

## *Shorter Papers and Comments*

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# Independent Currency Authorities

An Analytic Primer

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*This paper provides an analytic overview of independent currency authorities (ICAs), sometimes called currency boards. ICAs issue and redeem domestic currency on demand against an exchange standard and back such operations through a 100 percent marginal foreign reserve cover. They also impose significant constraints on the banking system and the budget of the country that operates them. When supporting institutions have been put in place, ICAs appear to promote price stability, foreign trade, saving, and investment. [JEL E52, E59]*

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**I**N MOST COUNTRIES, the management of currency—the issue and redemption of notes and coins—is bundled with other monetary tasks of the central bank. Undertaking these tasks gives the central bank flexibility and discretion but can also breed uncertainty about its basic objectives. The associated policy trade-offs may reflect political pressures on top of the usual considerations of monetary stability. The diversity of public interests sends confusing signals to the central bank, and the complexity of monetary outcomes and their potential causes sends similarly confusing signals to the public. Moreover, the “time inconsistency” of optimal policies (Kydland and Prescott (1977); Barro and Gordon (1983); Blackburn and Christensen (1989)) may undermine the central bank’s credibility. For these reasons, many economists have advocated narrowing central bank mandates—for example, to focus only on monetary stability instead of some combination of objectives regarding infla-

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tion, real growth, and employment. Some recommendations also reduce a central bank's flexibility by committing it to achieving a predetermined rate of money supply growth or inflation.

One way to narrow a central bank's mandate is to delegate the issuance and redemption of currency to a separate institution, which we call an "independent currency authority," or ICA. For example, an ICA might issue domestic currency that is convertible into a specified foreign currency at a fixed exchange rate and back up this commitment by holding a foreign reserve cover equal to 100 percent of the currency issue. Such an ICA is known as a currency board, and the prefix "orthodox" is sometimes added to distinguish it from other variants.

Other ICA arrangements might include those under which the currency authority, although not formally independent of the central bank, nevertheless operates autonomously. Estonia, for example, has recently opted for a currency board in which the outstanding stock of high-powered money is fully backed by foreign reserves and legally convertible into deutsche marks at a fixed rate. Those functions of a central bank that are not delegated to an ICA have been handled in a variety of ways. In countries with orthodox currency boards, free banking has tended to prevail.<sup>1</sup> In Estonia, the non-ICA functions of the Bank of Estonia, such as emergency lending to commercial banks and bank supervision and licensing, are operated by separate departments.

This paper considers how ICAs operate and describes their attractions as well as the constraints they impose on the banking system and on the government's fiscal position. The first section outlines the operating principles of an ICA. We show that in order to maintain confidence in the currency, an ICA must exchange the domestic currency on demand, according to a preannounced exchange rate schedule against a standardized commodity or foreign currency, and must maintain full or close-to-full reserve cover. Thus, to a certain degree, price stability and convertibility are built into an ICA. A second section examines the fiscal implications of ICAs, while a third section considers banking arrangements and shows that an ICA may require extra banking discipline.

<sup>1</sup> Orthodox currency boards were once widespread in the colonial regimes of Africa, Asia, and the Caribbean, but now operate only in Hong Kong and Brunei. For a comprehensive history of currency boards, see Schuler (1992), Hanke and Schuler (1991a, 1991b, 1991c), and Shannon (1951, 1952). Schuler (1992) documents the relative success of currency boards in promoting price stability, foreign trade, and saving and investment. Although some economists view currency boards as anachronistic, others defend them as a relatively easy way to achieve monetary stability and convertibility (Greenwood (1984); Walters (1987); Hanke and Schuler (1991b)). Recently, they have been advocated for the emerging market economies in Eastern Europe and the former Soviet Union (Hanke and Schuler (1991a, 1991b); Walters (1992)).

## I. Operating Principles

A national currency managed by an ICA must be perceived as a reliable store of value. Otherwise, people will be unwilling to hold the currency even for transaction purposes, or such willingness may be so volatile that it destabilizes goods and factor markets. This section identifies operating principles for an ICA that are compatible with this requirement.

### Key Elements

It is helpful to distinguish two types of operating principles: rules for issuing and redeeming currency and mechanisms for ensuring that the rule can and will be followed.

#### *Rules for Issuance and Redemption*

Any license to print currency at will and forgo redemption is suspect. Moreover, any significant asymmetry between the terms for issuance and those for redemption could be exploited by the ICA itself or outside arbitrageurs. In effect, the only viable rule is an “exchange of equivalents,” whereby domestic currency is traded for something else that is widely regarded to have equal value. To ensure fair treatment, currency should be issued and redeemed on demand according to a preannounced exchange schedule.

One exchange standard that should *not* be used is domestic debt, whether government or commercial. Otherwise, debtors could use the ICA as a money pump, forever submitting new IOUs to draw currency. The ICA’s independence from fiscal and banking pressures would be lost as a result.

The exclusion of domestic debt leaves an ICA with two possible types of exchange standard. One is a directly consumable (but standardized and durable) commodity, such as gold or oil. The other is foreign currency.<sup>2</sup> From the mid-nineteenth century until World War I, the major international currencies and most of the colonial currencies were effectively tied through ICAs to gold, either directly or through the gold-linked pound sterling.<sup>3</sup> After the gold standard was abandoned in the early 1930s, the attraction of a commodity standard for small countries

<sup>2</sup> The ICA might also use a basket of commodities or foreign currencies as the exchange standard. Such a standard would be more complicated to administer and less transparent to the public, but not unmanageable.

<sup>3</sup> The latter had the advantage of being cheaper to transport and hold than gold.

diminished further, while the transaction cost advantage of foreign currency remained. Hence, we here assume that the rules for issuance and redemption of domestic currency can be summarized as a preannounced exchange rate schedule against a foreign currency, with full currency convertibility on demand.

### *Enforcing the Rules*

For currency boards to work, these rules must be enforced. First, currency should not be issued without being paid for. This is fundamentally an administrative problem—and not a particularly difficult one—which can be addressed through standard accounting and auditing procedures and penalization of malfeasance. Second, foreign currency must be available to redeem domestic currency. This is fundamentally a problem of reserves. If 100 percent reserve cover is maintained, resources for convertibility are guaranteed and auditing is simplified. It is possible, however, to reduce the degree of cover below 100 percent without running a significant risk of a reserve-depleting speculative attack. One alternative, which may be useful when an ICA is imposed on a previously unbacked currency, is to cover only a fraction of the initial currency stock but 100 percent of any subsequently issued currency. Another, inferior, alternative is to provide only fractional backing of foreign reserves for newly issued currency, which would create a strong incentive to fill the gap between new foreign exchange reserves and new currency liabilities with domestic debt, once again threatening the ICA's independence.

### Rationales for ICAs

To the extent that purchasing power parity holds (more precisely, to the extent that relative differentials in purchasing power remain constant), domestic inflation is tied to inflation in the reserve currency country. The ready and preannounced convertibility of currency tends to reduce transaction costs in foreign trade and investment.<sup>4</sup>

Granted, these benefits might be obtained even more easily by letting the foreign currency circulate directly. So, why bother with an ICA?

<sup>4</sup> The ICA may affect the relative priority of monetary stability and convertibility through its choice of a reserve currency anchor. Control over inflation is most easily achieved with a very stable currency as the reserve anchor, although convertibility considerations favor using the currency (or currency basket) of the main trading and investment partner(s).

Apart from national pride, there are two reasons. The first is seigniorage.<sup>5</sup> When the foreign currency circulates, seigniorage accrues to the foreign country.<sup>6</sup> When a domestic currency circulates in an ICA arrangement, the domestic currency takes on most of the foreign currency's characteristics but the ICA intercepts most of the seigniorage by investing most foreign currency receipts in foreign-currency-denominated bonds. Profits from seigniorage beef up reserves and are periodically turned over to the government.

The second reason for establishing an ICA is to retain flexibility. For example, the ICA might improve control over domestic inflation by shifting to a more stable currency as the reserve anchor, or it might change the anchor so as to promote trade and investment with a given area. Provided the shift is economically justified and the real purchasing power of the domestic currency is maintained, the change need not erode public confidence. Indeed, the availability of this option might increase public confidence in the country's economic resilience. The ICA could also provide an administrative base for a future full-fledged central bank.

The simplest, strictest, and most credible type of ICA is an orthodox currency board, in which the domestic currency's rate of exchange against the foreign currency is fixed permanently, and the foreign reserve backing is 100 percent. Consider a hypothetical country, Patria, which entrusts to a currency board the management of its currency, the "pat," pegged one to one to the deutsche mark. The Patrian currency board would engage in only two types of transactions. In the first, a customer comes to the board with a mark and demands a pat; the board issues the pat and buys one mark's worth of high-quality German bonds. In the second, a customer comes with a pat and demands a mark; the board sells one mark's worth of bonds and exchanges the mark for a pat.

Although an orthodox currency board sets an exchange rate independent of the date, one can conceive of ICAs where this does not happen. Realistically, the pegged exchange rate could not swing too much or reserves would be drained through arbitrage. However, the preannounced rate could move slowly, or "crawl," in a variety of ways. Provided that foreign reserves are always maintained at 100 percent of the currency in

<sup>5</sup> Revenue from seigniorage refers to the difference between the interest earnings from the investment of foreign reserves and the ICA's administrative expenses, including costs of printing bank notes and minting coins, at a *stable price level*.

<sup>6</sup> The foreign country might agree to share seigniorage, but it is not easy to monitor changes in currency holdings in different regions of a common currency zone, to calculate an appropriate sharing ratio, or to enforce a sharing agreement. In practice, there would seem to be a tendency to treat imputed seigniorage as simply a form of delivering an independently determined amount of aid.

circulation, the fundamental operations of the currency board need not change. The institution just described—an orthodox currency board redesigned so that the exchange rate, although preannounced, can vary over time—is a crawling-peg currency board.

In its simplest form, a crawling-peg currency board would set an initial rate of exchange *and* a preannounced fixed rate of depreciation  $\delta$  (or appreciation, which would make  $\delta$  negative) between its currency and the reserve currency. In other words, if the foreign currency price is 1 today ( $t = 0$ ), it is  $e^{\delta t}$  at time  $t$ . A crawling-peg currency board would have little long-term merit unless the peg is used to keep domestic inflation below inflation in the reserve currency country. Nevertheless, a depreciating crawling peg might be useful as a transitional mechanism in countries where the initial rate of inflation is very high and a sudden shift in monetary policy may precipitate large output shocks. The rate of depreciation would be high initially, reflecting the initially large difference between the domestic inflation rate and that in the reserve center, and would gradually decline in line with the programmed reduction in inflation.<sup>7</sup> With a fully prespecified peg, whether fixed or crawling, an ICA would draw the country into the reserve currency area. The country would gain the credibility of the reserve currency and facilitate its foreign trade. At the same time, it would sacrifice the use of the exchange rate as a defense against shocks emanating from elsewhere in the reserve currency area.<sup>8</sup>

Once the exchange rate schedule has been set, an ICA is easy to operate. As Hanke and Schuler (1991b) explain, the ICA might reduce its own handling costs by refusing small-scale transactions and by not dealing directly in the currency of the reserve country. Commercial banks

<sup>7</sup>As already noted, an orthodox currency board generates seigniorage. In addition, a currency board that operates a depreciating peg would also generate inflation tax revenue. In the case where the rate of depreciation is gradually reduced to zero as the domestic inflation rate converges on that of the reserve currency country, the inflation tax revenue would correspondingly decline, but the seigniorage receipts would continue. By contrast, the ability of a discretionary central bank to inflict inflation surprises allows it to generate extra revenue from the inflation tax quickly. But to the extent that monetary policies are anticipated by money holders, the revenue gain associated with a shift from a depreciating-peg currency board to a central bank pursuing the same peg is unlikely to be large. With incomplete anticipation, the additional inflation tax generated by a central bank will be offset by the credibility and uncertainty costs. Hence, for a given average inflation rate, the central bank may be able to generate more inflation tax than an ICA. For a given degree of price predictability, the seigniorage advantage goes to an orthodox ICA. A more detailed note on the impact of monetary institutions on revenues from seigniorage and the inflation tax is available from the authors on request.

<sup>8</sup>There is an extensive literature on optimum currency areas, beginning with Mundell (1961) and McKinnon (1963) and recently surveyed in Masson and Taylor (forthcoming).

would be left to aggregate purchases and sales of the reserve currency and to cash reserve currency checks.

## II. Fiscal Implications

An ICA system narrows the authorities' options in both fiscal and monetary policy. By demanding a preannounced amount of foreign currency for every note it issues and offering convertibility on demand, the ICA prevents the discretionary printing of currency to cover fiscal obligations. It also precludes the surprise devaluation of existing fiscal claims on the government, such as a promise to be paid a given wage or pension, or the devaluation of outstanding government debt denominated in domestic currency. An ICA arrangement precludes recourse to the inflation tax as a discretionary taxing instrument.

### Financing Constraints

As a result of these constraints, an ICA makes it harder to manipulate the budget recklessly and irresponsibly, and thereby enhances investor confidence. If capital markets are perfect, the ICA's fiscal restrictions would matter only to the extent that they affect the present value of governmental revenue and expenditures. For example, if prices suddenly jump by 25 percent, the real fiscal burden of unindexed civil service salaries and pensions would initially fall by 20 ( $= 25/1.25$ ) percent. Over time, however, salaries and pensions would presumably adjust to the new price level, so that the budgetary savings would accrue only during the transition period.<sup>9</sup> Presumably, for an ICA and central bank pursuing similar long-run inflation paths, real expenditure burdens would roughly coincide over time.

Similar considerations apply to revenues from seigniorage and the inflation tax. If capital markets are perfect, the government would obtain the inflation tax on currency in circulation at the domestic rate of interest, which in turn would equal the domestic rate of inflation plus the world real rate of interest. The public's willingness to hold currency, which is the other main influence on the revenue from the inflation tax, depends negatively on the expected rate of interest. To the extent that future

<sup>9</sup> If civil servants and pensioners expect inflationary shocks, they may press for formal indexation to prevent even a temporary drop in real incomes. Failing that, they will attempt to negotiate a wage or pension buffer against potential future inflation shocks.

inflation is correctly anticipated, a central bank should generate as much revenue from an inflation tax as an ICA would when pursuing a similar inflation policy.

Thus, the main long-term fiscal advantage of a central bank, over an ICA, derives from the former's ability, in a world of imperfect capital markets, to inflict inflation surprises. For example, if the central bank begins to issue currency beyond what is expected, prices and real money holdings will not adjust instantaneously to the new equilibrium levels. As a result, in the short term, the government can collect additional real tax revenue.<sup>10</sup> Nominal fiscal obligations can also be devalued in this fashion. By contrast, an ICA emits currency only passively (barring a change in the exchange rate schedule) in response to shifts in domestic money demand.

The ability to surprise the public is also a disadvantage, however. Agents fearing inflationary surprises from the central bank may reduce their currency holdings or demand a risk premium in nominal-wage negotiations. Attempts to raise current revenues from the inflation tax may lower the long-term average level of real resources the authorities can obtain using this form of taxation, and the policy of undercutting nominal commitments breeds a demand for indexation. More important, attempts to manipulate inflation make it more volatile and unpredictable, undermining the real economy. One of the main attractions of an orthodox currency board is that it clearly accords higher priorities to price stability and convertibility than to inflation taxes.

### Restoring Flexibility

To better assess the trade-off between precommitment and adaptability, it is worth reflecting on why there might be binding constraints on the government's ability to finance a fiscal deficit by noninflationary means. It is rarely the size and the urgency of a government's financing needs that make credit difficult to secure. Private capital markets can mobilize large amounts of credit quickly. In lending to governments, they are backed by a network of governmental and intergovernmental institutions. The main consideration in sovereign lending, as in most other lending, is fear of default. If the government *cannot* repay, capital markets are right to withhold credit and refer the request to public grantors. If it is feared that the government can repay the debt but *will not*, then the government

<sup>10</sup> Khan and Knight (1982) point to empirical evidence of government revenue being extracted in this manner.



needs to convince creditors it is willing to earmark a share of future revenues for debt repayment.

Therefore, whether one focuses on lack of credit or lack of reserves, the main reason that a government with an ICA might have difficulty covering an unusual fiscal deficit is that in the past it has rarely run a surplus. In that case, replacing an ICA with a central bank will not help. The public will suspect, not without cause, that the government may manipulate central bank policies to increase the inflation tax. The public is then likely to restrict its demand for currency and other domestic assets.

Suppose, however, that a government that is determined to pursue responsible fiscal policies is temporarily stuck with a bad or uncertain reputation, so that it cannot borrow all it wishes. In that context, a discretionary central bank offers some immediate fiscal advantages over an ICA. On the other hand, the very decision to establish an ICA, by distancing the government from the mint, may encourage more responsible budget planning, which in turn might enhance a government's fiscal reputation and open doors to credit markets sooner.

Of course, an ICA's restraints on discretionary monetary financing by the government are not absolutely secure. One danger is that the government may simply override the ICA's charter. Another is that commercial banks are obliged to lend to the government at a favorable interest rate—for example, by requiring them to hold part of their reserves in low-yielding government bonds. If the bonds were traded freely, their prices would be lower. The difference between actual yields and free-market yields (or, in aggregate present value terms, the difference between actual bond prices and their market values) may be viewed as a noncash form of seigniorage. Such evasive measures, which undercut both the ICA and the banking system, are counterproductive.

### **III. Banking Implications**

In addition to the fiscal discipline cited above, the smooth operation of an ICA requires extra discipline from the commercial banking system.

#### **Regulatory Approaches**

The ICA has no responsibility to convert demand deposits directly into currency; indeed, its charter should forbid it because it could erode the reserve cover. Hence, in order to ensure sufficient liquidity under an ICA arrangement, the commercial banking system needs to maintain extra

reserves of domestic currency, or of reserve-currency-denominated assets that are easily convertible into domestic currency. There are two possible, not necessarily mutually exclusive, ways to do this efficiently. One way is to encourage international branch banking. The other is to establish a separate monetary agency with substantial holdings of foreign reserves and credit lines abroad to back up the commercial banks.

The international banking option is straightforward. Recall that the domestic currency under an ICA can be viewed as a proxy for the reserve currency to which it is pegged. Hence, there is no natural monetary obstacle to the entry of banks from the reserve currency zone, or indeed to any bank with substantial reserves denominated in the reserve currency. To encourage international banks to set up domestic branches, the licensing procedures, reporting requirements, and tax rules may need to conform broadly to those of the main reserve currency country. However, the authorities would need to take a relatively active role in monitoring capital adequacy, setting reserve requirements, and enforcing other prudential regulations. Through an interbank market, the international banks could also supply reserve liquidity to locally owned banks.

If the penetration of international banks into the domestic market is not very deep, or if additional backing for domestic commercial banks is desired, the domestic authorities may consider establishing, alongside the ICA, a separate monetary agency that can provide discount facilities, which would be subject to strict limits. Indeed, access to the window should be tightly restricted because the monetary agency cannot risk exhausting its foreign assets. Restrictions may include punitive interest rates, time limits on outstanding discounts, and requirements that repayment of reserve borrowings by the commercial banks take precedence over new credits to customers.

To illustrate the conversion of demand deposits into currency in an ICA system, let us return to our imaginary country, Patria, which is now assumed to have established a separate monetary agency *alongside* its ICA. Table 1 lists the accounts of the ICA, the monetary agency, and the commercial banks, assuming reserve backing of 100 percent. The exchange rate is one pat for one mark, the reserve currency.

Suppose the public wishes to cash 100 pats' worth of bank deposits, but only 50 pats are in the bank vault. To obtain additional cash, the bank can go to the ICA and exchange 50 marks for 50 pats. Once the relevant transactions are completed, the bank's deposit liabilities, domestic currency holdings, and foreign exchange holdings have fallen by, respectively, 100 pats, 50 pats, and 50 marks. The ICA holds an additional 50 marks of reserve assets and 50 pats of currency liabilities, while the public holds 100 pats more of currency and 100 pats less of de-

Table 1. *Accounts of the Banking System Under an ICA*

Institution assets	Liabilities
	<i>ICA</i>
Foreign reserves ( <i>FR</i> )	Currency held by: public ( $C_p$ ) banks ( $C_b$ ) monetary agency ( $C_{ma}$ )
	<i>Monetary agency</i>
$C_{ma}$ Net foreign assets ( $NFA_{ma}$ )	Reserves deposited by banks ( $RES$ )
Reserves borrowed by banks ( $BOR$ )	
	<i>Commercial banks</i>
$C_b$ $RES$ Net foreign assets ( $NFA_b$ )	Deposits ( $D$ ) $BOR$
Loans and investments ( $LI$ )	

posits. Branches of international banks have relatively easy recourse to this mechanism, since they can draw on a parent office's foreign exchange resources if their own foreign exchange is insufficient. Even local banks might avail themselves of such resources through drawings on an interbank market.

Suppose, however, that the bank has no marks and for some reason cannot borrow from the interbank market. It then turns to the monetary agency for a cash loan of 50 pats. The monetary agency may lend from its cash holdings, but eventually it must replenish those holdings by exchanging 50 marks for 50 pats at the ICA. At the end of the transactions, banks have compensated for the 50 pat shortfall by drawing down their net reserve position at the monetary agency; the latter's net reserve liabilities to banks have declined by 50 pats and either cash or mark assets have fallen by 50. As for the ICA, its pat liabilities to the public have risen by 100, its pat liabilities to banks have fallen by 50, and its mark assets have risen by 50.

### Scope for Reserve Money Operations

These illustrations show that foreign reserves or established credit lines abroad allow commercial banks or the monetary agency to provide liquidity. If the government's reputation for fiscal orthodoxy is weak, the monetary agency should be prohibited from holding government debt, or

at least from expanding its holdings beyond some initial level. Because the monetary agency's judgment on private nonbanking investments may be suspect or appear so to the public, holdings of commercial paper should also be forbidden, or restricted to top-grade reserve-currency-denominated bills.

Similar considerations apply to loans from the monetary agency to commercial banks, which reinforce the earlier insistence on restricting access to a discount window. For maximum discipline, the discount window could be eliminated, but then there is no point to holding reserves at the monetary agency, and the latter would perform only supervisory functions. As long as domestic authorities provide a discount window, it seems wise to keep the monetary agency institutionally separate from the ICA to avoid confusion about the reserve backing of the currency.

To better appreciate the money supply implications of an ICA, compare the accounts in Table 1 with those for a central banking system in Table 2. There are two main differences. First, the central bank combines the accounts of the ICA and monetary agency. Second, the central bank has an additional asset: claims on the domestic government and nonbank enterprises. The first difference does not affect the ratio of broad money to adjusted base money, but the second implies that the ratio of broad money to foreign reserves tends to be higher for the central bank than for the ICA and monetary agency. The relevant formulas are derived in Table 3, which shows that consolidation (or separation) of the functions of the ICA and monetary agency does not affect the ratio of broad money to adjusted base money. However, the ratio of broad money to foreign reserves is higher for a central bank than for the ICA and monetary agency, because central bank base money is backed by its holdings of government and enterprise debt ( $NDA_{ma}$ ). If the ratio of  $NDA_{ma}$  to foreign reserves at the central bank is  $\alpha$ , then the ratio of broad money

Table 2. *Accounts of a Central Banking System*

Institution assets	Liabilities
<i>Central bank</i>	
Foreign exchange ( $FR + NFA_{ma}$ )	Currency ( $C_p + C_b$ )
Net domestic assets ( $NDA_{ma}$ )	RES
BOR	
<i>Commercial banks</i>	
$C_b$	D
RES	BOR
$NFA_b$	
LI	

Table 3. *Money Supply and Multiplier Formulas*


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Under an ICA,<sup>a</sup>

$$\begin{aligned} FR &= C_p + C_b + C_{ma}, \\ C_{ma} + NFA_{ma} + BOR &= RES, \\ C_b + RES + NFA_b + LI &= D + BOR. \end{aligned}$$

$BOR = 0$  implies no credit window, and  $RES = BOR = 0$  implies that no monetary agency exists. Consolidation yields the money supply equation:

$$M = C_p + D = \frac{c_p + 1}{c_p + c_b + res - bor} (FR + NFA_{ma}),$$

where  $M$  equals the money supply and the terms in lowercase letters denote ratios to deposits  $D$ .

For a central bank,<sup>b</sup>

$$\begin{aligned} FR + NFA_{ma} + NDA_{ma} + BOR &= C_p + C_b + RES, \text{ and} \\ M &= \frac{c_p + 1}{c_p + c_b + res - bor} (FR + NFA_{ma} + NDA_{ma}). \end{aligned}$$


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<sup>a</sup>The relations follow from Table 1, since total assets equal total liabilities.

<sup>b</sup>The relations follow from Table 2.

to foreign reserves is  $100\alpha$  percent higher for the central bank than for the ICA and monetary agency, other things being equal. If the monetary agency under an ICA arrangement were allowed to hold domestic government paper, the money multiplier formulas for the ICA arrangement would be indistinguishable algebraically from those for the central bank, although the magnitudes of the parameters might differ.

For a given money supply, it is straightforward to compute the foreign reserve requirements under various monetary arrangements. For illustration, let  $c_p = 0.2$ ,  $c_b = 0$ ,  $res - bor = 0.1$ ,  $M = 1,000$ , and  $NDA_{ma} = 100$ . (See Tables 1–3 for a definition of the variables.) The values for  $c_p$  and  $res - bor$  appear to be roughly representative of banking systems in developing countries. Because of facilities provided either by the central bank or monetary agency, banks tend to hold negligible cash in their vaults ( $c_b \approx 0$ ). The 0.1 ratio of  $NDA_{ma}$  to  $M$  is very low and used only for illustrative purposes. Under these assumptions, the total net foreign reserves ( $FR + NFA_{ma}$ ) work out to 250 for the ICA and monetary agency and to 150 for the central bank. If the central bank increases  $NDA_{ma}$  to 200, the foreign reserve falls to 50.

If a country wants an ICA but is concerned about its ability to obtain sufficient foreign reserves, it could consider backing only a portion of

the previously accumulated currency stock. Provided that new issuance is fully covered by foreign exchange, the marginal money multipliers remain the same.

Over time, the expansion and qualitative improvement of banking can be expected to reduce the currency-to-deposits ratio. For a given level of reserve money, the money stock will grow under either an ICA arrangement or a central banking system. However, the growth mechanisms may differ in the two cases. If the monetary agency holds no domestic assets, an increase in reserve money requires an equivalent increase in foreign reserves through a trade surplus or foreign loans. This is typically a market-driven adjustment. By contrast, under a central banking arrangement, part of the reserve money increase is usually engineered through an administrative decision to issue new domestic credit. This discretionary authority to expand reserves, like the discretionary authority to issue currency, has inflationary potential.

#### **IV. Closing Remarks**

The independence of an ICA means its insulation from immediate fiscal and banking concerns rather than freedom from monetary rules. To maintain public confidence in the domestic currency, an ICA chooses an exchange standard, like gold or a foreign currency, and offers convertibility of domestic currency into the standard on demand. Typically, the exchange rate schedule is preannounced, usually at a fixed level, and new issues of currency are fully covered by reserves. The difference between the yields on international reserve investments and the generally small administrative costs of the ICA accrues as profit to the government.

For a country interested in having its own currency but uncertain of its ability to undertake discretionary management of the currency, or make it acceptable in international trade and payments, an ICA may offer a shortcut to monetary stability and convertibility. The domestic currency serves as a proxy for the reserve currency, but the ICA intercepts seigniorage for the government and retains more flexibility for the future (say, in terms of the option to change the reserve anchor or to expand into a full-fledged central bank). A fixed exchange rate peg is the simplest to operate and offers maximum credibility, but more complicated schedules may be useful in periods of transition.

The ICA's independence from fiscal and banking affairs requires extra discipline in the management of the latter. Since discretionary monetary financing of the budget is or should be prohibited, governments must build up other reserves or credit lines to maintain fiscal flexibility. Since

the ICA does not redeem demand deposits, the banking system must have ready access to extra reserves of cash or foreign assets.

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