Monetary Transmission in Low-Income Countries: Effectiveness and Policy Implications

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Abstract

This paper reviews the monetary transmission mechanism in low-income countries (LICs). We use the standard description of monetary transmission as a benchmark to identify aspects of the transmission mechanism that may operate differently in LICs. In particular, the paper focuses on the effects of financial market structure on monetary transmission. The weak institutional framework prevalent in LICs drastically reduces the role of securities markets. Consequently, traditional monetary transmission through market interest rates and market-determined asset prices are weak or nonexistent. The exchange rate channel, in turn, tends to be undermined by heavy central bank intervention in the foreign exchange market. The weak institutional framework also has the effect of increasing the cost of bank lending to private firms. Coupled with imperfect competition in the banking sector, this induces banks to maintain chronically high excess reserves and to invest in domestic public bonds or (when possible) in foreign bonds. With the financial system not intermediating funds properly, the bank lending channel also becomes impaired. These factors undermine both the strength and reliability of monetary transmission, which has important implications for the conduct of monetary policy in LICs.

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While Milton Friedman was a great believer in the power of monetary policy to affect aggregate demand, his perception that these effects were transmitted with long and variable lags led him to be skeptical of the effectiveness of activist monetary policy. It is easy to imagine that if in addition to being subject to long and variables lags, the ultimate effects of monetary policy on aggregate demand had been perceived by Friedman as unpredictable, his conviction that nonfeedback rules for monetary policy were superior to rules with feedback would have been strengthened.

In contrast, the modern consensus that monetary policy should be conducted in accordance with predictable rules is not predicated on the view that the effects of monetary policy on aggregate demand tend to be uncertain. Instead, it is based on the perception that central bank credibility is vital for the effective conduct of monetary policy, because only systematic central bank behavior in accordance with an interpretable rule that embodies a commitment to price stability can provide a reliable anchor for private sector expectations.[1] As befits their different motivation, modern monetary policy rules tend to be of the feedback variety. Taylor rules, for example, incorporate feedback from both inflation and real activity to the setting of the monetary policy instrument. These rules are formulated on the explicit premise that the monetary policy instrument can exert systematic and predictable effects on aggregate demand, at least under normal (that is, nonliquidity trap) conditions. In other words, these rules take as given a reasonably reliable mechanism of monetary transmission.

This favorable view of the effectiveness of monetary transmission is the result of more than two decades during which economists have devoted a substantial amount of attention to the transmission mechanism. However, these efforts have typically been carried out in the analytical and empirical context of economies with sophisticated and well-functioning financial markets. Much less is known about monetary transmission in economies with more rudimentary financial systems—not just quantitatively, but even qualitatively. This is particularly true in low-income countries (LICs). Consequently, the link between the central bank's monetary policy instruments and the behavior of aggregate demand in such countries remains something of a black box. Since LICs have the same reasons to value rules-based monetary policy credibility as do high-income economies, and since the optimal design of such rules depends critically on the strength and reliability of monetary transmission (as suggested by the contrast between Friedmanesque constant-money-growth rules and more activist Taylor rules) understanding the characteristics of monetary transmission in LICs is an important issue, particularly since we have reason to believe that monetary transmission is strongly influenced by financial structure, and that the financial structure of most LICs differs significantly from that of most high-income countries.

[1] Goodfriend (2007) describes the evolution of this modern consensus

This paper examines how the various conventional channels of monetary transmission are likely to operate in the financial environment that tends to characterize LICs.[2] Not surprisingly, we find that there are strong a priori reasons for believing that the monetary transmission mechanism in LICs is fundamentally different from that in economies with more sophisticated financial systems. More importantly, we conclude that there are similarly strong a priori reasons to believe that monetary transmission may be both weak and unreliable in the context of LICs, and provide some empirical evidence consistent with this view.[3] We argue that this state of affairs has important policy implications for the conduct of discretionary monetary policy in such countries, for the desirability and design of inflation targeting, for the choice of exchange rate regimes, and for the desirability of capital account restrictions.[4]

The paper is structured as follows. The next section provides an overview of the monetary transmission mechanism as it is conventionally understood to operate in a general setting, with the goal of highlighting the assumptions about the economy's financial structure that underpin the various channels of monetary transmission typically identified in descriptions of the transmission mechanism. Section II turns specifically to the empirical characteristics of financial structure in LICs, documenting the extent to which the stylized facts about financial structure in such countries fail to match the assumptions identified in Section I. These differences in financial structure suggest that the bank lending channel is likely to be the dominant channel for monetary transmission in LICs, at least in relative terms (that is, compared with other potential channels of transmission).

However, the effectiveness and reliability of this channel may itself depend on the economy's financial structure. Section III provides a brief overview of the empirical literature on financial structure and monetary transmission in the context of higher-income countries. To explore the potential relevance of this issue for LICs, Section IV examines some cross-country evidence on the effectiveness of the bank lending channel, comparing the relationship between central bank policy rates and bank lending rates in LICs, advanced, and emerging economies. The results are consistent with this link being both weaker and less systematic in LICs than in the other country groups.

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[2] We limit our analysis to "typical" LICs. The usual definition of LICs refers to countries with PPP-adjusted income per capita of less than US$1,000 per year. We use this definition in a broad sense, considering that some countries with higher incomes per capita share many characteristics with typical LICs. Notably, we exclude India and China from our analysis. This is mostly because these countries present economic and institutional characteristics that are very different from the usual LICs. In addition, a vast and growing literature is devoted to these countries.

[3] By referring to monetary transmission in low-income countries as "weak" or "ineffective," we mean that the effect of monetary policy on aggregate demand is small; and by "unreliable," we mean that the effect depends on country-specific structural and institutional features and is likely to vary over time in unpredictable ways.

[4] We make a strong distinction in this paper between monetary and exchange rate policies. While the trilemma tells us that these are not independent instruments in the presence of high de facto capital mobility, this is not the situation that prevails in most LICs. Monetary and exchange rate policy tend to be independent instruments in the short run in most LICs, because credit market frictions that operate at the international level ensure that these countries are generally characterized by very limited de facto capital mobility, even when their capital accounts are open de jure (see Stultz, 2005). The implication is that fixing the exchange rate does not require these countries to surrender monetary autonomy.

They are also consistent with the frequent finding in empirical research (surveyed in Mishra, Spilimbergo, and Montiel, 2011) of weak monetary policy effects on output and prices in LICs. Section V examines the policy implications of these results. The final section summarizes.

I. Monetary Transmission: An Overview

The standard description of the monetary transmission mechanism proceeds as follows:

The Formulation of Monetary Policy

Monetary policy is usually taken to be formulated by an independent or quasi-independent central bank in pursuit of broad macroeconomic objectives, rather than with the objective of meeting the government's financing needs. In the United States, for example, this situation dates to the Fed-Treasury Accord of 1951, which freed the Federal Reserve to pursue its own macroeconomic objectives, rather than simply pegging the interest rate on Treasury bills for fiscal reasons.[5]

The Policy Instrument

Although the Finance Ministry may hold periodic auctions of government securities to finance deficits and refinance maturing debt (the primary market for government securities), these are assumed to be purchased by the domestic or foreign private sectors or by foreign official institutions, rather than by the domestic central bank. The central bank conducts monetary policy by buying and selling short-term government securities in a well-functioning secondary market. In doing so, its objective is to control the value of some financial market variable (for example, the interbank interest rate, the stock of unborrowed reserves, the monetary base, or the money stock) as an intermediate target. In recent years, central banks in advanced and emerging economies have most commonly targeted an interbank rate (for example, the federal funds rate in the United States). The value of this intermediate target is assumed to influence aggregate demand through the transmission mechanism and thus to affect the central bank's ultimate macroeconomic objective(s) (typically, price stability and/or full employment). The intermediate target is accordingly typically set through a feedback rule (such as a Taylor rule) that depends on the observed values of the ultimate macroeconomic objective(s).

The Transmission Mechanism

The transmission mechanism from open market transactions by the central bank to aggregate demand can be described as follows (consider for concreteness the example of a central bank *purchase* of government securities):

- From central bank intervention in the market for short-term government securities to interest rates in the interbank market for reserves.

[5] The role of central bank independence in monetary transmission (as opposed to monetary policy formulation) is discussed later in this section (see footnote 11).

The sellers of short-term government securities to the central bank hold the proceeds in commercial banks (these sellers are often the commercial banks themselves), thereby increasing commercial banks' free reserves. The increased stock of reserves causes a reduction in the interbank rate.

- From interest rates in the interbank market to interest rates on short-term government securities.

Arbitrage in commercial bank portfolios between the interbank market and bank holdings of very short-term government securities creates an equilibrium relationship between the return on those securities and the interbank rate. When the interbank rate is low relative to the prevailing rate on short-term government securities, banks reallocate their asset portfolios away from reserves, which can be used for lending in the interbank market, and into purchasing short-term Treasury bills, which lowers the rate of return on those bills (and vice versa when the interbank rate is high). The arbitrage condition between the return on short-term government securities and the interbank rate leads to the following relationship:

$$i_T = i_R, \tag{1}$$

where i_T is the interest rate on very short-term government securities and iR is the interbank rate. Notice that this arbitrage condition describes the relationship between the two interest rates, but does not pin down the value of either rate.

To see how the central bank can set iR, note that banks purchase short- term Treasury bills by issuing deposits on themselves, but for financial market equilibrium to hold, these new deposits must be willingly held by the nonbank public. For this to be the case, the rate of return on alternative assets has to fall. These alternative assets are precisely short-term Treasury bills. Write the demand for deposits as D(iT, Y), where Y denotes real income and D1<0, D2>0. Let rr be the required reserve ratio, er the ratio of excess reserves to deposits (taken to be a decreasing function of the differential between the Treasury bill rate iT and the return on reserves iR, with er equal to some equilibrium value er* when that differential is zero), equilibrium in the market for reserves requires:

$$H = (rr+er(i_T - i_R)\, D(i_T, Y), \tag{2}$$

where H is the supply of reserves. Using Equation (1), this becomes:

$$H = (rr+er^*)\; D(i_R, Y),$$

To hit a desired target for the money market rate, say * , the central bank therefore has to set:

$$H = (rr+er^*)\; Pd\,(i^*_R, Y),$$

This "liquidity effect" creates the first channel through which monetary policy may affect aggregate demand. Under sticky prices and rational expectations, the short-run expected rate of inflation is

unaffected by the central bank's intervention in the Treasury bill market, so the effects of open-market operations on the interest rate on short-term Treasury bills should be reflected in the short-term real interest rate, which (at least potentially) affects aggregate demand directly by altering the intertemporal profile of household consumption (in formal terms through the Euler equation). The effectiveness of this channel, which is one component of the interest rate channel, depends on the degree of intertemporal substitutability in consump- tion as well as on the extent to which households are rationed in credit markets.[6] The higher the degree of intertemporal substitution in consumption and the less prevalent is credit rationing, the more effective this channel is likely to be. As we shall discuss below, there is a separate component of the interest rate channel which affects spending on durable goods by households and firms. Accordingly, to be precise, we can refer to this first channel as the short-term interest rate channel.

- From the interbank rate to bank lending rates.

In principle, an increase in the size of banks' deposit base should increase the volume of resources that banks intermediate (but see below), thus increasing banks' supply of loanable funds. Competition among banks would be expected to cause this increased supply of funds to reduce bank lending rates as well as to increase the availability of credit for rationed borrowers, if any. This induces a second effect on aggregate demand, as the reduced interest rates on bank loans and greater availability of bank credit induces an increase in spending by bank-dependent agents (typically small, opaque firms). This second channel of monetary transmission is referred to as the bank lending channel, one component of a broader credit channel. The effectiveness of this channel depends on the extent that an expansion of reserves does increase the supply of bank loans, and that an increase in the supply of bank loans reduces the cost and/or availability of finance for the nonbank sector.[7]

Why might the supply of bank loans not be affected? There are two reasons. First, on the liability side of banks' balance sheets, banks may be able to attract resources not just by issuing deposits, but also by issuing their own short-term securities (for example, negotiable CDs in the United States).[8]

Thus, when their supply of deposits increases, they may simply cut back on the securities they issue, leaving the asset side of their balance sheets unchanged. This happens when short-term securities and deposits are close substitutes.[9]

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6 The interest rate channel is sometimes referred to as the "money" channel

7 The bank lending channel may operate whether or not banks ration credit to bank- dependent customers. To the extent that they do, the channel would operate through the availability of credit to rationed borrowers. But even if banks do not ration credit, the channel would operate through the cost of credit to bank-dependent borrowers.

8 Not everyone agrees that the role of securities and large CDs necessarily weakens the bank lending channel in advanced economies. For a contrary view, see Keeton (1993).

9 Notice that this implies a very high elasticity of demand for money—that is, a very flat LM curve.

Second, on the asset side of banks' balance sheets, when their deposit base increases, banks may simply purchase more securities, rather than make more loans. This would be more likely to happen when securities and loans are close substitutes (in the portfolios both of banks and their customers)—in other words, when bank lending is not "special" in the usual sense. The strength of that channel depends on the degree of competition among banks (which determines the response of banks' lending rate to banks' cost of funds). In a noncompetitive environment (because of regulation or collusion), banks will not pass on their reduced costs of funding to their loan rates.[10]

- From short-term government securities to the exchange rate.

Under floating exchange rates and perfect capital mobility, arbitrage between domestic and foreign short-term government securities causes incipient capital flows which change the equilibrium value of the exchange rate required to sustain uncovered interest parity. This triggers a third channel of transmission, the exchange rate channel. With sticky prices, this change in the nominal exchange rate is reflected in a real exchange rate depreciation that induces expenditure switching between domestic and foreign goods. The effectiveness of this channel depends on the central bank's willingness to allow the exchange rate to move (which may be constrained by "fear of floating"), on the degree of de facto capital mobility (for a given change in domestic short-term interest rates, there will be less movement in the exchange rate the lower the degree of capital mobility), on the strength of expenditure-switching effects (this depends on the commodity composition of production and consumption), on the importance of currency mismatches (because adverse balance sheet effects could create negative expenditure- reducing effects that may offset or even dominate expenditure-switching effects on aggregate demand), and on the degree of exchange rate pass-through (because what induces expenditure switching is a change in the real exchange rate, which is less likely to follow from a change in the nominal exchange rate when pass-through is large).

- From interest rates on short-term government securities to interest rates on long-term government securities.

An expectation mechanism operating on the term structure ties interest rates on short-term securities to rates on longer-term securities. The effectiveness of this mechanism depends, among other things, on the perceived per- manence of the change in short-term rates—that is, on the information content of a change in the current short-term rate for expected future short- term rates. Changes in long-term interest rates in turn give rise to two additional channels. The long-term interest rate channel operates through the effects of changes in long-term interest rates on firms' and households' purchases of durable goods.

[10] For example, if the banking sector is oligopolistic and individual banks believe they face a "kinked" demand curve for loans, they would be unlikely to pass small changes in their marginal cost of funds on to their lending rates.

While the short-term interest rate affects mostly household consumption, the long-term real interest rate affects firms' spending on investment through the cost of capital and household spend- ing on durables.[11, 12]

- From long-term interest rates to asset values.

Changes in long-term interest rates affect the discount factors applied to future income streams, including those from long-maturity bonds, equities, and real assets.

The asset channel operates through the implications of changes in long-term interest rates for the prices of such assets, which exert wealth effects on private consumption. The effectiveness of this channel depends on the sensitivity of asset values to changes in long-term rates, on the ratio of these components of wealth to household incomes, and possibly on the distribution of these assets among households if the marginal propensity to consume out of wealth varies across households.

- From asset values to external finance premiums

Changes in asset values affect the collateralizable net worth of firms and households. Because the availability of collateral reduces the severity of the moral hazard problem that is associated with external finance for firms and households, it reduces the premium that lenders charge such borrowers over the risk-free interest rate, known as the external finance premium. Fluctuations in asset values are therefore negatively correlated with fluctuations in the external finance premium. This creates a mechanism that reinforces the effects of changes in interest rates on the cost of external financing: higher interest rates reduce asset values and therefore increase the external finance premium. This financial accelerator is a manifestation of a distinct component of the channel for monetary transmission, the balance sheet channel.

Underlying Assumptions

Note that this conventional description of monetary transmission relies on effective arbitrage along several margins: between different domestic short- term securities, between domestic short-term and long-term securities, between long-term securities and equities, between domestic and foreign securities, and between domestic financial and real assets. It is therefore clearly intended to apply to an economy with a highly developed and competitive financial system. As such, it implicitly assumes the following institutional setup, which is typically taken for granted in discussions of monetary transmission in OECD countries:

11 Why does central bank independence matter from the perspective of monetary transmission as opposed to that of policy formulation? The answer is that, as suggested in the previous paragraph, the transmission from short-term interest rates to longer-term rates depends on agents' interpretation of what an unanticipated change in monetary policy indicates about future monetary policy. This in turn depends on their understanding of the central bank's "true" policy reaction function—that is, on the central bank's credibility. Because the degree of central bank independence affects the nature of the central bank's policy reaction function, it may thus be expected to also affect agents' interpretation of the implications of current monetary policy actions for expected future monetary policy.

12 Given the central role of expectations about future monetary policy in this channel, it is sometimes referred to as the "expectations" channel.

- A strong institutional environment, so that loan contracts are protected and financial intermediation is conducted through formal financial markets.
- An independent central bank.
- A well-functioning and highly liquid interbank market for reserves.
- A well-functioning and highly liquid secondary market for government securities with a broad range of maturities.
- Well-functioning and highly liquid markets for equities and real estate.
- A high degree of international capital mobility.
- A floating exchange rate.

As we shall argue below, these conditions are rarely satisfied in LICs. This raises doubts about the relevance of the standard description of monetary transmission for such countries.

The question is how far off the mark the standard description of monetary transmission is in a "typical" LIC.

II. The Monetary Policy Environment in LICs

To the extent that financial structures in LICs depart from the assumptions listed at the end of the last section, we should expect the transmission mechanism in those economies to differ from the standard description. In this section we will examine the extent to which the conditions listed above are satisfied in LICs, and will consider the implications both for the channels of monetary transmission that are likely to be dominant in LICs and for the likely effectiveness of those channels.

Size of the Formal Financial Sector

Financial intermediation may be carried out either inside or outside the formal financial sector. Informal finance may involve transactions between related parties, reliance on specialized moneylenders, or the use of informal credit cooperatives. All of these have in common that they rely on informal means to overcome asymmetric information and contract enforcement problems, and they are likely to play a dominant role in financial inter- mediation when the formal institutional environment is weak. Under these circumstances the formal financial sector is likely to be small and to conduct a relatively minor fraction of total domestic financial intermediation.

Panel A of Table 1 suggests that this is indeed the case in LICs. Relative to advanced and emerging economies, LICs exhibit substantially smaller ratios of deposit money bank assets to GDP as well as of nonbank financial intermediary assets to GDP.[13] The ratio to GDP of assets held by deposit money banks and other formal financial institutions in advanced economies is 1.24, while in LICs it is only 0.32. Thus, relative to what is typically the case in advanced economies, the formal financial sector is a relatively much smaller player in LICs.

[13]The data are from Beck, Demigurc-Kunt, and Levine (2010).

How should this be expected to affect monetary transmission? The transmission mechanism can be decomposed into two steps: from central bank actions to financial variables such as those described in the last section, and from financial variables to aggregate demand. When the formal financial sector is small, much of the economy does not interact with the formal financial sector. Consequently, any effects of monetary policy on formal financial sector variables (for example, on bank loan rates) would tend to have weaker effects on aggregate demand than would be true where formal financial intermediation is extensive. In other words, the second step in the transmission mechanism, which depends on the elasticity of the IS curve with respect to formal-sector financial variables, would tend to be weak when the formal financial sector is small.

Central Bank Independence

Arnone, Laurens, and Segalotto (2006) constructed a measure of central bank independence for a group of 145 advanced, emerging, and low-income economies. Panel B of Table 1 provides a comparison of this measure for groups of countries classified into each of these categories. The key observation is that central banks in both emerging and low-income countries appear to be significantly less independent than those in advanced economies, with LIC central banks being roughly half as independent by this measure as those in emerging economies. As indicated before, this affects not just the scope for the exercise of monetary policy, but also the effects of that policy, because it influences the perceived implications of any current monetary policy action for future monetary policy.

Quality of the Institutional and Regulatory Environment

The small size of the formal financial sector in many LICs is undoubtedly due in large part to the serious deficiencies in the institutional and regu- latory environment that characterizes many of these countries. As indicated in Panel C of Table 1, LICs score substantially lower than both advanced and emerging economies on the full range of the Kaufmann, Kraay, and Mastruzzi (2009) governance indicators. This poor institutional environment affects not just the overall size of the formal financial sector, but also the environment in which that sector operates. Political instability, poor account- ing and disclosure standards, weak property rights, limited government accountability, a weak regulatory environment, a poorly functioning legal system, and the prevalence of corruption would all tend to contribute to high costs of financial intermediation.

Money and Interbank Market Development

While we know of no comprehensive data set on this issue, substantial case study evidence suggests that money and interbank markets are poorly developed or nonexistent in many LICs (see IMF, 2005). The poor institutional environment provides a plausible reason. In the absence of an institutional infrastructure that promotes bank transparency, with a weak regulatory and supervisory structure, and with the occasional inability to enforce contracts, mutual distrust causes banks to avoid lending to each other. Moreover, these same institutional deficiencies also make lending to the nonbank sector an expensive proposition, which means that unlike banks in advanced economies, which sometimes demand or supply excess reserves, banks in many LICs have chronic excess reserves.[14] With all potential participants on one side of the market, there is no demand for interbank transactions.

[14] Saxegaard (2006), for example, estimated that excess reserves amounted to over 13 percent of deposits on average in sub-Saharan banking systems in 2004.

Table 1. Financial Environment Across Countries, 2005

Groups	A. Size of Banking Sector		B. Central Bank Independence	C. Governance Indicators 2008					
	Deposit money bank assets/gdp	Other financial institutions assets/gdp		Voice and accountability	Political stability & absence of violence/ terrorism	Government effectiveness	Regulatory quality	Rule of law	Control of corruption
Advanced									
Mean	1.24	0.55	0.96	1.08	0.92	1.44	1.34	1.47	1.54
#countries	28	5	28	29.0	29.0	29.0	29.0	29.0	29.0
Emerging									
Mean	0.63	0.17	0.60	-0.03	0.35	0.40	0.37	0.09	0.07
#countries	26	11	26	28.0	28.0	28.0	28.0	28.0	28.0
LIC									
Mean	0.32	0.06	0.33	-0.34	0.30	-0.52	-0.45	-0.51	-0.49
#countries	91	18	91	118.0	118.0	118.0	118.0	118.0	118.0
Total									
Mean	0.55	0.17	0.50	-0.06	0.10	-0.05	-0.02	-0.09	-0.06
#countries	145	34	145	175	175	175	175	175	175

Table-1 (Continued)

Groups	D. Securities Market			E. Bank Competition				F. Degree of Financial Repression
	Arnone-Laurens-Segalotto 2003	Private bond market capitalization/GDP: Thorsten-Beck	Public bond market capitalization/GDP: Thorsten-Beck	Security Markets Index	Net interest margin	Bank concentration	Entry barriers/ procompetition measures index: SR Database	Interest rate controls index
Advanced								
Mean	0.73	0.51	0.46	1.00	0.02	0.67	1.00	1.00
#countries	29	22	22	21	28	28	21	21
Emerging								
Mean	0.58	0.12	0.29	0.86	0.05	0.57	0.87	0.96
#countries	27	24	24	28	28	28	28	28
LIC								
Mean	0.55	0.00	0.43	0.56	0.06	0.73	0.89	0.83
#countries	89	3	3	42	85	87	42	42
Total								
Mean	0.59	0.28	0.38	0.75	0.05	0.69	0.91	0.91
#countries	145	49	49	91	141	143	91	91

Table-1 (Continued)

Groups	G. Stock Market				H. International Financial Integration
	Stock market capitalization/gdp	Stock market total value traded/gdp	Stock market turnover ratio	No. of listed companies per 10k population	
Advanced					
Mean	0.90	0.79	0.77	0.43	4.40
#countries	29	29	29	29	20
Emerging					
Mean	0.82	0.53	0.61	0.24	1.03
#countries	28	28	28	28	20
LIC					
Mean	0.27	0.02	0.11	0.23	0.92
#countries	51	52	51	51	61
Total					
Mean	0.58	0.35	0.41	0.29	1.63
#countries	108	109	108	108	101

Table-1 (Continued)

Groups	I. Exchange Rate Classification (IMF)				J. Exchange Rate Classification (Ilzetzki, Reinhart, and Rogoff)				
	1	2	3	4	1	2	3	4	6
Advanced									
#countries	19	0	0	10	19	0	7	3	0
% countries	22	0	0	34	29	0	23	38	0
Emerging									
#countries	7	0	11	9	5	9	10	2	1
% countries	8	0	20	31	8	17	33	25	50
LIC									
#countries	60	4	44	10	41	45	13	3	1
% countries	70	100	80	34	63	83	43	38	50
Total									
#countries	86	4	55	29	65	54	30	8	2
% countries	100	100	100	100	100	100	100	100	100

Sources: International Financial Statistics (IFS) of IMF; Beck, Demirguc-Kunt, and Levine (2009),, "A New Database on Financial Development and Structure" IMF Structural reform (SR) database "Structural Reforms and Economic Performance in Advanced and Developing Countries" (2008), prepared by the Research Department of IMF; Dhungana Sandesh (2008),, "Capital Account Liberalization and Growth Volatility," Williams College, unpublished. Governance Indicators (2008), are taken from Kaufmann, Kraay, and Mastruzzi (2009). "Governance Matters VIII: Governance Indicators for 1996–2008" World Bank Policy Research June 2009. The index of Central Bank Independence and the first securities market index are taken from Arnone, Laurens, and Segalotto (2006).

Notes: Securities market index relates to securities markets and covers policies to develop domestic bond and equity markets, including (i) the creation of basic frameworks such as the auctioning of T-bills, or the establishment of a security commission; (ii) policies to further establish securities markets such as tax exemptions, introduction of medium- and long-term government bonds to establish a benchmark for the yield curve, or the introduction of a primary dealer system; (iii) policies to develop derivative markets or to create an institutional investor's base; and (iv) policies to permit access to the domestic stock market by nonresidents. Entry barriers/procompetition measures index measures competition restrictions, such as limits on branches and entry barriers in the banking sector, including licensing requirements or limits on foreign banks. Interest rate controls index covers interest rate controls, such as floors or ceilings.

Secondary Market for Government Securities

The secondary markets for government securities tend to be poorly developed in LICs. Panel D in Table 1 provides some evidence for this observation. For example, the index of securities market development presented in the last column attains only half of its average advanced country value in LICs.[15] The implication of poor securities market development is that central banks cannot conduct monetary policy through open market transactions in liquid secondary markets. Instead, monetary policy instruments tend to consist of purchases of Treasury bills in primary auctions (which effectively give the central bank control over the share of new Treasury issues that must be held by the public) and of the amounts and terms of credit extended by the central bank to the commercial banking system (rediscounts).[16]

Competition in the Banking Sector

Banking sectors in LICs tend to be only imperfectly competitive, partly because the banking industry is characterized by a small number of banks and by an important role for government-owned banks, but also because the industry faces weak competition from nonbank financial intermediaries. As shown in Panel E of Table 1, banking sectors in LICs on average exhibit both larger net interest margins and higher degrees of concentration than those in advanced and emerging economies. As shown in Panel A, the size of the nonbank financial sector is very small compared with those in advanced and emerging economies not only in absolute terms, but also relative to the size of the banking sector.

The relevance of this observation for monetary transmission concerns the connection between policy rates and market rates: when the banking system is imperfectly competitive, changes in policy interest rates (for example, the central bank's rediscount rate) may have weak effects on market rates, since imperfectly competitive banks may not pass on changes in policy rates. If so, changes in policy rates may largely affect banking spreads, rather than market rates.

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15 The index is drawn from the IMF structural reform database. It relates to securities markets and covers policies to develop domestic bond and equity markets, including (i) the creation of basic frameworks such as the auctioning of T-bills, or the establishment of a securities commission; (ii) policies to further establish securities markets such as tax exemptions, introduction of medium- and long-term government bonds to establish a benchmark for the yield curve, or the introduction of a primary dealer system; (iii) policies to develop derivative markets or to create an institutional investor base; and (iv) policies to permit access to the domestic stock market by nonresidents.

16 In contrast to advanced economies, discount credit is used very commonly as a monetary policy instrument in LICs. As a rough indicator, approximately three-quarters of our LIC sample of 109 countries report at least five years of monthly data on discount rates, and there is significant variation in discount rates over time. A simple variance decomposition exercise suggests that 95 percent of the variation in discount rates in our sample is within countries (as opposed to across countries). Buzeneca and Maino (2007) report that, while no advanced countries in the IMF's Information Systems for Instruments of Monetary Policy (ISIMP) database used discount credit as a monetary policy instrument, 69 percent of low- income countries did so.

Financial Repression

The flexibility of market rates may also be reduced by legal restrictions on the interest rates that banks can apply both to their liabilities and to their assets. This is one component of financial repression, a set of restrictive policies toward the financial system that was formerly quite common in developing countries. Since the late 1980s, financial liberalization has greatly reduced the incidence of financial repression among LICs. Nevertheless, as shown in Panel F of Table 1, while financial liberalization has been undertaken widely in LICs, this process is not complete.[17] Restrictions on the role of the market in setting bank loan rates remain somewhat more common in LICs on average than in advanced or emerging economies.

Maturity of Government Obligations

As documented in the "original sin" literature (see Eichengreen and Hausmann, 1999), governments in LICs are typically unable to issue long- term domestic currency-denominated bonds. The absence of long-term government bonds means that there is no observable market-based term structure. This implies more uncertainty about future short-term interest rates than would be the case with a well-developed term structure, since in the absence of long-term securities agents are unable to contract in the present for the interest rate that will prevail over the life of an asset and are forced to finance such assets by rolling over short-term loans at whatever interest rate prevails at the time.

In principle, the effects of the absence of long-term securities on monetary transmission are ambiguous. On the one hand, because the average maturity of financial contracts is shorter, it means that monetary policy can have a more significant short-run impact on the cash-flow positions of firms and households. On the other, because long-maturity assets are scarce, wealth effects operating through changes in the value of such assets are likely to be weaker (Kamin, Turner, and Van't dack, 1998).

Stock Market Size and Liquidity

Many LICs are characterized by the complete absence of a domestic stock market, or where such a market is present, by a small number of listed firms and minimal turnover in the market. Panel G of Table 1 indicates that stock market capitalization relative to GDP is significantly smaller in LICs than in either advanced or emerging economies, and both the ratio of value traded to GDP and the turnover ratio in the market are dramatically smaller in LICs than in the others. The implication is that the value of physical capital in place is not easily marked to market in LICs, and the illiquidity of physical capital may short- circuit the asset channel working through equity prices.

[17] Financial repression is measured by controls on interest rates, including whether the government directly controls interest rates or whether floors, ceilings or interest rate bands exist. The index is taken from the IMF structural reform database and is normalized between zero and one, with higher values indicating less financial repression and higher degrees of liberalization.

Efficiency of Real Estate Markets

The data on the functioning of real estate markets in LICs are notoriously difficult to obtain. Nevertheless, there is substantial indirect evidence that such markets are poorly developed and highly illiquid. Many LICs are characterized by poorly defined property rights, which inhibits the buying and selling of real estate. While property rights have many dimensions, at bottom they require a low risk of predation, either by the government or by other private agents. A poor institutional environment is likely to be associated with a high risk of predation, and thus with de facto weak property rights. As panel C in Table 1 indicates, in this respect LICs are far worse than advanced economies. The implication is that, like the market for shares in productive firms, the real estate market is also likely to be highly illiquid and market prices for real estate poorly defined. Again, the implication for monetary policy is that a potentially important channel for arbitrage is weakened, diminishing the power of the asset channel.

International Financial Integration

Panel H of Table 1 reports the ratio of the sum of gross external assets and liabilities (net of foreign exchange reserves on the asset side and of official borrowing on the liability side) to GDP, an indicator of de facto international financial integration. This indicator provides evidence that LICs are characterized by a significantly smaller degree of de facto integration with international capital markets than are advanced economies, and by a smaller degree of integration than emerging economies as well. This affects another important arbitrage margin: that between domestic and foreign financial assets. The implications of imperfect capital mobility for monetary transmission depend on the exchange rate regime. Under fixed exchange rates, the weakening of this arbitrage margin allows at least some degree of monetary autonomy, and thus allows the functioning of an interest rate channel. Under floating rates, it implies a smaller change in the exchange rate for a given change in the domestic interest rate, and thus weakens the exchange rate channel.

Exchange Rate Flexibility

The very presence of an exchange rate channel depends on the exchange rate regime adopted by the country. Here again, LICs tend to differ from advanced and emerging economies. As indicated in Table 1, whether classified by their official (de jure) announced regimes (Panel I), or by de facto exchange rate behavior (Panel J), LICs tend to restrict exchange rate flexibility to a much greater extent than do either advanced or emerging economies. This reduced exchange rate flexibility leaves relatively limited scope for an exchange rate channel.

Summary

The evidence presented above has important implications for the channels of monetary transmission in a "typical" LIC. First, the complete absence or poor development of domestic securities markets suggests that both the short-run and long-run interest rate channels should be weak. Second, small and illiquid markets for assets such as equities and real estate would tend to weaken the asset channel.

Third, in countries that are imperfectly integrated with international financial markets and tend to maintain relatively fixed exchange rates, the exchange rate channel would tend to be completely absent, or relatively weak. In general, therefore, the financial structure of LICs should lead us to expect the interest rate, asset, and exchange rate channels to be weak or nonexistent in such countries. By a process of elimination, the bank lending channel remains as the most viable general mode for monetary transmission in LICs.[18]

III. Financial Structure and Monetary Transmission

Although we argue on a priori grounds that the banking lending channel is likely to be relatively more important than the other channels, this does not necessarily imply that strong monetary transmission should be expected through the bank lending channel in LICs. A large empirical literature for advanced economies suggests that the strength of the bank lending channel depends on the specificities of the banking sector—in particular, the institutional environment in which it operates, its regulation, the degree of substitutability among different assets in bank portfolios and the degree of competition in the banking sector. The empirical literature has focused on some of these dimensions to identify the potential strength of a bank lending channel. This section provides a brief review of that literature to suggest what might be expected regarding the effectiveness of the bank lending channel in LICs.

The evidence on the strength of the bank lending channel in the United States is primarily based on variation across banks' characteristics. For example, Kashyap and Stein (2000) find that the impact of monetary policy on bank lending is stronger for banks with less liquid balance sheets (that is, banks with lower ratios of securities to assets), and that this pattern is largely attributable to smaller banks. The implication is that small banks with highly liquid balance sheets are unlikely to pass on changes in policy interest rates to their lending rates.

Cecchetti (1999) and Mihov (2001) provide some cross-country evidence from countries in the euro area, the United States, and Japan. They find that the strength of monetary transmission varies systematically across countries with differences in the size, concentration and health of the banking system, as well as with differences in the availability of primary capital market financing. Specifically, the bank lending channel is likely to be stronger in countries in which small banks are relatively more important, the banking systems are less healthy, and firms have little access to nonbank sources of finance.[19] Similarly, Angeloni and others (2003) summarize the evidence from a number of individual country studies from the euro area, and find that bank liquidity position seems to be an important determinant of the strength of the bank lending channel. However, they find less evidence that bank size and bank capital play significant roles. In a similar vein, Ehrmann and others (2001), in a comprehensive study of the structure of banking and financial markets in the euro area, find that the effect of monetary policy on the supply of bank loans is most dependent on the liquidity of individual banks, though the size of banks is not a significant determinant.

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18 The strength of this channel may be influenced by balance sheet effects on the cost and availability of bank credit—that is, by the operation of the balance sheet channel

19 Cecchetti (1999) traces these differences in financial structure to differences in countries' legal systems.

An important observation that emerges from this literature is that where banks opt to remain highly liquid, the bank lending channel tends to be weak. Since the level of portfolio liquidity is a decision variable for banks, the appropriate interpretation of this finding is that those characteristics of their environment that induce banks to hold high levels of liquidity also tend to be conducive to weakness in the bank lending channel. This is important for our purposes for two reasons. First, the evidence of the last section provides reason to suspect that the variation in the environment in which banks oper- ate between low- and higher-income countries may be substantially larger than that among higher-income countries themselves. Second, the banking sectors of many LICs indeed tend to maintain high levels of liquidity, compared with those of banks in higher-income countries.[20] If institutional environment and financial structure indeed matter for monetary transmission through bank lending, and if high levels of bank liquidity are the telltale sign of environmental characteristics that tend to weaken the bank lending channel, these two observations together imply that we should expect to find significant differences in the functioning of this channel when comparing LICs to higher-income economies. The next section takes up this issue.

IV. The Bank Lending Channel in LICs: Some Cross-Country Evidence

The central role of the bank lending channel in LICs implies that the strength and reliability of the monetary transmission mechanism in these countries depend critically on the effectiveness of this channel. However, as shown in the previous section, there is evidence that the strength of this channel differs from country to country, even among industrial countries, depending on the environment in which banks operate and on the structure of each country's banking system. Section II showed that in LICs banks tend to operate in an environment characterized by poor institutional development and limited competition. This makes the functioning of the bank lending channel potentially quite different in LICs from what is observed in advanced economies, implying that the strength and reliability of this channel cannot be taken for granted in LICs. Since Section II also indicated that the bank lending channel is likely to be the dominant channel for monetary transmission in LICs, weaknesses in the bank lending channel are likely to imply overall weakness in monetary transmission.

To get a sense of the empirical relevance of these issues, this section presents some cross-country evidence bearing on the effectiveness of various steps in the bank lending channel in countries at different income levels. Specifically, we examine broad cross-country differences in the links between central bank policy actions and bank lending rates by computing some simple correlations among the relevant financial variables in advanced, emerging, and low-income economies. We focus on the association between central bank policy rates and money market rates, as well as that between money market rates and bank lending rates. In doing so, we seek to unearth suggestive empirical regularities, rather than to identify specific causal relationships.

[20] See Mishra, Montiel, and Spilimbergo (2010).

Policy Rates and Money Market Rates

The first step of the transmission mechanism relates changes in policy rates to changes in money market rates. We therefore begin by looking at the correlation between policy rates and money market rates across alternative country groups.

Recall from footnote 16 that discount credit is used as a monetary policy instrument in the vast majority of LICs. Accordingly, we use the discount rate as a proxy for the policy rate. Consistent with our observation in Section II, liquid money markets are not common in LICs. Out of a total of 109 LICs in the sample used to develop the stylized facts in that section, only 29 report data on both discount rates and money market rates. Of the 109 LICs in our sample, 83 report discount rates, but only 45 report money market rates.

Since direct central bank lending to commercial banks is more often used as a policy instrument in LICs than in countries with more sophisticated financial systems, we would expect changes in discount rates to be more closely associated with changes in money market rates in LICs (where such markets exist) than in advanced and emerging economies. Table 3 reports statistics on the relationship between discount rates and money market rates in advanced, emerging, and low-income economies, where such rates are available.[21]

The second column of Table 2 reports the average contemporaneous correlations between changes in discount rates and changes in money market rates in all three types of economies. Despite the likelihood that the discount rate represents a better indicator of the monetary policy stance in the LIC context, this correlation actually turns out to be somewhat lower on average in LICs than in advanced and emerging economies. Columns 3 and 4 report the average short- and long-term correlations between the policy rate and money market rates. These correlations are calculated by estimating the equation $y_{it} = \alpha_i y_{it-1} + \beta_i y_{it-2} + \gamma_i x_{it} + \delta_i x_{it-1} + \eta_i x_{it-2} + \varepsilon_{it}$ (where y is change in the money market rate and x the change in the discount rate) for each country. The short-term effect reported in column 3 is the average estimated γ; the long-term effect reported in column 4 is calculated as the average $\hat{\gamma}_i + \hat{\delta}_i + \hat{\eta}_i / 1 - \hat{\alpha}_i - \hat{\beta}_i$. If interpreted causally, these results would suggest that an increase in the policy rate by 1 percentage point would be associated with a 0.82 percentage point increase in the money market rate in advanced economies within one month, but only with a 0.29 percentage point increase in LICs. In the long run, the increase in the policy rate would be fully transmitted to an increase in the money market rate in advanced economies, but only partially transmitted (0.40) in LICs. This suggests a much weaker link between the policy instrument and market rates in LICs, both in the short and in the long run.[22]

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21 Only countries with at least 60 observations are included in the sample. For simplicity we use the same specification for all countries. Similar results are obtained if we use different specifications, including different lag structures.

22 These results are not driven by outliers. Taking the medians rather than the means of the various income groups gives qualitatively similar results.

Money Market Rates and Bank Lending Rates

The second step in the bank lending channel is the link between the money market rate and bank lending rates. A necessary condition for the channel to be operative is that the lending rate charged by banks is responsive to the money market rate, where that rate exists. Forty-two LICs in our sample report data on money market and bank lending rates.[23] Table 3, which follows the same structure as Table 2, shows a strong contemporaneous correlation between money market rates and bank lending rates in advanced and emerging economies, but a much weaker correlation in LICs. The short-term partial correlation between money market rates and lending rates is also significantly weaker among LICs than among either advanced or emerging economies (column 3), and while differences in long-term effects are not as pronounced, they remain weaker in LICs. Most importantly, note that changes in money market rates explain a much smaller proportion of the variance in lending rates in LICs than in either advanced or emerging economies.

We consider these findings to be important, since they suggest that the links between the policy instrument controlled by central banks and the mechanism for transmission to the economy's IS curve that is likely to be most relevant in LICs may actually be relatively loose and unreliable.

Table 2. Correlation Between Changes in Discount Rate and Changes in Money Market Rate

	Contemporaneous Correlation	Short-Term Effect	Long-Term Effect	R-squared	Number of Countries
Advanced	0.28	0.82	0.95	0.32	25
Emerging	0.31	0.72	0.59	0.93	26
LICs	0.22	0.29	0.40	0.31	29

Note: The discount rate corresponds to IFS line 60 and the money market rate to IFS line 60b.
The data are monthly from January 1960 to December 2008, where available. The second through the fifth columns report the average of each variable for the number of countries reported in the last column.

Possible explanations, as alluded to before, are institutional deficiencies that discourage bank lending activity and/or noncompetitive behavior by banks. To explore these explanations, we first run panel regressions in which monthly changes in bank lending rates are regressed on changes in discount rates, a measure of bank concentration, and interaction terms between changes in discount rates and the index of bank concentration for our full sample of countries. The first column of Table 4 shows that 1 percentage point increase in the discount rate is associated on average with a contemporaneous

[23] Almost all the LICs in our sample report at least five years of data on bank lending rates.

0.31 increase in the lending rate. The second column of the table shows that the partial correlation between discount and lending rates indeed appears to be affected by the degree of bank concentration (this index is equal to one if the index of bank concentration is higher than the median and 0 otherwise). However, this result is not robust to the introduction of an index of transparency (column 3), our proxy for institutional quality.[24]

As shown in column (3), improved transparency increases the correlation of changes in policy rates with lending rates, suggesting that the institutional deficiencies that discourage bank lending may be more important than bank concentration in explaining the limited pass-through from policy rates to lending rates in LICs. However, the specification in column 4 shows that a dummy variable for LICs interacted with changes in the policy rate is highly significant in explaining the weak correlation between the policy rate and the lending rate in LICs, even after controlling for our measures of bank concentration and institutional quality. Thus, although bank concentration and transparency appear to be part of the story, other unidentified factors may also play a key role in explaining the difference between LICs and other countries.[25]

Table 3. Correlation Between Changes in Money Market Rate and Changes in Lending Rate

	Contemporaneous Correlation	Short-Term Effect	Long-Term Effect	R-squared	Number of Countries
Advanced	0.33	0.19	0.35	0.41	25
Emerging	0.35	0.38	0.61	0.65	27
LICs	0.18	0.09	0.29	0.16	42

Note: The lending rate corresponds to IFS line 60p and the money market rate to IFS line 60b.

The last three columns in Table 4 assess the robustness of these results. Column (5) reports regression results using the same specification as in column (4) but restricting the sample to observations in the period after 2000. This is done to allow for the possibility that the persistence of financial repression in earlier years may have affected our results. The results confirm that, even in the absence of pervasive financial repression, transparency and the "LIC dummy" continue to play a relevant role in explaining the link between the discount and lending rates. The same results hold when we drop high-inflation countries and emerging-market economies from the post-2000 sample. The motivation for doing so is that correlations between lending rates and policy rates may be contaminated by the large swings in nominal interest rates associated with inflation stabilization, or with stabilizing exchange rates in the face of speculative attacks (arising either indigenously or as contagion from crises in other emerging economies). Note particularly that both bank concentration and transparency are statistically significant in column (7), but they do not eliminate the significance of the LIC dummy.

[24] The index of transparency is from the World Bank.

[25] As suggested below, such factors may include limited central bank credibility and informal dollarization.

As a final robustness check, Table 5 restricts the sample to countries with flexible exchange rate regimes, to allow for the possibility that the weak relationship between policy rates and bank lending rates in LICs may in part reflect the greater prevalence of fixed exchange rates among those countries. As can be verified by a comparison of Tables 4 and 5, this does not seem to be the case. While the number of countries in the sample is reduced sharply in this case and some statistical precision is lost, the results in this table are qualitatively very similar to those of Table 4.

The cross-country evidence presented above should be interpreted with caution, mainly owing to the poor quality of data for LICs.[26] Nonetheless, the main message from the cross-country evidence is that there is indeed reason to suspect that bank concentration and weak institutional quality may adversely affect the strength of the link between policy rates and bank lending rates in LICs, raising questions about the strength of the first link in the bank lending channel (between policy rates and bank lending rates).[27]

Coupled with the suspicion that the small size of the formal financial sector would imply a weak effect of bank lending rates on aggregate demand, there are even stronger reasons to question the effectiveness of the bank lending channel in LICs and therefore the overall effectiveness of monetary transmission in those countries.

There is indeed a large VAR-based empirical literature examining the effects of monetary policy innovations (as measured through a variety of monetary policy variables including, but not limited to, policy interest rates) on aggregate demand (as indicated by the behavior of output and/or prices) in a large number of individual LICs. This literature does not restrict the specific channels through which monetary policy may affect aggregate demand. It broadly finds weak and imprecise effects of monetary policy on output and prices in such countries.[28] We consider our findings in this paper as offering an interpretation of those results: specifically, monetary policy innovations have weak effects on output and prices in LICs because the typical financial structure in LICs renders channels of monetary transmission other than the bank lending channel inoperative, while a poor institutional environment and high levels of bank concentration, possibly in conjunction with other factors, combine to make the bank lending channel both weak and unreliable.

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26 One complicating factor, for example, is the role of dollarization in developing countries. To the extent that a significant share of bank loans is denominated in foreign currency, the domestic-currency lending rates used in our tables may measure the true cost of bank loans with error. Since we would expect arbitrage by banks between foreign- and domestic-currency lending to weaken the link between policy rates and domestic-currency bank lending rates, the sign and significance of the LIC dummy may partly reflect the effects of dollarization. Unfortunately, we lack the cross-country data with which to test this hypothesis.

27 In addition to the LIC-specific factors emphasized in this section, the link between policy rates and bank lending rates may also be affected by factors that apply in other countries as well, such as the extent of central bank credibility. If altering lending rates is perceived by banks as costly, for example, and the central bank lacks credibility, then banks may be reluctant to alter their lending rates in response to changes in the policy rate, in the expectation that such a change may be reversed in the near future.

28 For a survey of this literature, see Mishra, Montiel, and, Spilimbergo (2011).

V. Policy Implications

As just noted, we interpret the evidence of the previous sections, as well as that of the broader VAR-based literature, as creating a strong presumption that in the financial environment that tends to characterize many LICs, monetary policy is likely to have both weak and unreliable effects on aggregate demand. If this is true, the implications for policy in such countries are far-reaching. In this section we review some of these implications, concerning the discretionary use of monetary policy for stabilization purposes, the desirability and design of inflation-targeting regimes, the choice between fixed or floating exchange rates, and the desirability of capital account restrictions.

Stabilization Policy

Consider a simple policy model, based on Blinder's (1998) adaptation of Brainard (1967). The structure of the economy is given by:

$$y=y_0 +am+ \varepsilon \tag{3}$$

where y denotes aggregate demand, m is a monetary policy instrument, a is a parameter that captures the effect of monetary policy on aggregate demand, and e is a shock to aggregate demand. We assume that α is a random variable with $E(a) = \mu_\alpha$ and $Var(a) = \sigma_\alpha^2$. When monetary policy is "weak and uncertain," as suggested by our previous finding, μ_α is small and σ_α^2 is large. Similarly, ε is a random variable with $E(\varepsilon) = 0$ and $Var(\varepsilon) = \sigma^2$. We assume that a and ε are uncorrelated, so $E(a-\mu_\alpha)\varepsilon = 0$. The expected value of y is given by $E(y) = y_0 +\mu_\alpha m$ and its variance by $E(y-E(y))^2 = \sigma_\alpha^2 m^2 + \sigma^2$.

The central bank has to set monetary policy before it observes the realized values of a and ε. Its objective is to stabilize aggregate demand around a desired value y* —that is, to minimize $E(y-y^*)^2$. Using Equation (1), we can write the central bank's loss function as:

$$L(m) = E(y-y^*)^2=E\{y_0+am+\varepsilon-y^*)=E\{(y_0+am+\varepsilon)^2 -2y^*(y_0+am+\varepsilon)+y^{*2}\}= E(y_0+am+\varepsilon)^2-2y^*(y_0+\mu_\alpha m)y^{*2}. \tag{4}$$

Minimizing Equation (4) with respect to m we can derive the optimal value of m with stochastic a, which we denote m^*_S :

$$m^*_S(y^*-y_0)/(\mu_\alpha+\sigma_\alpha^2/\mu_\alpha). \tag{5}$$

Notice that if α is nonstochastic (that is, if it has a degenerate distribution around $E(a) = \mu_\alpha$, so that $\sigma_\alpha^2= 0$), meaning that the effects of monetary policy on aggregate demand are not uncertain, we would have

$$m^*_N = (y^*- y_0)/\mu_\alpha.$$

Table 4. Transmission Mechanisms and Bank Concentration

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
					After 2000	After 2000 + drop high inflation countries	After 2000 + drop emerging markets
Dependent variable: monthly changes in lending rate							
Change in discount rate	0.309***	2.935***	1.443	1.525	0.183**	0.022	0.574***
	[0.092]	[0.393]	[1.278]	[1.293]	[0.086]	[0.051]	[0.151]
Concentration Change in discount rate		-2.393***	-1.155	-1.21	0.037	0.349***	-0.381*
		[0.452]	[1.525]	[1.519]	[0.167]	[0.099]	[0.200]
Concentration		-0.938	-1.388	-1.31	-0.32	- 0.368	0.006
		[0.818]	[1.215]	[1.211]	[0.235]	[0.327]	[0.195]
Transparency Change in discount rate			0.642**	0.603*	0.149***	0.172***	0.232**
			[0.309]	[0.313]	[0.047]	[0.026]	[0.105]
LIC Change in discount rate				0.761***	0.228***	0.213***	0.413***
				[0.186]	[0.050]	[0.028]	[0.146]
Country fixed effects	X	X	X	X	X	X	X
Number of observations	33,296	14,480	9,650	9,650	3,806	2,988	1,970
Number of countries	140	116	67	67	51	40	29
R-squared	0.03	0.51	0.53	0.53	0.15	0.18	0.03

Note : *significant at 10 percent; ** significant at 5 percent; ***significant at 1 percent. Robust standard errors clustered by country in parentheses. The index of bank concentration is 1 if banks are highly concentrated. The of transparency is from Transparency International.

Table 5. Transmission Mechanisms and Bank Concentration: Flexible Exchange Rate Regimes

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
					After 2000	After 2000 + drop high inflation countries	After 2000 + drop emerging markets
Dependent variable: monthly changes in lending rate							
Change in discount rate	0.307***	3.199***	1.795*	1.792*	0.490**	0.423*	0.563
	[0.090]	[0.378]	[0.982]	[0.991]	[0.187]	[0.222]	[0.438]
Concentration x Change in discount rate		2.743***	2.284*	2.268*	0.551	0.419	1.083
		[0.434]	[1.198]	[1.210]	[0.362]	[0.430]	[0.981]
Concentration		0.324	0.101	0.096	0.364	0.224	0.227
		[0.588]	[0.743]	[0.745]	[0.352]	[0.545]	[0.446]
Transparency x Change in discount rate			1.121***	1.113***	0.259**	0.221***	0.431**
			[0.163]	[0.161]	[0.097]	[0.073]	[0.173]
LIC Change in discount rate				-0.297***	0.218**	0.169**	0.118
				[0.106]	[0.085]	[0.064]	[0.101]
Country fixed effects	X	X	X	X	X	X	X
Number of observations	13,682	5,163	3,360	3,360	1,274	1,094	639
Number of countries	140	116	67	67	51	19	13
R-squared	0.03	0.51	0.53	0.53	0.15	0.18	0.03

Note : *significant at 10 percent; ** significant at 5 percent; ***significant at 1 percent. Robust standard errors clustered by country in parentheses. The index of bank concentration is 1 if banks are highly concentrated. The of transparency is from Transparency International.

where m^*_N is the optimal value of m in the nonstochastic case. That is, monetary policy would be used actively to stabilize the economy by adjusting the monetary policy instrument so as to set $E(y) = y^*$. In this case, weaker monetary policy (smaller μ_α) implies more policy activism (larger m^*_N). When the effects of monetary policy are uncertain, however, optimal monetary policy is *less* activist, closing only part of the gap between $E(y)$ and the target y^*. This can be verified by noting that:

$$m^*_S/m^*_N = 1/1 + (\sigma_\alpha/\mu_\alpha) < 1: \quad (6)$$

The reason for this result is that when a is stochastic, higher values of m—more aggressive monetary policy—increase the *ex* ante variability of aggregate demand. This cost of activist policy has to be traded off against its benefit in the form of closing the gap between actual and desired aggregate demand. This tradeoff suggests less activist use of monetary policy the weaker monetary policy is (the smaller μ_α) and the more uncertain it is (the larger σ^2_α). To see the intuition, consider first the effect of smaller μ_α.

Note that we can express the monetary authority's loss function as:

$$E(y - y^*) = \sigma^2_\alpha m^2 + \sigma^2 + (y_0 + \mu_\alpha m - y^*)^2 \; : \quad (7)$$

This expression shows that the central bank's loss function can be expressed as the sum of the variance of y and the square of the gap between the expected and target values of y. Notice that changes in m play two roles in Equation (7): they affect the variance of y (the first term on the right-hand side of equation (7)) as well as the gap between the expected and target values of y (the third term on the right-hand side). The marginal benefit of increasing m after a reduction in μ_α is given by $2(y_0 + \mu_\alpha m - y^*)\mu_\alpha$, which captures the effect of higher m in reducing the larger negative gap between expected y and target y, that would be created by a reduction in μ_α. This marginal benefit depends on the size of the gap, which is decreasing in m. The marginal cost, on the other hand, is given by $2\sigma^2_\alpha m$, which captures the effect of higher m in increasing the variance of y, and is increasing in m. It is precisely because increases in m are subject to increasing marginal costs through their effects on the variance of y that it would not be optimal for the central bank to pursue such increases to the point where their marginal benefit is zero—that is, where they would fully eliminate the gap between the expected and targeted values of aggregate demand. The upshot is that weaker monetary policy encourages less activist policy when the effects of policy are uncertain. Similarly, for a given value of μ_α, an increase in σ^2_α increases the uncertainty penalty associated with each unit increase in the value of the monetary policy instrument (the first term on the right-hand side of equation (7)) and thereby also discourages monetary activism. In short, weak and uncertain monetary policy transmission calls for less activism in monetary policy.

Inflation Targeting

The adoption of formal inflation targeting involves the central bank putting its reputation on the line by making a public announcement of its objectives and being held accountable for achieving them. The desired result is for the private sector to form inflation expectations that are consistent with

the central bank's inflation target. Weak and uncertain monetary transmission undermines this objective in two ways. First, unreliable transmission is likely to undermine the effectiveness of public announcement and central bank accountability as a commitment device, because the probability that the central bank would miss its mark would create uncertainty as to whether it is trying to manipulate monetary policy or is genuinely missing the mark— that is, unreliable transmission gives plausible cover to the central bank for deviating from its announced intentions without being caught, which undermines the credibility of monetary policy ex ante. Second, even if the commitment device associated with the public announcement and central bank accountability is effective—that is, even if the central bank is expected to behave in accordance with its announced objective—its inability to reliably attain that objective in the presence of uncertain monetary transmission loosens the link between the central bank's announcement and the inflation outcome that the private sector would be led to expect, thereby reducing the benefits to be expected from adopting inflation targeting. The implication is that the adoption of inflation targeting is less desirable when monetary transmission is weak and uncertain.

Alternatively, if inflation targeting is to be adopted in a context in which monetary transmission is weak and unreliable, these characteristics of monetary transmission have implications for the optimal design of the IT regime. In particular, since the central bank would be less confident in hitting its target, avoiding the additional social loss associated with a loss of reputation would suggest lengthening the horizon over which the target is to be attained and widening the band within which the central bank commits itself to delivering actual inflation.

Exchange Rate Regimes

An important argument for floating exchange rates is that, when capital mobility is high, the trilemma implies that the adoption of fixed exchange rates involves the sacrifice of monetary autonomy. When a country is subject to asymmetric shocks, when domestic wages and prices are sticky, when fiscal policy is inflexible, and when it does not enjoy a migration safety valve, this sacrifice of monetary autonomy can be costly, because it deprives the economy of its only available stabilization policy tool. But the value of monetary autonomy in allowing the use of monetary policy to stabilize the economy in response to shocks that are asymmetric to those of a country's trading partners depends on the effectiveness of monetary policy as a stabilization policy instrument. If monetary policy is unreliable, so that the optimal policy involves restricting the exercise of monetary autonomy, the value of that autonomy is impaired and the case for floating exchange rates is thereby weakened.

The value of monetary autonomy can be interpreted as the reduction in the central bank's loss function that can be achieved by setting monetary policy optimally, compared with eschewing the use of monetary policy altogether. The latter can be derived by setting $m = 0$ in Equation (7), while the former is determined by setting $m = m^*_S$. The gain from monetary autonomy, therefore, given by $L(0)-L(m^*_S)$, is:

$$L(0)-L(m^*_S) = [\sigma^2 +(y_0-y^*)^2]-[\sigma_\alpha^2 m^{*2}_S+\sigma^2+(y_0+\mu_\alpha m^*_S- y^*)^2 :$$

After some algebra this can be written as:

$$L(0) - L(m^*_S) = (y_0 - y^{2*})^2 / (1 + (\sigma_a / \mu_\alpha)^2): \quad (8)$$

Notice that in the absence of uncertainty about monetary transmission ($\sigma_a = 0$), the gain from monetary autonomy would be given by $(y_0-y^*)^2$, since monetary autonomy would allow the entire gap between the actual and target levels of aggregate demand to be eliminated. Uncertainty about monetary transmission, however (sa40), reduces the value of monetary autonomy, and this loss of value is greater the greater the level of uncertainty and the weaker the effects of monetary policy.

Capital Account Restrictions

Similarly, suppose that a country places a high value on exchange rate verifiability, so that it judges a fixed exchange rate regime to be optimal. In this case, the optimality of capital account restrictions depends on the value placed on monetary autonomy. Capital account restrictions would tend to be viewed as more desirable the more prized is monetary autonomy. By a similar analysis to that just completed, the lower the effectiveness of monetary policy, therefore, the weaker the case for capital account restrictions.

Summary

The implications of the analysis in this section are that a setting in which domestic monetary policy is weak and unreliable is one in which the central bank should restrain activist impulses and should either postpone the adoption of policy regimes that raise the stakes associated with attaining publicly announced price level objectives or modify the design of those regimes to reflect the uncertainty about monetary policy effects. In addition, this setting strengthens—but by no means clinches—arguments favoring fixed exchange rates and unrestricted capital movements.

VI. Conclusions

It has long been recognized that, while the general outlines of monetary transmission share many common features across economies, specific channels of transmission are highly country-specific, and depend among other things on each economy's financial structure. There are significant differences across economies in financial structure, even among those at very advanced stages of financial development. These differences are even more pronounced between economies at advanced stages of financial development and those—such as many LICs—that have long suffered from financial repression and have only recently liberalized their financial systems. Unfortunately, research on mechanisms of monetary transmission has traditionally been focused on countries with advanced financial systems, leaving a significant gap in our understanding of monetary transmission for contexts that are more typical of LICs. This situation is particularly serious because monetary policy is often the only countercyclical policy tool available in such countries, making its effective operation a very high priority.

This paper has provided an overview of the reasons why we might expect monetary transmission to be different in an LIC context from what we are familiar with in industrial countries. We have argued that at lower levels of financial development, the transmission mechanism is likely to be dominated by the bank lending channel. Yet in many LICs a combination of institutional deficiencies that restrict bank lending, as well as high levels of bank concentration, lack of central bank credibility, and informal dollar- ization may make the transmission from central bank monetary policy actions to bank lending rates both weak and unreliable. We have pro- vided some simple cross-country evidence that is consistent with this proposition.

This situation has important policy implications. When domestic monetary policy is weak and unreliable activist policy is less desirable, and the adoption of policy regimes that raise the stakes associated with attaining publicly announced monetary objectives should be postponed or their design should be modified to take the uncertainty about monetary policy effects into account. In addition, weak and unreliable monetary transmission weakens arguments for floating exchange rates as well as for capital account restrictions under fixed exchange rates.

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