Reconsidering the long-run relationship between inflation and unemployment

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Abstract

In this paper a brief history of the Phillips curve from Fisher (1973 [1926]) to the *Friedman-Phelps natural rate hypothesis* is sketched. Empirical evidence from France, Germany, the United Kingdom and the United States during the latter half of the 20th century in support of a positive long-run relationship between inflation and unemployment is presented. In order to reconcile the predominant theoretical view with the data, two arguments are outlined, both of which build on unintended consequences of monetary expansion: 1.) redistributional effects, and 2.) business cycle fluctuations. Both arguments hinge on further political interventions in response to these consequences.

1 Introduction

Many students of David Hume's theory of money and the related thought experiments have interpreted his ideas as emphasizing primarily monetary neutrality.[1] Yet, a closer look shows that he has also pointed to various situations in which money is not neutral. In particular, Hume has argued in favor of paper money and monetary expansion as having more advantages than disadvantages, precisely with respect to certain real aspects of the economy such as international trade and economic growth.[2]

Neutrality of money is the idea that, no matter how large the stock of money, the economy can work equally well, and that changes in the supply of money only affect nominal variables such as prices, but not real variables like output and unemployment.[3] This would of course imply that central bank policies, more precisely, the expansion and contraction of the money supply, are also neutral with respect to real variables. However, upon closer inspection one can say that it is generally accepted today that there is at best a long-run dichotomy between real and nominal economy, and that monetary policy, that is, changes in the money supply, can indeed affect real variables in the short-run.

A case in point is the much discussed relationship between price inflation and unemployment. Already in 1926, economist Irving Fisher published an empirical investigation of the link between those two variables and went even so far as to postulate a causal relationship.[4] Fisher analyzed data from the United States at the beginning of the 20th century and concluded:

> But as the economic analysis already cited certainly indicates a causal relationship between inflation and employment or deflation and unemployment, it seems reasonable to conclude that what the charts show is largely, if not mostly, a genuine and straightforward causal relationship; that the ups and downs of employment are the effects, in large measure, of the rises and falls of prices, due in turn to the inflation and deflation of money and credit.[5]

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[1] For example he pointed out that "the greater or less plenty of money is of no consequence; since prices of commodities are always proportioned to the plenty of money." See his essay *Of Money* in Hume (1987).

[2] This has been pointed out by Schabas (2008).

[3] According to Hayek (2008, p. 301) it was apparently neoclassical economist Knut Wicksell who introduced the phrase "neutral money" into monetary theory. More precisely, Wicksell wrote about neutral interest rates, which are given when the *money rate of interest* (the actual interest rates payed on the financial markets) coincides with the *natural rate of interest*, a concept that we will discuss below. See in particular Wicksell (1898), chapter 8.

[4] His article has been republished as *I Discovered the Phillips Curve* in 1973. See Fisher (1973).

[5] See Fisher (1973 [1926]), p. 502. Note also that Fisher is actually using the traditional definitions of inflation and deflation, meaning expansion and contraction of the supply of money and credit, respectively, instead of mere increases or decreases of some price index.

This finding seems to be of utmost importance. John Maynard Keynes probably had some relationship of this kind in mind when he formulated his policy recommendations in response to the Great Depression in the 1930s, although he has always resolutely emphasized the complementary role of fiscal policy in order to stabilize and improve macroeconomic conditions.[6] Yet, Fisher's article remained widely unrecognized, and the relationship was not named after him, but some 35 years later after statistician Alban W. Phillips.

We will discuss the development of the Phillips curve in section 2 of this paper without going into the more recent reformulations of the concept, such as the new keynesian versions, which are for the most part mathematical formalizations of theoretical contributions that have been developed before.[7] Thereafter, data from Germany, France, the United Kingdom and the United States from the second half of the 20th century will be presented. The data show rather strong positive correlations between present price inflation and future unemployment. In section 4, a theoretical explanation is provided that does not attempt to draw a direct causal relationship, that is an apodictic, time and place invariant, relationship between both variables, but rather an indirect one that hinges on public opinion and political responses to unintended consequences of inflation. It is important to note that necessary apodictic implications of inflation are not disputed in this paper. On the contrary, they play an essential role for the argument outlined. However, long-run unemployment in the author's view is mostly determined by the institutional environment which to a large extent is shaped by politics. Yet, at the point at which the argument relies on political decisions, it strictly speaking loses its apodictic character and becomes more of a historical interpretation of the data.[8] Some conclusive remarks will be given at the end of the paper.

2   A brief history of the Phillips curve

In 1958, Alban W. Phillips of the *London School of Economics* published an empirical study on the relationship between the rate at which nominal wages change and the rate of unemployment

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[6]See for example Keynes (1933) and Keynes (1936), in particular chapter 15 entitled *The psychological and business incentives to liquidity*. In the keynesian framework monetary expansion can increase employment and output through investments stimulated by lower interest rates and increased aggregate demand. Increased demand, according to his rationale, will push production and the use of resources, including labor, to its full societal potential.

[7]See in this context Mankiw (2001, p. 52) who argues that the expectations-augmented new keynesian Phillips curve "loosely [resembles] the model that Milton Friedman and Edmund Phelps pioneered in the 1960s and that remains the theoretical benchmark for inflation-unemployment dynamics." Mankiw makes another interesting remark on the new keynesian Phillips curve: "I think it's fair to say that its fundamental inconsistency with the facts is not widely appreciated." (also p. 52)

[8]Compare to the epistemological distinction between economic theory and history as developed in Mises (2007). See also Hoppe (2007).

for the United Kingdom from 1861 to 1957.[9] The statistical evidence collected in his study suggests a negative relationship, that is, unemployment tended to be relatively low during periods in which wages rose quickly. Two years later Samuelson and Solow replaced the rate of change of money wages by the rate of inflation. They popularized the finding and explored its political implications. Assuming a causal relationship, just like Fisher did back in the 1920s, they argued that expansionary monetary policy would lead to lower unemployment rates.[10] The Phillips curve was born and encouraged a lively intellectual debate. Gordon (2011, p. 13) describes its immense influence as follows:

> So widely read and discussed was the Samuelson-Solow article that the term "PC" [Phillips curve] entered the language of macroeconomics almost immediately and soon became a lynchpin of the large-scale macroeconometric models which were the focus of research activity in the 1960s.

Samuelson and Solow investigated data for the U.S. from the turn of the century to the 1950s and found that the relationship did not hold during the two world wars and the Great Depression in the 1930s. During the three remaining periods, namely, before World War I, from the end of World War I until the end of the 1920s, and after World War II, they identified an empirical relationship between inflation and unemployment that very much resembles Phillips' results. In addition, they point to the possibility of a shift of the Phillips curve:

> What is most interesting is the strong suggestion that the relation, such as it is, has shifted upward slightly but noticeably in the forties and fifties. On the one hand, the first decade of the century and the twenties seem to fit the same pattern. [...] [W]age increases equal to the productivity increase of 2 to 3 per cent per year is the normal pattern at about 3 per cent unemployment. This is not so terribly different from Phillips' results for the U.K. [...] On the other hand, from 1946 to the present [1960] [...] it would take more like 8 per cent unemployment to keep money wages from rising. And they would rise at 2 to 3 per cent per year with 5 or 6 per cent of the labor force unemployed.[11]

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[9]See Phillips (1958).

[10]See Samuelson and Solow (1960). It should be noted that Phillips did not draw any political conclusions from his finding. He merely hinted at an unemployment-inflation relationship. By subtracting the long-term productivity growth from the rate of change of nominal wages, which is assumed to correspond to the rate of inflation, he concluded that for "a stable level of product prices the associated level of unemployment would be a little under $2\frac{1}{2}$ per cent." See Phillips (1958), p. 299.

[11]See Samuelson and Solow (1960), p. 189.

The authors assume a long-run productivity growth of 2 to 3 per cent. Hence, under the further assumption that the rate of inflation corresponds to the rate of change of nominal wages minus productivity growth, we have stable prices when wages rise at 2 to 3 per cent.[12] For the analysis of Samuelson and Solow, this means that prior to World War I prices have been stable at 3 per cent unemployment. After World War II the zero inflation unemployment rate has risen to 5 to 6 per cent.

Samuelson and Solow represent the Phillips curve, whatever its position may be, as a "menu of choice",[13] suggesting a trade-off that could be exploited by political authorities. The position of the curve in turn is determined by the institutional environment, that is, factors like the power of trade and labor unions, or labor laws. Subsequently, this alleged trade-off has found its way into political debates in various countries. In the case of the United States, for example, Gordon (2011, pp. 15-16) wrote:

> The policy advisors of the Kennedy and Johnson administrations, led by Walter Heller
> with support roles by Robert Solow and James Tobin, argued that the previous Repub-
> lican administration had chosen a point too far south-east [high unemployment and
> low inflation] along the PC trade-off, and that it was time to 'get the country moving
> again' by moving to the north-west [low unemployment and high inflation].

In 1972, German Superminister - minister of economic affairs, finance and defense - Helmut Schmidt of the Social Democratic Party famously stated that he would rather have 5 per cent inflation than 5 per cent unemployment.[14] According to former state secretary Otto Schlecht, Schmidt knew full well that this statement was technically false, but he thought it was politically necessary.[15] It is no surprise that he was aware of the technical falsehood, since research conducted after Samuelson and Solow (1960) has shown that the relationship between unemployment and inflation is far from being a mechanistic and stable trade-off.

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[12]In general, as described in Blanchard and Fischer (1993, pp. 542-543), in order to arrive at an unemployment-inflation relationship, a markup equation that connects price and wage developments, is needed as an intermediate step. More precisely, prices are assumed to be a markup over unit labor costs, which are defined by wage rates and labor productivity. In this context, see also Tobin (1972) to whom the authors refer.

[13]See Samuelson and Solow (1960), p. 193.

[14]The original quote says: "Lieber fünf Prozent Inflation als fünf Prozent Arbeitslosigkeit."

[15]In response to a critical remark by Schlecht, Schmidt said: "Daß dies fachlich falsch ist, weiß ich selbst. Aber Sie können mir nicht raten, was ich auf einer Wahlveranstaltung vor zehntausend Ruhrkumpeln in der Dortmunder Westfalenhalle zu sagen für politisch zweckmäßig halte." [That it is false I know full well, but you can't tell me what I should say in front of ten thousand laborers in Dortmund on an election rally, if I deem something else politically necessary. (own translation)] See Schlecht (1996).

A speech delivered by Milton Friedman in 1967, which was subsequently published in the *American Economic Review*, contained a twofold criticism of the prevailing contemporary opinions on monetary policy and what it allegedly can accomplish.[16] First, he pointed to the fact that monetary authorities could not keep interest rates pegged for longer than a rather limited period. Second, he argued that they cannot peg the rate of unemployment for very long either. The reason for both restrictions lies in the following argument. Imagine central bankers would like to lower interest rates. When they increase the rate at which the money supply expands through larger open market operations, interest rates will initially fall as a larger money supply generally leads to a larger supply of credit. Sooner or later, however, inflation will adjust to this accelerated rate of monetary growth. As inflation becomes higher, creditors will demand compensation in the form of higher interest rates. We see that Friedman brings in a distinction between short and long-run opportunities of monetary policy. In the short-run it may well be possible to lower or increase interest rates by increasing or decreasing the rate of monetary expansion. Yet, in the long-run nominal interest rates will increase or decrease again due to higher price inflation or deflation, respectively.

A very similar mechanism is at work in the case of unemployment. It has essentially the same source, but it was less acknowledged at that time. Friedman said:

> The second limitation I wish to discuss goes more against the grain of current thinking. Monetary growth, it is widely held, will tend to stimulate employment; monetary contraction, to retard employment. Why, then, cannot the monetary authority adopt a target for employment or unemployment - say, 3 per cent unemployment; be tight when unemployment is less than the target; be easy when unemployment is higher than the target; and in this way peg unemployment at, say, 3 per cent? The reason it cannot is precisely the same as for interest rates - the difference between the immediate and the delayed consequences of such a policy.

More precisely, in Wicksellian spirit, Friedman introduced the concept of the *natural rate of unemployment* as being "consistent with equilibrium in the structure of *real* wage rates", and as

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[16]It was Friedman's presidential address delivered at the *Eightieth Annual Meeting* of the *American Economic Association* (AEA), Washington, D.C., December 29, 1967, published as Friedman (1968). He introduced his criticism by saying:

> I stress nonetheless the similarity between the views that prevailed in the late twenties and those that prevail today because I fear that, now as then, the pendulum may well have swung too far, that, now as then, we are in danger of assigning to monetary policy a larger role than it can perform, in danger of asking it to accomplish tasks that it cannot achieve, and, as a result, in danger of preventing it from making the contribution that it is capable of making. (p. 5)

being mainly determined by institutional and political conditions.[17] He argues that in the long-run an economy will return to this rate as inflation expectations adapt to the actual rate of inflation, even though unemployment can be pushed below that level temporarily by accelerating the rate of monetary expansion. In the short-run, the additional money which is initially available at relatively low interest rates may trigger a boom in investments and thus lead to lower unemployment. Yet again, as inflation increases, there will be an upward pressure on nominal wages, pushing the real wage structure back to equilibrium. This entails a return of the unemployment rate to its *natural* level.[18] This theory of adapted expectations led to the notion of the expectations-augmented Phillips curve.[19]

Consequently, Friedman's analysis led to a distinction between the short-run Phillips curve, which is downward sloping, and a long-run Phillips curve, which is just a vertical line, exhibiting no relationship at all. This corresponds to the representation that we find in most university textbooks today.[20]

A very similar, but more formal exposition of the same idea can be found in Phelps (1968). That is why Gordon (2011, p. 11) calls it the "Friedman and Phelps natural rate hypothesis". Lucas (1972) took the same line of argument. He postulated long-run monetary neutrality by introducing *rational expectations* that adjust in response to policy changes, such as accelerated monetary expansion.[21]

The theory derived from the Phillips curve thus tells us that we can improve economic conditions in the short-run through monetary expansion, but that this very expansion is neutral in the long-run. However, if we think of the long-run as being a sequence of consecutive short-runs, then we should be able to improve conditions in the long-run as well, as we can improve conditions in each of the short-runs. Unfortunately, this seems not to be the case. Even in times of relatively persistent monetary expansion we encounter quite regularly periods of recession characterized by

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[17]Friedman (1968, p. 9) clarifies: "To avoid misunderstanding, let me emphasize that by using the term 'natural' rate of unemployment, I do not mean to suggest that it is immutable and unchangeable. On the contrary, many of the market characteristics that determine its level are man-made and policy-made."

[18]Subsequently, the concept of the *noninflationary rate of unemployment* (NIRU), later termed *non-accelerating inflation rate of unemployment* (NAIRU), has been developed in Modigliani and Papademos (1975, p. 142): "It is defined as a rate such that, as long as unemployment is above it, inflation can be expected to decline."

[19]Several years before, Mises (1953 [1912], pp. 218ff.) has already pointed out that the effects of monetary policy are contingent on the expectations of employees.

[20]See for example Mankiw (2012), pp. 769ff., or Samuelson and Nordhaus (2007), p. 947.

[21]This can be interpreted in light of the more general Lucas critique, which tells us that the effects of changes in policy cannot reliably be predicted on the basis of historical data as policy changes may entail fundamental changes of conditions under which decisions are made, and so empirical relationships in economics are also subject to change. See Lucas (1976). For a critique of both, adaptive and rational expectations, see Gertchev (2007).

rising unemployment and low output. The emergence of stagflation, that is, increasing inflation and unemployment rates at the same time, was instrumental in nursing doubts about the validity of the Phillips curve analysis. Usually, however, these periods are explained by reference to some sort of exogenous shocks, such as the oil price shocks of the 1970s, that simply shifted the Phillips curve, and hence the short-run "menu of choice", towards more unemployment and inflation,[22] but do not question the relationship on a fundamental level.[23]

In the following we shall present official data on inflation and unemployment rates from the United Kingdom, Germany, France and the United States.

3   Some empirical evidence from Germany, France, the United Kingdom and the United States for the latter half of the 20th century

Figure 1 shows more or less fragmentary time series of unemployment rates for the United Kingdom, the United States, France and Germany covering roughly the past 150 years. We can clearly observe the disturbing effects of the Great Depression during the 1930s with unemployment rates of up to 30 per cent in Germany and above 15 per cent in the United Kingdom. After the Second World War a convergence of unemployment rates towards a level which we might call *full employment* occurred. By 1960, unemployment rates were down to 1.7 per cent and 1.3 per cent in the United Kingdom and Germany, respectively. Until 1970, they remained below 3 per cent in both countries. In Germany unemployment was even below 1 per cent most of the time. Only in 1967 and 1968, it was at 2.1 and 1.7 per cent, respectively.

After the Nixon Shock and the end of the Bretton Woods system, unemployment rates initially remained at relatively low levels, but by 1976, they were up to 5.4 per cent in the United Kingdom and 4.6 per cent in Germany, which is still comparatively low by today's standards. The unemployment rate in France at that time was around 4.4 per cent. However, in the subsequent decades we can observe a trend towards rates well above 10 per cent. In 1993, they are up to 10.4 per cent

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[22]The typical line of argument can be found in Bernanke et al. (1997) who suggest that monetary authorities should not have raised interest rates in order to control inflation after the oil price shocks in the 1970s. Rather, they should have pursued a looser monetary policy in order to push unemployment down.

[23]The author is aware of the rich and extensive literature of recent decades that developed the idea of the Phillips curve further, namely by incorporating various theories of price stickiness and frictions into the framework. See for example the derivation of the new keynesian version in Roberts (1995) and its application in dynamic stochastic general equilibrium (DSGE) models as presented in Clarida et al. (2000). A detailed review of these contributions is beyond the scope of this study. It should suffice to note that they are for the most part mathematical formalizations based on the theoretical foundations outlined above. Compare to footnote 7 on page 3.
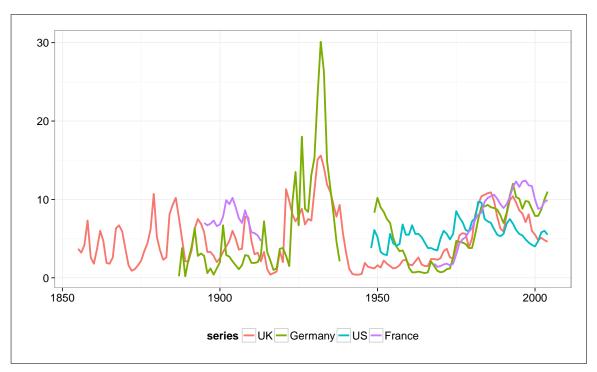
Figure 1: Unemployment rates in Germany, France, the United Kingdom and the United States from 1855 to 2004

Source of data: Mitchell (2007), for U.S. data see *Bureau of Labor Statistics* (BLS), for France see *Insee*

in the United Kingdom, 12.0 per cent in Germany and 11.6 per cent in France.[24] The available data for the U.S. tell a slightly different story. Although one might argue that they follow the same overall pattern, that is a rising trend over the 1970s and 80s until the early 1990s, their amplitude is clearly smaller. Unemployment rates have neither been as low as in the U.K., France and Germany in the 1950s, nor have they been as high in more recent decades.

How do these more recent developments of unemployment compare to fluctuations of inflation rates? The top left panel of Figure 2 shows unemployment and inflation rates in Germany from 1956 to 2004. If we look carefully, some episodes which might vindicate the short-run Phillips curve analysis become visible. In particular, around 1973, 1981 and 1991, decreasing rates of inflation coincided with increasing unemployment. From 1986 to 1990, the inflation rate increased and unemployment fell. Yet, those periods never lasted longer than five years. We also find years in which inflation and unemployment rates move in the same direction, contradicting the short-run Phillips curve. After 1990, both series seem to be almost cointegrated.[25] Hence, the short-run

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[24]The chosen countries are no exceptions. We can observe the same trend in almost any other European country. An extremely drastic example would be Spain, where we had an unemployment rate of only 1.5 per cent in 1968. Yet, from 1994 until 1997 it has been above 20 per cent. See also Mitchell (2007).

[25]The two series still fail a formal test for cointegration, both for the entire period as well as the sub-period after 1993. If we fit a linear model between both series and apply the augmented Dickey-Fuller test to the residuals, we cannot reject the null hypothesis of non-stationarity on the 10 per cent confidence level. The p-values are 0.34 and 0.91
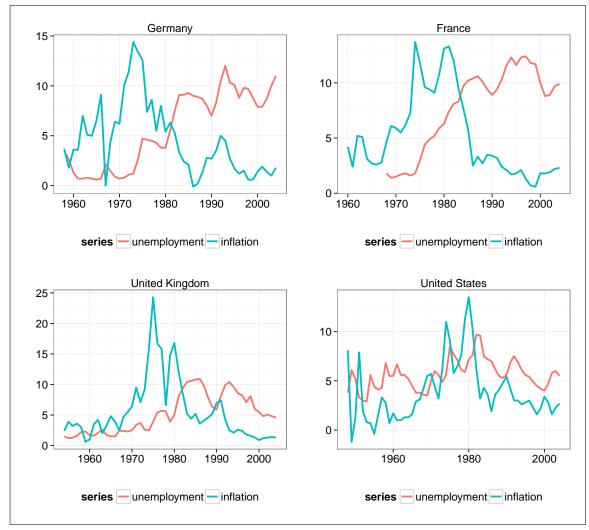
Figure 2: Unemployment rates and inflation rates for Germany, France, the United Kingdom and the United States in the second half of the 20$^{\text{th}}$ century

Source of data: data on inflation from Reinhart and Rogoff (2009); for unemployment rates for U.K. and Germany see Mitchell (2007); for U.S. data on unemployment see *Bureau of Labor Statistics* (BLS); for French data on unemployment see *Insee*

relationship is empirically ambiguous, although it is negative overall.[26]

The top right panel shows the same plot for France. Again, we encounter various episodes in which unemployment rates and inflation rates tend to move in opposite directions, as for example from 1981 to 1986, but also some in which they move in the same direction, like around 1973. Analogously, for the United Kingdom and the United States which are shown in the bottom panels of Figure 2, we find both, episodes vindicating and contradicting the short-run Phillips curve.

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for the entire series and the sub-period, respectively.

[26]Pearson's correlation coefficient and Spearman's rank correlation coefficient are -0.60 and -0.61 respectively. Compare to Table 1.
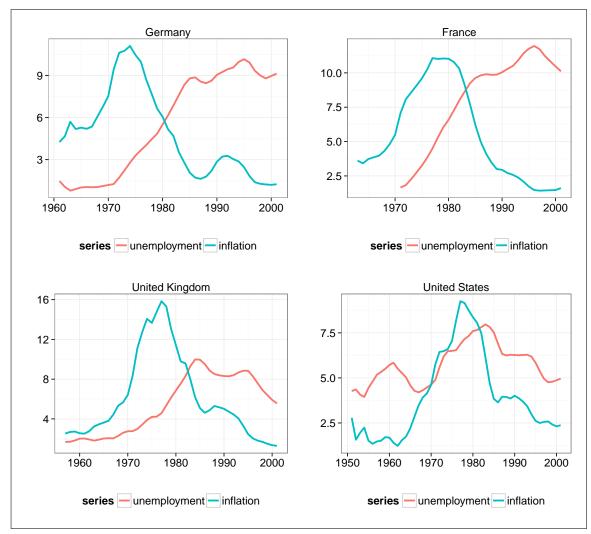
Figure 3: Unemployment rates and inflation rates as seven-year moving averages for Germany, France, the United Kingdom and the United States in the second half of the 20$^{\text{th}}$ century

Source of data: data on inflation from Reinhart and Rogoff (2009); for unemployment rates for U.K. and Germany see Mitchell (2007); for U.S. data on unemployment see *Bureau of Labor Statistics* (BLS); for French data on unemployment see *Insee*

We note that the overall pattern in all four countries is astonishingly similar. In Figure 3, short-run fluctuations have been smoothed out by computing seven-year moving averages of both series.[27] Far from being perfectly connected, it seems as if unemployment is following inflation with a considerable time lag. In Germany from 1960 to 1973 inflation rates increased. So did the rate of unemployment from 1970 to 1985. Inflation rates after 1973 show a decreasing trend and unemployment remains rather stable, around 9 per cent, after 1985. The time lag thus lies between 10 to 12 years. For France and the United Kingdom, each of the two smoothed series can likewise be separated into an upward sloping segment, followed by a downward sloping segment. There

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[27]Each observation has been replaced by the arithmetic average of the seven observations closest to it with respect to time, which includes the observation itself, as well as the three preceding and subsequent observations.
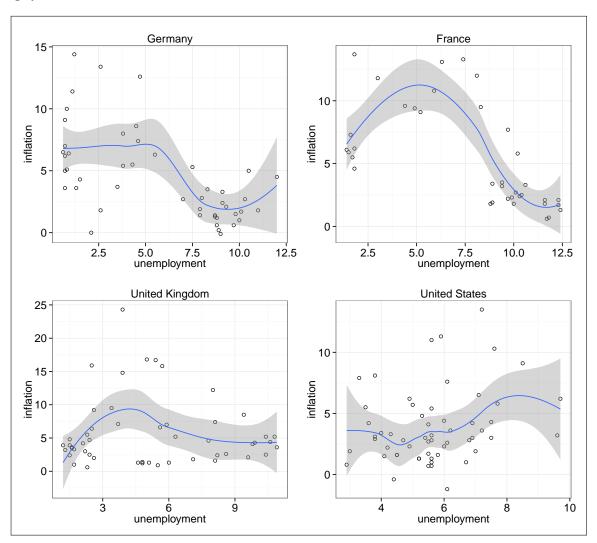
Figure 4: Scatterplots of unemployment rates and inflation rates for Germany, France, the United Kingdom and the United States in the second half of the 20$^{\text{th}}$ century; loess smoother (blue) with 95 per cent confidence band (grey)

Source of data: data on inflation from Reinhart and Rogoff (2009); for unemployment rates for U.K. and Germany see Mitchell (2007); for U.S. data on unemployment see *Bureau of Labor Statistics* (BLS); for French data on unemployment see *Insee*

is again a time lag of about the same size as for Germany between the two peaks - roughly a decade. If we shift the moving average of unemployment rates ten years backward in time, it almost overlaps the moving average of inflation rates. In the case of the United States, the pattern is not as clear-cut. In fact, the time lag between both series seems to be substantially shorter.[28]

Table 1 shows that in the cases of the United States and the United Kingdom there is very little evidence for a short-run Phillips curve trade-off. Only the Bravais-Pearson correlation coefficient

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[28]This is also reflected in Table 1, where the correlation coefficients between unemployment and inflation in the U.S. are maximized (> 0.6) when unemployment is shifted two to three years backward in time, instead of ten to twelve years as for the other countries.
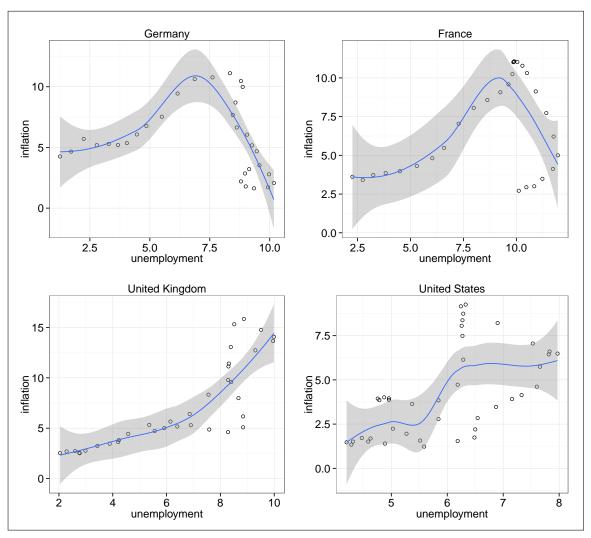
Figure 5: Scatterplots of unemployment rates and inflation rates as seven-year moving averages for Germany, France, the United Kingdom and the United States in the second half of the 20th century; loess smoother (blue) with 95 per cent confidence band (grey)

Source of data: data on inflation from Reinhart and Rogoff (2009); for unemployment rates for U.K. and Germany see Mitchell (2007); for U.S. data on unemployment see *Bureau of Labor Statistics* (BLS); for French data on unemployment see *Insee*

for the U.K. without shifting the unemployment series (time lag equal to 0) has a positive sign (0.03), being so close to zero that it is better interpreted as exhibiting no linear relationship at all. This is also shown in the bottom left panel of Figure 4. All other coefficients are positive and increase up to a certain point as we shift the unemployment series backward in time. Spearman's rank correlation coefficient for the U.K. increases up to values above 0.7 for shifts of ten to twelve years. This statistic is considered for a very specific reason. Already Philipps argued that the relationship, on theoretical grounds, is "likely to be highly non-linear."[29] In this case, Spearman's

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[29]See Phillips (1958), p. 283. Investigating the relationship between the rate of change of money wages and unemployment, he argued that wages might be bid up rather quickly when very few workers are unemployed. Conversely, with a large number of workers being unemployed and the demand for labor being low, wages tend to fall slowly as

coefficient is a more appropriate measure as it looks for a monotonic, but not necessarily linear relationship. However, from Table 1 we see that the differences between both statistics are not substantial.

Table 1: Bravais-Pearson correlation coefficient (BP) and Spearman rank correlation coefficient (SR) for unemployment rates and inflation rates in Germany, France, the United Kingdom and the United States for the second half of the 20th century; unemployment rates have been shifted backwards in time by the respective time lag.

time lag	Germany		France		USA		UK	
	BP	SR	BP	SR	BP	SR	BP	SR
0	-0.60	-0.61	-0.61	-0.74	0.25	0.25	-0.03	0.08
1	-0.49	-0.50	-0.47	-0.62	0.55	0.53	0.14	0.23
2	-0.41	-0.38	-0.32	-0.47	0.66	0.60	0.24	0.35
3	-0.36	-0.33	-0.19	-0.32	0.65	0.64	0.29	0.40
4	-0.34	-0.33	-0.08	-0.21	0.52	0.55	0.34	0.46
5	-0.33	-0.34	-0.01	-0.14	0.41	0.48	0.44	0.55
6	-0.31	-0.34	0.05	-0.10	0.48	0.56	0.56	0.63
7	-0.29	-0.38	0.14	-0.00	0.49	0.54	0.63	0.68
8	-0.22	-0.38	0.20	0.07	0.37	0.35	0.62	0.69
9	-0.09	-0.28	0.25	0.14	0.24	0.25	0.61	0.69
10	0.05	-0.10	0.31	0.22	0.29	0.39	0.64	0.73
11	0.13	0.04	0.38	0.32	0.27	0.32	0.66	0.77
12	0.20	0.11	0.47	0.47	0.31	0.31	0.64	0.78

Source of data: data on inflation from Reinhart and Rogoff (2009); for unemployment rates for U.K. and Germany see Mitchell (2007); for U.S. data on unemployment see *Bureau of Labor Statistics* (BLS); for French data on unemployment see *Insee*

In contrast, the data for Germany and France reveal a negative short-run or immediate relationship between unemployment and inflation as shown in the top panels of Figure 4. From Table 1 we see that the correlation coefficients gradually increase as we shift the unemployment series backward in time. The effect is somewhat weaker for Germany. The Bravais-Pearson correlation coefficient is just slightly above zero (0.05) for a time shift of ten years, while Spearman's coefficient remains below zero (-0.10). For a shift of eleven or twelve years both statistics are positive.

The scatterplots of the smoothed data for a time shift of ten years are provided in Figure 5. Again, we find quite strong evidence for a positive long-run link between inflation and unemployment in the cases of the United States and the United Kingdom, and somewhat weaker evidence for Germany and France. In the following section, we will provide an explanation for why this empirical finding should not come as a surprise, and why it might be worth rethinking the long-run neutrality of inflation.

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workers are reluctant to offer their services at wages below the prevailing wage level. Under the assumption that the rate of change of money wages equals the increase of labor productivity minus inflation, the argumentation may well extend to the general price level within the economy.

4   Reconsidering long-run neutrality

The short-run effect of monetary expansion is well described by the Phillips curve. Although it is difficult to provide clear-cut empirical evidence, the initial stimulating effect is supported on theoretical grounds. Yet, the alleged long-run neutrality is neither supported by historical data, nor by theory. On the contrary, I would like to focus on two theoretical arguments emphasizing the detrimental effects of inflation that had been neglected in the contributions we have discussed so far. Both arguments, strictly speaking, do not attempt to establish direct causal relationships between the two variables under consideration - price inflation and long-run unemployment - but rather indirect connections.

First of all, the starting point of both arguments will be expansionary monetary policy, that is, inflation according to the traditional definition of the term. Monetary expansion might then lead to inflation in the contemporary sense (rising prices), but also, with a considerable time lag, to higher unemployment rates. The arguments are indirect ones in another important respect, namely in that they rely at least partly on certain political responses to unintended consequences of monetary expansion. These consequences, which concern income inequality and the distribution of wealth on the one hand, and business cycle fluctuations on the other hand, are, although unintended, necessarily and inevitably linked to the expansion of money and credit in the modern financial system. Yet, the political responses that they trigger are by no means necessary, but just very likely. As mentioned earlier, at the point at which our analysis is contingent on politics, it should rather be seen as a historical interpretation, not as a deductive theoretical argument that claims a priori validity at all places and times.

The first argument builds on the redistributional effects of credit expansion, and in particular the recent contributions contained in Hülsmann (2013). The second argument is based on the monetary theory of the trade cycle, which was introduced by Mises (1953 [1912]) and further developed by Strigl (2000 [1934]) and Hayek (2008 [1931, 1933, 1935]).[30]

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[30]Another work that essentially ingested this theory is Robbins (1971 [1934]). Further contributions and an application of the theory to the Great Depression can be found in Rothbard (2000 [1963]). Huerta de Soto (2012) is a contemporary exposition of the theory, which among other things contains contributions from a judicial point of view. See also Salerno (2012) for a reformulation and application of the theory to the recent financial crisis.

4.1   Redistributional effects of monetary expansion

Under the assumption that wages are more rigid than prices of final products, the positive short-run effects of monetary expansion on unemployment can be explained by diminishing relative labor costs. If output prices increase faster or earlier than the price for labor, entrepreneurs will have an incentive to hire more workers, which tends to lower unemployment. It is clear that when workers or labor unions, which act on their behalf, anticipate the rate of inflation correctly, they will demand compensation in the form of higher wages and the effect collapses. If they overestimate the rate of inflation, the effect on employment might even be negative. In any way possible, the effect can only be short-lived, since wages will sooner or later adjust to the actual purchasing power of the monetary unit, or alternatively, workers may adjust their labor productivity, which is not a given in nature. According to this rationale, monetary expansion can lower unemployment only for a rather short period of time, and if it does so, it is only possible because workers and labor unions are tricked by unexpected inflation.[31] This constitutes a somewhat deceitful justification for monetary expansion.

Employers and employees will in the long-run adjust their contracts to the actual rate of inflation. However, a persistent depreciation of the exchange value of money vis-à-vis other goods and services produced in the economy has negative side-effects, at least for some groups in society. First of all, we have to abandon the view that prices or wages within an economy grow synchronously under inflation. There will always be wages and prices that increase faster than others. When money is created, it does not increase all cash balances and incomes in exact proportion to the cash balances and incomes as they existed before. Therefore, it will benefit some - those who receive disproportionately more - at the expense of others - those who receive disproportionately less. In particular, those who receive the newly created money first benefit, as they are able to make more purchases for still relatively low prices. As they spend the additional money, they gradually bid up prices. Others, those who have not yet received any of the newly created money or only receive their shares later are worse off, as they are confronted with rising prices but still constant or relatively low incomes. These distributional effects of inflation have become known as Cantillon effects.[32]

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[31]On this point, see also Ackley (1983). An alternative to the traditional sticky wages theory for explaining the short-run trade-off between inflation and unemployment is the new Keynesian theory of monopolistic competition and costly price adjustments, that is the theory of sticky prices. See Mankiw (2001, pp. 49-50) for a brief overview.

[32]They are named after Richard Cantillon. He describes these effects in Cantillon (1755). It should also be mentioned here that these redistributional effects do not depend on the actual emergence of price inflation. As long as the money supply is expanded, prices will be higher than they would otherwise have been, and a redistribution of wealth from the late receivers to the early receivers is set in motion. For an attempt to explain the counterfactual nature of

Who are then typically the beneficiaries of monetary expansion, that is to say, who are the first receivers of the money that is injected into the economy? Under modern central banking, money is created and injected into the economy through credit on financial markets. Commercial banks and other financial institutions are usually the first receivers of the newly created money. They can either sell financial assets to the central bank in open market operations, or they can borrow money from the central bank at relatively low interest rates.[33] In both cases, central bank accounts of commercial banks and other financial institutions are credited with so-called *base money* that has not existed before. It is created through the very act of buying or lending by the central bank.[34] Under a system of fractional reserves, commercial banks then have the power to lend out more money to other parties than they have actually received from the central bank. They can create *commercial bank money*. For example, under a reserve ratio of 1% as currently set in the euro zone, a commercial bank may extend loans of up to 99 units in excess of every unit of base money, which they hold as reserve. Reserve requirements are one instrument of monetary policy. They define a threshold, up to which commercial banks can expand the money supply over and above the base money creation of central banks.[35]

It is not astonishing that under such a system financial markets tend to grow much faster than they would under commodity money standards with full reserve requirements.[36] The first beneficiary of monetary expansion, therefore, is the financial industry itself. There are three main reasons why the growth of financial markets is triggered by monetary expansion:

> (1) because financial titles are particularly useful securities in debt contracts; (2) because foreseeable price-inflation, a common consequence of fiat money systems, discourages money hoarding and encourages both the demand for, and the supply of, financial titles; (3) because the production of money through central banks is a matter of sheer human will and therefore creates moral-hazard problems leading to both an artificially high demand for financial titles, and an artificially big supply thereof.[37]

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economic propositions like this, see for example Hülsmann (2003).

[33]In the euro zone the central rate of interest is currently 0.05%. The federal funds rate in the U.S. is 0.25%. In Japan it is 0.10% and in Great Britain it is 0.50%, as at January 27, 2015.

[34]Analogously, central banks may sell financial assets in open market operations and thereby contract the money supply.

[35]Base money consists of commercial banks' reserves held at their accounts with the central bank and the currency in circulation, which includes cash in the banks' vaults, so-called vault cash. Commercial bank money, the type of money that commercial banks create in excess of base money, typically consists of numerical entries on their clients' bank accounts. It is essentially scriptural money.

[36]See for example Levine (2005), who shows that financial markets have grown much faster than factor markets.

[37]See Hülsmann, *Fiat Money and the Distribution of Incomes and Wealth*, published in Howden and Salerno (eds.) (2014), p. 130.

The growth of financial markets and the increase of the relative value of financial assets leads to a higher wealth to income ratio. This is not problematic for those who are already wealthy and possess assets, but for those who do not, it diminishes the chances of catching up. Consequently, monetary expansion decreases upward social mobility.[38] An important leverage effect lies in the selective and discriminatory nature of granting commercial bank credit. As pointed out, commercial banks create money through the extension of loans. Relatively wealthy people, who have stable streams of income, can service higher debts. They can get their hands on a larger share of the newly created money, and they usually have to pay lower interest rates as they are more credit-worthy and exhibit lower default risks. The economics of Cantillon effects tells us that they benefit disproportionately, since they can purchase more goods, services, and real assets for still relatively low prices. We might interpret this effect as a redistribution from bottom to top. These unintended consequences of monetary expansion, namely the rising gap between rich and poor,[39] motivate further political interventions, especially in countries governed by egalitarian politicians, which are more likely to be voted into office when the redistributional effects of inflation foster egalitarian sentiments among the electorate.

For example, more power is given to trade and labor unions. Labor laws are adjusted in order to protect and support employees, and in particular low wage earners. These adjustments generally make labor markets less flexible. Minimum wage laws are a case in point.[40] On a much more fundamental level, the growing inequalities are instrumental in generating public support for a rising welfare state which can only be sustained through tax increases. These political measures have of course numerous effects, but irregardless of possible advantages, when it comes to employment, they can only have a negative impact. Higher tax rates render businesses less profitable. There will be less investments and fewer workers will be employed.[41] If labor laws increase the responsibilities and obligations of employers towards their employees, there are less incentives to hire people. Therefore, unemployment tends to increase - even more so, when the welfare state takes away incentives to work.

Moreover, large firms and corporations which are well established and connected on the market are benefited by credit expansion and inflation, since they can refinance their activities much more easily on the financial markets than smaller firms and newcomers. This provides big businesses

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[38]Compare to Ibid.

[39]That there is a rising gap between rich and poor is generally accepted. See for example Piketty (2013). However, very little attention is given to the role of monetary policy and in particular credit expansion in that development.

[40]In January 2015, a minimum wage of €8.50 per hour has become operative in Germany.

[41]On the economics of taxation, see for example Hoppe (2006), chapter 2.

with the opportunity to operate under higher leverage ratios. Credit expansion serves as a means to deprive themselves of unpleasant competition. Higher tax rates are effective in the same way. A successful and innovative newcomer usually serves the needs of consumers better than his competitors, because he improves a product or develops a completely new one. He therefore obtains higher revenues. Yet, if a larger share of his revenues is taxed away, he partly looses his most important advantage that would help him to hold his ground and compete against well established firms and corporations for longer periods.[42] To the extent that credit expansion destroys competition between firms and corporations, it also destroys job opportunities and demand for labor, and hence tends to increase unemployment.[43] This effect may even be reinforced under a corporatist government, as opposed to the egalitarian version mentioned above. In recent years, corporatist inclinations have manifest themselves among other things in the *too big to fail* argumentation. Yet, it should be mentioned that corporatist and egalitarian governments are not mutually exclusive categories.

Finally, the effect of the so-called bracket creep under a system of progressive taxation should not be neglected. When incomes are pushed into higher tax brackets through inflation, the private sector is deprived of a larger proportion of its income. This effectively diminishes the capacity and the incentives to save and invest, and thereby tends to lower output and increase unemployment.

4.2   Cyclical downturns from monetary expansion

As mentioned above, the second argument builds upon the monetary theory of the trade cycle as introduced by Ludwig von Mises. In essence, Mises developed his theory out of three components.[44] First, he incorporated elements from the cycle theory of the *currency school*, which was basically a theory of liquidity shortages in the financial sector under fractional reserve banking, but

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[42]This problem has implicitly been acknowledged by some governments who introduced tax exemption schemes for start-up companies, like the Singaporean government in 2005.

[43]This view of course stands in sharp contrast to Schumpeter's take on credit expansion and inflation. He characterized it as a means to finance the ventures of bright entrepreneurs with innovative ideas who lack capital. In his view, it increases competition and innovation. However, see Hülsmann (2008, pp. 181-182), who wrote:

> Indeed, the economist Joseph Schumpeter has famously characterized fractional-reserve banks as being some sort of mainspring of economic development.[...] He argued that such banks may use their ability to create credit out of thin air (*ex nihilo*) to provide funding for innovative entrepreneurs. It is conceivable that in some cases they played this role, but the odds are overwhelmingly on the other side. As a general rule, any new product and any thoroughgoing innovation in business organization is a threat for banks, because they are already more or less heavily invested in established companies, which produce the old products and use the old forms of organization.

Hülsmann refers to Schumpeter (1993 [1934]), chapter 3.

[44]Compare Rothbard (1988), pp. 21-22, and Hülsmann (2007), chapter 6.

did not extend to the real economy. Second, he made use of the differentiation between the *natural rate of interest* and the *money rate of interest* as introduced by Wicksell (1898). The former, the natural rate of interest, is the rate at which capital markets, in real terms, are in equilibrium, that is, in a state in which demand for and supply of real savings are equal to each other. The latter is simply the nominal rate of interest that actually occurs on the market. The third component is the capital theory of Eugen von Böhm-Bawerk.[45] Böhm-Bawerk emphasized the importance of the *structure of production* and its essential ingredient: capital, which is heterogeneous by nature. He separated production into different stages in which different kinds of capital goods are used. As more capital and more stages enter the structure of production, output and productivity increase. In the course of economic progress, there is a transition to what Böhm-Bawerk called *roundabout* methods of production.[46]

Böhm-Bawerk noticed that the transition to more roundabout methods of production can only be successful when there are the necessary means of subsistence for the time it takes to build up the new structure of production, in other words, when there is a sufficient amount of real savings. They are the basis for the completion of investment projects. Mises recognized that it is in fact the role of interest rates to coordinate investment projects according to the available subsistence fund in the economy. If people save more, that is, if they forego consumption opportunities today, interest rates tend to decrease, as more funds become available for investments. If people save less, interest rates tend to increase. It is the rate of time preference which determines the willingness to save. Interest rates payed on the financial markets can then be understood as an aggregate of individual time preferences, or a reflection of *societal time preference*. Hence, the crucial point of Mises' theory is that interest rates are not arbitrary numbers, which should be interfered with. They should be allowed to reflect the natural rate of interest which accommodates investment projects, and hence the roundaboutness of production, to the amount of real savings available in the economy.

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[45]It has been developed in his major work Böhm-Bawerk (1930 [1888]). Noteworthy is also his historical analysis of interest and capital theories, Böhm-Bawerk (1890).
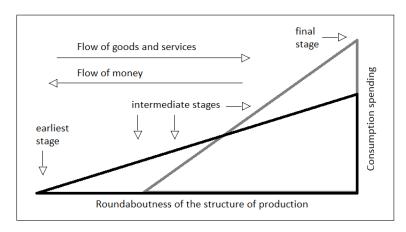
[46]See for example Böhm-Bawerk (1930, pp. 18-19) where he describes the concept of *roundaboutness* for the first time:

> We either put forth our labor just before the goal is reached, or we, intentionally, take a roundabout way. That is to say, we may put forth our labor in such a way that it at once completes the circle of conditions necessary for the emergence of the desired good, and thus the existence of the good immediately follows the expenditure of the labor; or we may associate our labor first with the more remote causes of the good, with the object of obtaining, not the desired good itself, but a proximate cause of the good; which cause, again, must be associated with other suitable materials and powers, till, finally, - perhaps through a considerable number of intermediate members, - the finished good, the instrument of human satisfaction, is obtained.

When central banks expand credit through artificially low interest rates, they essentially push the money rate of interest below the natural rate of interest. Under these conditions, investment projects that would have been unprofitable otherwise appear to be profitable and are undertaken. In particular, capital intensive long-term investments, which include more stages and a more roundabout method of production, are affected, since they are more sensitive to changes in interest rates.[47] This means that investments are undertaken which cannot be sustained given the amount of real savings available in the economy, because people do not necessarily consume less. They might even consume more[48] - and although, the economy might lack the necessary means of subsistence, a transition from the current structure of production towards a more roundabout structure of production is set in motion.

Initially, this leads to an economic boom, as more investment projects, and in particular more roundabout investment projects, are started than would otherwise be the case. Consequently, the demand for labor tends to increase, which lowers unemployment. Hence, the relationship of the short-run Phillips curve can be explained using this theoretical framework.[49] However, sooner or later the mismatch will become apparent, when relative prices adjust accordingly. This is when the heterogeneous nature of capital goods and their application in different stages of production come into play.

Figure 6: A Modification of the Hayekian Triangle after Garrison (1994) - more roundabout method of production (black) and less roundabout method of production (grey).

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[47]Imagine a rate of interest of 5%. If we have to lend € 1000 for an investment project that enables us to repay the loan after one year, we have to bear costs of € 50 due to interest payments. For an investment project that enables us to repay the loan only after 10 years, interest payments would amount to € 629. Yet, if the interest rate was only 2.5%, interest payments for both investment projects would be € 25 and € 280, which corresponds to relative cost reductions of 50% and 55%, respectively.

[48]Especially, when money becomes so cheap that it is borrowed for consumptive purposes.

[49]Compare to Bellante and Garrison (1988), Ravier (2011) and Ravier (2013) whose short-run analyses are essentially the same.

In a stylized fashion, we may think of the production structure as a triangle as shown in Figure 6.[50] The opposite leg corresponds to the amount of money spent for consumption. The adjacent leg reflects the roundaboutness of the structure of production, or respectively the stages of production through which a desired good, as well as goods necessary to produce it, pass until it is ready for consumption. On the left hand side we have the earliest stage of production, lets say the extraction of raw materials like wood and iron. By moving along the adjacent leg, we pass through the intermediate stages, for example the manufacturing of a shovel from the wood and iron of the earlier stage. This shovel may then be used to prepare land for crop growing. Ultimately, we reach the final stage of production, in which the crops may have been transformed into bread ready for consumption. The distance between the adjacent leg and the hypotenuse represents the increasing amount of money spent on the goods and services produced in the consecutive stages. It increases from left to right, which might be interpreted as the value added in each stage of production.[51]

It is important to recognize, that the height between adjacent leg and hypotenuse, including the opposite leg itself, represents the amount of money spent in the respective stage of production, rather than the real amount of goods that is consumed or passed on to the next stage. This means that the grey triangle does not represent an economy in which more goods are produced for consumption, but simply an economy in which more money is spent on consumers' goods relative to producers' or capital goods. It is in fact the more roundabout structure of production that due to increased productivity leads to greater output. In both cases, money flows from later stages of production, which are close to consumption, to earlier stages, while the goods and services produced flow the other way around. If we think of the grey triangle as representing the *wood-iron-shovel-crop-bread* structure of production, the black triangle may be interpreted as a structure of production in which also other raw materials are extracted and not only a shovel is produced, but also heavy machinery like plows and tractors, which then can be used in agriculture. This renders the method of production more roundabout and time consuming, but also physically more productive. The transition to a more roundabout structure of production itself takes time, that is to say, it does not generate consumable output immediately. During that transition period, in which the means of production, including labor, are gradually shifted towards the earlier stages of the new structure

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[50]Originally Hayek introduced this heuristic device in the second lecture of his *Prices and Production*, which can be found in Hayek (2008). In the original representation the triangle stands on the opposite leg (the leg that represents consumption spending). See Hayek (2008, pp. 228, 233, 239, 242, 244 and 246.). Roger Garrison has turned the triangle by 90 degrees to put it on the adjacent leg (the leg that represents the roundaboutness of production, or production time). See for example Garrison (1994) or Bellante and Garrison (1988).

[51]The Hayekian Triangle as shown in Figure 6 suggests a continuous flow of production. We might as well separate the structure of production into a given number of stages, simply by drawing vertical lines between hypotenuse and adjacent leg at given points in the triangle, and thereby transform the problem into a discrete one.

of production, real savings are needed in order to sustain workers and entrepreneurs until the new structure of production is implemented and generates output.

If it is through monetary expansion and artificially low interest rates that investment projects are stimulated, an accelerated bidding process for the available means of subsistence as well as non-specific capital goods, which can be employed in many if not all stages of production, begins. Yet, the means of subsistence are scarcer than it is reflected by interest rates, since real savings have not actually increased. Higher demand will push prices further up - possibly with a considerable time lag - and render the costs of investment projects higher than initially expected. It turns out that not all the investment projects can be finished given the amount of real savings in the economy.[52] Labor and non-specific capital goods have however been attracted to those projects in order to produce the specific capital equipment needed in the respective stages of production. Necessarily, some of the projects have to be liquidated. Businesses go bankrupt and employees lose their jobs. The capital that was used has to be redirected into productive and sustainable methods of production if possible. However, to the extent that specific capital goods have been produced, which cannot simply be used in other stages and other projects, and which are now useless, society has been impoverished. It takes time to actually rebuild a sustainable production structure, during which unemployment will tend to be higher than prior to the initial monetary expansion, due to frictions in the movement of labor. This phase constitutes the economic bust.

Krugman has drawn attention to the asymmetry of booms and busts,[53] the fact that increased unemployment occurs during the structural adjustments of the bust, but not during the structural adjustments of the boom, which he explains by reference to downward wage rigidities. During a boom period wages tend to rise, but during the bust they do not fall as much and as rapidly as they should in order to prevent increased unemployment. An alternative explanation is provided by Andolfatto (2013), who argues that the most obvious cause for asymmetry is not to be found in nominal rigidities, but rather in the mass destruction of productive relationships, which takes place during the bust. In his view, the labor market is a market for productive relationships, or

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[52]Hayek (2008, p. 272) compares this situation to a hypothetical scenario of a people on an isolated island:

> The situation would be similar to that of a people of an isolated island, if, after having partially constructed an enormous machine which was to provide them with all necessities, they found out that they had exhausted all their savings and available free capital before the new machine could turn out its product. They would then have no choice but to abandon temporarily the work on the new process and to devote all their labor to producing their daily food without any capital. Only after they had put themselves in a position in which new supplies of food were available could they proceed to attempt to get the new machinery into operation.

[53]See Krugman (2013).

what he calls *relationship capital*. Just like physical capital, relationship capital is redirected onto unsustainable paths during the boom. Relationships are built up, intensified, replaced or adjusted, merely to get destroyed during the bust. In his own words:

> The basic idea is very simple. [...] [T]he labor market is a market for productive relationships. It takes time to build up relationship capital. It takes no time at all to destroy relationship capital. (It takes time to build a nice sandcastle, but an instant for some jerk to kick it down.)

During the bust there is essentially a matching problem. It just takes some time until new productive relationships emerge. If the bust comes along with credit defaults and turbulences on the financial markets, bank credit deflation may be a consequence, as banks refuse to extend loans further, due to increased economic risks. Moreover, people tend to demand higher cash balances in response to increased economic risks, which might lead to cash-building deflation.[54] Hence, towards the end of the cycle increasing unemployment and price deflation, or at least very low price inflation, may coincide as suggested by the short-run Phillips curve relationship. However, the above explanation should have made clear that the cause of increasing unemployment is not to be found in the deflationary tendencies of the bust at some point t, but rather in the inflationary tendencies during the boom period which occurred prior to t.

This, in and of itself, does not establish a positive link between price inflation and unemployment in the *long-run*. Eventually, after the boom period with lower unemployment and the bust period with higher unemployment, the rate returns to its natural level as determined by the institutional environment.[55] Interestingly, Ravier (2013) argues that there is a permanent positive impact on unemployment. However, the author does not make sufficiently clear that his argument is contingent on politics. He starts from a situation with minimum wage legislation arguing that, due to capital consumption and destruction during the boom, labor productivity may have fallen so much that minimum wages lead to increased unemployment. Yet again, in the long-run, through a genuine process of capital accumulation based on real savings, labor productivity may increase again. Moreover, nominal wages might have risen so much in the inflationary process that paying minimum wages, which are fixed in nominal terms, does not actually pose any problems for employers. Abstracting from minimum wages and unemployment benefits, it is even conceivable that employment increases after the business cycle, namely when capital destruction has impoverished

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[54]For a classification of different types of deflation, see Salerno (2003), Bagus (2011), or more recently Bagus (2015).

[55]Compare to Bellante and Garrison (1988) who argue for long-run neutrality between inflation and unemployment.

society to such an extent that it precipitates lower wage elasticities of the supply of labor. To be fair, strictly speaking, in this scenario we are not dealing with a reduction in unemployment of the kind that we are really concerned with, that is *involuntary unemployment*. What we have here is a case in which *voluntary unemployment* in a society that enjoys relatively high living standards has been transformed into *involuntary unemployment* in the impoverished society after the business cycle. On a free market for labor this would lead to increased employment.

These considerations show that it is a rather futile endeavor to establish a necessary, time and place invariant and politically independent long-run relationship between price inflation and unemployment, while there certainly are necessary short-run implications. Ultimately, unemployment is determined by rigidities that are politically forced upon labor markets.[56] Leaving the realm of pure economic theory and adding the extra layer of politics, we can extend our analysis in very much the same way as we have done above. To the extent that the theory which has been sketched explains reality, that is to say, to the extent that economic crises are caused by monetary expansion, loose central bank policy is instrumental in nursing public support for higher taxes and more rigid interventions into the labor market with the objective of preventing economic mischief. Yet, in general, these measures render labor markets less flexible and tend to increase unemployment and decrease output in the long-run. So again, we might say that inflation itself produces political incentives that tend to shift the Phillips curve, in the words of Milton Friedman, towards a higher *natural rate of unemployment*, or what Mises much more appropriately termed *institutional unemployment*.[57] In other words, the political decision for a movement along the short-run Phillips curve towards more inflation and less unemployment may inherently trigger a rightwards shift of the entire Phillips curve schedule through the political process of interventionism.

5   Summary and conclusive remarks

In this paper we have provided a brief overview of the history of the Phillips curve, from its beginnings as a mere empirical relationship, its interpretation as a mechanistic trade-off between inflation and unemployment and its alleged political implications, to the differentiation into short-run trade-off and long-run neutrality. Yearly time series data from Germany, France, the United

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[56]That unemployment is essentially a political issue is a widespread view. See for example Rueff (1925, 1931) who emphasized the role of unemployment benefits. See also Mises (1931, pp. 15ff.) and (1998, Chapter XXI, pp. 584ff.). Ravier (2013, p. 181) also acknowledges the role of politics by writing: "In fact, the loss of employment is usually exacerbated because rigidities are often increased during the adjustment phase, a political reaction to the difficulties monetary expansion inevitably causes."

[57]See for example Mises (1998, p. 598).

Kingdom and the United States over the latter half of the 20th century show some evidence for the short-run Phillips curve trade-off, but give good reason to rethink the generally accepted neutrality of inflation in favor of a positive link to unemployment in the longer term. Similar results have been presented for the U.S. in Niskanen (2002) and Mulligan (2011), who both, by estimating slightly different specifications, come to the conclusion that there is a positive empirical relationship between unemployment and inflation in the long-run.

In section 4 of this paper an attempt to provide a theoretical explanation for this empirical finding is undertaken. Two arguments are outlined. First, it is argued that the unintended consequences of monetary expansion on the distribution of incomes and wealth, which trigger a rising gap between rich and poor, might increase public support for more restrictive regulations on labor markets as well as higher taxes and increased welfare spending. These political measures render labor markets less flexible and destroy incentives to invest and hire people and thereby tend to increase unemployment. The bracket creep under a system of progressive taxation reinforces this tendency. Second, monetary expansion may cause cyclical fluctuations that temporarily lower but ultimately increase unemployment as the boom turns into a bust. One may argue that increased unemployment during economic crises is also only a temporary phenomenon that will cease in the long-run. Yet again, political measures to counter economic downturns and protect workers and firms are motivated in the course of the business cycle. Irregardless of several other effects that these measures may have, they tend to increase the *natural* or *institutional* rate of unemployment. In both cases, the unintended consequences of monetary expansion are considered to be unavoidable on purely theoretical grounds. They form the incentive structure under which political decisions are made. Yet, at the point at which we rely on political reactions in order to establish ties between inflation and unemployment we are leaving the realm of apodictic theory and enter into historical interpretations of what the data show.

At the core of both arguments is the idea of interventionist spirals as developed in Mises (2013 [1929]). The initial intervention is monetary expansion through loose central bank policies. Whatever the purposes of the expansion, it leads to unintended consequences which demand further intervention. It is the initial intervention that causes price inflation, and the further interventions that subsequently lead to increased unemployment.

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