



Openness, income-tax progressivity, and inflation

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ABSTRACT

This paper considers a model of an open economy in which the degree of income-tax progressivity influences the interaction among openness, central bank independence, and the inflation rate. Our model suggests that an increase in the progressivity of the tax system induces a smaller response in real output to a change in the price level. This implies that increased income-tax progressivity reduces the equilibrium inflation rate and that the effect of increased income-tax progressivity on inflation is smaller when the central bank places a higher weight on inflation or when there is greater openness. Examination of cross-country inflation data provides empirical support for these key predictions.

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1. Introduction

A significant literature has developed since Romer's (1993) seminal paper exploring the nature of the relationship between the extent of openness to international trade and inflation. Romer's motivation for the negative dependence of inflation on openness observed in cross-country data hinged on the idea that greater openness might worsen the terms of the output-inflation trade-off, thereby reducing a monetary authority's incentive to inflate. This rationale best applies to countries sizable enough to affect international relative prices, and Lane (1997) explored how greater openness can reduce the potential output gains from unexpected inflation in non-traded-goods sectors with imperfectly competitive goods markets and sticky prices. Nevertheless, Temple's (2002) examination of the relationship between openness and sacrifice ratios across a range of nations cast doubt on Romer's proposed explanation of the openness–inflation relationship. Daniels and VanHoose (2006) and Razin and Yuen (2002) offered alternative perspectives indicating that in fact the sacrifice ratio should respond positively to an increased degree of openness, yet inflation nevertheless should decline. Daniels et al. (2005) and Razin and Loungani (2005) have provided empirical support for a positive relationship between openness and the sacrifice ratio, while preserving the predicted inverse relationship between openness and inflation found in the data by Romer and others.

Missing from this literature to date has been consideration of the role that a nation's tax structure likely has on the equilibrium inflation rate. This is somewhat surprising for two reasons. First, some researchers have questioned whether the trade openness–inflation relationship either may be illusory (Terra, 1998; Ball, 2006) or may have shifted or even broken down since the early 1990s (Bleaney, 1999). Second, the marginal tax rate is a key supply-side factor influencing the output-inflation relationship and hence the equilibrium inflation rate. The considerable cross-country variation in degrees of

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marginal tax rates suggests that the interplay between the effects of trade openness and income-tax progressivity – measured by the ratio of marginal to average tax rates – should be explored.

This paper considers an open-economy framework which accounts for the fact that in a more progressive tax system, the marginal tax rate is more responsive to a given change in real income. Consequently, an increase in real output induced by a rise in the price level raises the marginal tax rate by a larger amount, which reduces the actual rise in output generated by a given increase in the price level. This reduces the incentive to increase money growth in an effort to raise the price level with an aim to boost output. Thus, money growth and inflation are lower, *ceteris paribus*, when the tax system is more progressive.

Our model also indicates that the degree of central bank independence also plays a role in influencing how the progressivity of the income-tax system and openness affect inflation. This is true because central bank independence has its own effects on the latter two variables, thereby conditioning the impacts of variations in income-tax progressivity and openness.

To evaluate the predictions forthcoming from the theoretical model, we consider cross-country data on income-tax progressivity, openness, central bank independence, and inflation. Empirical analysis of cross-country inflation rates provides empirical support favoring the theoretical prediction of a negative relationship between inflation and the progressivity of the income-tax system. This analysis also supports the theory's subsidiary implications that greater openness and increased central bank independence both reduce the effects of income-tax progressivity on inflation – and *vice versa*. Thus, a larger degree of income-tax progressivity may reduce the negative influence of greater openness on inflation.

The next section presents our theoretical model and its predictions regarding how income-tax progressivity, openness, central bank independence affect the inflation rate. Section 3 assesses the empirical implications of our analysis and evaluates the evidence. Section 4 summarizes our conclusions.

2. A model of the interplay among openness, progressive taxation, and inflation

The theoretical framework is based in part on the model developed in Daniels and VanHoose (2006). There are numerous atomistic firms, indexed i , distributed uniformly along a unit interval. A portion, Ω , of firms have workforces that contractually set nominal wages in advance of labor-market clearing. Spot labor markets determine nominal wages in the portion of firms, $1-\Omega$, that do not have such contracts. Duca and VanHoose (2001) have shown in a closed-economy version of this basic framework that if risk-neutral firms and risk-averse workers face common aggregate shocks and heterogeneously distributed firm-specific disturbances, Ω typically lies between zero and unity but declines as the variability of firm-specific disturbances increases relative to the volatility of aggregate shocks. To maintain tractability, we treat Ω as an exogenous parameter and thereby abstract from considerations of disturbances that influence the share of firms with nominal wage contracts.

We also consider the competitive limit of the Daniels–VanHoose framework, in which we take into account income taxation. The output produced by a given firm i is

$$y_i = \alpha l_i, \quad (1)$$

where y_i is the log of output and l_i is the log of employment at firm i . We abstract from productivity or other shocks that would not influence trend inflation in the standard Barro and Gordon (1983) discretionary-policy framework. The domestic nation's income-expenditure equilibrium condition (for a derivation of this Cobb–Douglas approximation, see, for instance, Canzoneri and Henderson, 1991; or Bryson et al., 1993) is given by

$$y = \eta(p^* + s - p) + (1 - \beta)y + \beta y^*, \quad (2)$$

where $y \equiv \int_0^1 y_i di$ is the log of aggregate domestic output; $p \equiv \int_0^1 p_i di$ is the log of the aggregate domestic price level; the average propensity to import, β , is a fraction; η is the elasticity of desired spending with respect to the real exchange rate; p^* is the log of the aggregate foreign price level; s is the log of the domestic currency price of foreign currency; and y^* is the log of aggregate foreign output. Specifying analogous structural relationships for a foreign nation would yield a two-country framework in which y^* and p^* would be endogenous variables, but here we assume the output and prices abroad are exogenously determined. Henceforth, the foreign money stock, foreign price level, and foreign output are normalized at unity, so that p^* and y^* equal zero. Finally, domestic income is determined by the quantity equation

$$y = m - p, \quad (3)$$

where m is the log of the money stock and where the log of velocity has been normalized at a value of zero.

Using (1) in the profit function, $P_i Y_i - W_i L_i$, yields the labor demand function for a firm i (with the intercept suppressed because it plays no role in our subsequent analysis):

$$l_i^d = \frac{-(w_i - p)}{1 - \alpha}, \quad (4)$$

where w_i is the log of the nominal wage for the firm.

Workers can consume both domestically produced output and foreign-produced goods. Consequently, labor supply to firms depends on the after-tax real wage computed in terms of the overall price workers pay for a basket of both domestic and foreign goods:

$$l_i^s = \lambda[w_i - (1 - \beta)p - \beta s - \tau], \quad (5)$$

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