



# Dynamic effects of terms of trade shocks: The impact on debt and growth<sup>☆</sup>

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## Abstract

By specifying borrowing costs to increase with the debt to equity ratio we generate procyclical debt flows in response to terms of trade shocks, consistent with empirical evidence. Since procyclical capital flows attract unsustainably large capital inflows during favorable shocks and force countries to overadjust to adverse shocks, we obtain nonlinear adjustments, involving possible overshooting of the long-run debt level. By linking growth, procyclical debt, and terms of trade shocks, we add a distinctly dynamic component to the “Harberger–Laursen–Metzler effect”. We also examine the welfare implications of the terms of trade shocks and find substantial impact of even intermediate sized shocks.

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## 1. Introduction

Adverse shocks to a country’s terms of trade – the relative price of its exports to imports – not only may disrupt the economy’s growth, but also may introduce considerable instability. The impacts of such shocks have been extensively documented. For example, [Mendoza \(1995\)](#) and [Kose \(2002\)](#) find that terms of trade shocks account for at least half of the output volatility in developing countries, while [Barro \(1996\)](#) documents that sustained deteriorations in a country’s terms of

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trade can have a significantly negative impact on growth.<sup>1</sup> Recent empirical evidence links terms of trade shocks not only to changes in economic growth and volatility, but also to changes in borrowing premiums and to the severity of debt crises.<sup>2</sup> This link has not been modeled formally, and in this paper we examine specifically how the effects of terms of trade shocks on growth and instability are influenced by debt and international capital flows.

The effects of terms of trade shocks on a small open economy have been extensively studied since the early 1950s when Harberger (1950) and Laursen and Metzler (1950) predicted that a deterioration in the terms of trade would reduce real income, thereby lowering savings and investment to cause a deterioration of the current account balance. The “Harberger–Laursen–Metzler effect” is purely static, however, giving rise to an extensive literature that re-examined the effects of terms of trade shocks within an intertemporal framework.<sup>3</sup> One general conclusion of the intertemporal literature is that the Harberger–Laursen–Metzler effect is sensitive to several key features of the economy. These include the exact specification of the nature of (i) preferences (Obstfeld, 1982; Svensson and Razin, 1983; Mansoorian, 1993; Ikeda, 2001); (ii) production in terms of labor supply (Bean, 1986) and capital (Sen and Turnovsky, 1989); (iii) international capital market imperfections (Obstfeld, 1982; Huang and Meng, 2004); and (iv) duration of the shock (Obstfeld, 1982; Persson and Svensson, 1985).

Previous investigations of the link between capital market imperfections and terms of trade shocks have been motivated by the potential for financial flows to smooth consumption following adverse shocks. However, this would imply that debt flows are countercyclical, contradicting the data that clearly suggest that debt flows are procyclical.<sup>4</sup> This procyclicality is thought to be driven by external supply factors that amplify the impact of the initial shock and exacerbate growth booms and busts. One such factor that has been closely tied in the data to procyclicality is the change in risk perception on the part of creditors (see, e.g., Kaminsky et al., 2003). Specifically, it is thought that frequently updated credit ratings influence the quantity and the price of international capital. Under such circumstances procyclical capital flows attract unsustainably large capital inflows during favorable shocks and force countries to overadjust to adverse shocks (see World Bank, 1993, p. 20; Easterly et al., 1999).

In this paper we seek to model such adjustment dynamics in terms of trade shocks. We extend a simple growth model to incorporate the role of endogenous country-specific borrowing premiums. The objective is to examine the resulting debt flows to see if these external factors amplify contractions (expansions) in the case of adverse (favorable) terms of trade shocks. Interest in the interplay between terms of trade shocks, risk, debt, and growth has gained significant momentum since the Asian crisis. Broda and Tille (2003) provide an extensive survey to show how strongly terms of trade, debt, growth, and risk are linked in developing countries. Min (1998) and Min et al.

<sup>1</sup> Mendosa (1995) finds that terms of trade disturbances explain 56% of aggregate output fluctuations in developing countries. Kose (2002) studies a broader set of world price shocks (including intermediate and primary goods) to find that they explain roughly 88% of aggregate output fluctuations. Turnovsky and Chattopadhyay (2003) provide evidence to show that volatility in the terms of trade have adverse effects on the growth rate.

<sup>2</sup> See Min (1998), Min et al. (2003), Cuadra and Saprizza (2006) and Peter (2002) for a survey on econometric studies of the probability of sovereign default in emerging markets.

<sup>3</sup> This reappraisal was initiated by Obstfeld (1982) and further pursued in a number of different directions by Svensson and Razin (1983), Persson and Svensson (1985), Bean (1986), and Sen and Turnovsky (1989), and more recently by Serven (1999), Ikeda (2001), Otto (2003), and Huang and Meng (2004). See Duncan (2003) for a survey.

<sup>4</sup> Procyclicality of capital flows to developing countries was first documented by Díaz-Alejandro (1983, 1984) prior to the first Latin American debt crisis. For recent, systematic reviews of the evidence on the procyclicality of capital flows, see Dadush et al. (2000), and Kaminsky et al. (2003). Procyclicality is observed not only for terms of trade shocks, but also for cyclical growth swings; see Botman et al. (1999).

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