Contents lists available at ScienceDirect





Journal of International Economics

journal homepage: www.elsevier.com/locate/econbase

Financial integration and the wealth effect of exchange rate fluctuations $\stackrel{ riangle}{\to}$

Cédric Tille*

Geneva Graduate Institute for International and Development Studies, Switzerland

ARTICLE INFO

Article history: Received 8 November 2005 Received in revised form 11 July 2007 Accepted 5 February 2008

Keywords: Foreign assets Valuation effect Exchange rate Asset prices Interdependence

JEL classification: F31 F41 F42

1. Introduction

ABSTRACT

Recent years have witnessed a large increase in international financial integration in the form of largely offsetting cross-holdings across countries. We assess how such financial leverage affects the international transmission of monetary shocks, and find that it leads to sizable welfare differentials that far exceed the impact due to nominal rigidities. We document the relevance of the exact nature of holdings, with bond holdings associated with larger effects than equity holdings. The impact of financial leverage on welfare is also sensitive to the extent of exchange rate pass-through and the substitutability between goods produced in different countries.

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The rise of international financial integration represents a major development in the world economy over the last two decades (Gourinchas and Rey, 2007a,b; Lane and Milesi-Ferretti, 2007, 2005, 2003). International investment positions have become more leveraged, with the values of both gross assets and liabilities surging in most countries. For instance the gross external assets and liabilities of the United States stood at 115 and 131% of GDP at the end of 2006, compared to 36 and 34% twenty years ago. This has opened an additional channel of interdependence as fluctuations in asset prices and exchange rate impact the value of international holdings. The U.S. provides a striking illustration. Since the end of 2001 it borrowed \$3.2 trillion from foreign investors, with no impact on its net external debt thanks to capital gains on its foreign assets.¹ Understanding how financial leverage alters international interdependence is then a relevant avenue of research, as discussed by Gourinchas (2006) and Obstfeld (2004).

This paper analyzes how the international transmission of monetary shocks is affected by the international financial leverage, building on the setup of Obstfeld and Rogoff (1995). We follow the standard method of solving the model around an allocation where countries hold no *net* claims on each other, but allow for a varied structure of offsetting *gross* holdings of different assets in different currencies. We focus on how financial leverage affects the impact of the shocks on welfare, as this provides a summary measure of their effect, and show five main points.

* Pavillon Rigot, Avenue de la Paix 11A, 1202 Geneva, Switzerland. Tel.: +41 22 908 5928; fax: +41 22 733 3049.

[★] I am grateful to Charles Engel and two anonymous referees for valuable comments. I also thank Roberto Chang, Pierre-Olivier Gourinchas, Dale Henderson, Philip Lane, Michael Moore, Paolo Pesenti, Richard Portes, Helene Rey, and Francis Warnock, and several seminar audiences for helpful feedback. Aaron Cooper and Svenja Gudell provided excellent research assistance. This research was initiated while I was at the Federal Reserve Bank of New York, and the views in the paper are mine and do not necessarily reflect the position of the Federal reserve Bank of New York or the Federal Reserve System.

E-mail address: cedric.tille@graduateinstitute.ch.

¹ For a discussion of the recent U.S. situation see Higgins et al. (2007) and Nguyen (2007).

Table 1

Composition of U.S. external assets and liabilities: end of 2006, percent of GDP

		Total	U.S. dollar	Foreign currencies
Assets	Total	115	46	69
	FDI and equity	65	2	64
	Other	50	45	5
Liabilities	Total	131	126	6
	FDI and equity	43	43	0
	Other	88	82	6
Net holdings	Total	-16	-80	63
	FDI and equity	22	-42	64
	Other	-38	-38	0

Source: Bureau of Economic Analysis, author's computations.

First, a country (Home) benefits from a depreciation of its currency when it is a net creditor in assets denominated in other currencies, as it raises the Home-currency value of a given income stream in foreign currencies. Second, the exact structure of assets matters. If cross-border holdings are dominated by equity instruments, monetary shocks lead to movements in international dividend payments that substantially offset the direct impact through the exchange rate described above. By contrast, no such offset occurs for bond holdings. Third, both the gross and net holdings in specific asset categories matter. If cross-border equity holdings are fully balanced, the offset through dividend streams fully cancels out the direct exchange rate effect, while the offset is only partial if the Home country is a net creditor in equity. Fourth, structural features that have long been recognized as central drivers of international interdependence also alter the impact of financial leverage. The offset through dividend payments described above is stronger when there is limited pass-through of exchange rate movements to import prices, and the impact of financial leverage is larger when goods produced in different countries are poor substitutes. Fifth, a financial leverage in line with the current situation of the U.S. leads to large international welfare differentials following shocks, well above the welfare effect of nominal rigidities per se.

This paper takes an exogenous structure of international assets and liabilities and assesses how it alters international transmission. Our approach is most closely related to the contributions by Benigno (2006) and Ghironi et al. (2006). We differ from Ghironi et al. (2006) who focus on equity holdings in a setting with purchasing power parity. While they do not directly assume the structure of international portfolios, they indirectly do so through exogenous financial frictions.

Our exercise is subject to two limitations that should be kept in mind. First, we capture only the unexpected impact of monetary shocks through international factor payments. While we consider several assets, they all yield the same return ex ante. The model therefore cannot capture expected valuation gains on international assets and liabilities, such as the ones stressed by Gourinchas and Rey (2007a,b). In addition, the welfare results if our analysis cannot be systematically exploited by monetary policy, as agents would adjust their expectations accordingly and offset the systematic component of monetary policy.

Second, our model is solved around an exogenous portfolio. An alternative would be to allow for an endogenous portfolio reflecting the various shocks that affect the economy. Developing stochastic models of endogenous international portfolios is the focus on an active literature, with the analysis of incomplete asset markets entailing substantial technical difficulties (Coeurdacier, 2006; Devereux and Saito, 2006; Devereux and Sutherland, 2006; Engel and Matsumoto, 2006; Evans and Hnatkovska, 2005; Heathcote and Perri, 2005; Kollman, 2006; Tille and van Wincoop, 2007). The literature shows that international portfolios can be quite sensitive to the structural features of the economy. For instance, Engel and Matsumoto (2006) show that productivity shocks lead to a foreign bias in equity holdings when prices are fully flexible, but have the opposite implication of home bias under nominal rigidities. The nature and volatility of various shocks also plays a central role, as can be seen for instance in the examples presented by Devereux and Sutherland (2006).

Against this background, our assumption of an exogenous portfolio is motivated in two ways. First, it sheds light on relevant structural features for international interdependence in the presence of financial leverage. While we focus on the transmission of monetary shocks, such innovations are a central building block of any analysis of monetary policy in a stochastic environment. Second, it allows us to choose an international portfolio that is line with the empirical evidence without having to fine-tune the model to deliver this portfolio. In particular, we do not need to take a stance of the nature and magnitude of the various shocks to which the economy is exposed.² While our approach is clearly imperfect, the literature has yet to converge to a consensus model that generates the observed international holdings.

The relevance of considering a rich structure of international assets and liabilities is illustrated by the case of the United States (Table 1). FDI and equity holdings account for a larger share of gross assets than of gross liabilities. In addition, the net international investment position shows a substantial leverage between net assets in FDI and equity and net liabilities in other holdings (mostly bonds and banking positions). A substantial leverage is also observed between net assets in foreign currency and net liabilities in U.S. dollar.

The remainder of the paper is organized as follows. Section 2 presents the main elements of a simple general equilibrium model encompassing international financial leverage. The transmission of monetary shocks is analyzed in Section 3, and Section 4 concludes. We focus on the main points of the analysis, and leave the detailed steps to an Appendix available on request.³

² Our focus on monetary shocks then does not imply that we regard them as the only source of volatility.

³ A detailed empirical and theoretical analysis, along with further discussion of related literature, can be found in the working paper version of this work (http://www.ny.frb.org/research/staff_reports/sr226.html).

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