Can Phillips curve explain the recent behavior of inflation? Further evidence from USA and Canada

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ABSTRACT

This paper explores the ability of the Phillips curve to forecast inflation over the course of the recent Great Recession. We use quarterly data for the USA and Canada for the period 1960Q1 through 2013Q4. Estimating the slope of the Phillips curve over a rolling 10-year (40-quarter) window, we find evidence in favor of its empirical instability for both countries. More precisely, our results suggest that the slope coefficient becomes smaller for the USA from 1980 and onwards, while it increases for Canada since 2000. We then simulate inflation for the period 2008Q1 to 2013Q4 and compare the results with those obtained from a standard, constant coefficient Phillips curve model. We conclude that modeling time variation of the slope parameter helps improve the accuracy of predictions for the USA, but not for Canada.

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1. Introduction

The financial crisis which started in 2007 was transformed into an economic crisis, commonly known as the "Great Recession", affecting the output produced, inflation and unemployment. Many OECD countries entered in a long recessionary period with significant drops of GDP and increases in the unemployment rate. Data on the unemployment rate and on the NAIRU show that the unemployment rate is higher than the NAIRU and that this difference becomes greater and greater during the recessionary period. Some of the characteristics of this last recession were the great decrease of the output during this period, the slow economic growth and the substantial weakness that many countries faced after the recession. This prolonged period of recession and the slow economic growth resulted in downward pressures on prices. This could lead to a period of deflation.

Phillips (1958) analyzed the relationship between unemployment and inflation by focusing on their negative relationship. While there is a short run tradeoff between unemployment and inflation, it has not been observed that this exists in the long run. Friedman (1968) says that the Phillips Curve was only applicable in the short-run and monetary policies would not decrease unemployment in the long-run. Then, Friedman correctly predicted that both inflation and unemployment would increase in the upcoming years after 1968. The long-run Phillips Curve is now considered as a vertical line at the natural rate of unemployment, where the rate of inflation has no effect on unemployment.

Standard models of inflation in the short run build upon the work of Friedman (1968) and support that inflation depends on expected inflation and slack in the economy. The accelerationist Phillips curve has been modified and adapted by many

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authors over the last decades. Ball and Mazumder (2011) explore the ability of the Phillips curve model to explain the behavior of inflation during the Great Recession. Murphy (2014) revisits the question of why the Standard Phillips curve has predicted deflation over that past several years in USA. He modifies the Phillips curve to allow its slope to vary continuously through time. He finds that modifying the Phillips curve to allow continuous time-variation in its slope greatly improves its ability to explain the recent behavior of inflation.

The capacity of the Phillips curve or the modified Phillips curve to predict correctly the future inflation has been long investigated by economic theory. Many of the researchers also investigate the reasons why forecasts using Phillips curve are not perfect. Most of these studies point out the fact that the economic instability which characterizes many countries affects the slope of the short-run Phillips curve and the quality of inflation forecasts. Hence, it seems quite interesting to examine the behavior of the Phillips curve in a period of economic recession, as it is the period from 2008 and onwards.

The purpose of this paper is to investigate the fitness of the Phillips curve to produce good forecasts for future inflation in a period of economic crisis. Our assumption is that the quality of the results depends on the slope of the Phillips curve, and especially if the slope varies over time. As far as we know there are few papers which analyze the role of the Phillips curve in a period of recession (Ball & Mazumder 2011; Croonenbroeck & Stadmann, 2012; ECB, 2014; Murphy, 2014). This paper explores the performance of the Philips curve in forecasting inflation during the recent Great Recession. Data from the USA and Canada are used for the period 1960Q1 through 2013Q4 in order to evaluate the Phillips curve forecasts taking into account the degree of stability of the slope of the Phillips curve.

The next section reviews the literature concerned with the role of the Phillips curve in forecasting inflation. In section 3 we present the methodology that we apply in this paper. In section 4 we present our results and in section 5 we discuss our empirical results.

2. Literature review

2.1. The role of the Phillips curve in forecasting inflation

There is a vast literature on the relation between unemployment and inflation. Phillips (1958) using U.K. economic data from 1861 to 1957 finds that the growth of nominal wages depends on the unemployment rate. More precisely, his findings suggest that nominal wages increase faster when unemployment rate is low and that they grow slowly when unemployment is high. He also maintains that the growth of nominal wages depends on the change of labor demand/unemployment. His empirical findings showed that the relationship between wage inflation and unemployment could be used to predict how the inflation rate would change in response to changes in the unemployment rate. Friedman (1968) develops a model in which the inverse relation between inflation and unemployment is valid in the short-run but not in the long-run. Friedman believed in the role of adaptive expectations and that excess demand is equivalent to the difference between the natural rate of unemployment and actual unemployment. Phelps (1969) constructs a dynamic model in which any optimal time-path of the unemployment ratio must approach the steady equilibrium level. He maintains that the trade-off between permanently high unemployment and permanently high inflation is not a timeless one, but a dynamic one. Therefore optimal aggregate demand depends on society's time preferences.

The role of prices is taken into account in the build-up of the Neoclassical Phillips curve. A fraction of the prices are set one period in advance, while the others are fully flexible (Friedman 1968; Phelps, 1969; Woodford, 2003). Thus inflation is influenced by the previous expected inflation. Calvo (1983) supported that a fraction of firms can adjust prices in each period, taking into account expected future price developments and the probability that they may not be able to adjust their prices in the following periods. According to Koop and Onorante (2012) expectations were modeled as backward looking adaptive processes until the mid-1970s. This strategy implies persistence in inflation and thus explains what seems to be a feature of inflation development. Recently, research focuses on the formation of expectations through learning processes, where agents continuously improve their knowledge of the economy.

Recent studies on the Phillips curve suggest that there have been shifts in the Phillips curve and that the crisis has changed the Phillips curve in the euro area. There are efforts to introduce informed judgment into forecasting models and adapt the models to the prevailing economic conditions.

2.2. Is there a change in the form of Phillips curve?

Gordon (2011) points that after 1975 the evolution of the literature on the Phillips curve was split in two directions: the mainstream approach and the post-1975 developments. One of the differences between the two approaches is that the role of past inflation is not limited to the formation of expectations, but it also includes a persistence effect due to the fixed-duration wage and price contracts and lags between changes in crude materials and final product prices. This approach is called the "triangle". The new Keynesian Phillips curve derives a forward-looking PC from alternative theories of price stickiness. As Gordon (2011) indicates there are three main differences between the triangle model and the new Keynesian Phillips curve (NKPC) model. These differences are the inclusion in the triangle model of longer lags on both inflation and unemployment gap, the inclusion of explicit supply shock variables and the time-varying NAIRU in place of a fixed NAIRU in NKPC.