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Macroeconomic Adjustment in a Highly Dollarized Economy: The Case of Cambodia

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Macroeconomic Adjustment in a Highly Dollarized Economy: The Case of Cambodia

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Abstract

Cambodia became dollarized suddenly in the early 1990s, as a result of massive dollar inflows stemming from a postconflict situation. Considering that the amount of dollars in circulation is unusually high, we attempt to estimate the true degree of dollarization empirically. Our results show that Cambodia has been virtually fully dollarized since 1995. Against a background of severe institutional limitations, the authorities have implemented in recent years policies akin to those of a de facto currency board arrangement, in particular with respect to fiscal discipline. The paper concludes that this policy mix has been appropriate for Cambodia's circumstances.

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I. INTRODUCTION AND SUMMARY

The signing of the *Paris Peace Agreements* on October 23, 1991 heralded the political and economic rebirth of the Kingdom of Cambodia after more than twenty years of continuous civil and international wars. The *United Nations Transitory Authority in Cambodia* (UNTAC) oversaw the country's political and economic management from 1991 until 1993, when free elections brought a civilian government to power. Since then the country has achieved an economic rebound, albeit from a very low base. Although the country achieved good economic progress during 1994-95—inter alia, in the framework of an International Monetary Fund (IMF)-supported program—factional fighting broke out briefly in July 1997, resulting in a temporary setback in development and foreign investment. Elections in 1998 brought a coalition government to the helm and, through the surrendering of the last *Khmers Rouges*, the country returned to peace and stability at the end of 1998. The coalition government has been able to focus on economic and structural reforms, and embarked upon a new IMF-supported program in October 1999.

A notable feature of the Cambodian economy is its high level of dollarization, which presents a challenge for decision makers to devise the best policy mix for sustainable growth, coupled with steadfast poverty reduction. Dollarization was neither sought nor encouraged by the monetary authorities. Rather, on the "supply side," it resulted from sudden and massive foreign-currency inflows—continuing to date—stemming from sizable international assistance, private transfers, and export earnings. Such large inflows of dollars from overseas, coupled, on the "demand side," with a lack of confidence in the domestic currency and political uncertainties, provided the impetus for speedy dollarization, which is a unique feature of Cambodia's economic experience. Since the authorities have adopted an open economy and a liberal exchange system, the U.S. dollar has become a de facto second legal tender along with the national currency, the *riel*. As a result, Cambodia has been confronted with multiple currencies circulating freely throughout its territory, to the point that the dollar has become the dominant currency, with the riel playing a relatively minor role.

Cambodia achieved almost complete de facto dollarization during 1991-95 and this condition has continued to prevail since then. Rapid dollarization resulted from the conjunction of an exogenous shock (supply of cash dollars) and a lack of confidence in the national currency. The country is largely a cash-based economy, with a large amount of cash dollars circulating outside the banking system. The originality of recent Cambodian economic policy is that it has been akin to an "orthodox" Currency Board Arrangement, yet it has been implemented in a virtually fully dollarized environment. This policy has served Cambodia well since 1999, but a number of risks, associated with the growing economy, call for close monitoring of economic developments.

This paper is organized as follows. Section II presents a short description of economic, financial, and structural developments in Cambodia since independence, but focuses on the decade ending in 2001, which serves as a backdrop for the discussion on the emergence of dollarization. Section III reviews recent developments in the literature on dollarization and

discusses the degree of dollarization in Cambodia. Owing to the unique way in which dollarization was introduced in Cambodia and to the specific characteristics of Cambodia's economy, an attempt is made to provide an econometric estimation of cash foreign currency circulation. Section IV examines costs and benefits of dollarization in Cambodia, and Section V discusses the ensuing macroeconomic policy implications.

II. OVERVIEW OF ECONOMIC AND FINANCIAL DEVELOPMENTS

Cambodia became independent from France in 1953 and experienced a 17-year period of relative political stability and steady economic growth, starting from a development base similar, if not superior, to that of other countries in South East Asia (Box 1). During that period, the riel was the legal tender and was used both for financial transactions and as a store of value. Following the March 1970 coup d'état that toppled the Government, the country was quickly drawn into the international turmoil of the subregion, and eventually into a civil war. In 1971, a flexible exchange rate system was introduced, while the exchange rates were unified. However, owing to economic difficulties, a dual exchange rate system was reinstated in 1973 with a "basic" rate for most transactions and a "preferential rate" for aid-related imports and services.[2]

The extreme revolutionary experience (an "agrarian moneyless society") of the Khmers Rouges during 1975-79 involved bans, inter alia, on private property, banking, and money, and brought the country to utter economic and human disaster, during which an estimated one and a half million people, about one-fifth of the population, perished.[3] The Khmers Rouges were driven out of most parts of Cambodia by the Vietnamese in 1979.[4] Under the new transition regime, the riel was reintroduced in 1980 as the domestic currency, and an official dual exchange rate system was created. A state-owned monobank was set up at the same time, whose role included central, commercial, and development banking activities, according to the socialist economic model.

Dollars started to flow into Cambodia in the mid-1980s, as the United Nations (UN) dispatched humanitarian and emergency aid, international nongovernmental organizations were allowed to return, and remittances from abroad resumed. During the 1980s, the country achieved only limited monetization and most domestic transactions were based on barter, with

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[2] Cambodia had its first experience with limited dollarization during the Lon Nol regime (1970-75), as increases in U.S. military personnel and assistance brought dollars into the country.

[3] It is noteworthy that, although the capital was forcibly emptied of all inhabitants a few days after it fell to the Khmers Rouges, the latter destroyed only two buildings in Phnom Penh, one of which was the *National Bank of Cambodia*'s (NBC) headquarters.

[4] In view of the shortcomings of their economic management, the Khmers Rouges considered reintroducing money in 1976, and went as far as printing bank notes, but they stopped short of proceeding. They later introduced a parallel currency, the *Khmer riel*, in March 1993 in the western border areas of the country under their control. This currency had only a limited circulation.

gold being the universal means of transacting and hoarding.[5] During 1988-91, the Vietnamese disengaged from Cambodia, leaving an unsettled political situation in their wake. Massive central bank financing of recurrent budget deficits during that period resulted in high inflation, in the range of 90-177 percent a year (end-period), and in an erosion of public confidence in the national currency. In 1993, the official exchange rates were unified de facto, and since then a free but managed floating exchange rate regime has existed.[6]

Box 1. Key Dates in Cambodian Political and Financial History

November 9, 1953 — Independence from France.
March 18, 1970 — Lon Nol coup d'état.
April 17, 1975 — Khmers Rouges take Phnom Penh and empty the capital.
January 7, 1979 — Vietnamese army enters Phnom Penh and establishes a new Government.
1980 — Reintroduction of the riel as domestic currency.
October 23, 1991 — Paris Peace Agreements.
May 1993 — National elections sponsored by the United Nations.
June 1993 — Restoration of monarchy.
July 1993 — Formation of a national Government.
May 6, 1994 — IMF Enhanced Structural Adjustment Facility (ESAF I) program.
January 26, 1996 — Law on the Organization and Conduct of the National Bank of Cambodia.
July 5-6, 1997 — Factional fighting in Phnom Penh.
August 22, 1997 — Law on Foreign Exchange.
July 26, 1998 — National elections.
November 23, 1998 — Formation of a coalition Government.
January 1, 1999 — Introduction of the value-added tax.
October 22, 1999 — IMF ESAF II/Poverty Reduction Growth Facility (PRGF) program.
November 18, 1999 — Law on Banking and Financial Institutions.
May 31, 2000 — Deadline for submitting applications for a new license for commercial banks.
January 2, 2001 — Launching of a clearinghouse for dollar-denominated checks.
December 31, 2001 — Deadline for meeting the new capital requirement for commercial banks.
January 1, 2002 — Acceptance of IMF Article VIII status.

During 1991-93, UNTAC took over the country's administration. UNTAC has represented the UN's costliest peace restoration effort to date, and resulted in a virtually overnight dollarization of the urban economy. This major nation-building operation involved the stationing of up to 22,000 UN military and civilian personnel throughout Cambodia, and it

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[5] The *domleung*, the unit for gold widely used in Cambodia, weighs 37.5 grams.

[6] During 1993-98, the NBC auctioned off a total of $177 million to strengthen the riel; however, since 1999, the NBC has refrained from doing so, except for the sale of a small amount of dollars in April-May 2001 to relieve temporary pressure on the riel's exchange rate.

is estimated that the total cost of the two-year operation was close to US$2 billion. Although evidently not all of this cost occurred in Cambodia, the total amount represented about 75 percent of the 1993 Cambodian GDP.[7] The UNTAC personnel arriving with dollars in cash and needing a wide array of services (local staff, housing, transportation, interpretation, etc.) and goods in a largely barterized economy, quickly introduced Cambodia to massive dollarization. The inflow of cash dollars was compounded by the return at about the same time of large numbers of Cambodian refugees and expatriates from abroad, also bringing dollars or Thai baht with them. As a result, foreign currency deposits in the banking system started to rise notably. Since 1992, they have constituted an increasingly important component of the banking system's deposit base (Figure 1).

Figure 1. Cambodia: Foreign-Currency Deposits, 1990-2001
(In millions of U.S. dollars)
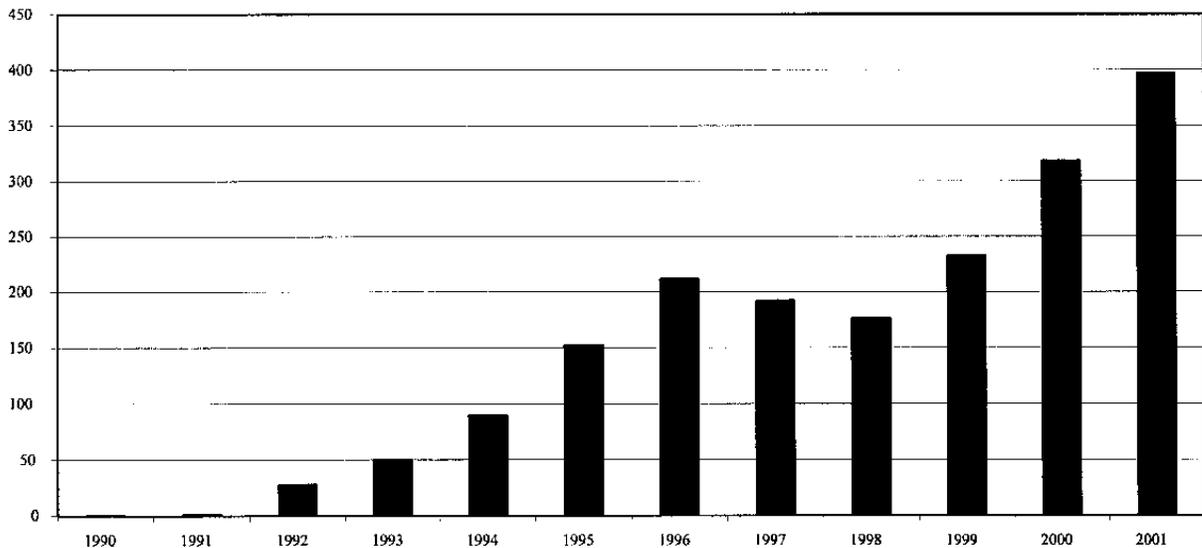
Source: National Bank of Cambodia.

In 1994, the authorities embarked upon a reform program, supported by the IMF under the *Enhanced Structural Adjustment Facility* (ESAF), and made notable progress in reining in inflation to single-digit levels, strengthening the fiscal position, furthering financial stabilization, and opening up the economy. The Government also achieved limited progress in some areas of structural reforms, such as state-owned enterprise reform and privatization, but policy implementation in other areas (notably civil service reform and forestry management) met with difficulties. However, owing to the continued unsettled political situation, and a resurgence of governance problems, the ESAF program was suspended in September 1995, and it expired in August 1997. Cumulative disbursements amounted to SDR 42 million. The political situation deteriorated to the point that factional fighting erupted in July 1997.

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[7] No GDP estimates exist for earlier years.

Compounded by the onset of the Asian crisis, the economic situation worsened, growth slowed down, the Government resorted to budget financing from the NBC in 1998 for the first time since 1993, and inflation picked up to double digits.

Not surprisingly, against the backdrop of continued large inflows of foreign assistance and private transfers, and of political uncertainty, the dollarization of the Cambodian economy continued during 1994-96, as illustrated by the continued rise in foreign currency deposits. However, the July 1997 fighting and the regional financial crisis led to a deterioration in confidence. National elections took place on July 26, 1998, but it took until November 1998 to complete the formation of a coalition government and to restore domestic stability and international confidence. As a combined result of the expansionary policy and of the regional financial crisis, the riel depreciated during mid-1997 and 1998, but its depreciation was smaller than those of other Asian currencies. The limited use of the riel in Cambodia minimized the impact of this depreciation on the economy. The effects of the political uncertainty seem to have been stronger than those of the regional crisis. During 1997-98, there was a decline in foreign currency deposits, but we show in the next section that "de-dollarization" during those two years, as evidenced by a decline in foreign currency deposits, is not a correct economic assessment: dollarization (including cash holdings of dollars) during the period under review remained broadly constant—however, the composition of dollar-denominated assets held by agents did change.

During 1999, the authorities paved the way for resumed IMF lending by taking a number of fundamental financial measures (e.g., introduction of the value-added tax on January 1, 1999) and structural measures (curbing illegal logging and initiating civil service and military reforms). In October 1999, a second three-year (1999-2002) ESAF program was approved, soon replaced by a *Poverty Reduction and Growth Facility* (PRGF) arrangement. Macroeconomic stabilization under the PRGF program has been largely successful to date: economic growth has resumed, fiscal balance has been restored, inflation has been reined in, revenue mobilization has improved, and a prudent monetary policy has been maintained. Accordingly, macroeconomic performance quickly rebounded from the relapse in 1997-98 and has improved notably, with estimated economic growth reaching on average more than 5 percent a year during 1999-2001, despite severe flooding in 2000 and 2001; inflation, as measured by the consumer price index (CPI, end-of-period), turned negative during the same period (Figure 2); and the garment, tourism, and agricultural sectors posted strong growth, resulting in additional foreign currency inflows for the first two sectors. The good inflation performance reflected the authorities' cautious monetary and fiscal stance, as well as cheaper imports from neighboring countries. The increase in broad money essentially resulted from a buildup in foreign assets, which itself stemmed from a rise in foreign currency deposits, while net domestic assets of the banking system declined, owing to a net repayment of government debt to the NBC and a relative lack of financial intermediation.

Figure 2. Cambodia: Real GDP and Inflation, 1991-2001
(In percent)

Consumer Price Index (end-of-period) (right scale) — Real GDP growth rate (left scale)
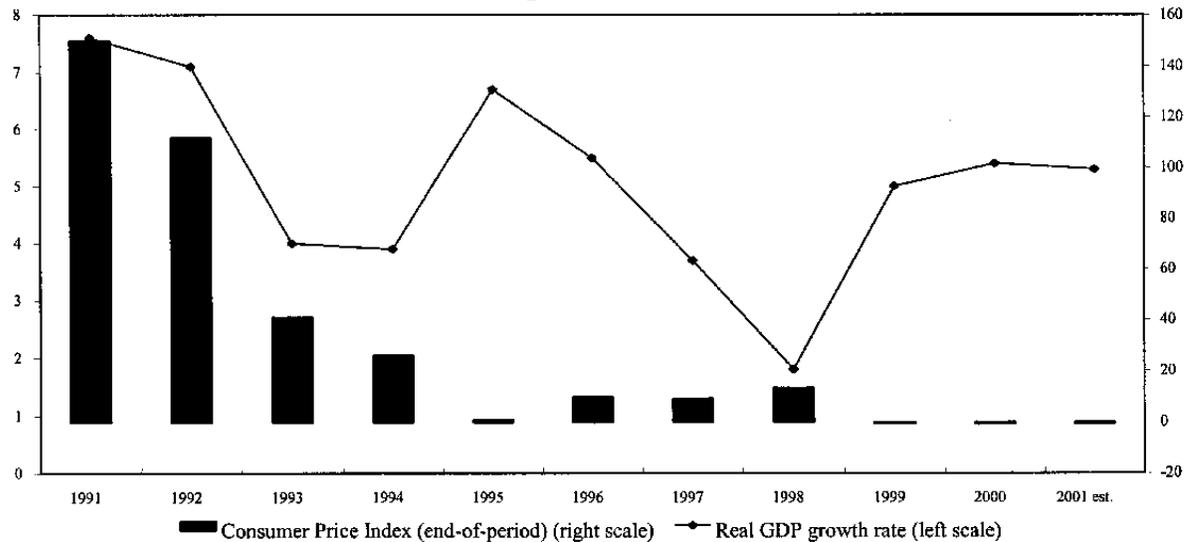
Sources: Data provided by the Cambodian authorities and IMF staff estimates.   Note: Old CPI, in use until end-2001.

III. DOLLARIZATION IN CAMBODIA

A. A Synopsis of the Concepts of Dollarization and of Currency Substitution

The notion of *dollarization* emerged as a novel economic phenomenon in the 1980s in Latin America. Early discussions of this phenomenon in the literature revolved around that region's experience with the increasing use of the U.S. dollar along with national currencies. Dollarization is described in the early literature as a situation where a foreign currency is used for the same purposes as the national currency, i.e., as a medium of exchange, a unit of account, and a store of value. The loss of the domestic currency's external value and appeal as a store of value prompts dollarization and the foreign currency assumes the three classic uses of the national currency. According to Ortiz (1983), dollarization is the degree to which real and financial transactions are performed in dollars relative to those performed in domestic currency.

Broader notions of dollarization also exist. Cuddington (1989), and Calvo and Végh (1992), define currency substitution as the use of cash foreign currency and of foreign currency deposits only as a medium of exchange in the domestic economy. McKinnon (1996) suggests a more extensive definition of currency substitution, distinguishing between *direct* currency substitution (several currencies compete as means of payment) and *indirect* currency substitution (several currencies serve as nonmonetary financial assets for stores of value). This distinction between the two motives for the demand for foreign-currency-denominated assets is also known in the literature as *currency substitution* and *asset substitution*.[8] Currency

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[8] However, there continue to be variations, divergences, and inconsistencies among authors on the notions of "dollarization," "currency substitution," and "asset substitution."

substitution occurs when foreign-currency-denominated assets are used as means of payment, while asset substitution occurs when they are primarily used as a store of value. Calvo and Végh point out that asset substitution is normally the late stage of dollarization that appears in a high-inflation environment where a foreign currency becomes the unit of account or a store of value.[9]

Dollarization has elicited a large body of *empirical* and *theoretical* studies. Despite difficulties related to the measurement of the degree of dollarization, there is an extensive empirical literature on this subject (Box 2). Among the dollarization factors investigated by

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Box 2. Empirical Models of Dollarization

The empirical studies can be roughly divided into two main groups: qualitative and quantitative analyses. The first group focuses on the costs and benefits of dollarization in terms of economic performance and economic policies—Argentina, Ecuador , Mexico, and Panama, are popular references—and so are some transition economies (e.g., the Baltics and the Russian Federation). No consensus has emerged on the performance of dollarized versus nondollarized economies. On the one hand, those who reject dollarization point out the loss of seigniorage, the inability of the central bank to act as a lender of last resort, and more importantly, the loss of flexibility and independence in monetary and exchange rate policies. On the other hand, those who favor dollarization emphasize that most dollarized countries exhibit low inflation, macroeconomic stability, and enhanced fiscal discipline (for instance, Baliño, Bennett, Borensztein et al., 1999; Berg and Borensztein, 2000; and Edwards, 2001). Covering the period 1970-98, and focusing on IMF member countries with various exchange rate regimes (from pegged to floating, including currency boards), Ghosh et al. (1998) provide empirical evidence that countries with high levels of dollarization or currency board arrangements may have sacrificed the flexibility of their monetary policy, but gained long-term benefits of lower inflation and a more stable exchange rate. As noted by Bogetić (2000), analysis and evaluation for a single country are relatively rare, except for Panama, which seems to have become a benchmark for related works. It is with regard to growth performance that studies differ most. Edwards (2001) provides evidence that some dollarized countries (Liberia, Panama, and ten micro-states) experienced during 1970-98: (i) lower inflation; (ii) similar fiscal deficits; and (iii) lower GDP per capita growth than nondollarized economies (emerging and developed countries, with a variety of exchange rate regimes, from floating through crawling to pegged but adjustable exchange rates). To emphasize these results, Edwards (2001) takes a closer look at the case of Panama. He finds that Panama did not perform better during 1970-98 compared with nondollarized reference economies, and external shocks generated higher costs in Panama—in terms of lower investment and growth. Conversely, Ghosh et al. (1998) find that sample economies exhibited faster economic growth than nondollarized ones.

The second group of empirical studies attempts to examine the factors that may explain the emergence of dollarization in a group of countries. Econometric studies investigate the contribution of two sets of variables to dollarization: institutional factors and economic factors. Vetlov (2001) identifies the following institutional factors as possibly leading to dollarization: open economy, great depth and large size of the domestic financial market, and relatively low transactions costs for acquiring foreign currency. He notes that key economic factors are the interest rate spread (between domestic currency and foreign currency deposits), the inflation rate differential (between domestic and foreign inflations), and devaluation expectations. Other variables, which can signal an expected devaluation, are also considered: the real exchange rate, the current account deficit, international reserves, and other related factors. To explain dollarization, most studies are money-demand models, in which the explanatory variables usually include a combination of the aggregates noted above. Agénor and Khan (1996) find that foreign interest rates and the expected depreciation of the exchange rate can be important factors leading to dollarization.

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[9] For simplicity's sake, from this point on we use the term dollarization for both currency and asset substitution, unless otherwise specified.

authors, the high degree of openness, low transaction costs for acquiring foreign currency, and lingering depreciation concerns are characteristic of Cambodia.

The schools of theoretical models focus on the different purposes of demand for foreign currency (means of payment or store of value—Box 3). They have been developed to describe money-demand behavior in countries like Argentina (Kamin and Ericsson,1993), Latvia (Sarajevs, 2000), or in a group of developing countries (Agénor and Khan,1996). However, neither of the two models described applies to Cambodia, as there are no markets offering the possibility of arbitrage among various financial assets.

B. Measuring Dollarization in Cambodia

Level of dollarization

According to Baliño et al. (1999), partial or unofficial dollarization "occurs when residents of a country hold a large share of their financial wealth in assets denominated in foreign currency, where foreign currency lacks the legal tender privileges that domestic currency enjoys." Bogetić (2000) defines full or official dollarization "as a complete monetary union with a foreign country from which a country imports currency, by making the foreign currency full legal tender and reducing its own currency, if any, to a subsidiary role." In 2001, 27 countries had officially dollarized their economies, 7 of which used the currency of another country and 20 belonged to a currency union.

An alternative to full dollarization is the official bimonetary system in which the domestic and a foreign currency are both legal tenders. The foreign currency usually tends to dominate in bank deposits, but the domestic currency is often used for the execution of the budget, including the payment of taxes and of the salaries of civil servants. Transactions can be paid for in one or both currencies, according to different country experiences. Cambodia's legal tender is the riel, but Cambodia's monetary system is characterized by a *de facto* dollarization, resulting in an unofficial multimonetary system. The dollar is widely used by residents but it is not a legal tender. In urban areas the riel is chiefly used for small cash transactions and as divisionary money. In those areas, prices for goods and services are mostly quoted in dollars and transactions are predominantly settled in dollars. In rural areas, far from the borders, the riel remains the main means of payment, and serves also as a store of value, along with gold. The riel is mainly kept in circulation through government payments for goods and services (including civil servants' salaries). In the border areas with Thailand, the Thai baht is widely circulating and is preferred to the dollar. Along the border with Vietnam, the Vietnamese dong circulates to a limited extent among traders who engage in regular cross-border trading.[10]

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[10] It seems that because of its continued depreciation in recent years, the Lao *kip* is not used/accepted in Cambodian border areas with the Lao PDR.

Box 3. Theoretical Models of Dollarization

Giovanni and Turtelboom (1994) provide a useful survey of the theoretical literature on dollarization, which takes money demand in a multicurrency environment as its starting point. The bulk of the analysis can be divided into two broad avenues: (i) *cash-in-advance* models, and (ii) *transactions costs* models.

In the cash-in-advance models, as reviewed for instance by Giovanni and Turtelboom (1994) and Sarajevs (2000), two currencies exist in the economy, with or without legal restrictions. Both domestic and foreign currencies are used as a medium of exchange. Moreover, the following underlying assumptions are posed: there is perfect substitution between the two currencies and financial assets (to avoid idle cash balances), and the acquisition of foreign currency is costless. Agents are maximizing their utility function (which is increasing in consumption and foreign currency holdings), subject to budget and cash-in-advance constraints, by choosing between domestic and foreign currencies, and domestic and foreign bonds with positive returns. It is assumed that prior to any consumption purchase, agents must acquire domestic or foreign currencies. The return on bonds in foreign currency expressed in domestic currency depends on the expected exchange rate depreciation and will positively affect the demand for foreign bonds and negatively affect the demand for domestic assets. In fact, the differential of real return (nominal return minus inflation rate) from domestic and foreign currencies determines the demand for domestic and foreign currencies. Bogetić (2000) asserts that foreign currency holdings are closely linked to domestic and foreign inflation rates and the credibility of legal restrictions. The higher the domestic inflation rate compared with the foreign one, the higher the level of foreign currency holdings. Conversely, the stronger the legal restrictions, the lower the level of foreign currency holdings. If there are no legal restrictions, there are two possible equilibria in which only one currency circulates: no currency substitution (low inflation) or full substitution (high or hyperinflation). Thus, in this model, the two currencies circulate simultaneously only if there are some credible and effective legal restrictions.

In the transactions costs models, developed by Poloz (1986) and Marshall (1987), it is time-consuming to acquire cash (both domestic and foreign) to purchase goods. The inability of agents to acquire cash instantaneously forces them to build up cash balances. The assumptions in this model are as follows: two currencies circulate simultaneously, there are available financial assets, and there are transactions costs, which reduce the agents' disposable income. The transactions costs function takes into account the time and resources required to acquire cash (i.e., time consumed increasing cash balances decreases the working time and consequently income). Agents maximize their utility function (which is increasing in consumption solely) subject to a budget constraint. This framework differs in two ways from the previous one. First, foreign currency holdings do not appear in the utility function. Second, there are transactions costs which reduce the disposable income of agents. By assumption, the transactions costs function is increasing in domestic and foreign goods consumption and decreasing in real money balances (domestic and foreign). In other words, agents need money (domestic and foreign) to purchase goods; consequently, they will bear transactions costs in converting their assets into cash in both currencies. The "liquidity" of different assets in the agents' portfolios will determine the demand for different currencies to permit the purchase of goods. Given the specific form of the transactions costs function, this framework leads to different equilibria, depending on consumption levels and transactions costs. If these levels and costs are high, agents will hold foreign assets for the purpose of payment and as a store of value, and thus, currency substitution will occur. Conversely, if consumption levels and transactions costs are low, agents will prefer to use the domestic currency.

Cambodia is essentially a cash-based economy, with checks used only by large institutions in urban areas, and virtually no electronic payments. Financial intermediation is shallow and transactions in the banking system are predominantly effected in dollars. Most banks (except the state-owned commercial bank) keep their books in dollars, using the daily market exchange rate to convert transactions in riels into dollars. During 1997-98, about 97 percent of bank assets and 95 percent of bank liabilities were denominated in dollars. However, since the 1998 national elections, assets and liabilities of commercial banks

denominated in riels have increased modestly, as macroeconomic stabilization and growth led to an expansion of banking operations in riels (Figure 3).

**Figure 3. Cambodia: Assets and Liabilities of the Banking System
in Foreign Currency, 1997-2001**

(In percent of total assets and liabilities)
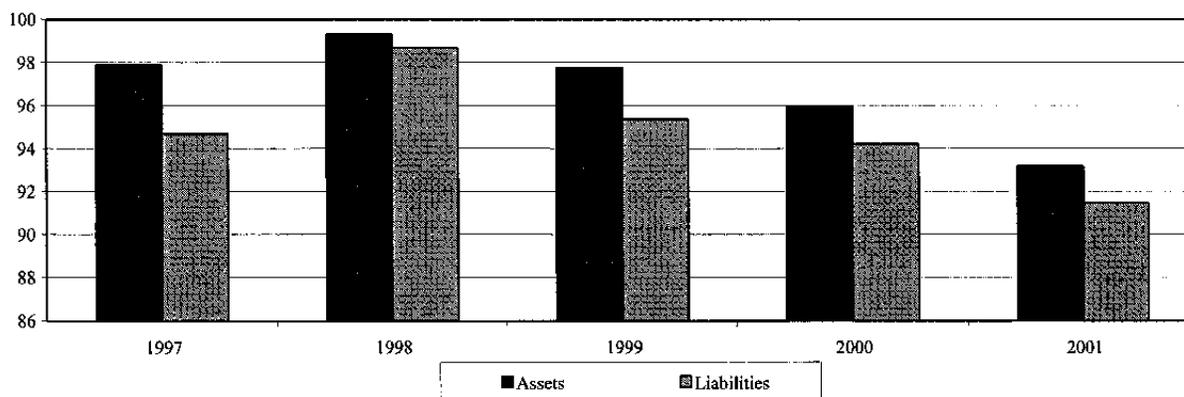
Beyond a qualitative description of dollarization occurring in an economy, the main challenge for characterizing this phenomenon more precisely is the measurement of the *degree* of dollarization. Usually foreign-currency-denominated assets held within a country's financial systems are reasonably well known, but the amount of foreign currency circulating in cash in the economy is unknown. Baliño et al. (1999) report that, based on U.S. Treasury data on net dollar inflows during 1989-96 in selected small open economies—comparable to Cambodia— such inflows represented three to four times the amounts of local currency in circulation.

Authors in this field of research acknowledge the problem of measuring the true degree of dollarization (i.e., foreign cash in circulation plus foreign-currency-denominated assets held in the banking system) and suggest circumventing the lack of data on foreign cash circulation by comparing a monetary aggregate denominated in foreign currency to another monetary aggregate denominated in domestic currency (possibly including a subcomponent denominated in foreign currency). These aggregates are usually extracted from monetary statistics, which are in general among the better statistics, especially in developing countries. For instance, Calvo and Végh (1992) propose to proxy the degree of dollarization by the ratio of foreign currency deposits held in commercial banks to broad money, inclusive of foreign currency deposits. In most cases, the choice of a dollarization index relies on data availability. Commonly, data on foreign banknotes circulating in the economy are unavailable. The only series typically available is residents' foreign currency deposits in the domestic banking system. Thus, habitual dollarization indices tend to underestimate the true degree of dollarization, as they do not include cash foreign currency in circulation.

Following Vetlov (2001), we start by using three of the most common dollarization ratios (DR) found in the literature (deposits defined as demand, savings, and time deposits):

- DR_1: residents' foreign currency deposits to domestic currency deposits;

- DR_2: residents' foreign currency deposits to the sum of residents' domestic currency deposits and domestic currency in circulation; and

- DR_3: residents' foreign currency deposits to broad money (M2).

In the case of Cambodia, the main difference between these ratios lies in their respective levels (Figure 4). With an appropriate re-scaling, these three time series follow each other rather closely. The cross-correlation coefficients between the ratios are high: 0.99 between DR_3 and DR_2; 0.80 between DR_3 and DR_1; and 0.76 between DR_2 and DR_1.

Figure 4. Cambodia: Dollarization Ratios, 1995-2001

Source: National Bank of Cambodia. - - - DR1 (left scale) — —DR2 (right scale) ——DR3 (right scale)
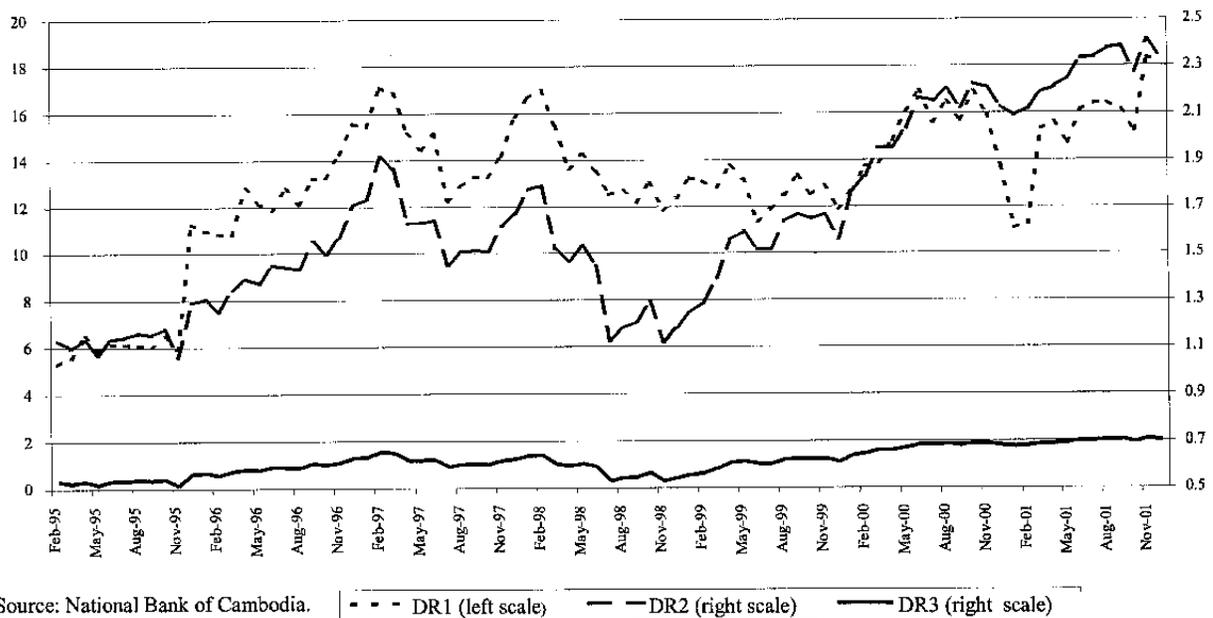
Using ratio DR₃, the degree of dollarization in Cambodia rose from 50 percent at end-1994 to 70 percent at end-2001. Between December 1994 and July 1997, DR₃ increased from 50 percent to 60 percent. It remained stable around that level for seven months, and then started to rise slightly, reaching 64 percent in January 1998. Between January and December 1998, dollarization declined from 64 percent to 54 percent. As noted in Section II, political uncertainty could explain this episode of "de-dollarization." In late 1998, after the formation of a coalition government, increased public confidence and heightened economic activity, in particular in the tourism and retail trade sectors, resulted in the return of foreign currency deposits to the domestic banking system. Since the beginning of 1999, the degree of dollarization has constantly increased, reaching a 71 percent peak in November 2001.

Baliño et al. (1999) characterize an economy as highly dollarized when DR_3 exceeds 30 percent. According to this definition, Cambodia can be viewed as a "very highly" dollarized economy and finds itself in the uppermost group of dollarized economies (Figure 5). At end-2000/2001, dollarization in the world—excluding full dollarization—as measured by DR_3, ranged from 7 percent in China to 84 percent in Bolivia; Cambodia, at 70 percent, ranked fourth after Bolivia, Lao PDR, and Uruguay.

Figure 5. Ratio of Foreign-Currency Deposits to Broad Money, 1995-2001
(In percent)

Sources: *International Financial Statistics,* and IMF staff estimates.
1/ 2000 data.
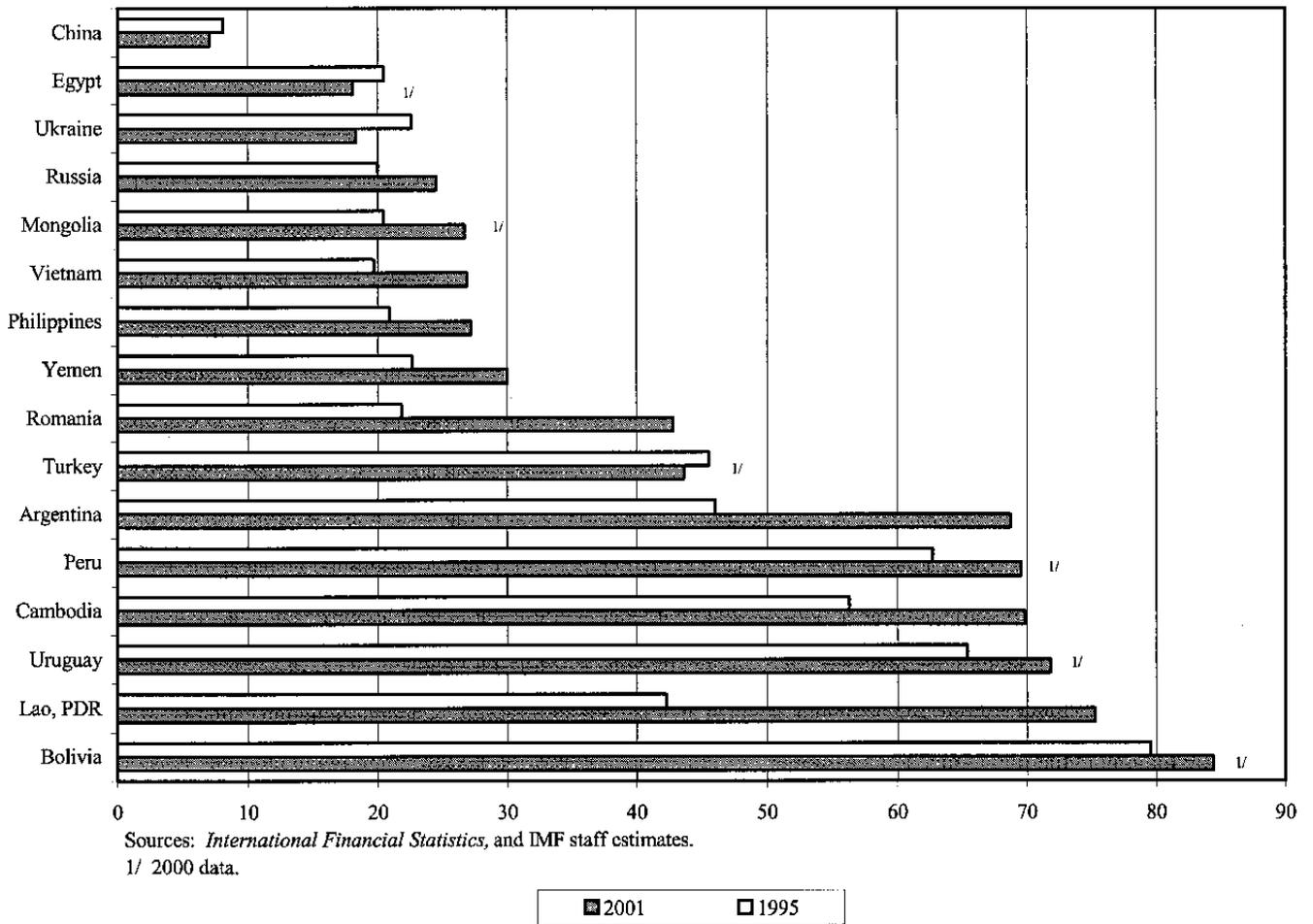
Sources of dollarization

By regional standards, the level of dollarization in Cambodia in 2001, as measured by DR_3, was between the levels of its two comparable neighbors (Figure 6). In Vietnam, high inflation in the early 1990s can be considered as the main factor behind the sudden surge in dollarization, peaking at 41 percent in 1991. As a result of macroeconomic stabilization,

Figure 6. Foreign-Currency Deposits in Cambodia, Lao PDR, and Vietnam, 1994-2001
(As percent of broad money)

Source: IMF.　　　　　　—●— Cambodia　　—■— Lao PDR　　- ▲ - Vietnam
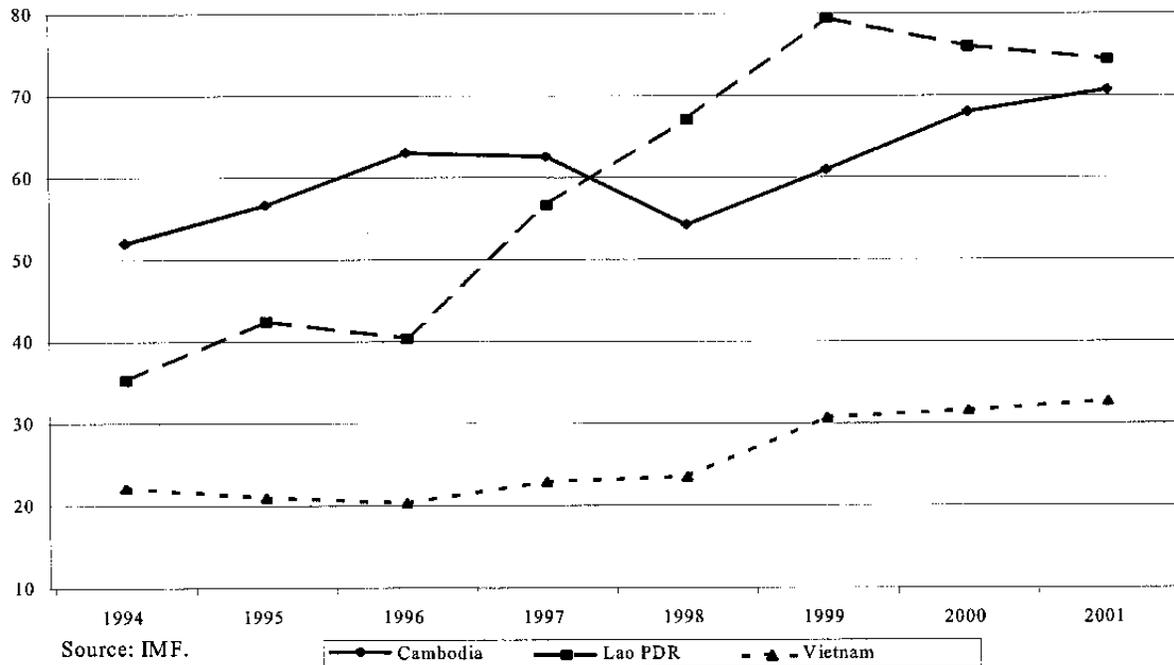
dollarization receded somewhat in the following years, but rose again during the last half of the decade, reaching more than 30 percent in 2001. Until the mid-1990s, dollarization in the Lao PDR was higher than in Vietnam, but lower than in Cambodia. However, it has expanded remarkably since 1996 and has now surpassed Cambodia. The main sources of the surge in dollarization in the Lao PDR were the episodes of high inflation (from December 1994 to December 1999) and a concomitant sharp depreciation of the domestic currency. However, since 1999, efforts at stabilizing the economy have resulted in a decrease in the inflation rate and dollarization has leveled off, albeit at a high level (75 percent). Conversely, the recent continued rise in dollarization in Cambodia has clearly not resulted from high inflation, as inflation has all but disappeared since 1999.[11] These findings are confirmed by a causality analysis between inflation and dollarization in Cambodia, Lao PDR, and Vietnam (Box 4).

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[11] The old CPI, used until end-2001, covered only the capital city and suffered from a number of structural weaknesses, as well as excessive sensitivity to seasonal fluctuations in food prices. It is thus possible that it slightly underestimated the underlying inflation. It was replaced in January 2002 by a new, updated, and expanded index.

Box 4. Causality Analysis Between Inflation and Dollarization in Cambodia, Lao PDR, and Vietnam

We examine the relationship between inflation and dollarization in three selected South-East Asian countries (Cambodia, Lao PDR, and Vietnam) during the second half of the 1990s, using the Granger (1969) causality methodology. We use monthly data from the Cambodian authorities and from *International Financial Statistics* (IMF, 2001). We compute dollarization as the ratio of foreign currency deposits to broad money, and inflation as changes in the monthly consumer price index. We use data from October 1995 to August 2001 for Cambodia; from February 1995 to September 2001 for Lao PDR; and from January 1996 to July 2001 for Vietnam. All the variables are specified as growth rates.

To test the stationarity of the time series, integration properties are assessed using conventional unit root tests (augmented Dickey-Fuller statistics). The results of the unit root tests are summarized in Box Table 1. All the time series are stationary and the order of integration is one, so they are I(1) series. For each time series, there is one unit root.

Box Table 1. Unit Root Tests

Country	Inflation (first difference)	Dollarization (first difference)
Cambodia	-1.6932 1/	-3.6704 1/ 2/
Lao PDR	-2.5482 1/	-1.9755*
Vietnam	-2.3114 1/	-2.9751*+

Note: 1/denotes significance at the 1 percent level; 2/ includes a deterministic element (intercept).
The results were obtained using 12-month lags.

Having established the stationarity of all the variables, we perform Granger causality tests. The statistics reported in Box Table 2 are the conventional *F*-statistics of this method. The test shows that episodes of high inflation in Lao PDR between early-1995 and end-1999 had an impact on the surge of dollarization during the same period. Conversely, in Cambodia and in Vietnam, dollarization cannot be explained by inflation during the period under review. In other words, inflation did not predict dollarization in these two countries a year later. As we noted earlier, dollarization in Cambodia seems to be the result, inter alia, of a massive exogenous shock during 1991-93. In Vietnam, high inflation in the early 1990s may explain the level of dollarization then. Since 1997, other factors may have contributed to the increase in dollarization: spillovers from the Asian crisis; real interest rate spreads in favor of foreign currency deposits; and strong performance in exports.

Box Table 2. Granger Causality Tests

Country	Inflation does not Granger cause dollarization	Dollarization does not Granger cause inflation
Cambodia	0.3738	1.0158
Lao PDR	2.5063 1/	0.4200
Vietnam	0.5097	0.8023

Note: 1/denotes significance at the 5 percent level. The results were obtained using 12-month lags.

An empirical attempt at measuring cash dollars circulating outside banks in Cambodia

Baliño et al. (1999) contend that "in general terms, dollarization is a response to economic instability and high inflation and to the desire of domestic residents to diversify their asset portfolios." While in the early 1990s, economic instability and high inflation certainly did prevail in Cambodia, these phenomena would likely not have sufficed to cause such high dollarization, had it not been for the sudden and massive inflow of cash dollars in 1991-93. Given the sheer volume of cash dollar inflows, we feel that the use of the traditional dollarization ratios referred to earlier significantly underestimate the true degree of dollarization in Cambodia, a characteristic that cannot be ignored in economic analysis. We therefore endeavor to estimate cash dollars circulating in Cambodia empirically.

At the outset, we would like to emphasize that our empirical attempt at measuring cash dollars in circulation is hampered by *severe data limitations*. As in many developing countries, some of the data used are of mediocre quality, especially data on national accounts. To our knowledge there are, however, no other statistical sources that would yield data of better quality. We recognize that our results rely heavily on the data, and we are aware that a revised data set could result in changes in levels, but it is unlikely that it would change dramatically the trend of the derived cash dollar time series. Accordingly, and as in related works, we emphasize that our results should be considered only as rough estimates. Our intention is not to provide exact cash dollar time estimates, but rather a "baseline" for illustrative purposes that is helpful to assess the policy options available. The empirical results we find are probably on the high end of the range of cash dollars in circulation, but we trust that they buttress the policy considerations and recommendations for Cambodia, laid out in Sections IV and V, in the context of very high dollarization. The empirical model used to estimate cash dollar circulation in Cambodia is presented in Appendix I.

According to our estimates, and as illustrated in Figure 7, cash dollars in circulation amounted to about US$1.2 billion in early 1995 and rose to US$2.9 billion at the beginning of 2001. The evolution of dollars in circulation can be divided into four phases: a steady increase from February 1995 until March 1996; a relative stabilization from April 1996 to March 1998; a second overall, though erratic, increase until the end of 1998; and a relative stabilization from January 1999 to December 2000. Using dummy variables, the impact of major political events was tested but yielded no significant results.

The estimated stock of cash dollars at the start of 1995 seems broadly consistent with the infusion of large amounts of cash dollars since the mid-1980s, especially during the UNTAC period, for the purchase of local services and goods; remittances and private transfers from abroad, which started in 1985; and the return of large numbers of refugees who brought cash

Figure 7. Cambodia: Dollars in Circulation Outside Banks, 1995-2000
**(In billions of U.S. dollars)**
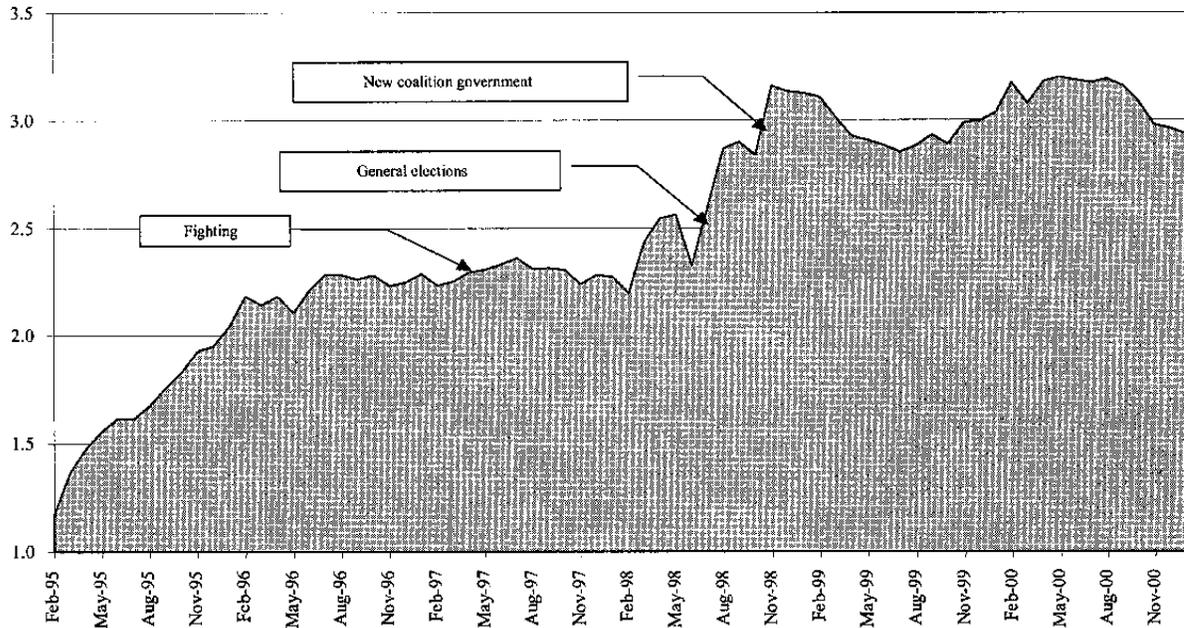
Source: Authors' estimates

with them. The steady increase of cash dollars in 1995-96 can be explained by the start of multilateral and bilateral aid disbursements (US$335 million in 1995 and US$437 million in 1996), the return of foreign investment (US$151 million in 1995 and US$294 million in 1996), and continued large private transfers. According to the Council of Development for Cambodia, the country received about US$2.1 billion from bilateral donors alone during the period 1992-2000. However, as the political situation, in the wider context of the Asian crisis, deteriorated in 1997 and the first half of 1998, cash dollars are estimated to have stabilized, but massive capital flight seems not to have occurred, as one might have expected. During 1997 and early 1998, owing to political uncertainty, international aid inflows and foreign direct investment slowed down and the amount of dollars circulating in the economy stabilized at around US$2.3 billion. After the general elections in July 1998, a new surge in cash dollars started, fuelled by the spectacular increase in foreign direct investment in the garment industry. Between 1995 and 1998, some 165 garment factories were opened and today they employ 160,000 people who receive, in aggregate, an estimated annual salary of US$140 million in cash. Since early 1999, the level of cash dollars has leveled off, as the underlying factors described above seem to have stabilized.

If we measure currency substitution by the percentage of the estimated foreign currency in circulation as a share of total currency in circulation (domestic and foreign currencies outside banks), we find an average of 96 percent (Figure 8). Anecdotal evidence cited by Liang (2000) and Marciniak (2002) suggested that foreign currency cash holdings in Cambodia amounted to 85-95 percent of total currency in circulation. Our results are consistent with those earlier estimates.

Figure 8. Cambodia: Estimated Currency Substitution, 1995-2000
(In percent of total money circulating)
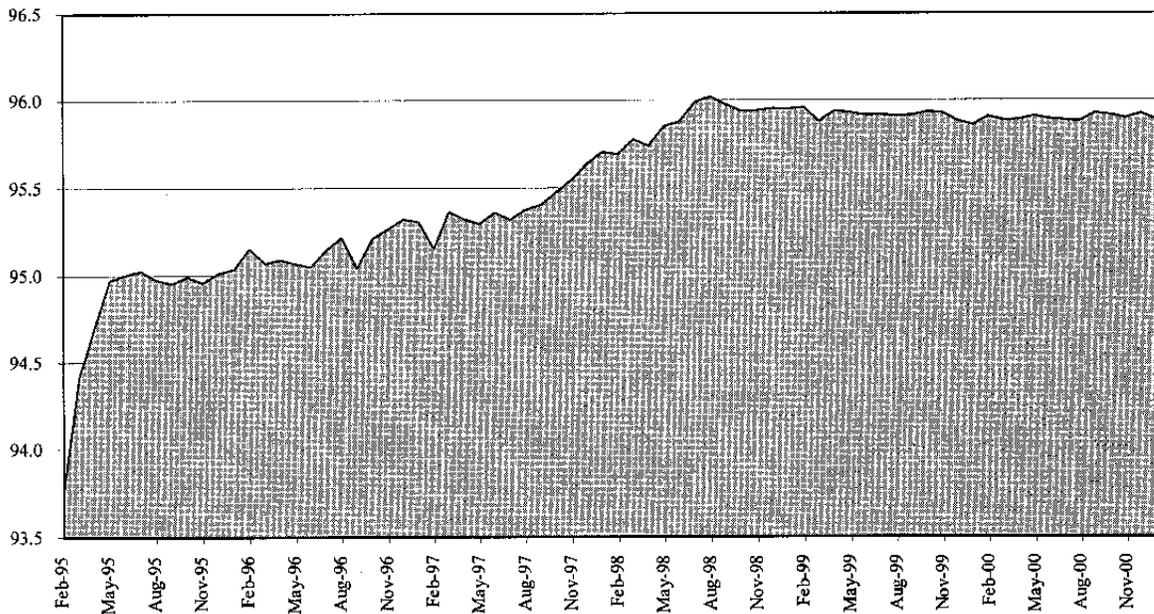
Source: Authors' estimates.

The high ratio of dollars in circulation to GDP and to foreign currency deposits can be explained by several reasons (Table 1). First, the lack of public confidence in the domestic banking system and uncertainty about the future lead people to hold high amounts of dollars in cash. Second, the lack of a modern payments system (electronic payments and credit cards) and the limited use of checks promote the use of cash dollars in the economy. Third, banks are overly liquid and a number of them decline taking small deposits.[12] Fourth, there are no financial institutions outside major cities, except some micro-finance institutions. Fifth, it is conceivable that large amounts of cash dollars circulate in the economy as a result of smuggling and of illegal activities, which typically transact in cash using a major international currency.

Table 1. Cambodia: Ratios of Dollars Circulating in the Economy, 1995-2000

| Year	1995	1996	1997	1998	1999	2000
Dollars/GDP	0.57	0.72	0.76	1.00	1.02	1.01
Dollars/FC Deposits	14.1	12.6	11.8	15.8	13.9	10.2

Source: Authors' estimates.
Note: Yearly averages of monthly estimates.

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[12] During 1998-2000, $530 million worth of banknotes were deposited overseas by Cambodian commercial banks.

Figure 9 illustrates the sensitivity of agents' preference for holding cash dollars versus dollar deposits in the banking system in times of political uncertainty, in a general context of increasing dollarization. During 1995Q3-1997Q1, as economic reform takes hold and financial intermediation deepens, the ratio of cash dollars over dollar deposits declines from about 14 to about 9½. During most of 1997, owing to political strife, and most of 1998, owing to uncertainty linked to the upcoming general elections, the ratio surges and, at its peak in August 1998, reaches19. Starting from the effective operation of the coalition Government in November 1998, the ratio steadily decreases to reach about 9, its lowest value in the period under review.

Figure 9. Cambodia: Ratio of Dollars in Circulation to Foreign-Currency Deposits, 1995-2000
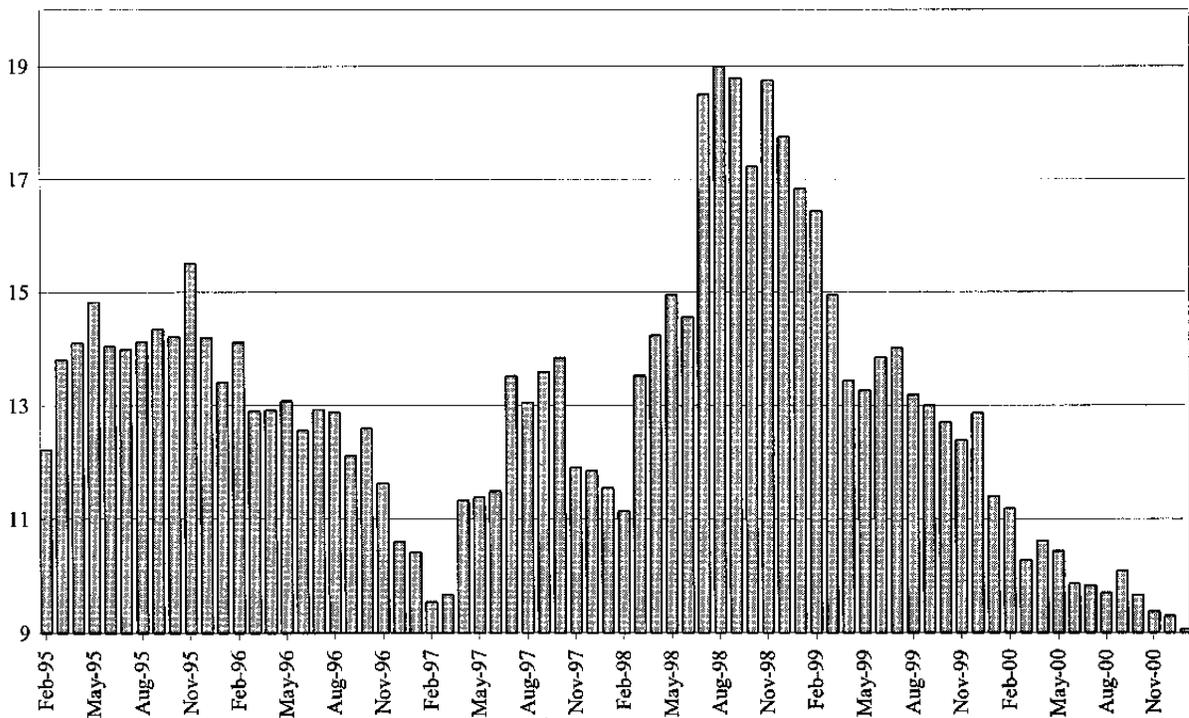
Source: Authors' estimates.

We compute a new dollarization ratio, DR_4, similar to DR_3, but including in the numerator and in the denominator our estimates for cash dollars in circulation. DR_4 is thus defined as the ratio of residents' foreign currency deposits *plus* cash dollars in circulation to total broad money (including cash dollars in circulation). The result of this computation, shown in Figure 10, is quite remarkable. We find that the degree of dollarization in Cambodia, as measured by DR_4, has been stable since early 1995, in the range of 93-95 percent. This validates our earlier assertion that Cambodia has become very highly dollarized during the period 1991-95 and has stayed so ever since. While the economy has expanded and financial intermediation has deepened since 1995, and while there have been large fluctuations in the composition of agents' dollar assets, as discussed earlier, the overall degree of dollarization has remained stable. Thus dollarization has persisted despite macroeconomic stabilization, resumption of growth, and relatively stable public finances. This persistence—or *hysteresis*—

has also been noted in other cases of high dollarization (e.g., Mueller, 1994). The continued lack of confidence in the national currency, owing to historical reasons, could be a key factor in explaining this phenomenon. Another reason could stem from the high costs of de-dollarization, in particular the cost associated with the physical replacement of the large volume of dollar banknotes.

Figure 10. Cambodia: Estimated Dollarization, 1995-2000

(In percent of broad money)
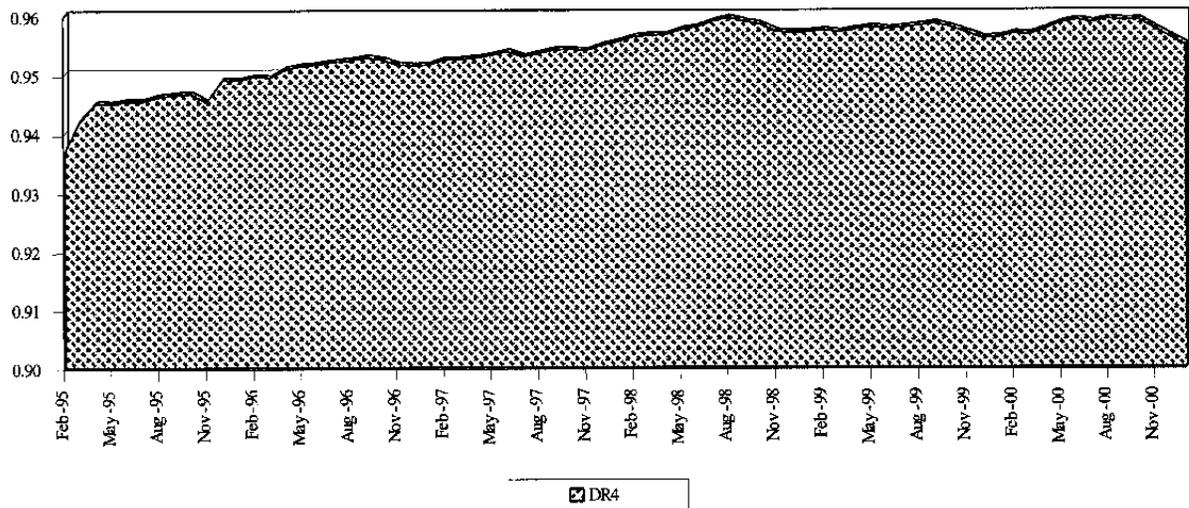
Source: Authors' estimates.

IV. Costs and Benefits of High Dollarization in Cambodia

A. Drawbacks of High Dollarization

Loss of seigniorage

A main cost of high dollarization in Cambodia is the loss of *seigniorage* revenue for the Government. Box 5 presents recent methods used in the literature to measure seigniorage.

Box 5. Measuring Seigniorage

Berg and Borensztein (2000) state that "the ancient concept of seigniorage is a government's profit from issuing coins for a cost less than face value. This concept is also relevant for paper currencies. Neglecting the minor cost of printing money, seigniorage is simply the increase in the volume of domestic currency." In other words, seigniorage represents the profit accruing to the monetary authorities from their right to issue the legal tender. While there is a general agreement on the concept of seigniorage, methods of estimating it empirically vary among economists.

According to Berg and Borensztein (2000), seigniorage can be measured by two alternative methods: the *reserve-money method* and the *central-bank-profit method*. These two methods ignore the costs of currency production and are also called the "flow cost" approach.

According to the reserve-money method, the monetary authorities earn seigniorage from the flow of new currency emitted into circulation, corresponding to the demand of money over time to conduct transactions. The reserve-money method measures seigniorage as the increase in reserve money in a given period:

$$S = \Delta R / P = (\Delta R / R).(R / P) = hm ,\qquad (1)$$

where R is the nominal stock of reserve money, P is the price level, h is the growth rate of reserve money, and m is the real stock of reserve money. This method assumes that there is no interest paid on some components of reserve money, such as commercial banks' reserves deposited at the Central Bank.

The central-bank-profit method measures seigniorage as the difference between what the Central Bank earns on its assets that back reserve money, and the interest that it pays to the holders of reserve money (typically commercial banks, which hold reserve deposits at the Central Bank). Seigniorage is thus equal to:

$$S' = i^A A - i^R R ,\qquad (2)$$

where i^A is the rate of interest earned by the Central Bank on its assets, A is the nominal stock of central bank assets, i^R is the rate of interest that the Central Bank pays on reserve money, and R is the nominal stock of reserve money.

In Cambodia, commercial banks' required reserves at the NBC are not remunerated, so i^R is equal to zero and seigniorage is thus equal to $i^A A$. Interest income series from NBC overseas deposits are available since 1995 and were used to compute seigniorage. Estimates of seigniorage are shown in Table 2, in absolute and relative terms.[13] Both estimation methods show a relatively low yearly seigniorage in terms of GDP, but yield a higher seigniorage in terms of government revenue, 11 ¼ percent a year on average—however that is chiefly a consequence of the very low level of government revenue. Thus, with the exception of 1998,

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[13] A similar table is presented by Liang (2000), although time coverage and results differ slightly for the reserve-money method. For the central-bank-profit method, we use actual interest earnings data.

when there was a large expansion in domestic currency to finance the budget deficit, seigniorage associated with dollarization since 1994 has been relatively moderate.

Table 2. Cambodia: Estimates of Seigniorage, 1994-2001

	1994	1995	1996	1997	1998	1999	2000	2001 Est.
Reserve-Money Method								
Change in reserve money (CR billion)	57.8	28.6	135.3	95.5	257.3	127.3	231.1	198.6
In percent of GDP	0.9	0.4	1.6	1.0	2.4	1.1	1.9	1.5
In percent of government revenue	19.9	4.8	21.0	12.7	29.2	13.5	17.3	13.0
Central-Bank-Profit Method								
Interest income (CR billion)	...	18.6	28.9	47.4	58.7	67.6	114.7	88.4
In percent of GDP	...	0.3	0.3	0.4	0.6	0.6	0.9	0.7
In percent of government revenue	...	2.9	3.9	5.4	6.2	5.1	8.0	5.8

Sources: National Bank of Cambodia; and Authors' estimates.

In case the authorities wanted to move to full dollarization, such a move would involve additional seigniorage losses. It would involve an initial "purchase cost" plus additional future annual seigniorage losses stemming from a larger money supply in dollars. To adopt the dollar as legal tender[14] and withdraw the domestic currency entirely from circulation, the monetary authorities would have to purchase the stock of domestic currency held by the public (and banks), effectively returning to the holders seigniorage accumulated over time. Fischer (1982) measures this initial purchase cost of full dollarization by expressing domestic currency in circulation as percent of GDP. In the case of Cambodia, this would correspond to 4 percent of the estimated 2001 GDP, and using the end-2001 exchange rate, the cost would be US$139 million, or about one-third of net official reserves. The additional annual seigniorage losses associated with full dollarization could be computed by using one of the two methods explained above.

Lower official international reserves

Another potential drawback associated with high dollarization in Cambodia stems from lower official international reserves. In the presence of an effective national currency, agents who hold foreign currency (e.g., exporters and foreign aid recipients) need to acquire national currency in order to do business in the country. Part of the foreign currency sold by them to purchase national currency is likely to end up in the coffers of the Central Bank, thereby boosting their international reserves. Conversely, those agents who would like to purchase foreign currency to do business abroad have to buy it from the market. If the Central Bank refrains from supplying foreign currency to the exchange market, foreign currency outflows from official reserves are reduced. Accordingly, although Cambodia's net international reserves

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[14]Such a move would probably not prevent Thai baht continuing to circulate in some border areas.

have steadily increased since the early 1990s (Figure 11) and are now equivalent to about three months of imports of goods and services, they could be still higher—including accrued interest earnings—were the country not so highly dollarized.

Figure 11. Cambodia: Official International Reserves, 1995-2001
(In millions of U.S. dollars)
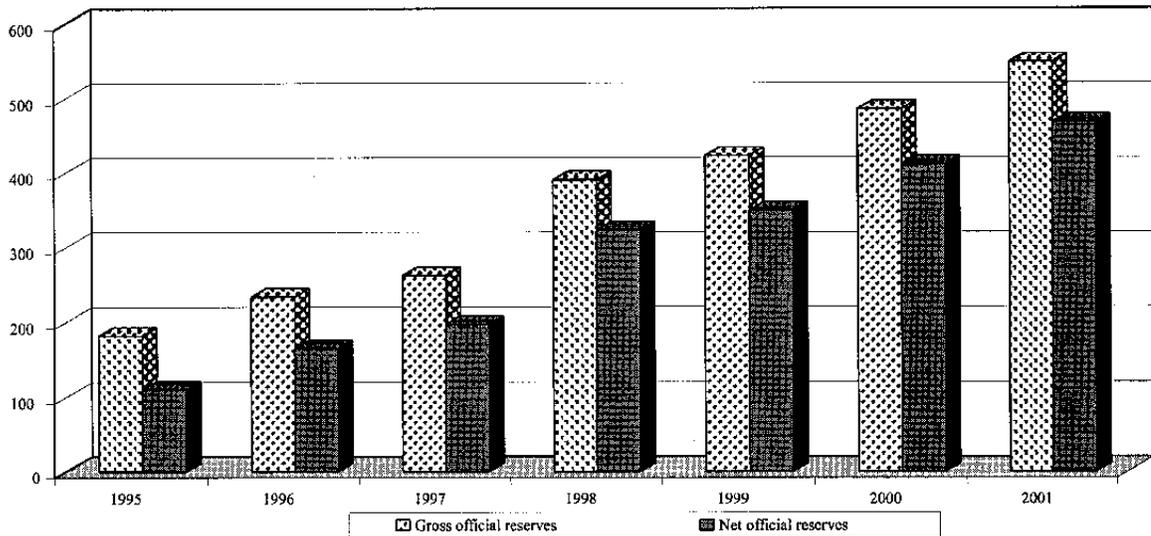
Source: National Bank of Cambodia.

We would argue, however, that in a highly dollarized economy, official reserves do not play the same role (i.e., increasing confidence in the national currency and weathering temporary external shocks) as in a country with a sole national currency. In a highly dollarized economy, the external credibility of the national currency is usually already largely compromised. And since the U.S. dollar is an international "reserves money," economic agents who hold large amounts of dollars have the means to react to a temporary external shock. Thus, the main difference in the status of "reserves" seems to be that these "reserves" are in the hands of agents, rather than in those of the monetary authorities. We would suggest that in an open economy like that of Cambodia this is not necessarily undesirable—as far as minimizing output loss is concerned—because in such an economy the markets are the economic driving force.[15] We recognize, however, that if the current high-levels of dollar inflows were to abate, and no longer available to finance the current account deficit, the importance of reserves would grow.

Loss of an effective monetary policy

In a highly dollarized economy, the foreign currency component of broad money cannot be directly influenced by the monetary authorities. Money supply in the economy is not

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[15] Current transactions in Cambodia are free of restrictions, and the authorities adopted IMF Article VIII status on January 1, 2002.

determined by the monetary authorities but by the behavior of agents holding both foreign- and domestic-currency-denominated assets, including cash. As money supply in the economy becomes endogenous, the authorities may not be in a position to fight inflation by tightening domestic money supply in an appropriate manner. Based on empirical evidence, Hoffmaister and Végh (1995) assert that in the case of Uruguay (a highly dollarized economy), dollarization may have severely hindered the effectiveness of monetary policy. High dollarization in Cambodia thus limits the effectiveness of the NBC's monetary policy in that the NBC's operations in riels have almost no impact on overall monetary developments.[16]

While in a highly dollarized economy, the monetary authorities cannot influence money supply directly, they can control other related variables, such as base money and the reserve requirement rate of banks. In theory, these monetary policy tools should allow them to control domestic money supply indirectly. In Cambodia, however, as financial intermediation is limited and conducted almost entirely in foreign currency, the NBC's ability to control base money is severely limited. The NBC retains changes in reserve requirement as a potential tool, but this regulatory instrument cannot be used frequently for the sake of financial stability. In fact, since December 1993, the NBC has changed the level of reserve requirements only once, in January 1998, raising it from 5 percent to 8 percent.[17] As another potential monetary instrument, a refinancing facility was introduced in Cambodia in June 1994. The only assets eligible for this facility are trade bills denominated in riels. The refinancing facility allows the lender to redeem the bills before maturity at a discount of 70 percent of face value. However, no commercial bank has ever used this facility.

With regard to interest rate policy, commercial banks are free to set their deposit and lending rates. Since the NBC does not refinance banks, it does not influence interest rates and therefore cannot use interest rate policy as an effective monetary instrument. The structure of deposit and lending rates is shown in Table 3. High interest rate spreads are characteristic of lesser developed economies, but the presence of dollarization usually enhances the credibility of the exchange rate and reduces inflation, and thus real interest rates tend to contract. In Cambodia, inflation has been very low and sometimes even negative since 1999, yet the real interest rate on dollar-denominated loans remains at 14 percent a year.[18] The sizable spread reflects the high country risk; the high costs of banking (legal uncertainty, litigation costs, and default rates); and the lack of aggressive financial intermediation, owing to few secure lending opportunities. In Cambodia, dollarization does not suffice to offset developmental constraints.

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[16] We do not consider the hypothetical issues related to a Central Bank conducting monetary policy with dollar-denominated instruments or using its foreign reserves and correspondent accounts.

[17] Reserve requirements on riel and foreign currency deposits at commercial banks are payable in riels and in foreign currency, respectively. Since most commercial banks are fully dollarized, they meet their reserve requirements in dollars, except the Foreign Trade Bank (FTB), which meets them in riels.

[18] As the banking system in Cambodia is almost fully dollarized, interest rates for transactions in riels are largely irrelevant for analytical purposes.

Table 3. Cambodia: Interest Rates on Deposits and Loans, February 2002
(In percent per annum)

	Riels		U.S. Dollars		Other Foreign Currencies	
Interest rate on deposits	Demand deposits	Time deposits 1/	Demand deposits	Time deposits 1/	Demand deposits	Time deposits 1/
	3.2	8.6	2.1	4.9	1.3	1.5
Nominal interest rate on loans 2/	18.4		16.7		18.0	
Real interest rate on loans 2/, 3/	15.7		14.0		15.3	

Source: National Bank of Cambodia.
1/ 12-month deposits;
2/ Lending rate to private enterprises, including small business;
3/ The real interest rate is computed as the difference between the nominal interest rate and the inflation rate—the latter is computed as the average of the CPI during the three-month period ending in February 2002 over the same period a year earlier.

Loss of an effective exchange rate policy

High dollarization implies losing flexibility in the exchange rate policy, as it obviates exchange rate adjustments in response to external shocks. In the case of "rigid" exchange rate arrangements, the monetary authorities cannot manipulate the exchange rate in order to spur the real sector, because changes in the exchange rate of the domestic currency are largely irrelevant in the face of the predominant role of foreign-currency-denominated assets in the economy. The same holds true for market-induced exchange rate depreciation in the case of "flexible" exchange rate arrangements. In the presence of an external shock, highly dollarized economies tend to adjust through the goods and factors market, with the help of the financial markets, if they are sufficiently developed. However, as discussed earlier, some country experiences show that the lack of flexibility in the exchange rate policy may be beneficial rather than detrimental.

Between 1994 and 1999, the NBC pursued a flexible exchange rate policy, keeping the spread between the official and the market rates below 1 percent, except in a few exceptional periods (Figure 12). Most of the time since late 1999, the NBC has further kept the spread at only at ½ of 1 percent, and it intends to eliminate the spread entirely.

Since most monetary and exchange rate instruments are not available to the NBC, the latter lacks the tools to conduct monetary and exchange rate policies effectively. Thus, in Cambodia, the brunt of macroeconomic adjustment falls on fiscal policy.

B. Benefits of High Dollarization

Isolation from the effects of exchange rate fluctuations

High dollarization provides some protection against exchange rate risks, as a change in the exchange rate bears only on a small part of money supply (i.e., the domestic component thereof) and financial assets (denominated in domestic currency). Typically, in a highly dollarized economy the bulk of trade-related and of large financial transactions are settled in dollars, whereas the national currency is mainly used for dealing with small-scale nontradables. As a result, in the case of an exchange rate devaluation/depreciation, the pass-though effect of higher import prices on inflation is limited and prices of nontradables settled in local currency are not directly affected. The impact of the Asian Crisis on Cambodia illustrated dramatically the isolation effect of high dollarization. From July 1997 to January 1998, the Thai baht

Figure 12. Cambodia: Spread Between Official and Market Exchange Rates, 1993-2002
(In percent)
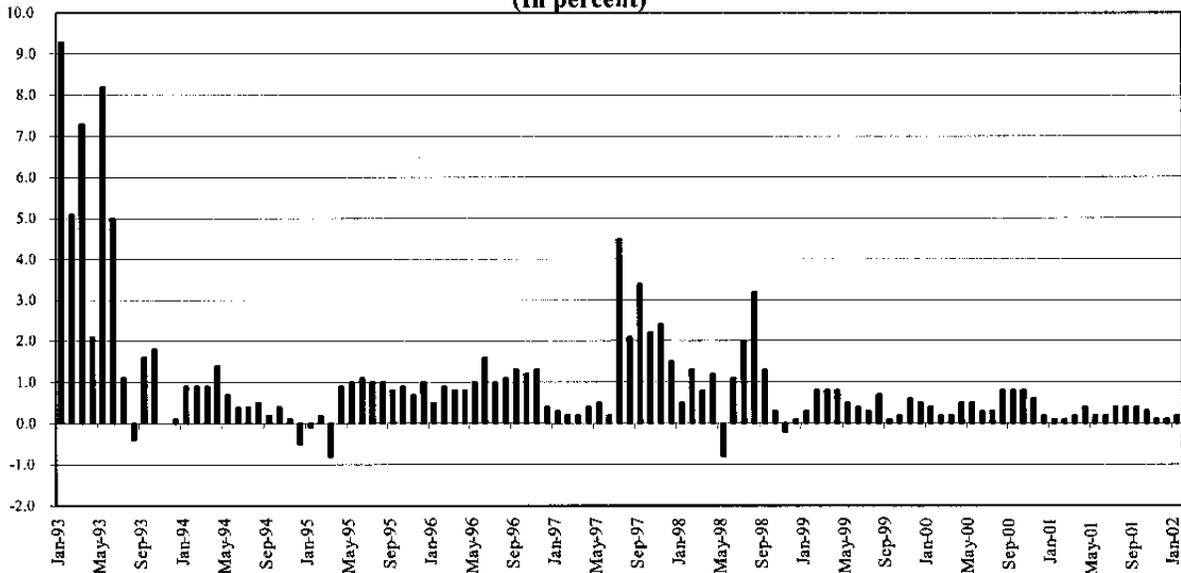
Source: National Bank of Cambodia.

depreciated by 71 percent against the dollar. During the same period, the riel depreciated by 23 percent (Figure 13). The inflation performance of the two countries show a similar disparity in favor of Cambodia, and this in spite of the July 1997 political crisis in Cambodia, which certainly did contribute to the riel's depreciation and to the rise in inflation.[19] Since 1999, the exchange rate of the riel against the dollar has been relatively stable, and both of them strengthened against the Thai baht and the Vietnamese dong (Figure 14). The largest market for Cambodian exports is the U.S. and the main sources of Cambodian imports—excluding imports

Figure 13. Cambodia: Riels per U.S. dollar, 1993-2002
(End of period)

Source: IMF.

· · · · · Market Rate   Official Exchange Rate

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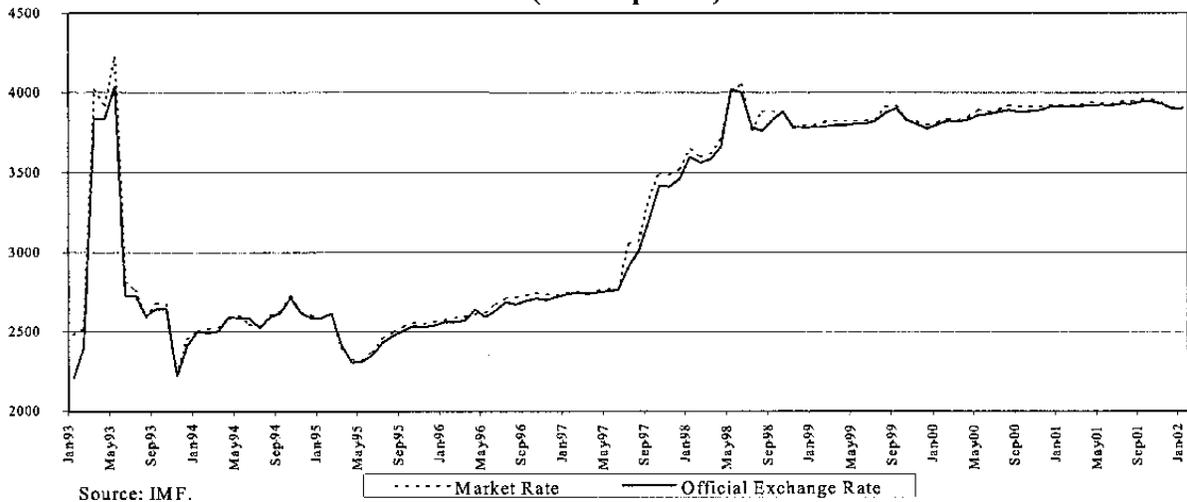
[19] However, if international bank exposure to Cambodia had been high relative to GDP, then withdrawal of such funding might have had more pronounced contagion-like effects.

Figure 14. Cambodia: Riels per Thai Baht and 100 Vietnamese Dong, 1993-2002
(End of period)
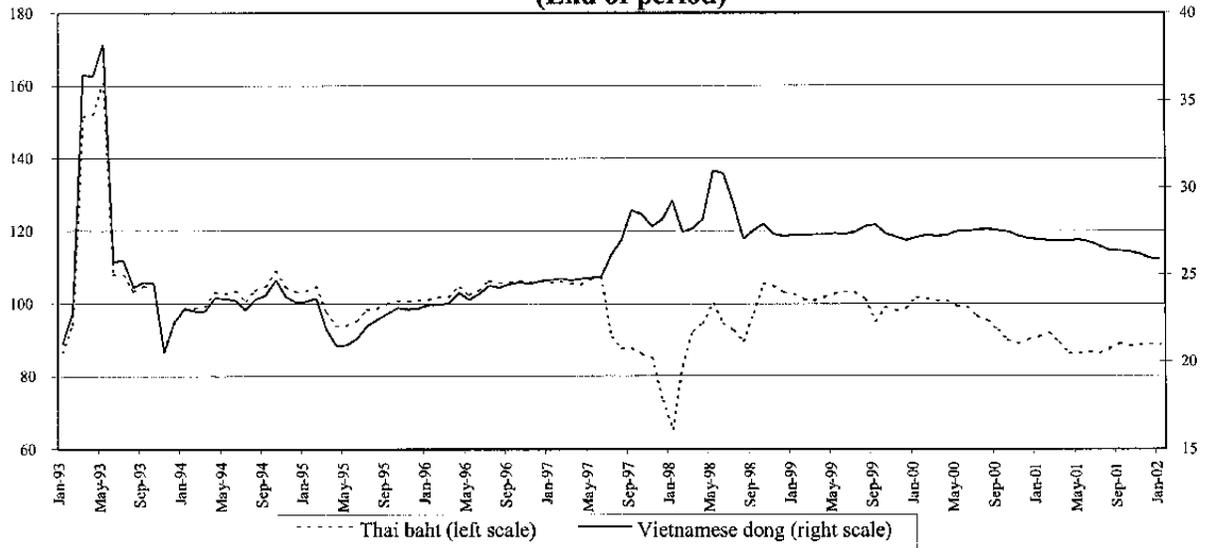
Source: IMF

for reexports—are Thailand, followed by Vietnam. The recent appreciation of the riel has allowed Cambodia to benefit from an improvement in its terms of trade. These evolutions could also explain the low level of inflation in Cambodia since the end of 1999.

The real effective exchange rate has increased regularly—except for the turbulence in 1998—by some 15 percent since early 1995, but this increase seems not to have hurt Cambodia's external competitiveness, presumably as a result of increased productivity in the export sector (Figure 15).

Figure 15. Cambodia: Effective Exchange Rates, 1993-2001
(Average of 1995 = 100)
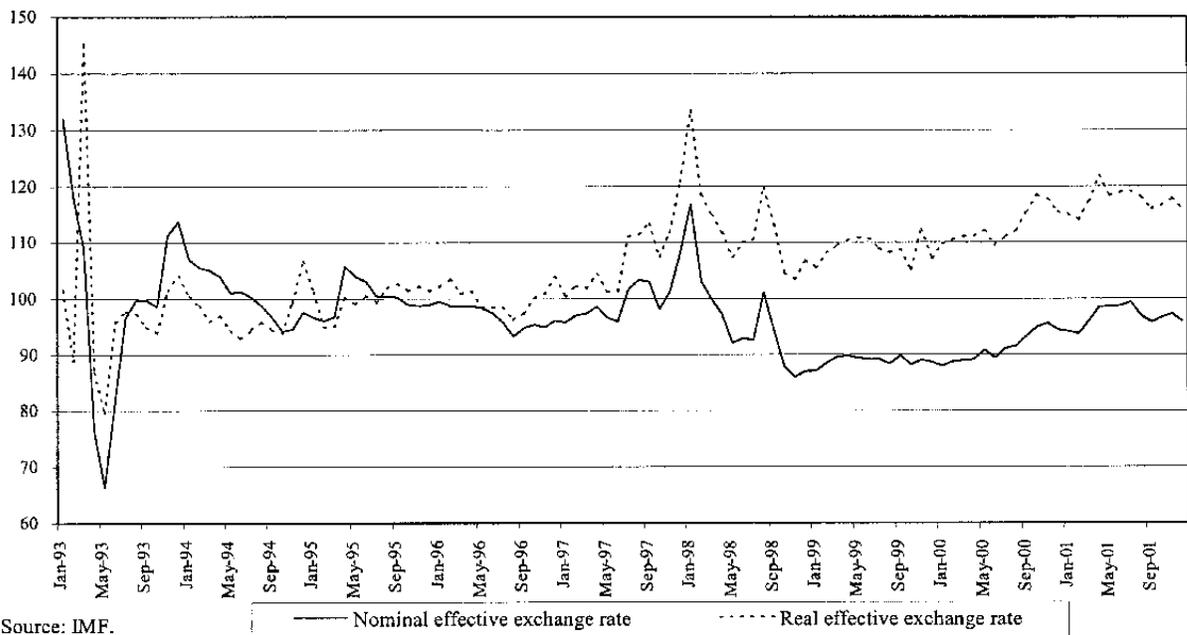
Source: IMF.

Note: An upward movement indicates an appreciation of the effective exchange rate.

Financial re-intermediation

Another benefit of dollarization in Cambodia has been a gradual financial deepening of the banking system. In economies that have experienced periods of high inflation and unstable macroeconomic situation, residents tend to become reluctant to hold deposits in the domestic banking system. Dollarization, through foreign currency deposits held in domestic banks, encourages agents to use bank services rather than to hold idle cash balances. When macroeconomic stability is restored in a dollarized environment, agents may have more confidence in the banking system and may be more willing to return to domestic intermediaries if they can hold dollar-denominated assets. More specifically, in Cambodia the dollar deposit growth rate was very low in 1998, at about 1 percent, but rose on average by 25 percent during 1999-2001.

Economic and financial integration

Dollarization may contribute to greater economic and financial integration with the rest of the world. The use of a foreign currency, especially the dollar, which is the most widely used currency in international trade, reduces the transactions costs of purchasing international currency. The more a country's trade and financial flows are integrated with countries using the dollar, the greater will be the gains from reducing exchange risks. Nonetheless, exchange risks with other currency zones remain. Mundell (1961) analyzes optimal currency areas and provides a good analysis of trade benefits associated with dollarization. Countries highly integrated in terms of trade and factor mobility can benefit from using the same currency. More recently, Rose (2000) and Rose and Frankel (2000) note that a country's trade can increase significantly if it belongs to a monetary union, or similarly, if its economy is dollarized. Edwards (2001) suggests that benefits from added trade integration can more than offset the costs of dollarization, including the loss of seigniorage. Cambodia, with its high level of dollarization, is likely to have benefited from enhanced trade. Between 1995 and 2001, the share of garment exports in Cambodia's total exports surged from nil to 83 percent, and since 1998 the United States has become the largest market for Cambodian garment exports (71 percent of total garment exports). While other factors, such as an export license system for the U.S., have certainly played an essential role in that expansion, dollarization has also contributed to it, and is likely to be critical in diversifying exports further in the future. However, dollarization hinders price/wage flexibility and therefore requires sufficient productivity gains in the export sector to keep abreast of competitors.

Dollarization holds the promise of macroeconomic stability for foreign investors and the elimination of the domestic exchange rate risk, especially with regard to the repatriation of profits. Dollarization also tends to limit the country's exposure to currency crises and to contagion episodes, as illustrated by the case of Cambodia during 1997-98. In the medium term, dollarization can also promote the development of domestic financial markets, as the use of dollars facilitates the integration of the domestic market into the rest of the world, owing to lower costs of international financial transactions.

Fiscal discipline

Another benefit of dollarization is fiscal discipline, as dollarization greatly reduces the government's ability to fuel inflation through monetized fiscal deficits. Most independent central banks will refrain from unsustainable financing of budget deficits through money creation, since such financing is inflationary and likely to lead to even larger deficits. When monetization of the deficit is hampered, as in a highly dollarized economy where the monetary authorities cannot emit dollars, lest they deplete their reserves, fiscal discipline will likely result (Sargent, 1986). Moreover, dollarization, by removing the seigniorage as a source of easy revenue, leads also to tighter fiscal policy.

In the early 1990s, Cambodia experienced high inflation resulting from monetized budget deficits. Since then, high dollarization has limited the scope for inflationary financing of fiscal deficits, and assisted in building financial discipline.[20] In addition, Article 24 of the *Law on the Organization and Conduct of the National Bank of Cambodia (1996)* forbids the NBC to lend money to the Government. Since then the NBC has done so only once in 1998, at a time of shortfalls in revenue collection linked to political upheaval. Henceforth, the Government is committed to eschew central bank financing of the budget. This policy stance has allowed Cambodia to minimize pressures on prices and on the exchange rate.

V. IMPLICATIONS OF HIGH DOLLARIZATION FOR MACROECONOMIC POLICY DESIGN IN CAMBODIA

The question arises as to what are the possible macroeconomic policy options for the authorities in the context of very high dollarization. More specifically, the question is whether the authorities would be better off continuing with the present policy stance, trying to de-dollarize the economy, or choosing full dollarization. We first endeavor to shed some light on these options by reviewing the role of commercial banks and of the central government budget. We then explore issues linked to a possible Currency Board Arrangement (CBA). We indicate our preferred course of action in Section VI.

A. Dollarization and the Banking System

In spite of notable progress in the last few years (Box 6), the banking system remains undeveloped and financial intermediation, shallow. The progressive establishment of a modern payments system will help to foster financial intermediation. The contemplated financial laws and payments facilities will be neutral with regard to the currency used (riels or dollars) and therefore will have no direct bearing on the issue of dollarization.

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[20] Technically, the Government can have recourse to the monetization of fiscal deficits through riel emission, but given the narrow riel base, the inflationary and exchange rate impacts provide a deterrent.

Box 6. Banking Reform in Cambodia

Following the adoption of the *Banking and Financial Institutions Law* in November 1999, the banking system has undergone extensive restructuring. At the start of the process, the banking system consisted of 31 banks: 22 private commercial banks, 7 foreign bank branches, and 2 state-owned banks. As a result of the first phase of a mandatory relicensing procedure in 2000, the NBC closed 4 banks in July 2000 and, after carefully evaluating the viability of the remaining banks, it closed another 7 banks in December 2000. In March 2001, 1 bank elected for voluntary liquidation, totaling 12 closed banks. Of these, 8 were voluntarily liquidated and 4 were compelled to go into liquidation. 6 banks were fully relicensed, including a specialized state-owned bank, and 13 banks were relicensed conditionally, including another state-owned bank. The banks relicensed conditionally were required to take corrective actions, agreed in Memoranda of Understanding signed with the NBC. Typically, these banks had to fulfill a number of prudential requirements, including the injection of supplementary capital to meet the US$13 million minimum capital requirement. At end-2001, 8 additional banks fully paid up their required capital. By end-March 2002, 2 more banks met their capital requirement, 1 bank was voluntarily wound up, 1 bank was compelled to go into liquidation, and 1 bank was converted into a specialized bank, with a lower capital requirement. In addition, two specialized banks were created in October 2000 and in March 2001, respectively. Thus, currently 19 banks operate in Cambodia, down from the initial 31 banks.

The use of checks is currently limited to transactions carried out by the Government and large entities. A clearinghouse for checks denominated in riels has been in operation since 1995 (Box Table 1). A new impetus was given to check circulation with the opening of a second clearinghouse for checks denominated in dollars on January 2, 2001. The clearing of such checks has been active from the beginning. During 2001, the total value of checks in dollars cleared amounted to US$643 million, versus only US$285 million for checks cleared in riels during 1995-2001. These figures further illustrate the predominance of dollars in the banking system. Both clearing houses operate under strict solvency rules, as debit balances at the end of a clearing session need to be paid up entirely by the bank concerned before the end of the day. The NBC manages and supervises the clearinghouses for a nominal membership fee, but does not assume any risk associated with their operations.

Table 1. Cambodia: Checks Cleared, 1995-2001

Year	Currency	Number of Checks	Total Value of Checks		Average Value per Check	
			CR billion	U.S.$ million	CR million	U.S. $
1995	Riel	1,473	183.7	75.0	124.7	50,882
1996	Riel	893	148.6	56.6	166.4	63,414
1997	Riel	692	88.6	30.1	128.0	43,456
1998	Riel	619	60.6	16.2	98.0	26,146
1999	Riel	723	88.5	23.2	122.4	32,098
2000	Riel	1,240	151.3	39.2	122.0	31,635
2001	Riel	1,436	177.2	44.9	140.9	35,682
2001	*Dollar*	*85,007*	*N/A*	*642.9*	*N/A*	*7,563*

Source: National Bank of Cambodia.

Before setting up the dollar clearinghouse under the aegis of the NBC, the authorities considered whether this move would promote dollarization further, or merely facilitate inter-bank operations. Since bilateral clearing of such checks between banks had existed for several years, the authorities eventually concluded that making the process more effective would provide efficiency gains while being fairly neutral with regard to the level of existing dollarization. In their opinion, the new dollar clearinghouse buttresses the payments system rather than promotes dollarization. In the near future, another important step for the establishment of a modern payments system will be the adoption of a set of new laws pertaining to the conduct of financial transactions. The *Law on Negotiable Instruments and Payment Transactions* is under preparation, with technical assistance from the IMF. The enactment of this law, coupled with the introduction of enhanced payments facilities, such as electronic payments, electronic correspondent accounts and credit transfers, and the use of credit cards, will contribute to the development of financial services offered by the banking system.

The monetary authorities could in principle promote de-dollarization through the banking system. The lack of a lender of last resort, in conjunction with the fact that Cambodia is still a largely cash-based economy, forces banks to hold excessively high dollar balances and increases their vulnerability. The first and most dramatic move for de-dollarization would be for the NBC to provide bank refinancing in riels, for operations conducted in riels, while the monetary authorities would continue to refrain from refinancing banks in dollars. This could entice banks into operations in riels. This would represent an important move away from the NBC's present policy stance under which de facto no refinancing is available. This initiative could in theory help foster credit operations in riels, and hence de-dollarization, but we would argue that at the current juncture, such a move would be largely ineffective, as other major conditions are yet not ripe for a significant expansion in bank credit (for either riel- or dollar-denominated loans). Banks are likely to continue to shy away from sizable loan operations, as long as they cannot secure adequate collateral. Even if they could, re-possessing such collateral remains currently highly uncertain, considering the weaknesses in Cambodia's legislation and judicial system. Accordingly, as long as the inadequacy of loan-guaranty legislation and enforcement has not been effectively addressed, offering refinancing would be ineffective, while it would send out the "wrong" signal from the NBC at a time when the restructuring of the banking system is still underway and the NBC is building a track record of encouraging banking discipline.

The second way of promoting de-dollarization through the banking system could be accomplished by rendering operations in riels more attractive security- and cost-wise than operations in dollars. However, under the current situation of almost full dollarization of the banking system, and given the progress toward an efficient, largely electronic payments systems that is currency neutral, there seems to be no immediate scope for achieving such a result. Conversely, were the authorities to opt for full dollarization of the economy, the banking system would be able to accommodate such a decision quickly and efficiently.

Another approach to fostering de-dollarization could be the development of financial instruments denominated in riels (e.g., Treasury bills). Such instruments would likely need to offer higher yields than deposits with strengthened commercial banks (both in riels and in dollars), as the Government will need to build up public confidence. However, we note that deposits in riels already carry higher interest rates than deposits in dollars, as shown in Table 3, yet deposits in riels remain modest compared with deposits in dollars. For Treasury bills to become attractive, they would thus need to offer very high remuneration to compensate both for sovereign default and exchange rate risks. This in turn could jeopardize the fragile budget stance. Such instruments would also require the setting up of an active financial market for the sake of liquidity, but such a development can be considered only in the medium term, as the required legislation is only at an early stage of preparation.

B. Execution of Budget

Co-currency circulation in Cambodia is fairly complex, as illustrated schematically in Figure 16. On the one hand, foreign currency enters the country mainly through two broad

Figure 16. Cambodia: Co-Currency Circulation
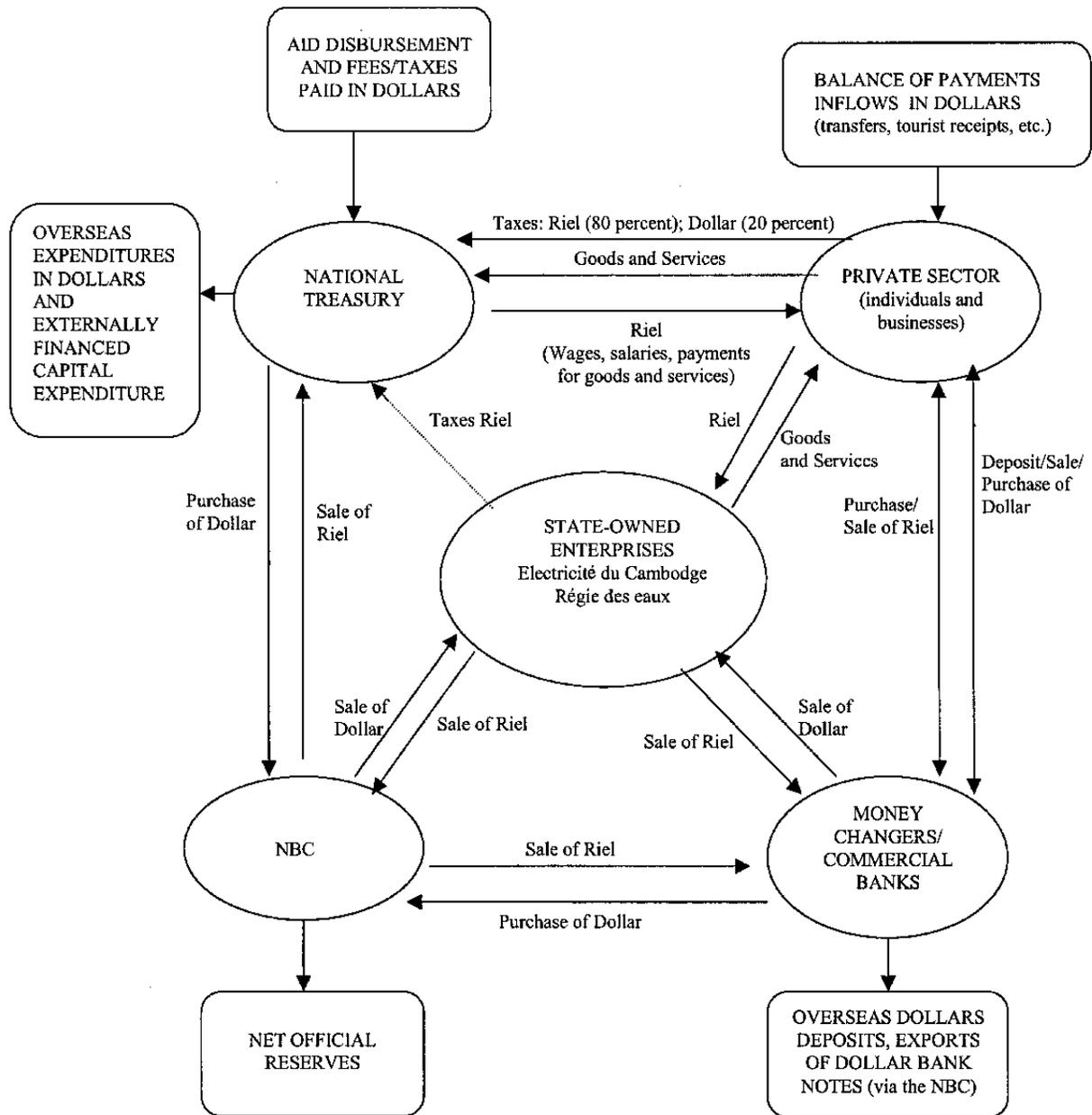
Source: IMF (1997); revised by Authors.

channels, official transfers to government accounts (transiting through the NBC), and current and capital transactions in the balance of payments, of which some examples are tourism receipts, private transfers, and foreign investment. These inflows mainly fuel cash foreign currency circulation, foreign currency deposits in and outside Cambodia, and official reserves.

On the other hand, the central government budget plays a crucial role in the circulation of riels. On the revenue side, the National Treasury collects taxes in riels (some 97 percent of tax revenue in 2001), including taxes linked to imports (Table 4). Conversely, three-fourths of nontax revenue was paid in dollars, essentially collected by the Foreign Currency Management Unit at the Ministry of Economy and Finance (MEF). Official aid and budget support is paid in foreign currency, also collected by the same Unit. Thus, last year about three-fourths of total revenue was collected in riels. On the expenditure side, about 86 percent of current expenditure was paid in riels (mainly in cash, but also in the form of "offsets"), while two-thirds of capital expenditure was disbursed in dollars, owing to the fact that 71 percent of such expenditure was externally financed. In sum, about three-fourths of total expenditure was paid in riels in 2001. Riels injected into the economy by the Treasury are used by agents for their domestic needs, chiefly tax payments, payments to two major utility companies in Phnom Penh, and small domestic transactions. Since there has been a current budget surplus and a negative or no domestic financing for the last three years,[21] the Treasury serves as the main engine for circulating riels in the country.[22] The NBC also injects riels into circulation occasionally by buying dollars in the foreign exchange market, but the amounts concerned are relatively small.

Table 4. Cambodia: Budget Execution in Foreign Currency, 2000–2001
(In percent)

	2000	2001
Revenue		
Total revenue in foreign currency/Total revenue	25.3	23.2
Tax revenue in foreign currency/ Tax revenue	4.4	2.6
Nontax revenue in foreign currency/ Nontax revenue	65.0	73.5
Expenditure		
Total expenditure in foreign currency/Total expenditure	22.6	25.9
Current expenditure in foreign currency/Current expenditure	15.4	14.3
Of which: Salaries paid in foreign currency/Salaries	4.0	7.0
Capital expenditure in foreign currency/Capital expenditure	43.9	67.4

Source: National Treasury of Cambodia.

The operations of the Treasury have an impact on the level of dollarization. The more the Treasury injects riels into the private sector through its expenditure, the more it contributes to the stabilization of dollarization or even to de-dollarization. Conversely, the more public

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[21] Excluding exchange rate adjustments and outstanding operations.

[22] Riels in circulation have been relatively stable since end-1999.

spending is made in dollars, the more dollarization is boosted. In this regard, the budgets in 2000 and 2001 show that dollarization of the national budget execution increased notably on the expenditure side. If the Government wanted to promote de-dollarization, it should reverse this trend. On the revenue side, the Government would need to initiate legislation requiring that all payments to the budget be made in riels. Taxpayers would then have to purchase riels from commercial banks/money changers or from the NBC, which would result in an increase in riel circulation. Alternatively, the central bank law could be effectively enforced with regard to the relations between the NBC and the MEF. According to the law (Article 21), government receipts in foreign currency should be immediately sold to the NBC at the official exchange rate, with the understanding that the latter would provide the Treasury with foreign currency against riels on demand to meet foreign expenditure requirements. However, in practice, budget revenue in foreign currency is deposited in the Government's accounts at the NBC and the FTB in dollar-denominated accounts.[23] They are used for expenditure in foreign currency. On the expenditure side, full budget execution in riels would allow Cambodia to stabilize (or even to reduce) dollarization. However, we note that the size of the budget compared with the economy is relatively small (about 12 percent of GDP), and since the country is highly dollarized, the impact of the budget being entirely executed in domestic currency would, in all likelihood, have a limited impact on the level of dollarization. Yet, the shift from three-fourths of a budget executed in riels to a budget entirely executed in riels would be the right step for promoting de-dollarization and could be done progressively but fairly rapidly, without upsetting the current state of economic affairs.

C. Consideration of a Possible Currency Board Arrangement for Cambodia

A radical move toward de-dollarization and restoration of confidence in the domestic currency in Cambodia could be the adoption of a CBA. A CBA is the strongest form of a pegged exchange rate system. It is a monetary institution that only issues currency that is fully backed by foreign assets at a fixed exchange rate. The exchange rate is fixed not by policy but by law and the foreign currency backing rule ensures that the CB will not exhaust its reserves to maintain the peg. In Cambodia, the natural choice for the "anchor" currency would be the dollar.

A CBA and very high dollarization present some similar features, but differences between them are important. First, dollarization implies the loss of seigniorage for the Government, whereas a CBA does not. Second, one of dollarization's key distinguishing features is that it tends to be permanent. In addition to hysteresis, one of the largest benefits claimed from dollarization is its credibility, precisely because it is nearly irreversible. Some authors argue that it is more difficult and costly to reverse dollarization than to modify or abandon a CBA. In many cases, country experience with "orthodox" CBAs has been positive (lower inflation, higher growth, and increased foreign investment) but a number of CBAs had to

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[23] They are however included in the calculation of official reserves.

be abandoned under economic duress, notably in the case of inappropriate fiscal and debt policies, remiss of a pegged exchange rate.

Arguably, Cambodia's recent monetary and exchange policies could be characterized as akin to a *de facto* CBA. First, although the NBC does not ensure the parity of the exchange rate, its entire policy stance has been geared toward maintaining the stability of the riel against the dollar. The NBC has been largely successful in this attempt since mid-1999, as illustrated by Figure 13. Second, net official reserves presently cover three times the amount of riels in circulation at the current exchange rate.[24] Third, the NBC refrains from refinancing commercial banks and focuses on enforcing stricter banking regulations—although it lacks a strong banking supervision capacity yet. Finally, the NBC does not provide advances or financing to the Government, and does not trade any public securities (which actually do not exist yet). The comparison between the NBC's policies and those normally implemented under an "orthodox" CBA are explored further in Box 7.

For Cambodia, it seems that a number of the necessary conditions for entering into a successful CBA are fulfilled. The country is a small and open economy—the sum of exports and imports represents 90 percent of GDP—well-integrated into world trade. Cambodia is a member of the Association of South-East Asian Nations (ASEAN), and accession to the World Trade Organization (WTO) is well under way. In addition, the authorities have a liberal investment law and are in the process of lowering tariff and trade barriers. Moving from very high dollarization toward a CBA in Cambodia thus could, in principle, be conceivable. This would however require an effective independence of the NBC (e.g., removing the government representatives from the NBC's Board); the ability to resist pressure for budget financing in times of uncertainties; and the ability to decide freely on the exchange rate policy. Two possible CBAs could be envisaged, a CBA with a single legal tender—the riel—and the obligation to quote all prices and effectuate all transactions in that currency; or a CBA where there would be two legal tenders, the riel and the dollar.

A successful riel-based CBA would allow Cambodia to revitalize its marginalized domestic currency, while ensuring continued economic stability. However, adopting a CBA would represent a drastic shift at a time when it is not an absolute necessity and would not yield any worthy benefit over the current policy mix. Most countries that adopt a rigorous CBA do so in times of crisis and as a last attempt to bring their economy under control. Cambodia, as described earlier, is far from being in a crisis and has enjoyed economic stability with growth

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[24] Some particularly strong CBA backing rules require foreign currency coverage of deposits in domestic currency in the banking system. Considering the low amount of deposits in riels in Cambodia, even if the coverage had been augmented to include such deposits, net official reserves would still have been equivalent to 2 and 3/4 times all riel components of broad money at end-December 2001.

Box 7. Cambodia : Currency Board Arrangement Versus NBC Policies

"Orthodox" Currency Board Arrangement	*NBC Policies*

Institutional setup

• Independence of the Currency Board	• NBC is not fully independent, in practice
• Audited accounts publicly available	• NBC audited accounts published since 2001
• Open economy	• Article VIII adopted from January 1, 2002; membership in ASEAN

Foreign exchange policy

• Guaranteed peg vis-à-vis an anchor currency	• Managed float aiming at a very stable exchange rate vis-à-vis the U.S. dollar
• International reserves to back domestic currency in circulation and deposits at the pegged exchange rate	• NBC's *net* international reserves were equal to about three times riels in circulation and riel deposits at end-2001
• Free convertibility of national currency into anchor currency	• Limited convertibility for selected state-owned enterprises only, in practice

Monetary policy

• Banks are free to set interest rates	• Banks are free to set interest rates; the NBC's refinance rate is only used for repayments from the Ministry of Economy and Finance to the NBC.
• No issuance of Currency Board paper	• No NBC paper issued (with one recent temporary exception to recapitalize the Foreign Trade Bank)

Relations with the Government

• No monetary financing of the budget	• No monetary financing of the budget (actually negative financing since 1999)
• No open market operations by the Currency Board, neither in the government bond issue market nor in the secondary market	• NBC does not hold or trade any public or private securities or bonds

Relations with commercial banks

• No commercial bank refinancing	• No commercial bank refinancing
• No guarantee to the banking system	• No NBC guarantee to the banking system, as illustrated by closed banks
• Strong banking supervision	• NBC banking supervision needs substantial strengthening
• Services provided for promoting financial intermediation but no guarantee	• Clearinghouse for checks in riels and dollars sponsored by NBC but no risk assumed

for some time. In addition, the banking system's restructuring is under progress, the financial system remains underdeveloped and fragile, bank supervision is inadequate, and the fiscal position is still weak. Also, the NBC and the Government may not have the capacity to proceed smoothly with all the operational aspects involved in reintroducing the riel on a massive scale and to enforce the exclusive use of the domestic currency. Furthermore, the level of net international reserves, compared with the amount of trade-related transactions and capital flows, is insufficient to offer credible support for an unconditional peg. Finally, such a sweeping policy move could have a negative impact on foreign investors, who appreciate the fact that they can operate entirely in dollars without an exchange rate risk. All these reasons argue against considering a single-currency CBA in Cambodia, as the benefits under such an arrangement would not exceed those currently enjoyed under the present policy stance, and would entail a major risk in case of rejection by the majority of economic entities. There is a strong possibility that an attempt to enforce a riel-based CBA administratively would instead lead to an immediate de facto full dollarization.

Considering the current co-currency situation and the liberal approach toward economic regulations prevailing in Cambodia, the second option (i.e., a CBA with two legal tenders) would be by far the most acceptable. However, we would argue that little additional benefit would be gained by "locking in" the riel into a pegged and irreversible status vis-à-vis the dollar. Most likely, a dual-currency CBA in Cambodia would not lead to significant de-dollarization, but would eliminate the possibility of the marginal exchange rate tool provided by the current flexible exchange rate policy.

VI. CONCLUSION

The involuntary form of dollarization, called partial or de facto dollarization, occurs when one or several foreign currencies circulate alongside a national currency, with usually the banking system also operating in those currencies. These developments largely eschew the direct control of the authorities. Partial dollarization, stretching from low to virtually full dollarization, typically stems from disorderly macroeconomic conditions. In most countries high dollarization is a spontaneous response—often desperate—to persistent high or hyperinflation. In the case of very high dollarization, full dollarization is now considered an exchange rate regime choice and can offer, under certain circumstances, an attractive option to countries that find themselves confronted with a protracted economic crisis. In Cambodia, dollarization surged suddenly and significantly during the period 1991-93, primarily as a result of massive dollar inflows. Very high dollarization in Cambodia thus was principally an exogenous shock, and has resulted in low inflation and economic stability. Yet dollarization has been persistent, despite increased economic and political stability.

There is a sizable amount of cash dollars circulating in the Cambodian economy, of which we provide an econometric estimate since early 1995. Residents keep a substantial amount of dollars in cash as a store of value, probably owing to the limited public confidence in the banking system and shallow financial intermediation. These dollars circulate very slowly in the economy, which remains relatively little monetized and operates predominantly on a cash basis, in particular as regards the national budget. The low estimated velocity provided by our

empirical analysis is consistent with inflation that has remained subdued in spite of the large dollar money supply in the economy. In this regard, the most important policy measure for the NBC was to eliminate its financing of the government budget deficit after mid-1998, which used to be the main source of inflation in Cambodia in the early 1990s.

In the face of very high dollarization, the NBC's monetary and exchange policies and the MEF's budget policy have served Cambodia well since 1999. By refraining from budget financing and from refinancing commercial banks on the one hand, and by producing a current budget surplus and an overall budget deficit entirely financed by foreign financing, on the other hand, both institutions have been conducting mutually reinforcing macroeconomic policies. This mix has provided a stable riel supply, which in turn resulted in a relatively stable exchange rate, while the dollar supply has been absorbed by large idle cash balances held by residents and the export of excess dollar banknotes by commercial banks. Very high dollarization, coupled with prudent macroeconomic policies, has thus largely sheltered the Cambodian economy from the international economic turmoil, while providing a propitious environment for growth and poverty reduction, provided advantage is taken of this situation to push forcefully ahead with wide-ranging structural reforms.

In our opinion, this policy stance is appropriate in the short to medium term. We do not favor endeavoring to de-dollarize the economy, beyond executing the budget fully in national currency, as the current economic context is not favorable for such an undertaking; nor do we recommend full dollarization. The current policy stance is not a panacea, however, and developments will need to be constantly monitored to ascertain that the domestic and international macroeconomic environments remain auspicious for the continued implementation of the aforesaid policies. Downside risks of the current policy mix are linked to uncertainties of the growing economy. They could involve increased dollar inflows, stemming from renewed investment and higher tourism receipts, coupled with improved financial intermediation and the launching of financial markets. Similarly, large amounts of idle cash dollar balances could flow into the banking system, as confidence improves. Heightened bank capital requirements, coupled with excess liquidity, constitute a strong incentive for increased lending in the future.[25] Such developments could result in higher inflation, as the NBC currently has no means to sterilize dollar inflows or dollars released from cash balances, and enhanced financial intermediation could lead to increased velocity of money circulation.[26] These likely developments call for improved policy tools capable of handling a more complex economy that will come from higher development. Fiscal discipline will need to remain a cornerstone of the authorities' policy mix, and the NBC will need to strengthen drastically its supervisory capacity

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[25] The recently approved *Land Law*, the prospect of a land registry, forthcoming laws on corporate insolvency and secured transactions, and the ongoing reform of the judiciary system will make the taking of collateral eventually easier, and thus may lead to new long-term lending activities. In the mean time, short-term credit is the most likely to develop.

[26] Commercial banks currently sterilize some of their dollar deposits by investing them abroad.

and its ability to influence bank liquidity, presumably via the eventual development of some type of financial instruments.

A number of studies have found that once an economy is highly dollarized, it is very hard to reduce dollarization significantly, even though economic and political stability has been restored. Only Liberia, with a long history of dollarization, reintroduced its own currency in the 1980s. In Cambodia, dollarization could be marginally reduced by implementing the budget entirely in riels, and by issuing treasury bills in riels,[27] but beyond that move, neither a single-currency CBA, nor an administratively enforced de-dollarization, appears desirable, as either would likely result instead in a de facto full dollarization.

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[27] For the first time, the MEF issued government bonds in February 2002 to bring the capital of the FTB to the statutory threshold.

Cambodia: A Simple Model to Estimate Dollars in Circulation Outside Banks

We start from the equation of exchange:

$$M_t V_t = P_t T_t, \tag{1}$$

where M_t, V_t, P_t, and T_t denote the money circulating in the economy, the velocity of money, the price level, and the number of transactions at time t, respectively. As a result of currency substitution, M_t has two components:

- riels in circulation (cash and checks): $^R M_{R,t}$;[28] and
- dollars in circulation (cash only) converted into riels: $^D M_{R,t}$.[29] Then,

$$M_t = {}^R M_{R,t} + {}^D M_{R,t} = (1 + k_t) \, {}^R M_{R,t}, \quad \text{with } k_t > 0. \tag{2}$$

Replacing M_t in equation (1), we have:

$$(1 + k_t) \, {}^R M_{R,t} V_t = P_t T_t. \tag{3}$$

For the sake of simplicity, we assume that the velocities of dollars and riels are the same.[30] At each period of time, $P_t T_t$ is proxied by nominal GDP, and consequently:

$$(1 + k_t) \, {}^R M_{R,t} V_t = GDP_t. \tag{4}$$

Taking logs and rearranging terms, we obtain:

$$\log(^R M_{R,t}) = \log(GDP_t) - \log(V_t) - \log(1+k_t). \tag{5}$$

Our goal is to give an evaluation of k_t in order to derive an estimate for $^D M_{R,t}$.

However, there are two unknown parameters in equation (5): the velocity of money, V_t, and the proportionality coefficient between riels and dollars in circulation, k_t, as k_t cannot be measured (or proxied) by direct accounting. Both variables are behavioral, as agents have to decide simultaneously between current expenditure, foreign and local money balances for future spending, and financial assets (in the Cambodian context chiefly foreign cash currency as store

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[28] Most checks clear immediately, hence no lags are used. There are virtually no electronic payments.

[29] This component includes all cash foreign currencies circulating in Cambodia. There are no sufficient time series for checks denominated in dollars.

[30] Relaxing this hypothesis leads to a nonlinear specification, which is hardly tractable, owing to the mathematical complexity of the resulting equations.

of value). Agents optimize their decisions in light of available economic information, including inflation and exchange rate anticipations. A related cash-in-advance model is presented by Hromcova (1998) in which the velocity of money evolves endogenously with time, because of uncertainty about the state of the economy. We develop the following assumptions for the behavior of the two unobservable variables.

The velocity of money, V_t, evolves over time according to three factors:
- changes in inflation, as measured by the CPI, including all items;[31]
- changes in the level of the exchange rate, which expand or contract the riel value of money; and
- stochastic shocks, which are unobservable.

The proportionality coefficient, k_t, evolves over time according to two factors:
- the level of the exchange rate; and
- stochastic shocks, which are unobservable.

In addition, we assume that both variables depend on their levels during the previous period to take into account persistence, in particular in the use of the dominant transactions technology—dollar paper money.

We derive two more equations from these assumptions:

$$\log(V_{t+1}) = a_1 \log(V_t) + a_2 \, dlog(CPI_{t+1}) + a_3 \, dlog(EXRATE_{t+1}) + \mu_{t+1}, \text{ and} \qquad (6)$$

$$\log(1+k_{t+1}) = b_1 \log(1+k_t) + b_2 \log(EXRATE_{t+1}) + \upsilon_{t+1}, \qquad (7)$$

where dlog indicates the difference $\log_t - \log_{t-1}$; CPI denotes the consumer price index; EXRATE is the exchange rate (riels per dollar); and μ_t and υ_t are two stochastic terms.

We thus have a system of three equations. The first equation is called the observation equation and is deterministic; the second equation is the state equation. The last two equations are stochastic:

$$\log(^R M_{R,t}) = \log(GDP_t) - \log(V_t) - \log(1+k_t), \qquad (5)$$

$$\log(V_{t+1}) = a_1 \log(V_t) + a_2 \, dlog(CPI_{t+1}) + a_3 \, dlog(EXRATE_{t+1}) + \mu_{t+1}, \text{ and} \qquad (6)$$

$$\log(1+k_{t+1}) = b_1 \log(1+k_t) + b_2 \log(EXRATE_{t+1}) + \upsilon_{t+1}. \qquad (7)$$

This system is known as a *state–space representation* whose parameters can be estimated by the Kalman filter (see Hamilton, 1994), which we use for solving the model. This method is particularly useful when two unobservable variables need to be estimated. The method

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[31] We also tried using *CPI all items less food, beverages, and tobacco*, and found similar results.

estimates a system of equations combining (i) two equations describing the unobserved variables to estimate (V_t and k_t); and (ii) one equation linking these two unobserved variables to an observed variable. The Kalman filter has been used in recent research, for instance by Harvey and Pierse (1994), and Bernanke, Gertler, and Watson (1997), as this dynamic procedure allows to update the first estimates as new information becomes available.

For the sake of simplicity we rewrite our system in matrix form:

$$\log {}^R M_{R,t} = 1 \log GDP_t + (-1 \quad -1) \begin{pmatrix} \log V_t \\ \log(1 + k_t) \end{pmatrix}, \tag{8}$$

$$\begin{pmatrix} \log V_{t+1} \\ \log(1 + k_{t+1}) \end{pmatrix} = \begin{pmatrix} a_1 \\ b_1 \end{pmatrix} \begin{pmatrix} \log V_t \\ \log(1 + k_t) \end{pmatrix} + \begin{pmatrix} a_2 & a_3 & 0 \\ 0 & 0 & b_2 \end{pmatrix} \begin{pmatrix} d \log CPI_{t+1} \\ d \log EXRATE_{t+1} \\ \log EXRATE_{t+1} \end{pmatrix} + \begin{pmatrix} u_{t+1} \\ \upsilon_{t+1} \end{pmatrix}. \tag{9}$$

Changing notations, we arrive at:

$$y_t = a'x_t^* + H'\xi_t, \text{ and} \tag{10}$$

$$\xi_{t+1} = F\xi_t + C'X_{t+1} + e_{t+1}. \tag{11}$$

Let $Y_t \equiv (y_1,...,y_t, X_1,...,X_t, x_1^*,...,x_t^*)$ be the information set at time t. And let us assume that:

$$E(\rho_t \rho_\tau) = \begin{cases} Q & \text{for } t = \tau \\ 0 & \text{otherwise.} \end{cases} \tag{12}$$

Cuche and Hess (1999), using a similar framework, find that:

- Correction update step:

$$\hat{\xi}_{t/t} = \hat{\xi}_{t/t-1} + CPI_{t/t-1} H \left(E(y_t - \hat{y}_{t/t-1})(y_t - \hat{y}_{t/t-1})' \right)^{-1} (y_t - \hat{y}_{t/t-1}), \tag{13}$$

$$CPI_{t/t} = CPI_{t/t-1} - CPI_{t/t-1} H \left(E(y_t - \hat{y}_{t/t-1})(y_t - \hat{y}_{t/t-1})' \right)^{-1} H'CPI_{t/t-1}, \text{ and} \tag{14}$$

where $CPI_{t/t-1} = E\left(\xi_t - \hat{\xi}_{t/t-1}\right)\left(\xi_t - \hat{\xi}_{t/t-1}\right)'$.

- Prediction step:

$$\hat{\xi}_{t+1/t} = F\hat{\xi}_{t/t} + C'X_t, \text{ and} \tag{15}$$

$$\hat{y}_{t+1/t} = a'x^*_{t+1} + H\hat{\xi}_{t+1/t}.$$ (16)

- Mean Square Errors (MSE) step:

$$MSE\left(\hat{\xi}_{t+1/t}\right) = CPI_{t+1/t} = FCPI_{t/t}F' + Q \text{, and}$$ (17)

$$MSE\left(\hat{y}_{t+1/t}\right) = H'CPI_{t+1/t}H.$$ (14)

At each step, we need $\hat{\xi}_{t/t-1}$ and $CPI_{t/t-1}$ to calculate $\hat{\xi}_{t+1/t}$ and $CPI_{t+1/t}$; therefore, to start the iterative process, $\hat{\xi}_{1/0}$ and $CPI_{1/0}$ need to be specified. While we do not have information for $t = 0$, usually $\hat{\xi}_{1/0}$ is set to zero and $CPI_{1/0}$ to an arbitrarily large value. F and C are matrices of unknown parameters whose values are derived by maximizing the log likelihood.

- Log likelihood:

$$y_t / y_{t-1} \ N\left(\left(a'x^*_t + H'\hat{\xi}_{t/t-1}\right)\left(H'CPI_{t/t-1}H\right)\right)$$

$$L = \frac{-T}{2}\log(2\pi) - \frac{1}{2}\sum_{t=1}^{T}\log\left(H'CPI_{t/t-1}H\right)$$ (18)

$$-\frac{1}{2}\sum_{t=1}^{T}\left(\left(y_t - \left(a'x^*_t + H'\hat{\xi}_{t/t-1}\right)\right)\left(H'CPI_{t/t-1}H\right)'\left(y_t - \left(a'x^*_t + H'\hat{\xi}_{t/t-1}\right)\right)'\right).$$

Our goal is to infer ξ_t based on the full set of data collected; a smoothed estimate of ξ_t based on the full set of data is noted $\hat{\xi}_{t/T}$. For this, we assume that we know the true value of ξ_{t+1}; therefore we can revise our estimates of ξ_t, given Y_t and ξ_{t+1}.

Then:

$$E\left(\xi_t / \xi_{t-1}, Y_t\right) = \hat{\xi}_{t/t} + \left[E\left(\xi_t - \hat{\xi}_{t/t}\right)\left(\xi_{t+1} - \hat{\xi}_{t+1/t}\right)'\right]$$

$$\times \left[E\left(\xi_{t+1} - \hat{\xi}_{t+1/t}\right)\left(\xi_{t+1} - \hat{\xi}_{t+1/t}\right)'\right]^{-1}\left(\xi_{t+1} - \hat{\xi}_{t+1/t}\right)$$ (19)

According to our previous equation, we obtain:

$$E\left(\xi_t / \xi_{t-1}, Y_t\right) = \hat{\xi}_{t/t} + CPI_{t/t}F'CPI_{t+1/t}^{-1}\left(\xi_{t+1} - \hat{\xi}_{t+1/t}\right)$$ (20)

and consequently:

$$\hat{\xi}_{t/T} = \hat{\xi}_{t/t} + P_{t/t} F' CPI_{t+1/t}^{-1} \left(\hat{\xi}_{t+1/T} - \hat{\xi}_{t+1/t} \right). \tag{21}$$

Then following Hamilton (1994), the Kalman filter is calculated, and the sequences $\left\{ \hat{\xi}_{t/t} \right\}_{t=1}^{T}$, $\left\{ \hat{\xi}_{t+1/t} \right\}_{t=1}^{T-1}$, $\left\{ CPI_{t/t} \right\}_{t=1}^{T}$, and $\left\{ CPI_{t+1/t} \right\}_{t=1}^{T-1}$ are stored. $\hat{\xi}_{T/T}$ is the last entry in $\left\{ \hat{\xi}_{t/t} \right\}_{t=1}^{T}$, we compute $P_{t/t} F' CPI_{t+1/t}^{-1}$ and use (21) for $t = T - 1$ to calculate $\hat{\xi}_{T-1/T}$. Proceeding backward, we derive the full set of smoothed observations.

In order to estimate the parameters of the state–space representation, initial values are required. To circumvent the issue of uncertainty for those values, high or low initial values are usually chosen. As a first estimate of the velocity of money, we divide nominal GDP by the average stock of broad money. While this method ignores cash dollars circulating in the economy, we use this information as an *a priori* upper limit for velocity. The computed velocities are provided in Table 1.

Table 1. Cambodia: Velocity of Broad Money I, 1995-2001

	1995	1996	1997	1998	1999	2000	2001 est.
Nominal GDP (in billions of riels)	7,543	8,325	9,149	10,543	11,646	11,923	12,932
Broad money (in billions of riels)	649	912	1,063	1,230	1,443	1,831	2,209
Velocity (V_t)	14.4	10.7	9.7	9.5	8.5	6.9	6.4

Source: National Bank of Cambodia.
Note: Yearly averages of quarterly data.

Happe (1995) assessed the possible degree of dollarization at end-1994 in Cambodia, by calculating velocity based on broad money (including foreign currency deposits). She found that measured velocity amounted to 15.4. Our velocity in 1995 is broadly consistent with this result.

Given our a priori bounds, we select an upper bound of 6 for V_0 and 0 for k_0. It is worth noting that in general the choice of initial values does not greatly affect the final results. However, poor choices of initial values may lead to convergence on local equilibria far from the *true* value of economic parameters (this is the major drawback of this methodology). They may also increase the time required for convergence on the estimation algorithm.[32]

To solve our system, we use data from the NBC and the National Institute of Statistics (NIS) covering the period January 1995-January 2001. The NBC provides monthly data for $^R M_{R,t}$ and for cleared checks denominated in riels. The NIS provides yearly GDP data for 1995-2000. Monthly data are derived from the yearly series using cubic interpolation. Using the X12

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[32] We experimented with different initial values and found that they led to similar results.

procedure, all data are seasonally adjusted. Computations are done using the Eviews Ver. 4.0 software. Using the data specified above and the Kalman filter methodology, we find the maximum likelihood estimates for the parameters, as shown in Table 2.

Table 2. Cambodia: Maximum Likelihood Estimates for the State-Space Representation

Parameter	Coefficient	Std. Error	z-Statistic	Prob
a_1	0.961050	0.019828	48.46836	0.0000
a_2	0.174978	0.380014	0.460451	0.6452
a_3	-0.644482	0.188682	-3.415702	0.0006
b_1	0.412067	0.296785	1.388434	0.1650
b_2	0.229147	0.117801	1.945211	0.0517
Log likelihood	143.6093		Akaike crit.	-3.794702
			Schwarz crit.	-3.573359
			Hannan-Quinn	-3.706585

Source: Authors' calculations.

We expect all parameters, except a_3, to be positive. Some of the parameters are not significantly different from zero; nevertheless, we do not drop them from the equations in view of their economic relevance. Under the hypothesis that a_1 is equal to unity, equation (6) can be reorganized so that the left member becomes $\log(V_t) - \log(V_{t-1})$. The equation would then describe the growth rate of V_t. Our empirical results indicate that a_1 is significantly different from unity. As expected, inflation raises the velocity of money (although this coefficient is not significantly different from zero), while an increase in the exchange rate decreases velocity. Other things being equal, if the dollar appreciates, the total amount of money circulating in the economy expands and velocity falls. Concurrently, the dollar's appreciation lead agents to hold cash in dollars rather than in local currency, increasing the proportionality coefficient.

We solve the system to compute the parameters of interest, V_t and k_t. According to our estimates, the average velocity of money is 1.14 (Table 3).

Table 3. Cambodia: Velocity of Broad Money II, 1995-2000

Year	1995	1996	1997	1998	1999	2000	Average 1995-2000
V_t	1.57	1.26	1.23	0.95	0.92	0.93	1.14

Source: Authors' calculations.
Note: Yearly averages of monthly estimates.

We find significantly lower velocities then those presented in Table 1, owing to the estimated larger money supply. A velocity close to, or below, unity reflects limited financial intermediation and the absence of financial assets, as we assume that cash balances are held by households as *unproductive* savings, and dollars are used largely as a store of value. In theory, residents should be able to switch between money and nonmonetary liquid assets; however, this is not possible in Cambodia. Therefore, the velocity of the *noncirculating* money is zero or close to zero. In other words, it is likely that a large part of dollars outside the banking system would be exchanged for nonmonetary assets with positive real returns, if this were possible.

Solving the system for the proportionality coefficient, k_t, provides an average value of 22.1 (Table 4). Using the earlier findings, our monthly estimates of dollars circulating in the economy are shown in Figure 7 of the main text.

Table 4. Cambodia: Value of the Proportionality Coefficient, 1995-2000

Year	1995	1996	1997	1998	1999	2000	Average 1995-2000
K_t	19.5	20.4	21.1	23.5	23.8	23.9	22.1

Source: Authors' calculations.
Note: Yearly averages of monthly estimates.

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