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journal homepage: www.elsevier.com/locate/jeboEnvy, guilt, and the Phillips curve[☆]Steffen Ahrens^{a,b,*}, Dennis J. Snower^{b,c,d}^a Technische Universität Berlin, Straße des 17. Juni 135, 10623 Berlin, Germany^b Kiel Institute for the World Economy, Hindenburgufer 66, 24105 Kiel, Germany^c Kiel University, Wilhelm-Seelig-Platz 1, 24118 Kiel, Germany^d CEPR and IZA

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ABSTRACT

We incorporate inequality aversion into an otherwise standard New Keynesian dynamic stochastic equilibrium model with Calvo wage contracts and positive inflation. Workers with relatively low incomes experience envy, whereas those with relatively high incomes experience guilt. The former seek to raise their income and the latter seek to reduce it. The greater the inflation rate, the greater the degree of wage dispersion under Calvo wage contracts, and thus the greater the degree of envy and guilt experienced by the workers. Since the envy effect is stronger than the guilt effect, according to the available empirical evidence, a rise in the inflation rate leads workers to supply more labor over the contract period, generating a significant positive long-run relation between inflation and output (and employment), for low inflation rates. Provided that wage adjustments are costly, this tradeoff remains significant even once the degree of wage stickiness adjusts to the inflation rate. This Phillips curve relation, together with an inefficient zero-inflation steady state, provides a rationale for a positive long-run inflation rate. Given standard calibrations, optimal monetary policy is associated with a long-run inflation rate around 2%.

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1. Introduction

Despite a well-known, growing body of empirical literature calling the classical dichotomy into question, it is still the conventional wisdom in contemporary macroeconomic theory that monetary policy is roughly neutral with respect to aggregate employment and output in the long run. Even though the standard New Keynesian model implies a non-neutrality due to time discounting and inefficiencies due to relative price instability, these long-run effects of monetary policy are quantitatively small for reasonable values of the interest rate and low inflation rates (Ascari, 1998; Graham and Snower, 2004; Levin and Yun, 2007).¹ This paper, by contrast, offers a new rationale for long-run real effects of monetary policy, resting on envy and guilt. We find that for reasonably calibrated values of the relevant parameters, these long-run effects are substantial. This result has important implications for the conduct of monetary policy. Our results suggest an optimal inflation rate in the neighborhood of 2%.

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¹ This holds true for the standard assumption of exponential discounting. Graham and Snower (2008) show that hyperbolic discounting leads to a long-run tradeoff of reasonable magnitude.

In particular, we incorporate fairness considerations into an otherwise standard dynamic stochastic general equilibrium (DSGE) model of New Keynesian type with Calvo nominal wage contracts and positive trend inflation. In this context, we show that the classical dichotomy (whereby nominal variables have no long-run effect on real variables) breaks down in an empirically significant and theoretically novel way. Our rationale for the long-run non-neutrality of monetary policy does not rest on money illusion, departures from rational expectations, or permanent nominal rigidities. Instead, we assume that workers are inequality-averse with respect to real incomes, following the seminal work from [Fehr and Schmidt \(1999\)](#) and [Bolton and Ockenfels \(2000\)](#). Accordingly, workers with relatively low income experience envy, whereas those with relatively high income experience guilt. Both experiences generate disutility and, in accordance with the evidence, the influence of envy is stronger than that of guilt.

In the presence of Calvo nominal wage contracts, higher inflation implies greater wage dispersion and thus greater dispersion of incomes, generating more envy and guilt. Since workers seek to mitigate envy and guilt, they adjust their employment accordingly. Those who experience envy seek to raise their income and do so by increasing their employment, where those who experience guilt reduce their employment. Since the envy effect is stronger than the guilt effect, higher inflation is associated with greater employment and output, thereby generating a long-run Phillips curve tradeoff. Provided that wage adjustments are costly, this tradeoff remains significant even once the degree of wage stickiness (measured by the Calvo probability) adjusts to the inflation rate.

We find that the optimal long-run inflation rate (maximizing the representative worker's discounted stream of utilities in the steady state) is positive, in the neighborhood of 2%, for the standard calibrations. This result is in stark contrast to earlier studies of DSGE models with trend inflation (e.g., [King and Wolman, 1996](#); [Khan et al., 2003](#); [Yun, 2005](#); [Schmitt-Grohé and Uribe, 2007, 2011a](#)), which find the optimal inflation rate to be either zero or negative. Our results are in line with the aims of practical monetary policy as practiced by central bankers.

The paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes our microfounded macro model and calibrates it. Section 4 presents the numerical implications of the model for the long-run Phillips curve, discusses the underlying intuition, and investigates the sensitivity of the results with respect to key parameters. Section 5 examines optimal monetary policy in the presence of envy and guilt. Section 6 analyzes the long-run tradeoff in the presence of an endogenous frequency of nominal adjustment. Finally, Section 7 concludes.

2. Relation to the literature

Although evidence regarding verticality of the long-run Phillips curve had been mixed over the past century, recent years have witnessed a rapidly growing literature calling the classical dichotomy into question.² As Gregory Mankiw puts it “. . . if one does not approach the data with a prior view favoring long-run neutrality, one would not leave the data with that posterior. The data's best guess is that monetary shocks leave permanent scars on the economy” ([Mankiw, 2001](#), p. 48). This paper provides a new rationale for such empirical findings.

The paper also contributes to a growing theoretical literature explaining how a non-vertical long-run Phillips curve can arise.³ For instance, [Cooley and Hansen \(1989\)](#) find a long-run relationship between inflation and real macroeconomic activity in the face of cash-in-advance constraints. [Sedaruski \(1967\)](#) achieves his well-known superneutrality result only under a utility function which is separable in consumption and labor. [Bénabou and Koniczny \(1994\)](#) derive technical constraints for demand and supply functions for which a non-vertical Phillips curve arises under costly price changes.⁴ [Hughes-Hallet \(2000\)](#) shows that a non-vertical long-run Phillips curve can arise through the aggregation of sectoral Phillips curves with different short-run slopes. [Holden \(2003\)](#) shows that strategic considerations between large wage-setters, such as industry-unions, can give rise to a non-vertical long-run Phillips curve. By contrast, we do not include cash-in-advance constraints or non-separable utility functions. We do show, however, that costly adjustment gives rise to a non-vertical long-run Phillips curve.

In seminal contributions, Akerlof and co-authors derive a non-vertical long-run Phillips curve from the assumption of money illusion. In their analysis, money illusion manifests itself either in the form of downward nominal wage rigidities ([Akerlof et al., 1996](#); [Akerlof and Dickens, 2007](#)) or departures from rational expectations ([Akerlof et al., 2000](#)). Our analysis, by contrast, rests on neither permanent downward nominal wage rigidity nor non-rational expectations.

² For the United States, see for example [Beyer and Farmer \(2007\)](#), [Karanassou et al. \(2008\)](#), [Russell and Banerjee \(2008\)](#), [Favara and Giordani \(2009\)](#), [Karanassou and Sala \(2010\)](#), and [Berentsen et al. \(2011\)](#). For a wider set of industrialized countries, examples include [Fisher and Seater \(1993\)](#), [King and Watson \(1994\)](#), [Kousta and Veloce \(1996\)](#), [Ball \(1997\)](#), [Kousta \(1998\)](#), [Ball \(1999\)](#), [Dolado et al. \(2000\)](#), [Fair \(2000\)](#), [Ericsson et al. \(2001\)](#), [Kousta and Serletis \(2003\)](#), [Gottschalk and Fritsche \(2005\)](#), and [Schreiber and Wolters \(2007\)](#). Empirical studies that study the Phillips curve in terms of the underlying structural macro models include [Bullard and Keating \(1995\)](#), [Ahmed and Rogers \(1998\)](#), [Karanassou et al. \(2003\)](#), [Karanassou et al. \(2005\)](#), and [Coenen et al. \(2004\)](#). Concerning developing and emerging countries, see [Bae and Ratti \(2000\)](#) for Argentina and Brazil, [Wallace et al. \(2004\)](#) for Nicaragua, [Chen \(2007\)](#) for Taiwan, [Wallace and Shelley \(2007\)](#) for Mexico, and [Puah et al. \(2008\)](#) for Singapore.

³ For a thorough survey on the assumptions which lead to non-vertical Phillips curves, refer to [Orphanides and Solow \(1990\)](#).

⁴ Related contributions are [Kuran \(1986\)](#), [Naish \(1986\)](#), and [Koniczny \(1990\)](#).

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