

Chapter 1 : The Fed - Monetary Policy and Risk Management at a Time of Low Inflation and Low Unemployment

The relationship between inflation and unemployment has traditionally been an inverse correlation. However, this relationship is more complicated than it appears at first glance and has broken.

Powell At the "Revolution or Evolution? Since , NABE has promoted the use of economics in the workplace and advanced the worthy purpose of ensuring that leading American businesses benefit from the insights of economists. I am pleased to say that, by these measures, the economy looks very good. The unemployment rate stands at 3. While these two top-line statistics do not always present an accurate picture of overall economic conditions, a wide range of data on jobs and prices supports a positive view. In addition, many forecasters are predicting that these favorable conditions are likely to continue. For example, the medians of the most recent projections from FOMC participants and the Survey of Professional Forecasters, as well as the most recent Congressional Budget Office CBO forecast, all have the unemployment rate remaining below 4 percent through the end of , with inflation staying very near 2 percent over the same period. Since , the U. Recent low inflation and unemployment have some analysts asking, "Is the Phillips curve dead? My comments today have two main objectives. The first is to explain how changes in the Phillips curve help account for the somewhat surprising but broadly shared current forecasts of continued very low unemployment with inflation near 2 percent. At the risk of spoiling the surprise, I do not see it as likely that the Phillips curve is dead, or that it will soon exact revenge. What is more likely, in my view, is that many factors, including better conduct of monetary policy over the past few decades, have greatly reduced, but not eliminated, the effects that tight labor markets have on inflation. However, no one fully understands the nature of these changes or the role they play in the current context. Common sense suggests we should beware when forecasts predict events seldom before observed in the economy. Historical Perspective on Jobs and Inflation Let us start with a look at the modern history of jobs and inflation in the United States. Figure 1 shows headline inflation and unemployment from to today and extended through using the average of median projections from both FOMC participants and the Survey of Professional Forecasters, and the CBO projections. As the figure makes clear, a multiyear period with unemployment below 4 percent and stable inflation would, if realized, be unique in modern U. From to , and the period from to today. The first period includes the Great Inflation, and the latter includes both the Great Moderation and the distinctly immoderate period of the Global Financial Crisis and its aftermath. Figure 2 shows unemployment and core, rather than headline, inflation in these two periods. While our inflation objective concerns headline inflation, switching to core inflation makes some relationships clearer by removing a good deal of variability due to food and energy prices, variability that is not primarily driven by labor market conditions or monetary policy. There is a dramatic difference in the unemployment-inflation relationship across these two periods. During the Great Inflation, unemployment fluctuated between roughly 4 percent and 10 percent, and inflation moved over a similar range. In the recent period, the unemployment rate also fluctuated between roughly 4 percent and 10 percent, but inflation has been relatively tame, averaging 1. Even during the financial crisis, core inflation barely budged. As a thought experiment, look at the right panel and imagine that you could see only the red line inflation , and not the blue line unemployment. Nothing in the red line hints at a major economic event, let alone the immense upheaval around the time of the global financial crisis. Notice that, in each period, there is only one episode in which unemployment drops below 4 percent. In the late s, unemployment remained at or below 4 percent for four years, and during that time inflation rose steadily from under 2 percent to almost 5 percent. By contrast, the late s episode of belowpercent unemployment was quite brief, and during the episode and surrounding quarters inflation was reasonably stable and remained below 2 percent. To explore the Phillips curve relationship in these two periods more closely, we need to bring in the concept of the natural rate of unemployment. In standard economic thinking, an unemployment rate above the natural rate indicates slack in the labor market and tends to be associated with downward pressure on inflation; unemployment below the natural rate represents a tight labor market and is associated with upward inflation pressure. During the Great Inflation, inflation generally rose in the tight, shaded periods and fell in the unshaded ones, just as conventional Phillips

curve reasoning predicts. From to today, the large and persistent swings in the gap between unemployment and the natural rate were associated with, at most, a move of a few tenths in the inflation rate. Comparing the shaded and unshaded regions, you might see some association between slack and the minor ups and downs in inflation, but the pattern is not at all consistent. Whether dead, sick, or merely resting, many of the questions about the Phillips curve come down to figuring out what changed between these two periods, and why. Let us turn to a conceptual framework for examining these questions more systematically. A Simple Framework for Understanding Changes in the Jobs-Inflation Relationship A natural starting point is the simplest form of a Phillips curve equation, which posits that inflation this year is determined by some combination of current labor market slack, inflation last year, and some other factors that I will leave aside for this discussion figure 4: With a larger value of B , any change in labor market slack translates into a bigger change in inflation. As we say, as B increases, the Phillips curve steepens. As the value of C increases, higher inflation this year translates more into higher inflation next year. A particularly nasty case arises when B and C are both large. In this case, slack has a large effect on inflation, and that effect tends to be very persistent. One implication of a large C is that, if a boom drives inflation up, it will tend to stay up unless offset by a subsequent bust. During the Great Inflation samples, the value of C is near 1, meaning that higher inflation one year tended to translate almost one-for-one into higher inflation the next. Thus, the Great Inflation presented that nasty case just described. The estimates of both B and C fall in value as the estimation sample shifts forward in time. In the most recent samples, the Phillips curve is nearly flat, with B very near zero, and C is about 0. These results give numerical form to what we see in the right-hand panel of figure 3, covering the recent period: Large and persistent moves in the unemployment gap were associated with, at most, modest transitory moves in inflation. What Led to the Changes in the Phillips curve? These developments amount to a better world for households and businesses, which no longer experience or even fear the scourge of high and volatile inflation. To provide a sound basis for monetary policy, it is important to understand what happened and why, so we can avoid a return to the bad old days of the s. Like many, I believe better monetary policy has played a central role. To do so, the central bank could persistently ease the stance of monetary policy in response to an uptick in inflation. No responsible central banker today would intentionally do this, but much research suggests that during the Great Inflation, misunderstandings about how the economy worked led the Fed effectively to behave in this manner. With the higher natural rate, the labor market was much tighter and provided much greater upward pressure on inflation than policymakers realized in real time. As a result, they were continually "behind the curve. If people come to expect that upward blips in inflation will result in ongoing higher inflation, they will build that view into wage and price decisions. The cost, in the form of very high unemployment, is clear in the Great Inflation figures. The Great Inflation taught us that a main task of monetary policy is to keep inflation expectations anchored at some low level. When monetary policy tends to offset shocks to inflation, rather than amplifying and extending them, and when people come to expect this policy response, a surprise rise or fall in labor market tightness will naturally have smaller and less persistent effects on inflation. Research suggests that this reasoning can account for a good deal of the change in the Phillips curve relationship. We do not fully understand the causes and implications of these changes, which raises risk management issues that I will take up now. To set the stage, let us return to the situation facing the FOMC. The baseline forecasts of most FOMC participants and a broad range of others show unemployment remaining below 4 percent for an extended period, with inflation steady near 2 percent. I have made the case that this forecast is not too good to be true and does not signal the death of the Phillips curve. Instead, the outlook is consistent with evidence of a very flat Phillips curve and inflation expectations anchored near 2 percent. But we still must face the cautionary advice to beware when forecasts point to rarely seen outcomes. As a way of heeding this advice, the Committee takes a risk management approach, which has three important parts: Let me describe a few of the risks and how we are thinking about them. Could Inflation Expectations Become Unanchored? First is the risk that inflation expectations might lose their anchor. We attribute a great deal of the stability of inflation in recent years to the anchoring of longer-term inflation expectations. And we are aware that it could be very costly if those expectations were to drift materially. As you probably know from our public communications, we carefully monitor survey- and market-based proxies for expectations, and we do not see evidence of a

material shift in longer-term expectations figure 6. The survey measures have been particularly steady for some time. The risks to inflation expectations are, of course, two sided. Until this summer, inflation had remained stubbornly below 2 percent for several years. And major economies in much of the world have been struggling mainly with disinflationary forces. Thus, we have been and will remain alert for possible downward drift in expectations. Some argue the contrary case--that by only gradually removing accommodation as the unemployment rate has fallen, the FOMC may have fallen behind the curve, thereby risking an upward drift in expectations. From the standpoint of contingency planning, our course is clear: A second risk is that labor market tightness or tightness in other parts of the production chain might lead to higher inflation pressure than expected--the "revenge of the Phillips curve" scenario. Wages and compensation data are one important source of information. These measures have picked up some recently, but in a way that is quite welcome. Specifically, the rise in wages is broadly consistent with observed rates of price inflation and labor productivity growth and therefore does not point to an overheating labor market. Further, higher wage growth alone need not be inflationary. The late s episode of low unemployment saw wages rise faster than inflation plus productivity growth without an appreciable rise in inflation. Despite what shows up in the aggregate wage and compensation data, however, I am sure that, like us, many of you are hearing widespread anecdotes about labor shortages and increasing bottlenecks in production. For example, the survey of members of the National Federation of Independent Business finds firms increasingly reporting that job openings are hard to fill figure 8. Further, these businesses now list "quality of labor" as their most important problem, as opposed to the more typical report of "poor sales. Notice, however, that these measures are near levels that prevailed in the late s or early s, a period when core inflation remained under 2 percent. While the late s case proves that elevated values of these tightness measures do not automatically translate into rising inflation, a single episode provides only limited reassurance. Thus, the FOMC takes seriously the possibility that tight markets for labor or other inputs could provide greater upward pressure on inflation than in the baseline outlook. Our best estimates, however, suggest that so long as inflation expectations remain anchored, a modest steepening of the Phillips curve would be unlikely to cause a significant rise in inflation or demand a disruptive policy tightening. A third risk--in this case an upside risk--is that the natural rate of unemployment could be even lower than current estimates. Some have argued that the Fed should be removing policy accommodation much more slowly, pushing the economy to see if the natural rate of unemployment is lower still.

Chapter 2 : All About Inflation

Inflation should fall because there is a negative relationship between unemployment and inflation. Inflation should rise because there is a positive relationship between unemployment and inflation.

Policies that hold prices down can be inflationary. When we think of inflation - when we define inflation - we think of rising prices instead of the actual causes of inflation. This is reasonable, since the ultimate outcome of inflation is always a general and sustained increase in price levels. It is thus easy to define inflation in terms of its ultimate results - the price increases that it causes - and ignore the underlying causes of inflation - the underlying forces that caused those results. This is no minor matter. It leads to the common policy mistakes that arise from the belief that anything that holds prices down is "anti-inflationary" - when the opposite is often actually true. Price controls and the expenditure of financial reserves subsidize inflationary levels of demand and deter increases in supply, and are thus inflationary. It is the price rises themselves that are "anti-inflationary. Price increases are anti-inflationary. Price increases powerfully assist in reducing demand and increasing supply so that inflation can be brought to a halt. Price controls and the expenditure of financial reserves subsidize inflationary levels of demand and deter increases in supply. They make it much more difficult - much more painful - to bring inflation to a halt and restore healthy and sustainable economic growth. Many people have vested interests in the simplistic and invalid concepts that define inflation in terms of the price increases that it causes. This fallacy is widely accepted without critical analysis. Econometric technicians - who have to ignore all economic factors that cannot be expressed as equations - and have to reduce all recognized economic concepts to the simplistic point where they can be mathematically measured or weighted - are forced to ignore the existence and extent of inflationary forces until those forces cause price increases that can be measured. This is like those medical tests that never show what is wrong until the patient is already half dead. However, this does not mean that it is wrong to use the extent of price increases to measure the scope of inflationary forces - as long as this is not done simplistically as it almost always is. These statistics must be evaluated in view of a variety of poorly measured factors. The evaluation must recognize that the price statistics cover just a part of the problem - and that even that coverage is very inaccurate. Modest rates of price deflation - in excess of one percent per year - were the rule in the 19th century, when the dollar was tied to gold and the United States became a wealthy economic powerhouse. Monetary inflation is actually a tax by which government - by expanding the money supply - transfers wealth from its people to itself. It also results in the transfer of enormous amounts of wealth from the hands of ordinary people to the hands of those speculators shrewd enough to take advantage of the price volatility inflation causes in the markets. Indeed, the measurement of inflation is notoriously inaccurate. The government and many people have a vested interest in these inaccuracies, because benefits due under social security and other government programs - or under labor contracts and commercial contracts - may be indexed to the inaccurate figure. They are slow to reflect new products, which are often the beneficiaries of especially rapid increases in productivity although this last weakness has been diminished somewhat in recent years - and indeed may well have been reversed. On the other hand, "real inflation" statistics are understated because they measure "price" inflation instead of the pressures that cause price inflation. They also generally omit asset price inflation, which is real inflation and enormously destabilizing. Prices would decline about three percent per year to reflect the increase in productive efficiency of our rapid technological progress - if government were not creating inflationary pressures. Indeed, except during the years of the gold rush and the Civil War, modest rates of price deflation - in excess of one percent per year - were the rule in the 19th century, when the dollar was tied to gold and the United States became a wealthy economic powerhouse. Indeed, inflation is perhaps the most destructive tax that can be imposed - but unfortunately it is the easiest one for a government to impose on its people. With productivity gains running in excess of three percent, and prices rising in excess of two percent, the real rate of inflation is already currently well in excess of five percent - representing a capital levy of five percent as of the beginning of . At current levels, the forces of inflation have achieved considerable momentum, and the effort to bring inflation back under control is likely to cause some real

economic distress. The pertinent statistics are grossly inaccurate, but even when very conservatively evaluated, inflationary forces in excess of 5 percent are indicated. At current levels, the forces of inflation have achieved considerable momentum and thus are proving more troublesome to control and reduce than expected. Even at current levels, the effort to bring inflation back under control - to where price inflation can be contained below 2 percent - is likely to cause some real economic distress. If inflationary forces are allowed to get much stronger, the economy would begin to revisit the problems of the s. See, Meltzer, History of the Federal Reserve, v. Indeed, the Credit Crunch recession in was the result. So, then, just what is the proper definition of "inflation? One of the unfortunate consequences of heavy reliance on debt financing is to turn the great benefits of price deflation into a severe threat to the debt-laden financial structure of the economy. It pleasantly enables demand to increase before any increase is produced in supply. This "cause" is so dominant that it should be the first thing that comes to mind when referring to "inflation" during peacetime. This was practiced most notoriously by the central bank of the Weimar Republic, which tried to stay ahead of the loss of purchasing power caused by price inflation by "maintaining liquidity balances. Today, under Keynesian "monetary policy," the money supply is easily expanded through open market purchases of government short term obligations - a "monetization of debt" - usually involving nothing more than the changing of notations on financial accounts from government bills to cash - and by shortening the average term of government debt and other modern credit based methods of expanding the money supply. For a detailed explanation of how the U. For a broader view of U. By reducing the purchasing power of all currency in circulation, and by reducing the purchasing power of credit based on assets, rising prices powerfully if somewhat belatedly counteract the pleasant artificial increase in purchasing power that is the purpose of monetary inflation. Price inflation tends to reduce demand and increase supply. The pleasant delay between the cause monetary inflation and this effect price inflation can be extended by expending financial reserves of gold and hard currencies to support the value of the inflated money. Since precise measurement is impossible, this is essentially an evaluative process, producing a figure or range of figures that constitute fairly inexact estimates. Among other inflationary causes - besides monetary inflation - are price controls and the expenditure of monetary reserves - both of which ultimately inhibit the growth of supply and sustain the period of artificially expanded demand. Of course, price inflation is an important part of the estimate of real inflation. However, so is the estimate of productivity growth - which would beneficially lead to reduced consumer costs but for inflationary forces. Increases in quality and variety are among the other factors that are impossible of exact measurement, but that must be factored in. In addition to the expansion of the money supply, this includes such factors as price controls, and expenditure of substantial percentages of monetary reserves which tends to immediately hold down price increases, and to ultimately increase financial risks and interest rates throughout an economy. Business taxes and import tariffs have an inflationary impact because they directly decrease the productive efficiency with which the economy produces goods and services.

Chapter 3 : Understanding Inflation, define inflation, causes of inflation, economic inflation

In order to answer that question, we need to better understand the relationship between inflation, GDP and unemployment rate. GDP Trend. Historical data suggests that annual GDP growth in excess of % will caused a % drop in unemployment rate for every percentage point of GDP over %.

Believe those who are seeking the truth. Doubt those who find it. What is the FOMC thinking here? To be more precise, what is the dominant view within the FOMC that is driving the present tightening cycle? Remember, the FOMC is made up of 12 regional bank presidents plus 7 board of governors at full strength possessing a variety of views which are somehow aggregated into a policy rate decision. Thanks in part to a recent change in U. As the economy expands, so too does the demand for investment and credit which, in turn, puts upward pressure on market interest rates. If the Fed does not follow this pressure upward by raising its policy rate then it risks inefficiently "subsidizing" investment spending and credit creation leading to excess credit and spending. There might even be some justification for raising the policy rate more aggressively than what the market would dictate on its own, if it is judged that the imminent growth spurt was due to an "irrational" exuberance or if it is otherwise judged to be unsustainable and subject to a sharp correction. The view above may constitute an element of the way a few hawks on the committee are thinking when they cite financial stability concerns. What is the "natural" rate of unemployment? The Board defines the term here. How do we know what this lowest sustainable level is? The statement implicitly answers this question by mapping "lowest sustainable level" into some notion of a "long-run normal level" of the unemployment rate. In short, take a look at the average unemployment rate over long stretches of time and assume that it roughly corresponds to what is sustainable. In any case, here is a plot of the U. The unemployment rate does appear to be a relatively stationary time-series. Given a relatively robust global economy, and given the recent fiscal stimulus in the U. This, evidently, is bad news. What does any of this have to do with inflation? Inflation is the rate of change of the price level the "cost of living" measured in dollars. Sometimes people speak of wage inflation--the rate of change of the average nominal wage rate. Way back in the day, William Phillips noted an apparent inverse relationship between the rate of wage inflation and the unemployment rate. Others noticed a similar inverse relationship between the rate of price-level inflation and the unemployment rate. This statistical relationship became known as the Phillips curve. The standard interpretation of the Phillips curve, a version of which is used by the Board staff today, goes something like this: To the extent that business cycles are caused by movements in aggregate demand e. Moreover, one would expect firms to recruit workers more intensively when aggregate demand is high than when it is low, so that the unemployment rate should decline in a boom and rise in a recession. In this way, aggregate demand shocks cause unemployment and the price-level to move in opposite directions. One would expect the inflation-unemployment relationship to reverse if a recession was instead triggered by a supply disruption e. Apart from the oil supply shock episodes, inflation and unemployment do tend to move in opposite directions in recessions. But recessions are short-lived, and the relationship between these two variables during economic expansions is much less clear. For example, inflation and unemployment both fell from December to January , from June to March , and from August to October Is there any evidence that a low unemployment rate during an expansion forecasts higher future inflation? My feeling is that the empirical evidence is weak on this score. If so, then it is odd that so many people seem to believe that "low unemployment causes higher inflation. I reproduce a few of the opening paragraphs here for convenience: Massive tax cuts, robust federal spending and a synchronized global upswing are expected to push annual growth in economic output to 2. To sustain such growth, the Fed projects employers will have to dig deep into a diminishing supply of workers. In theory, unemployment will eventually have to go back to 4. Yet since records begin in , unemployment has never risen by 0. This almost makes it sound like the Fed is trying to increase the unemployment rate. Of course, this is not how Fed officials would describe their intent. The goal is to ensure that the economy does not embark on an "unsustainable" bound-to-end-badly growth path. To hedge against this event, the Fed will have to raise its policy rate to keep aggregate demand and inflation in check. The collateral damage in this hedging strategy is

for the unemployment rate to rise hopefully in a smooth manner and to more sustainable levels. There are two good reasons to do so. Second, and more importantly, it would help avoid policy mistakes like raising the federal funds rate too aggressively against low unemployment rate data. As it so happened, the Fed did not raise its policy rate when the unemployment rate broke below 6. But it might have, and markets likely hedged against this possibility, resulting in a tighter than desired monetary policy. In any case, back to the current tightening cycle and the factors influencing it. A few FOMC members are asking what the apparent rush to raise rates is all about. Jim Bullard, president of the St. Louis Fed has long been a vocal advocate for data-dependent policy. Inflation remains below target and long-term inflation expectations are on the low side as well. According to Bullard, the Fed can afford to be patient and to move rapidly as conditions dictate. One counterpoint to this view is the idea that the Fed needs to "get ahead of the curve. According to Evans, the "getting ahead of the curve" idea is largely a byproduct of an era where inflation was almost always above target. Getting ahead of the curve is perhaps not as pressing an issue as it once was. A doubling of the inflation rate from 1. Suppose we subscribe to the notion that a below-natural-rate of unemployment portends future inflation. Suppose further we admit that we do not know where the natural rate of unemployment resides as mentioned above, Fed Chair Jay Powell alluded to the uncertainty surrounding this estimate. Well, then why not just assume that the natural rate is declining as long as we see no evidence of price or wage inflation pressure? Conversely, we can expect the price-level to decline or inflation to slow down as the demand for safe nominal wealth rises as in times of crisis. The framework is perfectly consistent with the Phillips curve, but with the direction of causality mainly reversed.

Chapter 4 : The Fed - Inflation, Uncertainty, and Monetary Policy

If unemployment is high, inflation will be low; if unemployment is low, inflation will be high. The Phillips curve and aggregate demand share similar components. The Phillips curve is the relationship between inflation, which affects the price level aspect of aggregate demand, and unemployment, which is dependent on the real output portion of.

Yellen At the "Prospects for Growth: Reassessing the Fundamentals" 59th Annual Meeting of the National Association for Business Economics, Cleveland, Ohio Share I would like to thank the National Association for Business Economics for inviting me to speak today and for the vital role the association plays in fostering debate on important economic policy questions. Today I will discuss uncertainty and monetary policy, particularly as it relates to recent inflation developments. Because changes in interest rates influence economic activity and inflation with a substantial lag, the Federal Open Market Committee FOMC sets monetary policy with an eye to its effects on the outlook for the economy. But the outlook is subject to considerable uncertainty from multiple sources, and dealing with these uncertainties is an important feature of policymaking. Key among current uncertainties are the forces driving inflation, which has remained low in recent years despite substantial improvement in labor market conditions. As I will discuss, this low inflation likely reflects factors whose influence should fade over time. But as I will also discuss, many uncertainties attend this assessment, and downward pressures on inflation could prove to be unexpectedly persistent. My colleagues and I may have misjudged the strength of the labor market, the degree to which longer-run inflation expectations are consistent with our inflation objective, or even the fundamental forces driving inflation. In interpreting incoming data, we will need to stay alert to these possibilities and, in light of incoming information, adjust our views about inflation, the overall economy, and the stance of monetary policy best suited to promoting maximum employment and price stability. Recent Inflation Developments and the Outlook Let me begin by reviewing recent inflation developments and the economic outlook. Furthermore, both overall and core inflation, after moving up appreciably last year, have slipped again in recent months. Sustained low inflation such as this is undesirable because, among other things, it generally leads to low settings of the federal funds rate in normal times, thereby providing less scope to ease monetary policy to fight recessions. As noted in its recent statement, the FOMC continues to anticipate that, with gradual adjustments in the stance of monetary policy, inflation will rise and stabilize at around 2 percent over the medium term. This expectation is illustrated by the green stars, which represent the medians of the inflation projections submitted by FOMC participants at our meeting last week. In part, this expectation reflects the significant improvement in labor market conditions over the past few years. As shown in figure 2 , the unemployment rate the blue line now stands at 4. As the green stars indicate, labor market conditions are expected to strengthen a bit further. To understand this assessment, it is useful to decompose the forces driving movements in inflation since the financial crisis, as estimated using a simple model of inflation that I presented in a speech two years ago. As illustrated by the purple dotted portion of the bars, labor underutilization, or "slack," accounts for a shrinking share of the shortfall since and is now having a negligible effect. By comparison, the influence of changes in relative food, energy, and import prices--the solid blue and checkered red portions--has been more substantial in the past few years, although their contribution is estimated to have greatly diminished this year. As indicated by the green striped portion of the bars, the residual component of the shortfall was modestly positive on average from through last year. This unusually large error does not necessarily imply that inflation is more likely to continue to come in on the low side in coming years. As the green dashed line in figure 4 illustrates, if the average change in consumer prices each month is calculated excluding items whose price changes are outliers on both the high and low side, the resulting "trimmed mean" measure of inflation shows less of a slowdown this year. But our understanding of the forces driving inflation is imperfect, and we recognize that something more persistent may be responsible for the current undershooting of our longer-run objective. Accordingly, we will monitor incoming data closely and stand ready to modify our views based on what we learn. Uncertainty about the Inflation Outlook Although we judge that inflation will most likely stabilize around 2 percent over the next few years, the odds that it could turn out to be noticeably different are

considerable. This point is illustrated by figure 5. Here the red line indicates the median of the latest inflation projections submitted by FOMC participants that I showed previously. The width of this region reflects the average accuracy of inflation projections made by private and government forecasters over the past 20 years. As the figure shows, based on that history, there is a 30 percent probability that inflation could be greater than 3 percent or less than 1 percent next year. These factors could easily push overall inflation noticeably above or below 2 percent for a time. But such disturbances are not a great concern from a policy perspective because their effects fade away as long as inflation expectations remain anchored. Such was the case when rising oil prices pushed headline inflation noticeably above 2 percent for several years prior to the financial crisis. A more important issue from a policy standpoint is that some key assumptions underlying the baseline outlook could be wrong in ways that imply that inflation will remain low for longer than currently projected. For example, labor market conditions may not be as tight as they appear to be, and thus they may exert less upward pressure on inflation than anticipated. More broadly, the conventional framework for understanding inflation dynamics could be misspecified in some fundamental way.

Resource Utilization The unemployment rate consistent with long-run price stability at any time is not known with certainty; we can only estimate it. But the long-run sustainable unemployment rate can drift over time because of demographic changes and other factors, some of which can be difficult to quantify--or even identify--in real time. If so, the economy could sustain a higher level of employment and output in the longer run than now anticipated--a very beneficial outcome, albeit one that would require recalibrating monetary policy over time in order to reap those benefits and compensate for the accompanying reduction in inflationary pressures. A related question is whether the unemployment rate alone is an adequate gauge of economic slack for the purposes of explaining inflation. Although the unemployment rate is probably the best single summary measure of labor utilization, some indicators have shown less improvement since the financial crisis. As shown in figure 7, those indicators include the quits rate the short-dashed blue line, household perceptions of job availability the short-and-long-dashed green line, the jobs opening rate the long-dashed red line, and the percentage of small firms finding it hard to fill jobs the solid black line. On balance, the unemployment rate probably is correct in signaling that overall labor market conditions have returned to pre-crisis levels. But that return does not necessarily demonstrate that the economy is now at maximum employment because, due to demographic and other structural changes, the unemployment rate that is sustainable today may be lower than the rate that was sustainable in the past. In that regard, some observers have pointed to the continued subdued pace of wage growth as evidence that the economy is not yet back to full employment. As shown in figure 8, labor compensation as measured by the employment cost index the short-dashed red line has been growing at more or less the same rate since, and hourly compensation in the nonfarm business sector the short-and-long-dashed green line--a quite noisy measure, even after smoothing--is actually growing more slowly. Overall, I view the data we have in hand as suggesting a generally healthy labor market, not one in which substantial slack remains or one that is overheated. That said, the evidence does not allow for any definitive assessment, so policymakers must remain open minded on this question and its implications for reaching our inflation goal.

Inflation Expectations Another source of uncertainty concerns inflation expectations. In standard economic models, inflation expectations are an important determinant of actual inflation because, in deciding how much to adjust wages for individual jobs and prices of goods and services at a particular time, firms take into account the rate of overall inflation they expect to prevail in the future. Instead, we can only imperfectly infer how they might have changed based on survey responses and other data. Provided this stability continues, standard models suggest that actual inflation should stabilize at about 2 percent over the next two or three years in an environment of roughly full employment, absent any future shocks. However, there is a risk that inflation expectations may not be as well anchored as they appear and perhaps are not consistent with our 2 percent goal. To assess this risk, the FOMC considers a variety of survey measures of expected longer-run inflation, some of which are shown in figure 9. Long-range projections of PCE price inflation made by private forecasters, the solid red line, have been remarkably stable for many years, as have been the longer-run inflation expectations reported in surveys of financial market participants not shown. If so, stabilizing inflation at around 2 percent could prove to be more difficult than expected. As indicated by the long-dashed green line,

TIPS inflation compensation for the five-year period starting five years from now has fallen roughly 1 percentage point over the past three years. However, research suggests that the fall in TIPS inflation compensation instead primarily reflects a decline in inflation risk premiums and differences in the liquidity of nominal and indexed Treasury securities.

Misspecified Inflation Dynamics Another risk is that our framework for understanding inflation dynamics could be misspecified in some fundamental way, perhaps because our econometric models overlook some factor that will restrain inflation in coming years despite solid labor market conditions. One possibility in this vein is a continuation of the subdued growth in health-care prices that we have seen in recent years--a sector-specific factor not controlled for in standard models. Because health care accounts for a large share of total consumer spending, this slow growth has restrained overall inflation materially and may continue to do so for some time. If these sorts of favorable supply-type shocks continue, achieving our 2 percent inflation goal over the medium term may require a more accommodative stance of monetary policy than might otherwise be appropriate. Some commentators have conjectured that, because of rising trade volumes and the integration of production chains across countries, U. However, studies of this issue do not, on balance, provide much empirical support for this possibility. Nevertheless, increased competition from the integration of China and other emerging market countries into the world economy may have materially restrained price margins and labor compensation in the United States and other advanced economies. In fact, one study concludes that most of the decline in the labor share of national income in the United States since the late s can be attributed to offshoring of labor-intensive production. More speculatively, changes in the structure of the domestic economy may also be altering inflation dynamics in ways not captured by conventional models. The growing importance of online shopping, by increasing the competitiveness of the U. Finally, I would note the possibility that inflation may rise more sharply in response to robust labor market conditions than anticipated. The influence of labor utilization on inflation has become quite modest over the past 20 years, implying that the inflationary consequences of misjudging the sustainable rate of unemployment are low. But we cannot be sure that this modest sensitivity will persist in the face of strong labor market conditions, given that we do not fully understand how it came to be so modest in the first place. Although the evidence is weak that inflation responds in a nonlinear manner to resource utilization, this risk is one that we cannot entirely dismiss.

Policy Implications What are the policy implications of these uncertainties? For one, my colleagues and I must be ready to adjust our assessments of economic conditions and the outlook when new data warrant it. In this spirit, FOMC participants--like private forecasters--have reduced their estimates of the sustainable unemployment rate appreciably over the past few years in response to the continual flow of information about the always changing economy. Importantly, even if resource utilization is currently lower than we estimate or if longer-run inflation expectations are running at levels consistent with longer-run PCE price inflation somewhat below 2 percent, the FOMC can still achieve its inflation goal. Under those conditions, continuing to revise our assessments in response to incoming data would naturally result in a policy path that is somewhat easier than that now anticipated--an appropriate course correction that would reflect our commitment to maximum employment and price stability. Similar considerations apply to other important sources of uncertainty, such as the value of the neutral real interest rate--that is, the inflation-adjusted level of the federal funds rate consistent with keeping the economy operating on an even keel. Estimates of this rate have declined considerably in recent years, and, by some estimates, the real neutral rate is currently close to zero. But the neutral rate changes over time as a result of the interaction of many forces, including demographics, productivity growth, fiscal policy, and the strength of global demand, so its value at any point in time cannot be estimated or projected with much precision. My FOMC colleagues and I will therefore need to continue to reassess and revise our assessments of the neutral rate in response to incoming data and adjust monetary policy accordingly. How should policy be formulated in the face of such significant uncertainties? In my view, it strengthens the case for a gradual pace of adjustments. Moving too quickly risks overadjusting policy to head off projected developments that may not come to pass. A gradual approach is particularly appropriate in light of subdued inflation and a low neutral real interest rate, which imply that the FOMC will have only limited scope to cut the federal funds rate should the economy be hit with an adverse shock. Job gains continue to run well ahead of the longer-run pace we

estimate would be sufficient, on average, to provide jobs for new entrants to the labor force. Thus, without further modest increases in the federal funds rate over time, there is a risk that the labor market could eventually become overheated, potentially creating an inflationary problem down the road that might be difficult to overcome without triggering a recession. Persistently easy monetary policy might also eventually lead to increased leverage and other developments, with adverse implications for financial stability. For these reasons, and given that monetary policy affects economic activity and inflation with a substantial lag, it would be imprudent to keep monetary policy on hold until inflation is back to 2 percent. But the outlook is uncertain, reflecting, among other things, the inherent imprecision in our estimates of labor utilization, inflation expectations, and other factors. As a result, we will need to carefully monitor the incoming data and, as warranted, adjust our assessments of the outlook and the appropriate stance of monetary policy. But in making these adjustments, our longer-run objectives will remain unchanged--to promote maximum employment and 2 percent inflation. Q4, the series is based on the median long-run forecasts of inflation as measured by the consumer price index CPI , less a constant adjustment of 40 basis points to put the CPI forecasts on a PCE basis; before Q2 in most cases--are first extended through the end of For changes in the price of core imports, the H2 extrapolations are based on a regression of this series on current and lagged changes in exchange rates. Finally, nominal spending shares for food, energy, and core imports are assumed to remain unchanged at their Q2 levels, and long-run inflation expectations are assumed to remain constant at 2 percent.

Chapter 5 : Understanding Inflation Dynamics and Monetary Policy

That everyone "knows" about inflation and unemployment makes it more difficult to teach. But it also increases the value of helping students arrive at a sound understanding of the concepts, models, and terminology of economic issues that will be an ongoing part of their daily economic lives.

The Phillips Curve A. Phillips was one of the first economists to present compelling evidence of the inverse relationship between unemployment and wage inflation. Implications of the Phillips Curve Low inflation and full employment are the cornerstones of monetary policy for the modern central bank. For instance, the U. Since a Phillips Curve for a specific economy would show an explicit level of inflation for a specific rate of unemployment and vice versa, it should be possible to aim for a balance between desired levels of inflation and unemployment. However, in the late s, a group of economists who were staunch monetarists , led by Milton Friedman and Edmund Phelps , argued that the Phillips Curve does not apply over the long term. If workers expect prices to rise, they will demand higher wages so that their real inflation-adjusted wages are constant. In a scenario wherein monetary or fiscal policies are adopted to lower unemployment below the natural rate, the resultant increase in demand will encourage firms and producers to raise prices even faster. However, wage inflation and general price inflation continue to rise. Therefore, over the long-term, higher inflation would not benefit the economy through a lower rate of unemployment. By the same token, a lower rate of inflation should not inflict a cost on the economy through a higher rate of unemployment. Since inflation has no impact on the unemployment rate in the long term, the long-run Phillips curve morphs into a vertical line at the natural rate of unemployment. The short-run Phillips curve includes expected inflation as a determinant of the current rate of inflation and hence is known by the formidable moniker "expectations-augmented Phillips Curve. The natural rate of unemployment is not a static number but changes over time due to the influence of a number of factors. These include the impact of technology, changes in minimum wages, and the degree of unionization. It is expected to be at 4. In fact, the data at many points over the next three decades do not provide clear evidence of the inverse relationship between unemployment and inflation. The s were a period of both high inflation and high unemployment in the U. The first oil shock was from the embargo by Middle East energy producers that caused crude oil prices to quadruple in about a year. The second oil shock occurred when the Shah of Iran was overthrown in a revolution, and the loss of output from Iran caused crude oil prices to double between and This development led to both high unemployment and high inflation. The s The boom years of the s were a time of low inflation and low unemployment. Economists attribute a number of reasons to this positive confluence of circumstances. The global competition that kept a lid on price increases by U.

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They could tolerate a reasonably high rate of inflation as this would lead to lower unemployment. There would be a trade-off between inflation and unemployment. Moving along the Phillips curve, this would lead to a higher inflation rate, the cost of enjoying lower unemployment rates. Mundell, Robert E. Lucas, Milton Friedman, and F. Theories based on the Phillips curve suggested that this could not happen, and the curve came under a concerted attack from a group of economists headed by Milton Friedman. In this he followed eight years after Samuelson and Solow [1] who wrote "All of our discussion has been phrased in short-run terms, dealing with what might happen in the next few years. It would be wrong, though, to think that our Figure 2 menu that related obtainable price and unemployment behavior will maintain its same shape in the longer run. What we do in a policy way during the next few years might cause it to shift in a definite way. Unemployment would then begin to rise back to its previous level, but now with higher inflation rates. This result implies that over the longer-run there is no trade-off between inflation and unemployment. This implication is significant for practical reasons because it implies that central banks should not set unemployment targets below the natural rate. Work by George Akerlof, William Dickens, and George Perry, [13] implies that if inflation is reduced from two to zero percent, unemployment will be permanently increased by 1. This is because workers generally have a higher tolerance for real wage cuts than nominal ones. For example, a worker will more likely accept a wage increase of two percent when inflation is three percent, than a wage cut of one percent when the inflation rate is zero. Today [edit] U. There is no single curve that will fit the data, but there are three rough aggregations—'71, '84, and '92—each of which shows a general, downwards slope, but at three very different levels with the shifts occurring abruptly. The theory goes under several names, with some variation in its details, but all modern versions distinguish between short-run and long-run effects on unemployment. This is because in the short run, there is generally an inverse relationship between inflation and the unemployment rate; as illustrated in the downward sloping short-run Phillips curve. In the long run, that relationship breaks down and the economy eventually returns to the natural rate of unemployment regardless of the inflation rate. In the long run, this implies that monetary policy cannot affect unemployment, which adjusts back to its "natural rate", also called the "NAIRU" or "long-run Phillips curve". However, this long-run "neutrality" of monetary policy does allow for short run fluctuations and the ability of the monetary authority to temporarily decrease unemployment by increasing permanent inflation, and vice versa. The popular textbook of Blanchard gives a textbook presentation of the expectations-augmented Phillips curve. In these macroeconomic models with sticky prices, there is a positive relation between the rate of inflation and the level of demand, and therefore a negative relation between the rate of inflation and the rate of unemployment. This relationship is often called the "New Keynesian Phillips curve". Like the expectations-augmented Phillips curve, the New Keynesian Phillips curve implies that increased inflation can lower unemployment temporarily, but cannot lower it permanently. First, there is the traditional or Keynesian version. Then, there is the new Classical version associated with Robert E. The traditional Phillips curve [edit] The original Phillips curve literature was not based on the unaided application of economic theory. Instead, it was based on empirical generalizations. After that, economists tried to develop theories that fit the data. Money wage determination [edit] The traditional Phillips curve story starts with a wage Phillips Curve, of the sort described by Phillips himself. This describes the rate of growth of money wages g_W . Here and below, the operator g is the equivalent of "the percentage rate of growth of" the variable that follows.

Chapter 7 : Phillips curve - Wikipedia

inflation rate on the unemployment rate, a 1-percent increase in unemployment is associated with a percentage-point decline in inflation during recessions (Table 1).

Students will understand that: Interest rates, adjusted for inflation, rise and fall to balance the amount saved with the amount borrowed, thus affecting the allocation of scarce resources between present and future uses. The real interest rate is the nominal or current market interest rate minus the expected rate of inflation. Higher real interest rates provide incentives for people to save more and to borrow less. Lower real interest rates provide incentives for people to save less and to borrow more. Real interest rates normally are positive because people must be compensated for deferring the use of resources from the present into the future. Higher interest rates reduce business investment spending and consumer spending on housing, cars, and other major purchases. Policies that raise interest rates can be used to reduce these kinds of spending, while policies that decrease interest rates can be used to increase these kinds of spending. Consequently, an initial change in spending consumption, investment, government, or net exports usually results in a larger change in national levels of income, spending, and output. Unemployment imposes costs on individuals and nations. Unexpected inflation imposes costs on many people and benefits some others because it arbitrarily redistributes purchasing power. Inflation can reduce the rate of growth of national living standards, because individuals and organizations use resources to protect themselves against the uncertainty of future prices. Inflation reduces the value of money. The unemployment rate is the percentage of the labor force that is willing and able to work, does not currently have a job, and is actively looking for work. The unemployment rate is an imperfect measure of unemployment because it does not 1 include workers whose job prospects are so poor that they are discouraged from seeking jobs, or 2 reflect part-time workers who are looking for full-time work. Unemployment rates differ for people of different ages, races, and sexes. This reflects differences in work experience, education, training, and skills, as well as discrimination. Unemployment can be caused by people changing jobs, by seasonal fluctuations in demand, by changes in the skills needed by employers, or by cyclical fluctuations in the level of national spending. Full employment means that the only unemployed people in the economy are those who are changing jobs. The consumer price index CPI is the most commonly used measure of price-level changes. It can be used to compare the price level in one year with price levels in earlier or later periods. Expectations of increased inflation may lead to higher interest rates. The costs of inflation are different for different groups of people. Unexpected inflation hurts savers and people on fixed incomes; it helps people who have borrowed money at a fixed rate of interest. Inflation imposes costs on people beyond its effects on wealth distribution because people devote resources to protect themselves from expected inflation. Review the circular flow model developed in the previous session. Review the total spending equation: Referencing the national economic goals of equity, stability, and full employment, use the circular flow model to point out how dis-equilibrium between changes in total expenditures and changes in total output affects price and employment levels. Demonstrate how changes in employment and price levels are natural conditions of a market economy. Define the employment rate and the unemployment rate, and demonstrate how they are calculated. Demonstrate how both can rise at the same time. Relate to the circular flow model and business cycle model. Define the natural rate of unemployment and emphasize its necessity to a healthy economy. Identify the historical patterns re which level of government tends to deal with each type of problem unemployment. Identify limitations of unemployment data and discuss issues related to measurement of unemployment. Model a process for analyzing the impact of employment policies “ for example, minimum wage laws or right-to-work laws. Define inflation and differentiate from changes in relative prices. Review the difference between real and nominal values. Define and distinguish between the consumer price index CPI and the GDP deflator as measures of inflation, and demonstrate how each is calculated. Identify limitations of CPI data and discuss issues related to measurement of inflation. Identify the consequences of inflation and discuss issues related to those consequences, including: Discuss capital markets, interest rates, and inflation. Discuss the relationship between inflation and unemployment. The employment

rate is the percent of the labor force that is employed. The labor force consists of the non-institutionalized civilian population, aged 16 or older, working or looking for work. The unemployment rate is the percent of the labor force that is unemployed, willing to work, and actively looking for employment. Inflation is a sustained rise in the general price level of goods and services. Inflation reduces the purchasing power of money. Interest rates are the prices necessary to get individuals and households to save, instead of spending money for immediate consumption. Nominal interest rates must exceed real interest rates by the percent of inflation in order to provide effective incentives for saving. If employment is rising, unemployment must be falling. High school and college students are not counted in the labor force. People who work part time are not counted in government employment statistics. The lower the unemployment rate, the better. High prices are synonymous with inflation. The lower the inflation rate, the better. Inflation hurts everyone in the economy. How can the economy create new jobs and still have a rising unemployment rate? How can people in debt benefit from inflation? Does inflation always destroy purchasing power? If everybody had COLAs, would there be any need to worry about inflation? Then ask student groups to place other national economies on the frontier graphic based on their recent histories of unemployment. Assign students to gather unemployment, employment, and inflation data for 5 major cities in different regions including the one in which they live of the United States, compare and contrast the data, and propose an explanation for similarities and differences among locations. Explain the reallocation effect of inflation and identify the winners and losers.

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to understand the movement of economic fundamentals such as inflation and unemployment cannot be overestimated if the goal of stability of the economy would be achieved. Unemployment is seen as one of the serious impediment to economic advancement; it leads to a waste.

Chapter 9 : Inflation in the 's

It has been fifty years since A.W. Phillips published the famous article on inflation and unemployment that established the Phillips curve as a central concept in macroeconomic analysis and policymaking.