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Vertically globalized production structure in New Keynesian Phillips curve

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ABSTRACT

This paper revisits the hypothesis that globalization may weaken central bank's monetary control by analyzing the potential effect of vertically globalized production structure that increasingly permeates the international production process on domestic macroeconomic dynamics under the foreign disturbances of productivity, demand, and inflation. We do so through the lens of New Keynesian model with Calvo-type staggered price setting and production function that uses foreign intermediate inputs. We find that central bank has to confront a policy tradeoff between stabilizing inflation and real output as exchange rates have transformed aforementioned foreign disturbances into domestic supply shocks channeled thorough real marginal cost.

1. Introduction

The recent wave of globalization of goods markets, factor markets, and financial markets have raised at least three important challenges to monetary economists and policymakers: that globalization has changed the slope of inflation-output tradeoff, that globalization has contributed to the steady fall in trend inflation, and that globalization has undermined the ability of home central banks to affect home inflation dynamics through their own monetary policy actions. Rogoff (2003, 2006), for example, suggests that the deregulation and privatization spurred by globalization create favorable competitive environment that helps driving down the trend inflation in the 1990s. The ensuing greater flexibility

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in prices and wages diminishes real gains from surprised inflationary monetary policy stance, and thus strengthens the sensitivity of inflation to real output change.

There are many doubtful views about the merits of globalization in bringing down the trend inflation and in steepening the output-inflation tradeoff. For instance, Clarida, Gali, and Gertler (2000), and Boivin and Giannoni (2006) argue that effectively-conducted monetary policy, particularly with more elastic Fed's responsiveness to inflation fluctuations, by and large underlies the "great moderation" in macroeconomic volatility post-1980. Equivalently, Robert (2006) suggests that a more predictable monetary environment with more aggressive reaction to inflation fluctuation and better output gap estimates can account for most or all of the change in the inflation-unemployment relationship. Sbordone (2008) considers a New Keynesian Phillips curve with demand elasticity that varies accordingly to the numbers of traded goods, and finds no convincing evidence supporting the claim that the increasing variety of traded goods of the magnitude observed in the United States in the 1990s as a result of growing globalization has altered the dynamic response of inflation to marginal cost and so real output. No less subtle criticism from the empirical point of view is that globalization actually flattens the slope of inflation-output tradeoff (see, e.g., Duca & VanHoose, 2000; Borio & Filardo, 2007; Ihrig, Kamin, Lindner, & Marquez, 2007; Pain, Koske, & Sollie, 2006).

Of interest in this paper, however, is about the third challenge aforementioned, that is, the very ability of national central bank to retain control over domestic output and inflation dynamics in the presence of globalization. Having considered a thorough sort of globalization that spans global liquidity, global saving and investment, and foreign output gap, Woodford (2010) eloquently argues that globalization is unlikely to compromise the national central bank's control over the inflation dynamics. In the same volume, Boivin and Giannoni (2010) also find that globalization neither becomes influential on U.S. inflation dynamics nor alters the U.S. monetary transmission mechanism between 1984 and 1999. At most, as the often-cited Ball (2006) has argued, foreign economic condition is a secondary influence on national inflation.

In this paper, we contribute to the contentious debates on the monetary policy effectiveness under globalization by considering vertical fragmentation in production structure across the sovereign borders. This is motivated by the recent development in the international trade literature that has been widely documenting the rise of cross-country production networks and as corollary of vertical trade. Drawn from Hummels, Ishii, and Yi (2001), *vertically globalized production structure* as a term is intended here to mean that goods are produced in multiple-sequential stages in which the country must use at certain portion imported intermediate inputs in its stage of production process, and some of the resulting output must be exported. In this respect, the productions of two or more countries are linked vertically and sequentially.

This vertically globalized production structure has been an increasingly important feature of today's pattern of production and trade. For instance, Chen, Kondratowicz, and Yi (2005) infers that Germany vertical trade as a share of total export has increased steadily from 18.4 percent in 1978 to 22.4 percent in 1995 while U.S. share being more than doubled from 5.9 percent in 1972 to 12.3 percent in 1997. They further show that the fraction of U.S. exports of manufactured goods went to foreign affiliates of U.S. multinationals for further manufacture has risen from 15.6 percent in 1977 to 22 percent by 1999. Throughout, the share of these remanufactured products of U.S. foreign affiliates for *re-export* has risen from 31 percent to 41 percent (see also, e.g., Feenstra, 1998; Hummels et al., 2001; Yi, 2003).

Interestingly, Dean, Fung, and Wang (2007) document that about 35 percent, in some sectors more than half, of China's exports to the world is remanufactured imported inputs. Seeing that East Asian countries are heavily dependent on international production fragmentation for export dynamism, the economic integration of China has deepened production fragmentation and contributed significantly to the growth of East Asia (e.g., Athukorala & Yamashita, 2006; Cheng & Kierzkowski, 2001, for South-East Asia; Haddad, 2007, for the role of China). All these hard evidences overwhelmingly point to a fact that the globally vertical fragmentation has been permeating the used-to-be national production structures.

Peculiarly enough, this defining feature of the second wave of globalization, compared to the first wave during the early twentieth century, has been completely overlooked in the received literature on why globalization might be expected to substantially complicate the task of national central banks to control the inflation within their borders. In this paper, we take up this possibility and offer a