrium as inconsistent with history was conflated with her critique of mathematical modelling which relies on equilibrium for closure. That point is made by Skott (2005, p.173-176), who frames it as a confusion of ontological and methodological considerations.

3.a The historical process

Figure 3 proposes a deconstruction of the historical process which is identified as having four elements: time, fundamental uncertainty, non-equilibrium, and hysteresis. Time is the first and most obvious element. History is a process through time, making time essential. Moreover, time has a particular characteristic which is that it is an irreversible process that cannot be rolled back. In Robinson's (1973, p.5) words, "history goes one way, from the irrevocable past into the

unknown future”. That one-way process introduces a distinction between past, present, and future.

Figure 3. History as a process consisting of four elements.



Time is central to history, and time is the way that mainstream economics (MSE) thinks of history. According to MSE, history is captured simply by the addition of time-dated variables, combined with the restriction that those time-dated variables can only move forward. The past is the memory of that process which is accumulated in tangible (e.g., capital) and intangible (e.g., information) stocks, while the future is captured via present expectations of future time dated variables.¹ If that were all there were to history, MSE models would suffice. Unfortunately, that is not the case and there is much more to history.

The second characteristic of history is fundamental uncertainty, which connects history to

¹ All three components of time (i.e., past, present, and future) are important. The past is the memory of experience, and accumulated experience guides and shapes thinking. The present is infinitely small and paradoxical. It is infinitely small in the sense that is gone immediately, yet it is critically important because all actions take place in the present. The future is large and looms ahead. It is the prospect of the future that motivates economic action, and the future also introduces the problematic of expectations.

Keynes' (1936) *General Theory*, and vice versa. That is a point Robinson repeatedly makes, including in her Richard T. Ely lecture:

“On the plane of theory, the main point of *The General Theory* was to break out of the cocoon of equilibrium and consider the nature of a life lived in time – the difference between yesterday and tomorrow. Here and now, the past is irrevocable and the future is unknown (Robinson, 1972, p.3).”

Fundamental uncertainty is a core characteristic of historical processes since history is full of surprise developments that are not generated via a probabilistic process. However, as argued next, fundamental uncertainty is not quite enough of an explanation, which may be part of the reason Robinson's message failed to gain traction.²

The third characteristic of history is it is a non-equilibrium process. Non-equilibrium is fundamentally different from disequilibrium. Non-equilibrium means equilibrium does not exist in the sense of cannot be, which is an ontological claim. Disequilibrium means the economy is away from or out of equilibrium. Non-equilibrium is the missing piece in Robinson's (1972, 1973, 1974) series of papers that engaged with history and equilibrium. Moreover, it is unfortunate that it is missing as Robinson essentially identified the argument years earlier. Thus, she writes:

“(equilibrium) is likely to be temporary and to contain within itself causes of change which will operate as time goes by (as though the balance were to grow

² Interestingly, Post Keynesians (PKs) have lost sight of Robinson's argument re fundamental uncertainty and history. Instead, PKs have viewed fundamental uncertainty through the lens of probability versus risk and focused on the uncertainty/animal spirits/investment volatility nexus. That lens connects with Keynes' (1921) *Treatise on Probability*. The argument is fundamental uncertainty renders objective probability theory inappropriate for thinking about uncertainty in the real world. That is because a world of fundamental uncertainty is characterized by non-ergodic processes in which events are generated idiosyncratically. However, it should be noted that though objective probability distributions cannot describe the real world, agents may still use subjective probability distributions to characterize their understandings. Those subjective distributions are fictional inventions which agents find useful to guide their thinking. Economists may also do the same to describe uncertainty in their models, but that is just a literary convention rather than a description of reality (Palley, 1993). Unfortunately, most economists do not understand that it is a literary convention and believe their fictional subjective probability distributions are objective distributions.

restless and begin to shift without any change in weights) (Robinson, 1956b, p.57, cited by Dutt, 2005, p.125).”

That is exactly right – except for Robinson’s reference to the temporary position as an equilibrium.

A non-equilibrium process can be identified with flux that is forever generating disruption and change from within, such that the process is never at rest – be it regarding the level of economic activity, the growth rate, or economic ratios. The disruptions and changes may be miniscule so that they are not visible in economic statistics, but they are perpetually on-going.

Non-equilibrium connects with Schumpeter’s (1942) construction of “creative-destruction” which describes the process of technical change and innovation that is continuously bubbling up from within the economy. It also connects with Minsky’s (1992 [1993]) “financial instability hypothesis” whereby financial markets endogenously generate instability that ends in a crisis and a reset (Palley, 2011). In the Minskyian world, stability breeds increased risk taking which ultimately produces instability and crisis. Consequently, what appears to be equilibrium is just a preamble.

Non-equilibrium also connects with Shackle’s (1955) construct of “crucialness” whereby the decision-making agent “cannot exclude from his mind the possibility that the very act of performing the experiment may destroy forever the circumstances in which it is performed (Shackle, 1955, p.6).” Crucialness is rooted in the reflexive nature of the economic process in which agents’ decisions change the economy, which may then change agents’ decisions. Reflexive processes lean to being non-equilibrium. Shackle emphasized the uncertainty induced by reflexivity, but it is equally significant for non-equilibrium. Reflexivity and inevitable self-destruction of the *status quo* are the mechanisms of non-equilibrium, and non-equilibrium is a

hallmark of the historical process.

The fourth characteristic of history is hysteresis, which was analytically described in section 2 above. Hysteresis should not be confused with historical time. The latter renders time a one-way process. Hysteresis operates within historical time and concerns specific developments that involve transformations that have elements of irreversibility. It introduces other forms of one-way process that operate within one-way time.

With the addition of hysteresis, the historical process is fully described. It takes place within historical time (one-way time). The economy is continuously dislodged by flux-like developments that autonomously emerge from within (non-equilibrium), and those events are unpredictable and cannot be described by objective probability distributions (fundamental uncertainty). Many events and outcomes from developments and choices are hysteretic (transformations with elements of irreversibility).

3.b A methodological dilemma: history versus equilibrium

The historical process creates a methodological dilemma for economists and the study of hysteresis. That is because the real world is historical, yet economics has widely used equilibrium methodology for purposes of understanding and representing the economy.

The use of equilibrium modelling can be rationalized as a simplifying assumption for untangling a complex world. Equilibrium can be viewed as a form of *ceteris paribus* thought experiment that is used to tame the complexity of history. In effect, equilibrium freezes the forces of reflexivity and creative-destruction that operate from within the economy to persistently dislodge the *status quo*.³

³ As discussed by Skott (2005, p.194), the major benefit of equilibrium analysis is it allows use of “the powerful tools of mathematical analysis”. Mathematical modelling exposes the skeletal structure of the economy and its presumed logic. Comparative statics analysis yields insight into the factors impacting the economy, while dynamic stability analysis yields insights into the factors moving the economy and the associated path of movement. That

Viewed in that light, equilibrium methodology is likely to work best for short duration analysis (e.g., macroeconomics) in which history has had little time in which to generate changes from within. It is likely to be a much less reliable guide for long duration analysis (e.g., growth) as the internal forces of self-destruction will have had time to surface. Hysteresis can be modelled in both equilibrium and non-equilibrium contexts. Its causes and impacts are most easily surfaced within an equilibrium frame, which is the frame that economists have engaged it.

4. A brief review of some existing applications of hysteresis

This section briefly discusses some existing economic applications of hysteresis. The focus is on macroeconomic applications which have been the source of most of the interest in hysteresis.

The purpose of the brief review is to provide a contrast with the broadening of applications suggested in the second half of the paper. It also raises some flags regarding the difference between “permanence” and “hysteresis”.

4.a Observational equivalence: macroeconomics and the difficulty of identifying hysteresis

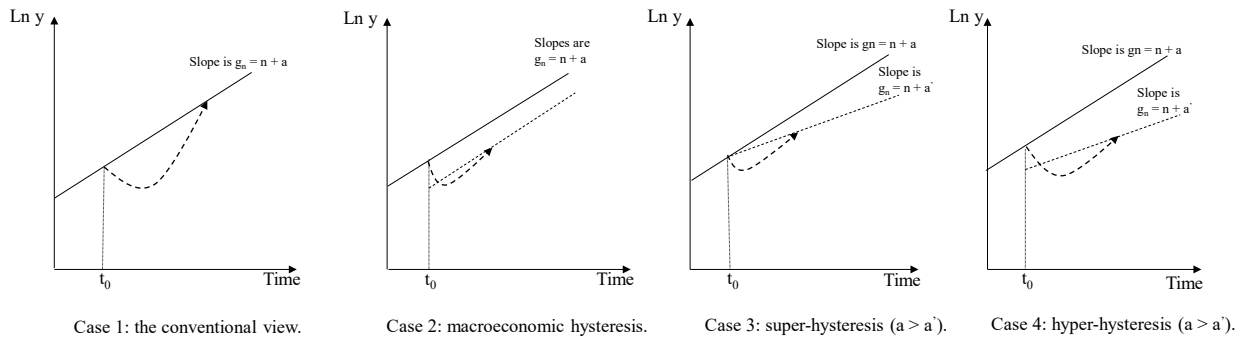
After the Great Financial Crisis of 2008, there was much talk of the need for economics to change. That need was symbolically captured in Queen Elizabeth II’s famous question to the director of the London School of Economics, asking why no economist had anticipated the crisis. Writing from a Post Keynesian (PK) vantage, Lavoie (2018) has argued for systematically incorporating hysteresis into macroeconomics and growth theory, with aggregate demand (AD) affecting potential output via hysteresis.

Figure 4 elaborates Lavoie’s (2018) characterization of recessions and hysteresis. Case 1 is labelled the “conventional view”. Case 2 is labelled “macroeconomic hysteresis” and is a

said, in this author’s view, Skott (2005, p.177) overstates the case for equilibrium analysis by defining it as theory-consistent analysis, and then claiming being against equilibrium is to be against theory. That second claim does not follow from the first. Non-equilibrium theory is also possible.

hysteretic level effect. Case 3 is labelled “super-hysteresis” and is a hysteretic growth rate effect. Case 4 is labelled “hyper-hysteresis” and combines hysteretic level and growth effects.⁴ The abscissa is time, and the ordinate is the natural log of real output ($\ln y$). The solid straight line describes the time path of potential output. Its slope corresponds to the rate of potential output growth (g_N), which is equal to the rate of labor force growth (n) plus the rate of labor augmenting technical progress (a). In each case there is a recession that starts at time t_0 .

Figure 4. Alternative characterizations of recessions and hysteresis.



Case 1 captures the conventional view of recessions. There is a drop in output, which falls below potential output. Thereafter, output recovers and eventually returns to potential. The recession output path is asymmetric, with the decline being sharp while recovery is drawn-out. The growth of potential output is unchanged. However, output lost in the recession (the area

⁴ The terminology of super-hysteresis draws on the 1960s monetarist debates which distinguished between changes in the level and rate of growth of the money supply. Money is neutral if changes in its level have no real effects, and it is super-neutral if changes in its rate of growth have no real effects.

above the trough) is permanently lost because of the passage of time which can never be recovered.

Case 2 describes macroeconomic hysteresis, whereby there is a permanent one-time negative shock to the level of potential output, but the growth of potential output is unchanged. Case 3 describes super-hysteresis in which there is a recession that temporarily lowers the level of output and permanently lowers the rate of growth of potential output owing to a fall in the rate of technical progress ($a > a'$). Case 4 describes hyper-hysteresis in which there is a permanent one-time negative shock to the level of potential output, and the economy also shifts to a potential output path with a lower growth rate.

A major challenge is identifying hysteresis. Recall, hysteresis was defined in section 2 as involving “irreversibility”. A change of output path or output growth path is not proof of hysteresis. Instead, it may reflect that the economy has no mechanism for automatically pulling itself back to its initial equilibrium, or it may reflect a change in the underlying equilibrium. In effect, hysteretic changes can be observationally equivalent with other causes of change. That makes specifying the theoretical causes of hysteretic change critical.

In the mainstream Neoclassical growth model (Solow, 1956), the equilibrium is a stable gravity point. *Ergo*, if the economy is dislodged from the equilibrium (as in Case 1), it is automatically drawn back to that equilibrium. That is not the case in PK macro and growth models which view the economy in terms of a continuum of possible equilibrium, with the actual equilibrium being determined by the forces of AD. Thus, when there is a non-temporary demand shock, the economy is shifted to a new equilibrium. In the canonical Keynesian income expenditure model, a non-temporary negative demand shock lowers equilibrium output. There is no mechanism to reverse the demand shock and restore the initial equilibrium. However, that

does not render the shock hysteretic as the economy would return to the initial equilibrium if it were reversed.

The same holds for Keynesian growth models (e.g., Fazzari and González, 2023) in which demand growth impacts supply growth, so that changes in the rate of demand growth change the rate of growth. Now, there is a continuum of equilibrium growth rates. However, a fall in the growth rate induced by lower demand growth is non-hysteretic. If demand growth were restored, the economy would revert to its initial position.

The situation is further complicated by policy considerations. For instance, a demand shock may be accompanied by a discretionary change of policy regime, as happened in the late 1970s with the shift away from full employment as a goal of policy. Consequently, whereas policy previously pushed the economy back to full employment, now it did not and the economy languished with a higher rate of unemployment.

Another empirical complication is slow adjustment, which can easily be misinterpreted as hysteresis. That misinterpretation reflects confusion over the difference between “persistence” and “hysteresis”. Slow adjustment generates persistence. However, persistence is only hysteretic if it is characterized by an element of irreversibility (i.e., the economy does not revert to its initial state if a shock or change is reversed). Likewise, asymmetric adjustment in response to shocks being reversed or dissipating is not hysteresis, though it too is easily misinterpreted as such – especially if the adjustment process is slow.

In sum, the macroeconomic effects of hysteretic shocks can be observationally equivalent with non-hysteretic shocks. Hysteresis involves some form of irreversibility which is difficult to identify and easily confused with persistence (i.e., unit root effects). PKs have emphasized the significance of hysteresis for unemployment and potential output, but there is a danger of

misinterpreting unit root persistence effects as hysteresis. From a Keynesian perspective, those persistence effects could also be the result of a combination of the economy lacking ability to self-correct demand shocks, and they would disappear if the demand shock were reversed.

4.b Macroeconomic hysteresis and labor markets

A principal area of application of hysteresis has concerned the macroeconomics of labor markets. That application was pioneered in the 1980s by Blanchard and Summers (1987) and Cross (1988) in connection with the controversy surrounding the natural rate of unemployment and its proclivity to drift up following recessions. There are a number of mechanisms whereby such macroeconomic hysteresis may operate.

4.b.1 Labor market scarring

Labor market scarring is one such mechanism and it works via multiple channels. First, scarring may result in increased unemployment and longer duration of unemployment spells by making it harder to find a job as workers unemployed workers may be stigmatized as “lemons” (Gibbons and Katz, 1991; Arrulampalam et al., 2000,).⁵ Second, unemployment may result in attenuated connections to the labor market via discouragement effects and erosion of work ethic. Third, unemployment may depreciate and erode human capital, thereby making unemployed workers less productive.

Taken together, those effects can have an adverse impact on aggregate labor supply, thereby causing a fall in the level of potential output akin to case 2 in Figure 4. However, for

⁵ Scarring by stigmatization will also have negative impacts on the lifetime incomes of those rendered unemployed (Arulampalam et al., 2001). There is strong evidence in the US that unemployment reduces the lifetime income of those subject to unemployment, and they are also consigned to less stable employment patterns (Kletzer, 1998). However, the macroeconomic implications of that are unclear. Those effects are very costly to the individuals concerned, but the cost to the aggregate economy may be small. Moreover, at the aggregate level it may just be a redistribution effect, with others benefitting at the expense of the stigmatized workers.

those effects to be hysteretic, there must be elements of irreversibility. That requires subsequent economic recovery and future employment not fully reverse adverse scarring effects. There is also a policy dimension. Scarring effects likely cumulate over time, increasing with the duration of unemployment. Consequently, prompt policy actions that reduce the depth of recessions can reduce the extent of macroeconomic hysteresis effects on the level of potential output (Michl and Oliver, 2019).

Lastly, just as there can be downside labor market hysteresis (i.e., scarring), there can also be upside labor market hysteresis. Thus, booms may result in marginal populations entering the labor force and acquiring human capital and work skills that stick. There may also be generalized learning-by-doing gains. Consequently, potential output may remain higher after the boom recedes. Such gains are sometimes described as the benefits of a “high pressure” economy.

4.b.2 Insider-outsider labor markets

A second mechanism that has been canvassed for macroeconomic hysteresis effects is insider-outsider labor markets (Blanchard and Summers, 1987). Though widely described as hysteretic, that is not the case. However, because the mechanism is so widely cited, it is discussed below.

The logic of the insider-outsider mechanism is as follows. Existing insider workers set a real wage equal to their marginal product, with all expecting to be employed at that real wage. The nominal wage is set according to expectations of the price level. Thereafter, aggregate nominal demand is subject to surprise monetary shocks that affect the price level, causing firms to increase (positive monetary shock) or decrease (negative monetary shock) employment. Actual employment then determines the next period’s insider group, and the process is repeated. Consequently, shocks get locked-in as the new insider group sets the next period’s expected level of employment. If the economy has been subject to a negative shock that reduces the current

period's employment, next period's expected employment stays at that lowered level.

There are several features to note. First, the insider-outsider model reflects the political economy of the 1980s (i.e., early Neoliberalism) which blamed workers for high unemployment. Second, given the widespread decline in unionization across the OECD, insider-outsider effects should now matter much less. Third, insider-outsider employment and unemployment dynamics are random-walk processes, rather than being hysteretic. That is because changes are reversible. The economy will revert to its initial position if a negative shock is followed by an equal and opposite positive shock. Fourth, systematic monetary policy cannot reverse changes because of the combination of Neoclassical monopoly real wage setting plus rational expectations. That highlights how the ability of monetary policy to offset hysteretic shocks depends on theoretical beliefs about the economy. Theory matters twice over. First, in identifying the mechanisms of hysteresis. Second, in identifying the possibility for effective counter-hysteresis policy.

4.b.3 Productivity growth hysteresis effects

Another channel for macroeconomic hysteresis effects of the type described in Figure 4 is pro-cyclical productivity growth. That channel relies on the logic of endogenous growth (Romer, 1990). The mechanisms for such effects include learning-by-doing (Arrow, 1962) and pro-cyclical R&D spending.⁶

If recessions negatively impact knowledge accumulation, they may temporarily slow labor productivity growth. Even though productivity growth subsequently recovers, the growth during the period of the recession would be lost forever. Consequently, the economy will have a lasting lower “level” of productivity than would be the case absent the recession, which produces

⁶ The theoretical literature on pro-cyclical productivity is extensive. See Cerra et al. (2020, p.17-19) for a brief survey.

a potential output pattern that is a kinked version of case 3 in Figure 4.⁷ That said, if booms have the reverse effect, the two will net out. However, recessions will still have a lasting impact and will still be worth avoiding. Also note that though pro-cyclical productivity effects are lasting, they are not hysteretic as they can be reversed by a shock in the opposite direction. That speaks again to the importance of distinguishing persistence vs. hysteresis (irreversibility).

Balanced against that, recessions may also have positive productivity growth effects via “cleansing effects” (Caballero and Hammour, 1994). First, tough market conditions may induce firms to search more intensively for efficiencies within. Second, recessions put less efficient rivals out of business. Their market share is picked up by the surviving more efficient firms, and the closing firms release resources that can subsequently be employed by the remaining more efficient firms. Together, those features mean recessions may ultimately raise productivity, though there are output losses during the reallocation process. The cost of recessions will depend on the speed of resource reallocation, the social discount rate, and the weight attributed to the losses of those individuals who bear the costs of closure.

In sum, cleansing effects run counter to pro-cyclical learning-by-doing and R&D effects, making the aggregate sign of this channel ambiguous. Also, in contrast with pro-cyclical productivity effects, cleansing effects are hysteretic since the closed firms are eliminated, making reversal impossible.

4.b.4 Aggregate demand and animal spirits

Scarring and high-pressure economy effects that impact workers and business can be viewed as a form of one-way hysteresis, and they also work via the supply-side. Hysteresis may also impact

⁷ During the recession, the growth rate falls so that the line describing potential output flattens. Once the recession is over, growth returns to trend and the line describing potential output returns to its prior steeper slope.

the demand-side.

Bassi and Lang (2015) provide a two-way demand-side model in which hysteresis operates via endogenous animal spirits that impact investment spending. The hysteretic logic of their model is as follows. Investment spending depends on animal spirits, and the state of animal spirits can be “high” or “low”. There are two regimes which the economy can switch between. If the economy is initially in the low spirits regime, investment is depressed. If capacity utilization rises above an upper threshold (u^+), animal spirits jump to the high spirits regime and investment is boosted. The economy remains in that regime unless capacity utilization drops below a lower threshold (u^-), in which case it falls back into the low spirits regime in which autonomous investment is depressed.

That framework corresponds to the two-way hysteresis structure shown in Figure 1.b. When placed in a Keynesian macroeconomic model, it explains why the economy exhibits bouts of higher and lower economic activity. Alternatively, when placed in a Kaleckian growth model, it explains why the economy exhibits periods of stagnant and rapid growth.

5. Expanding the domain of hysteresis

Macroeconomic data is full of evidence of slow adjustment processes that exhibit persistence and unit root processes that exhibit lasting persistence, and it is easy to conflate those processes with hysteresis which involves irreversibility. An open question is how much of the macroeconomic data is characterized by hysteresis and how substantively significant are those hysteretic elements.

The balance of this paper seeks to redirect attention away from macroeconomics and growth. Regardless of the conclusion re the significance of hysteresis for macroeconomics and growth, the argument is hysteresis is a critical concept for political economy and it is critical for

understanding the evolution of economies as historical processes. Applying hysteresis in that way sheds light on the significance of hysteresis, and hysteresis provides a gateway for engaging difficult issues which economics has historically neglected.

The argument below is that hysteresis plays a critical role in determining the institutional structure of economies which is central for understanding the distribution of income, wealth, and power. Economic ideas also play a critical role in determining both institutional structure and economic outcomes via their impact on policy, and both economic ideas and policy are significantly subject hysteresis. Lastly, psychology is also prone to hysteresis, and psychology impacts macroeconomic outcomes. However, that impact is not of the type identified in Figure 4 regarding the long-run path of potential output. Instead, psychology is prone to two-way hysteresis that reverses, and it contributes to explaining the boom-bust pattern of capitalist economic activity and why that boom-bust pattern lacks tight periodicity.

5.a Institutions and sociological structures

In many regards, institutions and organizations can be viewed as the infrastructure in which economic activity takes place. One way of thinking of them is as the “deep” supply-side of the economy, within which is nested the traditional supply-side as represented by firms’ production capabilities (i.e., the aggregate production function) and monopoly pricing power.

From a Keynesian perspective, the actual level of economic activity is then determined by the level of AD operating within that dual structure. However, the deep infrastructure (i.e., institutions and organizations) also impacts AD via its influence on income distribution. That influence works through norms about pay and pricing, and through organizations and institutions. Consequently, the economy’s demand- and supply-sides are inter-woven. Hysteresis is relevant because it can contribute to explaining the evolution of organizations and institutions,

which Setterfield (1993, p.755) describes as “evolving, non-optimal, path-dependent phenomena.”.

5.a.1 Trade union density and union behavior

Trade unions have been a historically important organization in capitalist economies, albeit they are diminished today relative to their presence and influence in the thirty years after World War II. That importance was captured in Galbraith’s (1952) classic book titled *American Capitalism: The Concept of Countervailing Power*. The overarching driving force for the rise of unions was the struggle for safety and dignity at work, combined with the struggle for better pay. Hysteresis can help elaborate developments within that context.

Palley and Jeunisse (2007) provide a dynamic model of trade union density in the US that exhibits multiple equilibria and path dependency. The multiple equilibria correspond to a high density (e.g., 1950s) and low density (e.g., 1920s and 2020s) outcome. Hysteresis can be added to the model to show how the decline in union density has been locked in. The logic is as follows. The forty-year period from 1970 to 2010 saw a large decline in union density, which was significantly attributable to US trade and globalization policy that accelerated de-industrialization. US union density declined because unions were historically located in manufacturing.

Now, there is talk of changing US policy to encourage re-shoring manufacturing. However, that will not revive union density because unions were formed in another political era (the 1930s and early 1940s) when US workers were more politically active and held different political sensibilities and views. That failure to revive union density reflects the operation of hysteresis. Trade policy helped erode unions, but density does not recover when policy is reversed because the political conditions that grew union density no longer prevail. Moreover, as

discussed below, there may be interactive hysteresis. That is because policy locked in lower union density, and the decline in union density may then have locked-in anti-union policy.

The generic implication is institutions may be created in a particular era. If policy undermines them, they may not revive if the policy is subsequently reversed because the conditions of creation no longer prevail.

A second way in which hysteresis may impact trade unions is via union behavior. Thus, union militancy (M) may vary with density (D) and exhibit two-way hysteresis of the type shown earlier in Figure 1.b. That is illustrated by the following model:

$$(1) M_t = M^+ \text{ if } D_t > D^+ \quad M^+ > M^-$$

$$M_t = M^- \text{ if } D_t < D^-$$

$$M_t = M^- \text{ if } D^- < D_t < D^+ \text{ and } M_{t-1} = M^-$$

$$M_t = M^+ \text{ if } D^- < D_t < D^+ \text{ and } M_{t-1} = M^+$$

M_t = militancy at time t , D_t = density at time t , M^+ = aggressive union stance, M^- = defensive union stance, D^+ = critical density level at which unions become aggressive, D^- = critical density level at which unions become defensive.

That structure generates a hysteretic system consisting of two regimes (aggressive and defensive). If unions are initially defensive and density crosses the upper threshold (D^+), they move to become aggressive. Thereafter, they remain aggressive unless density falls below the lower threshold (D^-), whereupon they turn defensive. The low-density regime will engender lower union wage demands owing to union fears of over-playing their hand. In the high-density regime, unions will be confident about their demands and make bigger wage demands.

The model has both particular and general implications. As regards the particular, it suggests a distinction between factors driving union wage demands. One factor is conventional

cyclical forces as identified in Goodwin's (1967) classic growth model. The second factor is the long-term hysteretic forces that determine the structural context (i.e., density) in which conventional forces play out. Union wage behavior may exhibit significant differences across eras marked by large changes in density.

As regards the general, the message is institutions have a psychology of their own that reflects their collective sense of self-worth and power. Moreover, institutional and organizational behavior may be subject to psychological scarring effects that live-on until future events reverse it. Such institutional scarring complements individual scarring.

5.a.2 Structural lock-in via cumulative causation

The previous section used the example of union density to show how policy can hysteretically impact institutional structure. Another way that policy can do so is via cumulative causation, whereby policy initially intervenes to create an unlevel playing field that then spurs *de facto* irreversible change.⁸

Dutt (1992) uses that framework to explain North – South uneven development, as illustrated by India. The argument rests on the mechanism of increasing returns to scale (IRTS) which gives rise to cumulative causation. By reaping economies of scale, early market entrants can acquire a cost advantage that deters additional new entrants who cannot match early entrants' costs. As regards India's falling behind, the argument is imperial Britain imposed specific policies on India that altered India's pattern of specialization, thereby locking it into a path of slower development. Britain specialized in manufacturing and gained the benefit of dynamic IRTS, while India was consigned to producing commodities that did not yield dynamic IRTS.

⁸ Kaldor (1981) emphasized cumulative causation in explaining industrialization and the importance of manufacturing.

Another structural lock-in mechanism is network effects which also embody cumulative causation. In a network, a product or service gains value as the number of network users increases. The cumulative causation aspect is captured by the fact that new persons looking to join a network have an incentive to join the largest existing network, and they make that network even larger by joining. Network effects are particularly important as regards persistence of sub-optimal technologies, and they can also work to exclude competition (Katz and Shapiro, 1994). If networks consist of companies (e.g., supply networks) or countries (e.g., economic blocs), policy can promote hysteretic network effects.

Cumulative causation is a particular form of hysteresis, and it can be understood in terms of the metaphor of a boulder rolling down hill. For the boulder, the hysteretic transformation is the acquisition of momentum. For increasing returns, it is the process of moving down the average cost curve. For networks, it is the process of increasing size.

5.b Political economy and policy lock-in

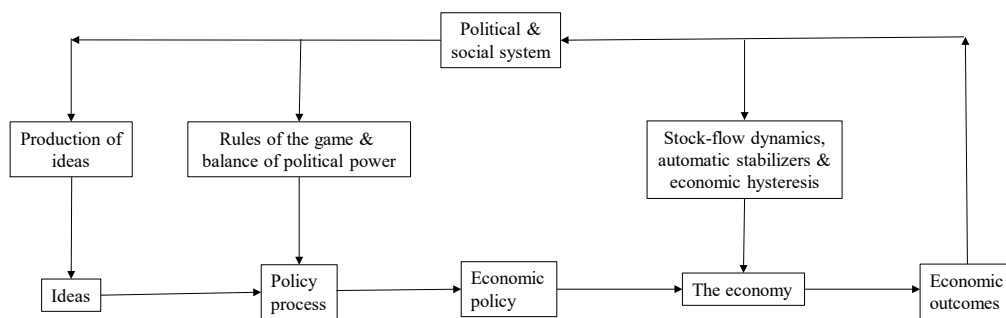
The above discussion of union density and cumulative causation highlights the importance of policy. Not only can policy cause hysteretic change within an economy, but policy can itself be subject to hysteresis via policy lock-in. Thus, changes in political sentiment can cause changes in the economy that lock-in a new policy regime.⁹

The phenomenon of policy lock-in is analyzed by Palley (2007, 2017/18). Its logic is illustrated in Figure 5 which shows a sequence loop running from ideas to economic outcomes and back again. Ideas enter and inform the policy process, which is the filter through which they

⁹ The general phenomenon of lock-in was introduced into economics in connection with technology (David, 1985; Arthur, 1994). Technological lock-in occurs when an initial technological innovation acquires dominance owing to early adoption, thereby ensuring continued use even if sub-optimal compared to subsequent innovations. Examples of such lock-in are the QWERTY keyboard and narrow-gauge railway.

must pass if they are to become policy. Economic policy then impacts the economy, and the economy generates economic outcomes. Those outcomes then loop back to impact each stage of the process running from ideas to the economy.

Figure 5. The logic of hysteretic policy lock-in.
Source: Palley (2017/18)



The linkage from policy to the economy is particularly important since policy can change the structure of the economy, and once the structure is changed it may be very difficult to reverse the new policy. There are two avenues of hysteresis. One is via policy’s impact on the economy. The other is via the economy’s impact on policy.

The conventional feedback from economic policy to economic outcomes is via flow-stock relations such as the investment - capital stock relation, or the borrowing - debt relation. Policy can also generate hysteretic effects, as exemplified by scarring effects in labor markets or via the dynamics of import penetration (Dixit, 1989) or via the impacts on union density discussed above.

Economic outcomes also feedback and impact economic policy. The standard feedback is via automatic stabilizer arrangements or via discretionary policy adjustments. However, economic outcomes can also feedback to structurally affect the policy process, and here one enters the realm of political process. For instance, wealth and power give influence over the policy process and policy selection (Bartels, 2008; Gilens, 2012). If economic outcomes impact the distribution of wealth and power, economic outcomes will structurally influence the policy process and policy selection. Those structural changes can generate policy lock-in. Thus, policy-induced changes in wealth and income distribution may give the beneficiaries the power to lock in the new policy regime. Regarding unions, the decline in union density diminished labor's political power, thereby tacitly increasing the political power of capital and enabling lock-in of pro-capital (i.e., Neoliberal) policies.

Though not the focus of the current paper, economic outcomes can also cause hysteretic political developments that feedback into the lower loop. An example of this is if extreme economic outcomes induce an overthrow of the democratic system and a shift to authoritarianism. A more moderate example is when economic outcomes result in large political majorities for a political party, enabling it to pass enduring legislation that lives on long-after. The 1930s provide examples of both. In Germany, the Nazi Party gained political power and suspended democracy. In the US, the Democratic Party won large majorities in Congress that enabled passage of the New Deal which is still institutionally present.

Lastly, economic outcomes may influence economic ideas and beliefs, which are part of the raw input into the policy process and policy design. The role of ideas and beliefs is a neglected aspect of economics and is explored below in sections 5.d and 5.e.

5.b.1 Examples of policy lock-in

Palley (2017/18) provides multiple examples of policy lock-in, which illustrates its pervasiveness. One example is the creation of the euro which locked-in a new monetary system predicated on Neoliberal monetary economics. A second example is anti-trust policy, whereby consummated anti-competitive mergers will likely remain in place owing to costs of unravelling, even if the stance of policy is subsequently changed. A third example is privatization and government policy capacity. Privatization can result in the destruction of government's policy capacity because it may destroy government's organization capital (i.e., its capacity to produce services). Once destroyed, even if the policy stance changes, it may not be worth government investing to re-build that organization capital. A fourth example is tax cuts which redistribute income and create political constituencies that oppose their reversal. Consequently, once reduced, it is difficult to reverse tax cuts. A fifth example is government spending which also creates political constituencies that oppose reducing such spending, once in place. A last example is globalization policy which has created new international economic rules that are difficult to reverse, rendering them cemented in. Moreover, even if policy changes, firms have created new patterns of global production that endure because they remain viable. That is because the costs of setting-up global production are sunk costs and the marginal costs of operation are only modestly impacted.

5.b.2 Broader implications of policy lock-in

A policy lock-in perspective dramatically changes thinking about policy. The conventional view implicitly treats policy as if it were a dial that can be dialed up and down. It assumes the structure of the economy is not permanently affected by policy changes so that future policy possibilities are unaffected by prior policy decisions, and that the political process and interests which determine policy are unaffected.

A policy lock-in perspective challenges all of that. The policy process is described as a loop rather than a dial, and the loop involves multiple stages which are not exogenous with respect to the economy. That means policy should be viewed as an embedded part of the economy, and understanding the economy requires understanding the way in which policy is embedded. Elements of the policy loop are subject to hysteresis which produces policy lock-in and lock-out. In terms of the policy dial metaphor, once policy is “dialed up”, it may not be possible to dial it back down – or vice versa. In sum, policy can cause hysteretic changes in the economy, and changes in the economy can cause hysteretic changes (i.e., lock-in) in policy and economic thinking.

The policy lock-in process described in Figure 5 also implicates economics and challenges the conventional view of economics as an objective value-free body of knowledge. Ideas matter because they shape policy, but which ideas get produced and adopted depends on political and economic power. That creates a loop between ideas, policy, and economic and political power.

5.c Psychology and hysteresis: applications to consumer confidence and investor confidence

Bassi and Lang’s (2015) animal spirits model shows the relevance of hysteresis for Keynesian demand-side models. The discussion of animal spirits is conducted regarding firms, which are owned and controlled by owners and managers. Animal spirits refer to the latter’s psychology. The animal spirits - hysteresis nexus shows the relevance of hysteresis for psychology and how hysteresis can impact the economy via psychological channels. That suggests further applications.

5.c.1 A model of hysteretic consumer confidence

One application is consumer confidence. The logic of such a model would parallel that of Bassi

and Lang (2015), with consumer confidence and consumption spending standing in for animal spirits and investment spending. Now, hysteresis would operate via consumer confidence which impacts consumer spending, especially spending on durable goods.

The state of consumer confidence can be “high” (A^+) or “low” (A^-), so that there are again two regimes which the economy can switch between. If the economy is initially in the low confidence regime, consumption spending is depressed. If the economy rises above an upper threshold (u^+), consumer confidence jumps to the high confidence regime and consumption spending is boosted. The economy remains in that regime unless the economy drops below a lower threshold (u^-), in which case it falls back into the low confidence regime in which consumption spending is depressed.

Analytically, the challenge is to identify the threshold variable that triggers the switch-on/switch-off mechanism that shifts consumer confidence between the two regimes. One possibility is the condition of labor markets as proxied by the unemployment rate or the job vacancy rate. A second possibility is the state of financial markets. That opens the possibility for interaction of hysteretic effects across markets.

The equations for a simple Keynesian growth model are given by:

$$(2) A_t = A^+ \text{ if } u_t < u^- \quad A^+ > A^-$$

$$A_t = A^- \text{ if } u_t > u^+$$

$$A_t = A^- \text{ if } u^- < u_t < u^+ \text{ and } A_{t-1} = A^-$$

$$A_t = A^+ \text{ if } u^- < u_t < u^+ \text{ and } A_{t-1} = A^+$$

$$(3) u_t = 1 - ay_t$$

$$(4) c_t = C(y_t, \sigma, A_t) \quad 0 < C_y < 1, C_\sigma < 0, C_A > 0$$

$$(5) s_t = y_t - c_t = S(y_t, \sigma, A_t) \quad S_y > 0, S_\sigma > 0, S_A < 0$$

$$(6) \ i_t = I(y_t, \sigma) \quad I_y > 0, I_\sigma > 0$$

$$(7) \ i_t = s_t$$

$$(8) \ g_t = i_t$$

A = consumer confidence ($A^+ > A^-$), u = unemployment rate ($u^+ > u^-$), y = capacity utilization (output/capital ratio), c = consumption per unit of capital, s = saving per unit of capital, i = investment per unit of capital, g = growth rate, σ = profit share. Equation (2) determines the evolution of consumer confidence. Equation (3) determines the unemployment rate and is a linear version of Okun's law. Equation (4) determines the consumption rate. Equation (5) determines the saving rate. Equation (6) determines the investment rate (i.e., the rate of capital accumulation). Equation (7) is the goods market clearing condition which determines the rate of capacity utilization and has saving equal investment. Equation (8) determines the growth rate.

The reduced form solutions for the unemployment rate and the growth rate are:

$$(9) \ u_t = U(a, \sigma, A_t) \quad U_a < 0, U_\sigma > 0, U_A < 0$$

$$(10) \ g_t = G(\sigma, A_t) \quad G_\sigma > 0, G_A > 0$$

Higher consumer confidence lowers the unemployment rate and increases the growth rate. In the high confidence regime (A^+), the unemployment rate is lower and the growth rate higher.

Hysteresis enters via the unemployment rate – consumer confidence – consumption spending nexus.¹⁰

5.c.2 A model of hysteretic financial investor confidence.

The same logic can be applied to financial investor confidence and financial markets. Doing so generates a Keynes (1936) – Kindelberger (1978) – Minsky (1992 [1993]) economy in which

¹⁰ The ambiguity of investment with respect to the profit share reflects the Kaleckian distinction between wage-led and profit-led demand regimes. A higher profit share increases capital accumulation in a profit-led regime and decreases it in a wage-led regime.

financial markets are subject to hysteretic bouts of mania that spill into the real economy. That also echoes with the ideas of Shiller (2000) regarding irrational exuberance in financial markets.

The equations for a simple Keynesian growth model are given by:

$$(11) A_t = A^+ \text{ if } y_t > y^+ \quad A^+ > A^-$$

$$A_t = A^- \text{ if } y_t < y^-$$

$$A_t = A^- \text{ if } y^- < y_t < y^+ \text{ and } A_{t-1} = A^-$$

$$A_t = A^+ \text{ if } y^- < y_t < y^+ \text{ and } A_{t-1} = A^+$$

$$(12) q_t = Q(y_t, \sigma, A_t) \quad Q_y > 0, Q_\sigma > 0, Q_A > 0$$

$$(13) s_t = y_t - c_t = S(y_t, q_t, \sigma) \quad S_y > 0, S_q < 0, S_\sigma > 0$$

$$(14) i_t = I(y_t, q_t, \sigma) \quad I_y > 0, I_q > 0, I_\sigma > 0$$

$$(15) i_t = s_t$$

$$(16) g_t = i_t$$

q = Tobin's q (ratio of stock market price of capital to goods market price). All other variables are as defined earlier. Equation (12) determines the value of Tobin's q (Brainard and Tobin, 1968, 1977) which is the ratio of stock market price of capital to the goods market price of capital. The stock market value of capital depends positively on the rate of capacity utilization, the profit share, and investor confidence.

The value of the stock market affects both saving and investment. The negative impact on saving reflects a consumption wealth effect, while the positive impact on investment reflects the logic of Tobin's q (Brainard and Tobin, 1968, 1977) whereby a higher value of the stock market lowers the effective cost of capital and provides an incentive for firms to invest and acquire more capital. Note, hysteresis effects originate in the financial market, and then ramify out to impact saving and investment.

The reduced form solutions for q , capacity utilization, and the growth rate are:

$$(17) \quad q_t = Q(\sigma, A_t) \quad Q_\sigma > 0, Q_A > 0$$

$$(18) \quad y_t = Y(\sigma, A_t) \quad Y_\sigma > 0, Y_A > 0$$

$$(19) \quad g_t = G(\sigma, A_t) \quad G_\sigma > 0, G_A > 0$$

Higher investor confidence increases the value of the stock market, which spills over and increases capacity utilization by increasing both the rate of consumption and investment. That in turn increases the growth rate. In the high confidence regime (A^+), stock prices, capacity utilization, and growth are all higher.

As before, the effect of the profit share on capacity utilization and growth is ambiguous and depends on whether the economy is wage- or profit-led. That said, inclusion of Tobin's q makes it more likely that the economy will be profit-led. That is because it adds additional channels whereby the profit share can positively impact the investment rate and negatively impact the saving rate.

Lastly, financial investors may also have their own behavioral conventions regarding portfolio composition. In booms they may lower liquidity holdings, while increasing them in slumps. If those conventions are subject to two-way hysteresis, asset prices will be elevated in booms, but they will fall sharply if the economy slumps and triggers adoption of the high liquidity convention. Thereafter, asset prices will remain depressed until a new boom causes sufficient recovery to trigger adoption of the low liquidity convention. That type of convention produces a more complicated pattern of asset price behavior, whereby prices are slightly dissociated from economic activity. Thus, prices can remain elevated after economic activity has peaked because the low liquidity convention still prevails. Likewise, prices can stay depressed after recovery has begun because the high liquidity convention still prevails.

5.c.3 Hysteretic creditor confidence and financial market hysteresis.

A similar logic might also be applied to credit markets and creditor confidence, which would produce hysteretic fluctuations in the supply of credit. Thus, there might be a regime where creditors are optimistic and relax credit standards, and another regime in which they are pessimistic and tighten credit standards. That would promote pro-cyclical patterns of mania and despondency in credit markets, as follows:

$$(20) C_t = \varphi^+ \text{ if } x_t > x^+ \quad 0 < \varphi < 1, \varphi^+ > \varphi^-$$

$$C_t = \varphi^- \text{ if } x_t < x^-$$

$$C_t = \varphi^- \text{ if } x^- < x_t < x^+ \text{ and } C_{t-1} = \varphi^-$$

$$C_t = \varphi^+ \text{ if } x^- < x_t < x^+ \text{ and } C_{t-1} = \varphi^+$$

C = credit rationing coefficient, x = trigger variable. The credit rationing coefficient determines the proportion of loan demand that is financed. The above corresponds to a two-state system in which credit supply conditions switch hysteretically between the two states. Assuming the supply of credit impacts AD, in the optimistic state credit supply is abundant and amplifies the boom. In the despondent state, credit supply is diminished and amplifies the slump. Most importantly, getting trapped in despondency will tend to entrench recessions.

The challenge is to identify the appropriate trigger variable. One possibility is a differentiated two-trigger mechanism (x_1, x_2) , which is slightly different from the above single variable trigger mechanisms. Thus, creditors may become despondent after large loan losses, defined as a percent (x_1) of the loan portfolio. Thereafter, optimism is restored after the passage of a certain amount of time (x_2) without further large losses. The differentiated triggers are loan losses and passage of time.

Another source of hysteresis in credit markets is bankruptcy. Thus, firms and households

might get stained by bankruptcy, which lowers their credit standing and may even deny them access to future credit. That stain may fade with time, so maintaining a good record gradually restores credit access. However, the staining is hysteretic in that reversal of the shock that triggered bankruptcy does not reverse the stain. Bankruptcy is a transformational event that generates financial market hysteresis.

5.c.4 A heterogeneous agent model with multiple psychologies

Managerial animal spirits, consumer confidence, financial investor confidence, and creditor confidence are all psychological forces that impact the economy, and each is potentially subject to hysteretic effects. The four can potentially be combined in a unified model with heterogeneous agents and multiple psychologies. Doing so creates a rich environment in which agents can exhibit differential psychological states.

It is also easy to imagine how those states may cascade, with changes in one type's psychology impacting the economy inducing changes in other agents' states. Stagnation is likely to occur when all are simultaneously trapped in a low confidence state. Booms will occur when all are in a high confidence state.

5.d Experience, ideas, and identity

Previous sections have emphasized the role of policy, behind which lies the world of ideas. Ideas entered the process of policy lock-in shown in Figure 5. This sub-section and the next excavate the role of ideas, with this section focusing on their impact and the next section focusing on their production. Ideas are intrinsically hysteretic, powerful in their influence, and impact both the individual and the collective.

In a sense, every individual is persistently subject to one-way hysteresis every day of their life. At the cellular level, everyday results in cell aging that is irreversible and leaves us

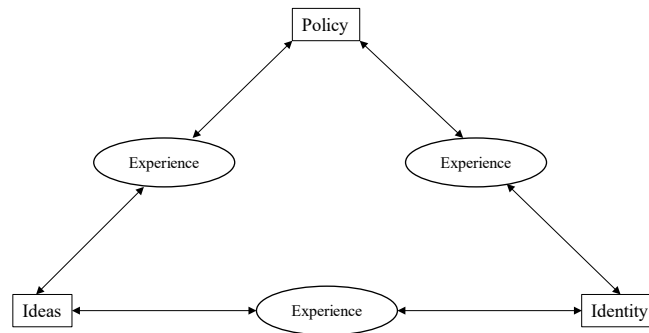
permanently changed. The same holds for mental life whereby each day adds to each person's cumulative experience, leaving her subtly changed by the memory of and learning from that experience. For young infants, that process is rapid and observable, but it also holds throughout life for everyone. Life is a hysteretic non-equilibrium process.

The same can be argued for society, with the social structure of society evolving over time. That evolution is guided by experience and new ideas, which irreversibly alter thinking at both the individual and collective levels. New ideas are incorporated into the old as part of a sedimented pattern of intellectual development. That pattern is hysteretic in that it is irreversible and the present is always slightly differentiated from the past.

The above observations suggest the economic order is subject to hysteretic effects operating via the nexus of experience, ideas, identity, and policy. Ideas and identity are intrinsically hysteretic as they constitute the portals through which experience is parsed. When they change, the parsing of experience is fundamentally altered, hysteretically changing the present and future relative to the past.

The nexus connecting ideas, identity, and policy is illustrated in Figure 6. Everything is parsed through the filter of "experience" (individual and collective) which informs thinking, belief, and action. The nexus is characterized by bi-directional causality. Ideas affect policy and vice versa. Likewise for the relationship between ideas and identity, and between identity and policy. Figure 6 elaborates aspects of Figure 5 which described the process of policy lock-in. The elaboration makes explicit the filter of experience, and it also surfaces the role of identity which influences political and economic choices that in turn influence policy.

Figure 6. The nexus between experience, ideas, identity, and policy.



5.d.1 Case study: the hysteretic impact of Neoliberalism on ideas and identity

The Neoliberal era (1980 – today) provides a case study illustrating the hysteretic transformative nexus shown in Figure 6. Neoliberalism is a political economic philosophy that consists of two claims, one economic and the other political. The economic claim is that a free-market *laissez-faire* is the best way to deliver societal prosperity as it ensures economic efficiency. The political claim is that a free-market economy is necessary for the promotion and protection of individual freedom (Palley, 2021a, p.1).

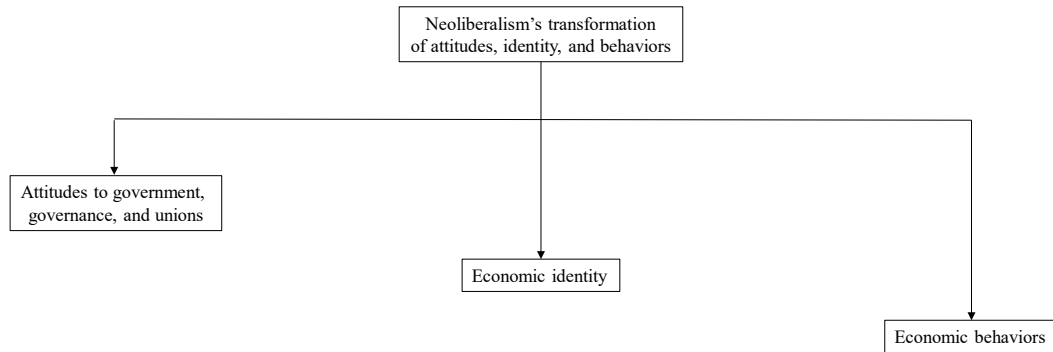
Neoliberalism emerged in the post-war era (1945-1979) as a counter to Socialism and Social Democratic Keynesianism. It was promoted by business interests and was intellectually anchored by the Chicago School of economics. It substantially captured the economics profession in the late 1960s and 1970s, and then achieved political hegemony in the 1980s. Since then, it has provided the hegemonic set of ideas which have shaped economic policy (Palley, 2012, Chapters 2 and 11). In accordance with the logic of Figure 6, that has given rise to

hysteretic change regarding policy and identity.

Since ideas inform economic policy, Neoliberalism's capture of economics has meant changed policy. That has triggered the circuit of policy lock-in described in Figure 5 and discussed in Section 5.b. The economy has been fundamentally and irreversibly changed by the economic policies of the Neoliberal era and their associated effects. Even if that policy regime was rolled back by an intellectual counter-revolution against Neoliberalism, the economy would not revert to the way it was.

The combination of changed ideas and policy regime has had transformative political economic impacts which are discussed by Palley (2020, 2021b, 2022). As illustrated in Figure 7, changed ideas and policy have served to transform attitudes to government and unions, transform economic identity, and change economic behaviors. Those changes fundamentally re-oriented individuals' understandings of themselves and society's collective political economic understanding of itself. They constitute a form of one-way hysteresis whereby society views and understands itself differently, supports and demands different policies, and responds differently to shocks and developments.

Figure 7. Neoliberalism's impacts on attitudes, identity, and behavior.



Once a society changes its political economic understanding of itself, the change can be very long-lasting and requires significant political economic distress before it is reconsidered. That process of societal reconsideration is explored by Hall (2022). In effect, ideas are powerful and hysteretic, both in themselves and in their impact on society.

Regarding transformation of attitudes to government, governance, and unions, Neoliberalism has spurred animosity toward government and a push for smaller (minimalist) government. That stance is captured in Hayek's (1944) celebrated *Road to Serfdom* polemic against government, which paints government as a political threat and an economic problem.

The Neoliberal era has also been marked by an attitudinal turn against unions – though that may now be reversing. That attitudinal turn changed people's thinking about unions, making it harder for unions to expand or even sustain membership. It illustrates the importance of ideas. Economists were likely important contributors to the turn with their monopoly union model, which characterizes unions as an economic inefficiency and as rent-seekers. More generally,

Neoliberalism has induced a change in attitudes to markets and governance. The role of economic ideas in propelling that change, and in driving the shift from Social Democratic Keynesianism to Neoliberalism, is eloquently analyzed by Burgin (2012) and Carter (2020, Chapters, 13-16).

Regarding transformation of economic identity, financial policy has been especially important (Fligstein and Goldstein, 2015; Palley, 2020, 2021b, 2022). It has encouraged homeownership, and it has also encouraged new retirement saving arrangements (e.g., 401K plans and Individual Retirement Accounts) whereby people invest directly in the stock market via defined contribution pension saving plans. As homeowners, people are supportive of policies (e.g., tax deductible interest, easier mortgage credit access, low interest rates) that inflate house prices and subsidize ownership costs. As direct investors, their interests are tied to the stock market and investors may come to identify with financial interests. More generally, policy has used the tax code to provide subsidies for a wide range of necessities and merit goods (e.g., housing, healthcare, education), thereby promoting individualist thinking and peeling political support away from collective public provision.

Neoliberalism's transformation of economic identity echoes Marcuse's (1964) "one-dimensional man" problematic. For Marcuse, the problematic was consumerism's corrosive and captivating effect on working class understandings of capitalism, whereby workers lose their bearings and become defenders of the system that oppresses them. With Neoliberalism, the problematic is ownership. Workers may become indebted homeowners and small-scale investors, causing them to identify with the interests of property and capital.

Regarding Neoliberalism's transformative impact on behavior, that operates through the political economic philosophy it proselytizes. Neoliberalism promotes the construct of *Homo*

Economicus, whose pursuit of utility maximization is represented as ideal behavior that supports the attainment of Pareto optimal outcomes. That position is rationalized by appeal to Adam Smith's (1776, Book 1., Chapter 2) observations about the role of self-interest:

“It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own self-interest. We address ourselves not to their humanity but to their self-love, and never talk to them of our necessities, but of their advantages.”

However, it neglects the fact that Smith situated his view within a restraining moral context articulated in *The Theory of Moral Sentiments* (Smith, 1759). When stripped of that moral context, *Homo Economicus* becomes a sociopathic egotist who is unrestrained in what he does except by his budget constraint, the deterrence of law, and the deterrence of the economic cost of loss of reputation.

Neoliberalism has actively promoted the *Homo Economicus* view of the individual, and its tenets now infuse society, up and down. The public's embrace of the Neoliberal ideal is reflected in the widespread admiration of Ayn Rand's (1957) novel *Atlas Shrugged*, which lionizes the egotistical sociopathic personality. In cinematic culture, it is captured in the movie *Wall Street* by the less noble lead protagonist Gordon Gecko, with his creed of “Greed is good”.

As a mainspring of intellectual inspiration for Neoliberalism, mainstream economics has assisted this social transformation. Mainstream economics takes the *Homo Economicus* characterization of people as primitive and endorses the *laissez-faire* economy as the ideal economy. Those ideas are given legitimacy and infused in undergraduate education and business schools, thereby rippling throughout society, influencing public policy and the way society thinks and behaves. As documented by Frank et al. (1993), there is substantial experimental evidence that exposure to Neoclassical economics is behaviorally transformative. It appears to diminish

honesty and cooperative behavior, encourage free-riding, and weaken the charitable impulse.

In sum, the ideology of Neoliberalism has transformed individuals' thinking and behavior, and that transformation is hysteretic. It changes individual behavior and political choice, with consequent implications for politics and policy.

5.e Intellectual and sociological lock-in: the hysteresis of economics

Thus far, the focus has been the economics of hysteresis (i.e., how hysteresis operates in the economy and society), but hysteresis can also be applied to understand economics (Palley, 2018). In terms of Figure 5 describing the process of policy lock-in, that takes the analysis to the box labelled "Production of ideas". Economics is an on-going activity that elaborates ideas within its own socio-economic structure, and that activity is subject to hysteresis via intellectual and sociological lock-in.

The starting point is recognition that economics is engaged with ideas, and ideas are intrinsically subject to hysteresis. New ideas constitute a sedimented addition to what already exists. They are not an addition to an existing homogenous pool of ideas. New ideas are different from what existed before, and it is that difference that makes them new.

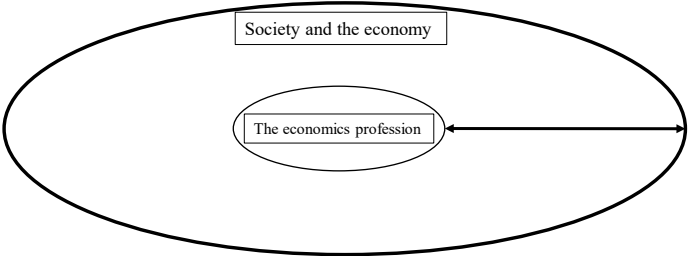
Exposure to new ideas results in permanent change that can be termed "intellectual lock-in". Like experience, exposure cannot be undone. The hysteretic impact of a new idea depends on the novelty and significance of the idea, and on the extent of conscious uptake. The greater the degree of novelty and conscious uptake, the greater the degree of hysteretic change.

The above characteristics are generic to ideas. Economic ideas are subject to an additional angle of hysteresis because economics is a contested discipline, marked by competing theoretical paradigms. Thus, if a new idea leads to a change of paradigm, its impact is even more hysteretic. That is what happened in the late 1960s with the turn against Keynesian economics.

That turn was led by the monetarist counter-revolution (Johnson, 1971), that then morphed into New Classical macroeconomics which spear-headed the macroeconomics of Neoliberalism. Reflecting the sedimented nature of ideas, strains of Keynesianism remain, particularly as regards need for monetary stabilization policy. However, the new theoretical landscape is also substantially different, and that difference constitutes a hysteretic development.

The production of economic ideas and economic teaching takes place within the economics profession, which constitutes a socio-economic structure. That structure provides a setting for additional sources of hysteresis that can be termed “sociological lock-in”. As illustrated in Figure 8, the economics profession is contained within society and the economy. There is bi-directional impact between the two sub-structures which is captured by the bi-directional arrow.

Figure 8. The relation between the economics profession and society and the economy.



The profession impacts society and the economy via the ideas it produces and teaches. Society and the economy impact the profession via financing, demand for ideas, and demand for

teaching. Those channels influence the type of research and the composition of the profession, as reflected in its dominant theoretical alignment. Those impacts are illustrated by the rise of business schools and business studies programs which have a close connection to the business community, employ large numbers of economists, are an important locus of economic research, and enroll more undergraduates than do economics programs.¹¹

The operation of hysteresis in economics can be understood with the assistance of Figure 5 which described the process of policy lock-in. The economics profession feeds ideas (via teaching, research, policy advice, and journalism) into society that contribute to hysteretic change in society, the economy, and economic policy. Conversely, changes in society impact the intellectual composition of the profession and type of research. Those impacts get locked-in via personnel channels (e.g., tenure) and via personal commitment by individuals to their prior intellectual investments.

In sum, ideas are themselves intrinsically hysteretic, and there are also hysteretic social forces that impact the production of ideas. Those hysteretic social forces operate both in society at large and within the economics profession. The net result is interaction of multiple hysteretic processes, with hysteretic developments being injected through multiple portals.

6. Hysteresis as a challenge to economics

Economists have engaged the construct of hysteresis but, thus far, that engagement has been substantially in terms of conventional equilibrium macroeconomics and growth theory. This paper has suggested applications of hysteresis that are significantly different in character, their focus being institutions, policy, psychology, and ideas. Unfortunately, those expanded

¹¹ According to the [National Center for Education Statistics](#), business bachelor degrees were almost triple those of social science and history bachelor degrees in 2020/21.

applications are likely to face significant resistance because of the challenge they pose to economics.

Economics is substantially devoid of appreciation of both identity and ideas.¹² Identity is socially constructed and influenced by ideas, and it affects behavior. That means economists' ideas shape the economy which is the object of their study. Since identity and ideas are both prone to hysteresis, that creates a hysteretic reflexivity between the economy and economics.

Ideas are even more challenging because they turn the spotlight on economics. They compel economics to recognize it is an input into the economy, and they also compel it to address the production of economic ideas. That introspective turn is corrosive of economists' knowledge claims as ideas are hysteretic social constructs and their production is socially influenced.

Economists are keen to apply their concepts to others, but not so keen to apply them to themselves. That holds for the concept of self-interested action, and it also holds for hysteresis and the production of ideas. To admit those features is to admit that economists' knowledge claims are tainted by self-interest and ideological interest.

7. Conclusion: opportunity and challenge

Hysteresis is already widely applied in economics, but its application is largely in conventional economic settings. This paper has argued for broadening its application to help explain the evolution of institutions and policy regimes, the evolution and significance of economic identity, and the evolution and significance of economic ideas.

Hysteresis is an element of historical processes, and the real world is historical. That

¹² Akerlof and Kranton (2005, 2010) have begun the process of introducing identity into economics. They do so by adding identity as an argument of the utility function, thereby providing a channel for identity to influence behavior. However, it is not treated in the dynamic hysteretic fashion described in Section 5.d.

explains why hysteresis is pervasive and why hysteresis is important. Hysteresis should be a fundamental building block of political economy, and expanding its application in economics is both an opportunity and a challenge. The opportunity is it provides a means for incorporating political, sociological, and psychological forces which economics has tended to neglect. In addition to enriching economics, expanded application of hysteresis can provide a mutually enriching bridge to other social sciences as hysteresis is a construct that could have significant application in those disciplines (and history). The challenge is introducing such concerns in economics raises questions about the character of economists' knowledge claims, which is likely to trigger resistance from economists.

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Imprint

Publisher

Macroeconomic Policy Institute (IMK) of Hans-Böckler-Foundation, Georg-Glock-Str. 18,
40474 Düsseldorf, Contact: fmm@boeckler.de, <https://www.fmm-macro.net>

FMM Working Paper is an irregular online publication series available at:
<https://www.boeckler.de/de/fmm-working-paper-22457.htm>

The views expressed in this paper do not necessarily reflect those of the IMK or the Hans-Böckler-Foundation.

ISSN 2512-8655



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