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Economics Group

Special Commentary

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Are We There Yet? Dynamic Adjustment in the U.S. Economy

Man is impatient but Nature gives up its secrets slowly.

In a world of instant communication, the promise of quick results in public policy and private sector turnarounds appears quite reasonable—almost to be expected. However, these promises and their associated expectations are more often to be disappointed than realized.

Shocks to the economy, either exogenous or induced by public or private actors, are likely to be accompanied by long and variable transition periods where changes in an economic series reflect the influence of the temporary shock and not the longer-term behavior of the series under study. During the 2009-2011 period, for example, a series of temporary fiscal policy shocks (Cash for Clunkers, tax rebates, and the extension of unemployment benefits) gave rise to a short-term improvement in economic behavior, but did not generate the sustained strong growth in the economy that was promised. How might this short-run behavior have misled an analyst into thinking that long-term behavior had been altered?

Shocks to the economy are likely to be accompanied by long and variable transition periods.

Four points are under consideration here. First, complex and fluid transition periods are more often the rule, not the exception. Second, the results of any public or private policy decision will often be impossible to judge in the short run since these actions have yet to reverberate throughout the economy in unexpected ways. Third, different markets, such as those for output (production), labor and credit, will react differently to the same shock, and those reactions are the product of the elasticity of response of actors in each market. Finally, the biases of decision makers will influence those responses, the evaluation of any induced policy shock and, certainly, any exogenous shock from other sources. To paraphrase, when you start looking for economic success, you tend to find it or some portion of it.

Analysts can be misled by several biases that influence their view of the economic data and lead them to misjudge the sustained effect of policy. First, the confirmation bias would lead the analyst to look for data that would confirm their belief in the efficacy of policy. When auto sales, for example, improved in response to the Cash for Clunkers program (Jul.-Aug. 2009), some analysts interpreted the gains in auto sales as a viable turnaround in the auto sector. However, when we apply a Hodrick-Prescott filter,[1] we can see that the entire response was an outlier and not sustained over time (Figure 1).[2]

[1]With the help of the HP filter, we can estimate a long-run trend of a time series and then judge where the effect of a policy is sustained (long-lasting) or not. For example, a sustained policy impact would influence the long-run trend component of the series. However, in the case of auto sale, Cash for Clunkers did not affect the trend and only produced an outlier. An example of the use of the HP filter is Silvia, John and Iqbal, Azhar. (2010). Three Simple Techniques to Analyze a Complex Economic Phenomenon: The Case of Profits, *Business Economics*, Vol. 45, No. 2.

[2] Hodrick, R. and Prescott, E.P. (1997), Post-was Business Cycles: An Empirical Investigation. *Journal of Money Credit and Banking*, Vol. 29.

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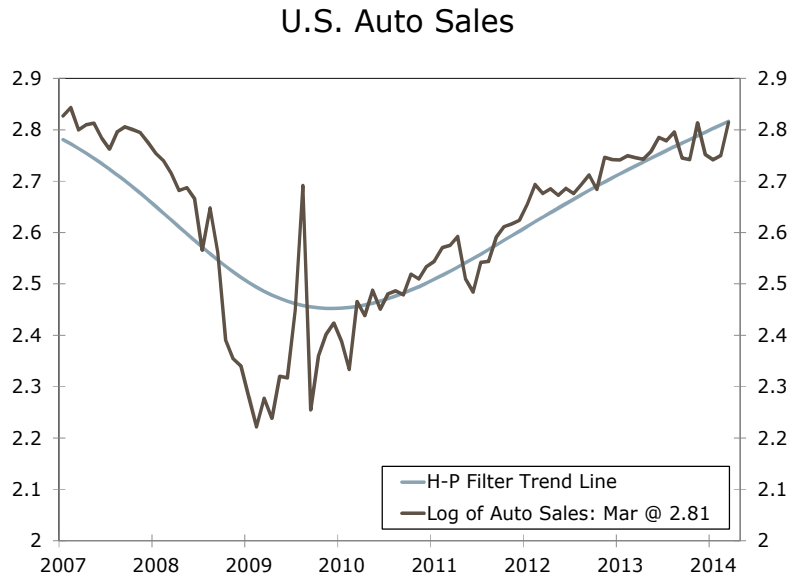
Figure 1



Source: U.S. Department of Commerce and Wells Fargo Securities, LLC

Alternatively, analysts may also have fallen for the recency bias, where recent history becomes the baseline perspective. This can lead to an assentation that policy was successful, but the reality was that, as the observation period lengthened, the effect of policy declined very quickly.

Real Economic Shocks and the Inventory Adjustment Process

When there is a difference between real final sales and inventory growth, there is an adjustment in the response in the momentum of GDP growth.

Our standard introductory adjustment process focuses on the market for goods. When there is a difference between real final sales and inventory growth (Figure 2), there is an adjustment in the momentum of GDP growth. GDP is considered the overall measure of economic activity but for the dynamics of growth, the balance of final sales and inventory takes center stage. Periods when final sales rise faster than inventory gains suggest that demand (measured by final sales) is rising relative to inventory on trend (Figure 3), and therefore would suggest increased production (GDP) in the short run. In contrast, when final sales rise less than inventory gains then future production is likely to decline to reduce any possible inventory overbuild. Moreover, we should recognize that firms may not immediately adjust inventory levels to the new equilibrium level due to uncertainty of pricing, processing rules and the risk of over-adjusting or under-adjusting on expected output changes.

Figure 2

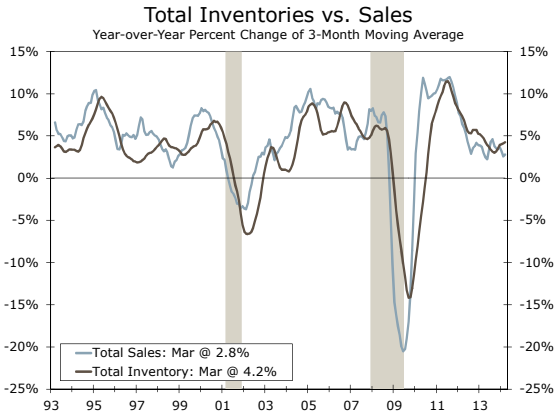
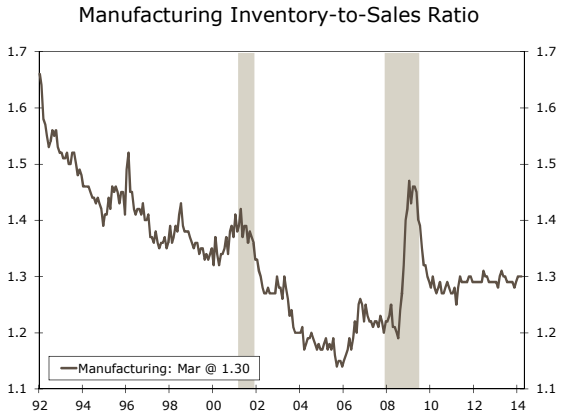


Figure 3



Source: U.S. Department of Commerce and Wells Fargo Securities, LLC

Here we note the distinction between intended and unintended inventory changes. What is the role of the inventory-to-shipments ratio in predicting economic activity? Intended inventory building is a planned activity where businesses increase stocks in line with expected future sales. Unintended inventory building occurs when the inventory build is in excess to the actual sales. The inventory-to-shipments ratio (also referred to as inventory-to-sales ratio) reflects the difference between expected sales and actual sales. As this rate moves up and down, businesses adjust their future production or stock accumulation, which affects the rate of GDP growth. In fact, in many economic scenarios, the difference between actual and expected variables is a driver of economic activity.

A Model for the Real World

A one product (GDP), two-period model where any policy change today is assumed to have its complete impact in the next period may serve as a useful model in the classroom or in the drawing room, but the problem in the real economy is that there are many products/markets and many future time periods. When one considers the many public policy proposals put forth, one notices that there are just two time periods—now and the period when the policy change has its complete projected impact. However, any shocks, whether real or policy induced, to an economic system permeate over several periods. The transition periods and their effects are seldom accounted for in policy proposals. One only has to examine the history of transition issues for many federal legislative and executive actions to recognize this. Policymakers frequently anticipate that the private market will adjust immediately and completely to a policy initiative when real world experience indicates just the opposite.

Policy changes represent significant policy shocks which would be expected to have complex and long-lasting impacts on many sectors of the economy. Shocks represent a surprise or an abrupt change to the economic and decision-making systems of individual actors. When actions are fully anticipated then no response would be expected. However, an unexpected economic or policy change would affect many markets (product, labor, credit) and not all markets would be impacted in the same way. Suppliers and consumers for each market would see the shock and its implications differently and, therefore, act differently than the policy models may have assumed.

Shocks represent a surprise or an abrupt change to the economic and decision-making systems of individual actors.

Consider the conduct of monetary policy in the fourth quarter of last year. In September, the Federal Reserve was expected to start reducing its bond purchases but did not. In December, the Fed was not expected to start tapering but did. These unexpected policy moves altered the markets for credit, products and labor and also the flow of capital between nations and thereby the exchange rates for many emerging markets. These moves can be seen in the movement in the two-year note yield in Figure 4.

Contrast that with the Fed's recent reduction in asset purchases. The $10 billion per month reduction appears to be already discounted by the market and thereby appears to have had little additional market impact each time another $10 billion reduction is announced. However, if there were to be a sudden end of tapering before October 2014, it would likely have a significant impact on the credit, output and labor markets.

Policy changes, such as the policy reactions to the credit crisis of 2007-2009 and 2009 recession represented shocks to the economic system. Legislation, at the federal, state and local levels alter the framework of decision making in credit and labor markets respectively, and, by implication, the functioning of the output markets as well.

Any policy shock, which alters the framework for decision makers, is unlikely to avoid transition issues as decision makers work out the feedback effects of such a change. Decision makers in the public and private sectors begin with a model of how the economy works. When public policymakers introduce a change, private decision makers do not stand still. They must judge the feedback or follow-on impacts of any change, make choices in their strategy and develop a new framework of how the economy works going forward. All of this takes time. Moreover, there are biases that will alter how decision makers react. An anchoring bias will lead decision makers to model their new framework on how the economy worked in the past. A recency bias will lead

decision makers to disregard the past and focus on the new. The framing bias will influence the decision to innovate in the face of new information. Each bias will influence the development of the new framework and, therefore, the eventual effects of any policy change initially implemented with the best of intentions.

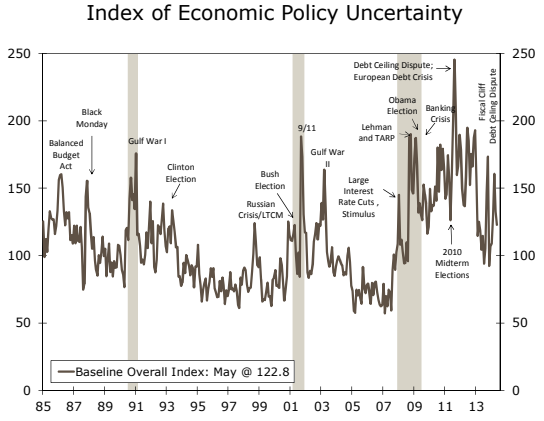
Characteristics of Adjustment

The path of the economy is altered by disturbances of various types and sizes at more or less random intervals.

Three characteristics of the adjustment process influence our development of a new framework on the economy and financial markets. First, there are no deterministic cycles in economics—the movements of output, labor and credit markets are not regular. Over the years, many analysts have sought to identify regular cycles, such as the Kuznets, Juglar or Kondratiev cycles, but these attempts have not proven fruitful. The path of the economy is altered by disturbances of various types and sizes at more or less random intervals. Those disturbances propagate through the economy and reflect the initial conditions of the economy and its institutional framework which, as expected, changes over time. Output movements are not regular and disturbances are uneven among markets. Real business cycles represent an alternative to policy changes when a real shock, such as a change in output per unit of input, alters the framework of manufacturing, for example. The oil price shocks of the 1970s gave rise to the immediate obsolescence of many large, traditional manufacturing facilities, particularly in the Midwest "Rust Bowl." There is also an asymmetry that must be recognized that economic behavior differs when shocks happen when the economy is operating above or below trend.

Figure 4

Figure 5



Source: Federal Reserve Board, Economic Policy Uncertainty and Wells Fargo Securities, LLC

Second, we must recognize the duality, and more, of markets—changes in federal legislation and executive actions do not alter just the output markets for credit or labor, but also have follow-on impacts on other macro markets. These follow-on impacts are often not well considered when the economic impact of these programs is first estimated. The initial public policy programs were focused on the immediate economic impact but the eventual impact was measured as a comparison of today to some ultimate second period. However, the long implementation periods and the delays help to bring home to the observer the numerous implementation problems and changes that are characteristic of any public or private initiative.

During the current cycle, we can observe the interaction of credit and labor markets which have produced unusual outcomes that would not be considered if we look at markets in isolation. For example, the inter-temporal substitution of labor today for labor tomorrow in response to market interest rates. A low interest rate reduces the incentive to work today and save relative to working

tomorrow. Therefore, current low interest rates contribute to less-than-expected employment growth—as we have indeed observed.[3]

Finally, policy uncertainty, Figure 5, can play a role in the formation of any framework. Uncertainty unfortunately means there is no deterministic path for product, labor and capital markets. Uncertainty on the future path of tax policy, for example, means that consumption is a function of income expectations and interest rates in future periods. Yet, income and interest rates are not known in the future, nor are the tax structure. Since 2009, policy uncertainty has been above its levels during the prior two economic expansions (Figure 6). Given the higher level of uncertainty, we would expect that the pace of consumer spending by households and investment and hiring by businesses would be more cautious relative to income expectations than in the past—and that indeed is what we have witnessed.

In addition, this example emphasizes the point that consumption and labor supply is a joint decision by a household, so there is a natural link between product and labor markets. That link can either strengthen or weaken the tie between any shock, however induced, and the ultimate outcome for the economy. A household will set a goal for its path of current and future consumption and thereby follow through with a decision on how much labor to provide to achieve that level of consumption. In a similar manner, business leaders will make joint decisions on the output they wish to produce as well as the corresponding capital and labor needed to achieve that output. This joint decision-making is also characteristic of many economic actors, such as the financial sector, who also make a joint decision on their deployment of capital in lending or in investing as well as the hiring of workers to carry out that effort. This link between credit growth and economic growth has been explored further in McKinnon.[4] Therefore, decisions to alter credit regulations by public policy-makers will alter the supply of credit, and therefore also have follow-on effects on the pace of growth in the economy and hiring of labor. A decision on credit regulation is a decision on employment.

Alternatively, a policy decision to expand federal spending is also a decision to increase a future tax liability and therefore reduce the expected future returns on private wealth. This will lead today's taxpayers to alter their choices on work and leisure and thereby affect labor and output markets.

Economic Adjustments: Key Role of Flexibility and Speed

There are many barriers to adjustment in nominal prices, wages and interest rates.

For any economic policy change or exogenous shock, our anticipated response for the economy will reflect the details of the individual markets. Each market—output, labor or credit—will have different levels of flexibility and speed of adjustment to change. There are many barriers to adjustment in nominal prices, wages and interest rates due to the existence of institutional arrangements in each market. For output, it takes time for production schedules to change and prices in the marketplace do not adjust instantaneously as producers are conscious of their long-run interests in preserving customer relationships and avoiding surprising customers with rapid price changes. As for labor, there are union contracts as well as agreed upon pay schedules in place. Finally, interest rates on many contracts are fixed for a certain time period.

As a result, when changes in policy or an exogenous shock happens in the economy, prices in each market do not adjust instantaneously. Therefore, an increase in the aggregate demand for goods, for example, will lead to a rise in production in the short run to meet that demand without a complete adjustment in prices for the output. In a similar way, easier credit from the central bank may alter the supply of credit in the market in the short run and thereby provide a short-run stimulus to the economy—the presence of the liquidity effect. However, for credit, for example, we would also recognize that the stimulus induced growth in the economy would also generate an

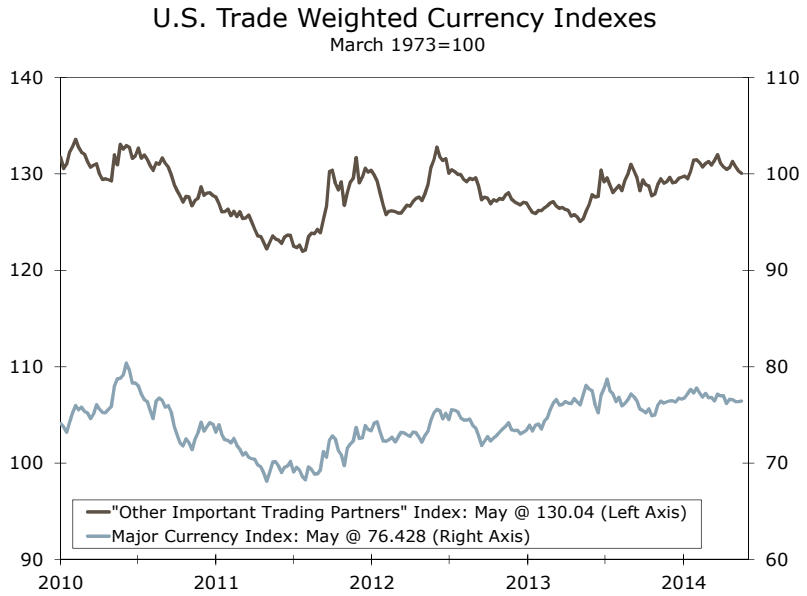
[3] See Robert Lucas and Leonard Rapping, 1969, "Real Wages, Employment and Inflation," *Journal of Political Economy,* vol. 77 (September/October): 721-754 and David Romer, *Advanced Macroeconomics*, McGraw-Hill Irwin Third edition, 2006, pp. 183-196.
[4]McKinnon, R.I., (1973), "Money and Capital in Economic Development", Brookings Institution, Washington DC.

income effect/inflation effect over time and therefore, if monetary policy stimulus is successful, the demand for credit will respond and drive up interest rates over time.

In the practical analysis of the implications of shocks, real or from policy, there are two problems. First, conclusions are difficult to draw on the long-term characteristics of the final outcomes since the initial shock will lead to changes in decision making frameworks and economic conditions (liquidity/income effects of monetary policy for example). Second, many analysts will pick and choose among outcomes over time and, therefore, the same policy will appear effective/ineffective depending on the time chosen for review.

In our initial model of the economy, we recognize that there are barriers to instant adjustment of nominal prices, wages and interest rates. Therefore, a rise in the aggregate demand for goods, due to rise in federal spending for example, will initially give rise to a gain in output when prices, wages and interest rates are sticky. What we initially observe, therefore, is a partial short-run adjustment to any shock and not the long-term affect. Moreover, for any shock we may also see a change in public policy over time to offset the initial impact (stimulus followed by regulatory restraint). For example, the initial credit shock of 2007-2009 was met with both fiscal and monetary stimulus, so separating out the effects of these actions is difficult and is compounded by the reality that each shock will have different effects that are likely to be spread out over different time periods.

Figure 6



Source: Federal Reserve Board and Wells Fargo Securities, LLC

Policy shocks are likely to have an impact on the exchange rate and thereby lead to changes in import/export prices and the balance of trade.

In the globalized economy of the United States in the 21st century, policy shocks are likely to also have an impact on the exchange rate and thereby lead to changes in import/export prices and the balance of trade. For example, the suggestion that the Federal Reserve would begin tapering the pace of asset purchases from May-September 2013, Figure 6, led to a rise in the U.S. dollar relative to several emerging market currencies. Moreover, since capital flows are not perfectly mobile between countries, interest rate adjustments are not instantaneous and differentials from the long-run equilibrium could persist over time and will impact the extent of any economic adjustment to a policy shock. This pattern of behavior can lead to exchange rate/interest rate overshooting in the short run and, thereby, a different complex of interest rate and exchange rates over time. This exchange rate pattern adds to the list of goods prices, wages and interest rates cases where the short-run change in a price will be different than the long-run price and thereby elicit a different type of behavior between periods.

With imperfect capital mobility, the effect of any domestic policy change will produce a less responsive movement in the aggregate demand for goods and thereby a weaker effect on output than in a closed economy case. Fiscal policy, for example has had less stimulus in practice than in models and this would help explain, in part, the more modest impact of fiscal policy change in 2001-2002 and again in 2009 compared to the Kennedy or Reagan tax cuts that occurred in a more closed economy. In addition, the impact of the tax cuts in both 2001-2002 and 2009 were hampered by weak credit markets, reinforcing the importance of the interrelationships between markets when trying to evaluate the impact of any exogenous or policy shock.

Incomplete Adjustment in Supply in the Face of a Drop in Aggregate Demand: 2007-2011

In the present economy, where prices adjust somewhat faster than nominal wages, the drop in aggregate demand we witnessed during the 2007-2009 recession gave rise to a rise in real wages. Despite the rise in real wages, however, real income declined because of the overall drop in employment and hours (Figure 7). Real wages tend to be counter-cyclical and therefore a drop in aggregate demand would be associated with a rise in real wages. Decreases in aggregate demand reduce both inflation and output but, given the character of the U.S. market as imperfectly competitive, inflation does slow but not completely, in the short run, to changes in aggregate demand.

Figure 7

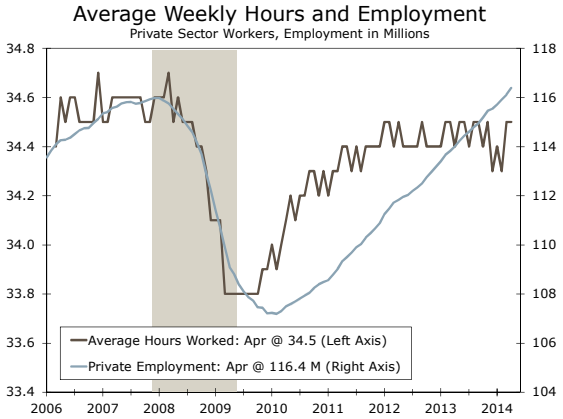
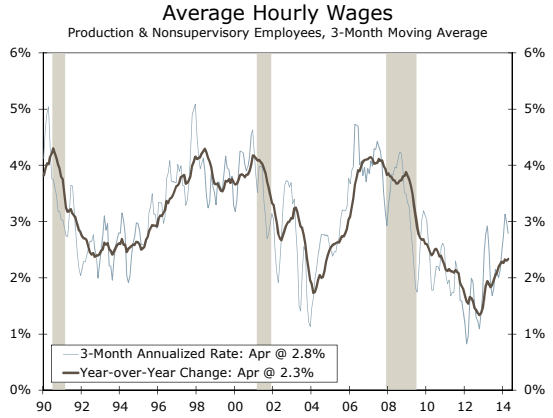


Figure 8



Source: U.S. Department of Labor and Wells Fargo Securities, LLC

A reduction in aggregate demand will lower the real wage.

In the U.S. economy, a reduction in aggregate demand will raise the real wage, and given that the labor supply is fairly unresponsive (inelastic) in the short run to the real wage, then employment will vary significantly when the aggregate demand for labor declined during the 2007-2009 period. This pattern helps explain the decline in real incomes in the short run (2007-2011), while also allowing for the market to adjust over time as the economic expansion continues and nominal wages begin to rise thereby raising real wages and incomes over time. Here again we can see the pattern that changes in the economic environment in the short run can, and often are, different from changes over the cycle. Notice in Figure 8, the pattern of falling, then rising nominal wage growth as the economy moves through the economic cycles of the 1990s, 2000s and now the most recent cycle. As an alternative approach, Barro and Grossman emphasize the role of disequilibrium in the marketplace such that firms are limited in their ability to compete for workers due to the limitations of product demand and so that even when the goods market is competitive and both wages and prices are rigid, we still end up with less than optimal employment and thereby higher than usual unemployment.[5]

[5] **Robert J. Barron and Herschel I. Grossman, *American Economic Review*, Vol. 6, No. 1 (Mar. 1971), pp. 82-93.**

During the 2007-2009 recession, there was a significant decline in the growth of aggregate demand. However, on the supply side, the labor supply is relatively unresponsive to lower wages offered. Workers attempt to maintain their nominal wage in the face of a decline in prices and thereby their real wage has risen. Employers facing a higher real wage, therefore, reduce their demand for labor and/or employ more capital in production. As a result, the real wage varies significantly over the business cycle due to the differences in the adjustment in aggregate demand and aggregate supply.

Here we can see the problem that the real wage remains above the level that equates the supply and demand for labor. As a result, the level of employment is now determined by growth of effective demand, which reflects the constraints of income growth that is below the potential growth of the economy. Therefore, unemployment persists as long as aggregate demand for goods and services is limited and the demand for labor follows the real wage and is not on the supply curve as the excess of supply of labor relative to demand leaves unemployment as a result.

Short-Run Adjustments: Not the Ultimate Outcome

When aggregate demand rises we get higher output associated with higher wages and prices.

In the short run, the lack of responsiveness for wages, prices, as well as interest rates, to changes in aggregate demand—whether due to public policy or an exogenous shock—produces a short-run change in output with associated changes in prices. When aggregate demand rises we get higher output associated with higher wages and prices. Therefore, in the short run, the aggregate supply curve is upward-sloping as prices and wages do not adjust immediately to disturbances. This result produces a set of output, price and wage combinations that are not the ultimate outcome of the initial shock to the economy. Therefore the existence of a short-run, but not yet a long-run equilibrium, creates a problem for analysts who may be impatient for a result. There are those who will claim success of any policy change by focusing on the short-run result. Yet others concerned about the long-run will dispute the short-run results. To model economic shocks we allow for supply shocks as well as adjustment to past and expected future inflation. These influences complicate the analysis of any initial policy or exogenous shock.

Inflation surprises are another complication in examining any economic movement. The problem is that in the short run, there is a tradeoff between output and the change in inflation but not the level of inflation.[6] However, there is no permanent tradeoff between output and inflation. For inflation to be held steady at any level, output must equal the natural rate. Therefore, an increase in output from the current growth pace of the economy would require an inflation surprise. However, to generate that surprise could require a policy shock and this gives rise to the problem of dynamic inconsistency in policy. Policymakers are committed to an inflation target, such as 2 percent, initially. However, if expected inflation is low, there is very little cost of additional inflation, say 2.5 percent in the short run, so that policymakers perceive that there is very little cost in attempting to lower the unemployment rate below its natural rate. But to the extent the public knows this incentive for policymakers to pursue higher inflation means that the public will anticipate inflation above the 2 percent target. As a result, higher inflation does not in fact produce higher levels of output and lower rates of unemployment. This pattern of recognition by the public may help explain the lack of a tradeoff between unemployment and a change in inflation since the 1990s.

Therefore, policy and real shocks lead to a series of adjustments that will both stretch out economic change and will often lead to changes that feed upon themselves. The result is that short-run responses to shocks may often yield results that differ from the long-run results and the initial intentions of policy-makers.

[6] See David Romer, *Advanced Macroeconomics*, McGraw-Hill, Third Edition, 2006, Chapter 5.

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