XXX Annual Monetary Studies Conference

The Central Bank of The Bahamas

In conjunction with

Caribbean Centre for Monetary Studies

Reserve Pooling in the Eastern Caribbean Central Bank Region: A Comparative Analysis

By

Oral Williams & Selvon Hazel
Eastern Caribbean Central Bank
Basseterre, ST. KITTS

Sheraton Grand Resort
Paradise Island, THE BAHAMAS

October 26 – 30, 1998

Reserve Pooling in the ECCB Region: A Comparative Analysis

by

Selvon Hazel and Oral Williams

Paper presented at the XXX Annual Monetary Studies Conference, Bahamas
October 26-30, 1998

Introduction

Nicholls (1994) defined reserve pooling as the amalgamation of the reserve holdings of a set of co-operating entities. Pooling of reserves is one of the most viable strategies for the advancement of economic integration and promotion of exchange rate stability in a region. Any investigation of reserve pooling warrants a thorough review of the wider literature on monetary integration. Farrell (1994) defined a monetary union as a group of countries linked by a common currency or by a permanently fixed nominal exchange rate, which guaranteed convertibility. Farrell (1994) identified three levels of monetary union. First, a weak monetary union, where countries elect to issue separate national currencies from separate central banks, to operate fixed nominal exchange rates among themselves, to conduct separate economic policies and place institutional limits on capital flows. Second, semi-strong monetary union where there is a common currency issued by a common central bank. However, economic policies are separately developed and managed and there are institutional limitations on capital flows. Third, strong monetary union, where a common currency issued by a single central bank, as well as centralised management of monetary, fiscal and trade and other policies. There is also free movement of labour and capital. In the ECCB region most of the preconditions for the categorisation of the area as a strong monetary union have being met. In the ECCB region their exit a common currency (the EC dollar), issued by one central bank (the ECCB). Additionally in the ECCB area, the exchange rate has remained fixed at EC $ 2.70 to a U.S since 1976. The Credibility of the exchange rate for the EC is hinges in part by the inability of member governments to monetise deficits and the required unanimity in membership in adjusting parity. Finally, monetary policy coordination exists among members of the ECCB region. These pre-conditions approximately characterise the region as a strong monetary union according to Farrell's nomenclature.

One fundamental ingredient for any successful monetary union is the presence and effective management of some reserve fund to maintain the value of the currency. In general reserves of a country consist of its official holdings of gold and convertible currency of other member states. The IMF defines reserves as the resources that are available to monetary authorities for the purpose of meeting balance of payment transactions. This definition includes

SDRs and the reserve position of the fund. Jager (1979) however, questioned the inclusion of the latter arguing that they fail to satisfy the very definition of reserves. In the ECCB region the notion of an imputed reserve is utilised.

The major purpose of this paper is to investigate whether countries within the ECCB region are enjoying greater balance of payment protection in the monetary union than they would have enjoyed autonomously. The main hypothesis of this paper is that countries within the monetary union are enjoying greater balance of payments protection in the monetary union than they would have enjoyed in an autonomous state.

The paper is organised as follows; Section 2 of this paper looks at the institutional framework for pooling reserves in the ECCB region. As far as possible a comparison would be made between the institutional framework governing the operations of the reserve pool in the ECCB region with that of the Central and West African Monetary union (CFA franc zone). Section 3 of this paper deals critically with the rationale for the establishment of a reserve pooling arrangement while section 4 explores the theory of reserve pooling. Section 5 of the paper is an empirical section looking at the gains from various pooling configurations as well as an analysis of the results. Section 6 of this paper deals critically with issues of reserve management within the ECCB region. Finally, some concluding remarks are made in section 7.

SECTION 2: OPERATIONAL FRAMEWORK

In order to understand the working of the reserve pool in the ECCB region it is vital that the concept of imputed reserves be clearly understood. In the ECCB region, there is no requirement that commercial banks surrender their foreign exchange earnings to the central bank. They do so out of need. These needs include:

(1) The need for domestic currency

(2) The need for settlement balances with the central bank to settle transactions abroad.

(3) To take advantage of interest bearing facilities at the central bank these accounts must be funded by foreign currency.

The central bank does not attribute foreign reserves to a particular country or bank. Prior to 1986, when no separate balance of payment accounts were prepared for the ECCB countries, this was not a major problem. When the ECCB started to prepare separate balance of payments accounts for the countries it became imperative that a method be found to allocate the reserves of the to the member countries. Thus it became necessary to impute their share of reserves.

The formula for calculating imputed reserves is based on the following identity where reserve money (RM) is equal to net foreign asset (NFA) plus domestic credit (DC)

$RM = NFA + DC$

Reserve money, which is the liabilities of the central bank, consists of currency in circulation well as balances of commercial banks held with central banks. Net foreign assets are the pool of reserves, which the bank manages and together with domestic credit constitutes the bank's assets. Domestic credit includes credit to governments and to commercial banks in government's role as lender of last resort. Let us assume the central bank is trying to determine the share of reserves to allocate to St.Kitts and Nevis. The bank issues currency to St. Kitts and Nevis and it redeems currency from St. Kitts and Nevis; the difference being currency in circulation in St. Kitts (Ck). The bank balances of commercial banks in St. Kitts and Nevis with the central bank is known by the central bank. This can be denoted as Bk. St. Kitts and Nevis's share of reserve money is equal to Ck + Bk. Domestic credit of St. Kitts and Nevis DCk, is calculated from credit to the St. Kitts and Nevis government and credit to commercial banks in St. Kitts and Nevis.

$Rk = NFAk + DCk$

$NFAk = Rk-DCk$

The way imputed reserves are calculated in the region has serious implications for the operation of the reserve pool in the ECCB region. To access the reserve pool countries must have reserve money. The primary policy focus of the ECCB is the maintenance of the external value of the domestic currency. This requirement implies central bank must always have foreign reserves to defend the currency. This fact is recognised in the ECCB agreement, which limits the

extent of domestic liquidity the bank can create at two levels. First is the global limit on fiduciary currency in which the ECCB is required to maintain a minimum foreign exchange cover equivalent to 60.0 per cent of the currency in circulation and its other demand liabilities. The nature of this requirement outlined in section 24(2) states that:

"The bank shall at all times maintain the external value of currency issued or deemed by the bank to have been issued by it and in circulation and other demand liabilities but excluding coins issued for commemorative purposes."

The second constraint on liquidity is the limitation placed on the accommodation, which can be provided to any of the eight governments. Under section 40(1) of the agreement temporary advances to meet seasonal needs, and holdings of treasury bills issued by member governments are limited to 5.0 per cent and 10.0 per cent of each government's recurrent revenue respectively. Additionally the holding of securities other than treasury bills in respect of all governments may not exceed 15.0 per cent of current in circulation and other demand liabilities. Once governments have exhausted their credit allocation they must then seek residual financing from commercial banks and/or non-banks. The commercial banks constitute the largest segment of the financial system which are integrated with the international financial system through the accumulation of foreign asset balances. It is these balances that are used primarily in balance of payments transaction and to smooth liquidity conditions in the respective countries.

In determining its annual limit for credit expansion, the central bank takes into account, the existing level of net foreign asset and demand liabilities. Cognisance is given to its obligations to maintain a reserve of external asset not less than 60.0 per cent of its demand liabilities, establishes global credit limits for the ensuing 12 months. Credit allocations to each government are determined by the ratio of that government's recurrent revenues to total revenues for all members. Governments are free to draw on their allocation at anytime to finance budget deficits, and the central bank advises them on the appropriate mix of treasury bills and long-term securities (debentures). In practice, the global amount allocated in any one year has never been taken up in full, though on occasions individual governments utilised the full amount of their respective limits.

A careful analysis of these arrangements suggests that each member government has individual credit pools at the ECCB, which cannot be normally extended upon exhaustion. Therefore, there is no spillover effect in regards to member's demand for credit. As Nicholls (1996) suggested there exist eight separate quasi-currency boards administered by a central authority. In the ECCB region it is possible to end up with a fiscal imbalance but with the foreign assets of the ECCB increasing over time.

CFA Zone Framework

The CFA Franc zone comprises two regional parts: West African Monetary Union and Central African monetary union. The members of the West African monetary Union are Benin, Burkina Faso, Cote d' Ivoire, Senegal, Togo and Mali. These countries are governed by a common central bank, the BCEAO; one of whose main responsibilities is to oversee the external operations of the member countries. The common currency, the CFA Franc, has been pegged tom the French Franc at a rate of 1 FF= CFAF 50 since 1948 and its alteration requires unanimous agreement between the member countries and France. Unlike what applies in the ECCB region, since the French treasury guarantees the convertibility of the CFA Franc, this, in effect means the French treasury stands ready to augment the pool with French reserves if needed. The BCEAO allocates credit based on joint needs, so that a single country cannot continuously draw down the pool reserves without evoking a response from the other members when the bank makes its credit allocation decisions each September for the following year. Each country maintains a separate account with the BCEAO where 65.0 per cent of its official reserves are maintained in the operations account. In the first instance, each country draws down its own account of pooled and unpooled reserves. If these are fully drawn down the other countries' pooled reserves may be used. The French Augmentation of the Operations Account occurs only when all union reserves have been fully drawn down. In essence, there is no statutory limit on a member country's use of another's reserves. A crisis management scheme takes over when the BCEAO's reserves fall below the prescribed threshold, not when a country's a reserve fall bellow it. Thus in the short run, a single country can draw down its partner's reserves, but the central bank can attempt to control this when it makes its credit allocation decisions each year.

The Central African Monetary Union Consist 6 members: Cameroon, Congo, Central

African Republic, Equatorial Guinea and Chad. The central bank governing these countries is the BEAC . The currency and the exchange rate regime are similar to what apply in the West African Monetary Union. In the BEAC region, unlike what applies in the other areas with multi-state central banks, member countries with balance of payment deficits have unrestricted access to the common pool. Additionally, the voting leverage on the board's decision-making depends on the size of their economies. Cameroon, which accounts for half the area's GDP and nominal money supply, has 4 seats on the board; Gabon accounting for quarter of the area's total GDP and money stock has 2 seats and the remaining members have 1 seat each.

SECTION 3: RATIONALE

The issue of a reserve fund for CARICOM is not an entirely new idea and was given some active consideration in the decade of the 1970s by Thomas (1973), the World Bank (1975), Worrel (1976), Bennett (1979) and Dodsworth (1978). These experts produced varying estimates of the potential benefits to the region of pooling. The most optimistic being that by Thomas who argued that the minimum gains to be expected from pooling represents about 17.0 per cent of reserve held. Worrell estimated gains in the region of 13.0 per cent using data from 1973 to mid 1975 and the World Bank's estimated 7.0 per cent based on quarterly data 1969-1973. These studies were deficient for present day economic analysis in the ECCB region as the size of the data set was too small, and they did not focus specifically on the peculiarities of the ECCB region. Since these initial results, Nicholls (1994) study attempted to investigate the phenomenon but like previous work no attempt was made to look at the subject in the specific context of the ECCB region. It is this omission in the literature that this work seeks to address.

Interest in the area of analysis stems from the tremendous benefits to be had from combining foreign reserves in an optimal manner. First, by belonging to a reserve pool each member state can buy itself unconditional access to the reserves of other member states during its time of need, Medhora (1992). Second, the pooling of reserves allows an increase in the bargaining strength of individual member countries with regard to negotiations with multilateral institutions like the IMF and World Bank, (Nicholls (1994). Third, pooling may afford member states the possibility of a reduction in their reserve variability thereby granting them protection against unforeseen variation in the volume and/or prices of their major foreign exchange earners.

However, it must be noted, it is only truly beneficial if the variability of the entire pool is smaller than the variability of the reserves of the individual member countries. Four, the existence of a strong regional reserve fund can give a position of strength to regional currencies by lessening the risk of frequent exchange rate depreciation. Five, reserve pooling by protecting the value of the currency can prevent currency substitution, where economic agents switch their wealth from a low confidence to a high confidence currency leading to the emergence of a parallel foreign exchange market. Finally, reserve pooling also confers indirect benefits by fostering an environment in which member states can pool knowledge, information and exchange technology. This can cultivate a better understanding of the differences and serve to enhance cooperative efforts among member states (Wadhva (1969).

SECTION 4: THEORETICAL FRAMEWORK

The cost benefit approach to reserve pooling is potentially the most insightful. There has been a wealth of research on the subject matter but little agreement on the empirical approaches employed to interpret these theories. One must be cognisant of the fact that although significant benefits accrue from reserve pooling, the cost can be substantial. Heller (1966) was the first to derive the optimal level of reserves from a model using the cost benefit approach. According to Heller, the benefits from holding reserves stem from the ability to avoid a reduction in output in a case of a balance of payment deficit. The opportunity cost of holding reserve is the difference between the return on capital and on reserves. According to Heller optimal reserve $R* = [\log (rm) / \log 0.5]\sigma$. The model was further developed by Hamada and Ueda (1977) who defined optimal reserve (R*) as $R^*=[1+1/(rm)\ 0.5]\ \sigma$ and Frenkel and Jovanic(1981)who defined optimal reserve as $R^* = C\sigma .\ 5\ r\ -.\ 25$, where C= R/m.

These models led to a specification R = R (m, q, r), where

R = desired official reserves

m = marginal propensity to import

σ = measure of balance of payment variability

r = opportunity cost of reserve holdings

The signs on the partial derivatives are positive for the variability measure (σ) and negative for the opportunity cost variable (r). The partial derivative of the propensity to import is ambiguous. Heller asserts that in the hypothetical absence of reserves, any temporary deficit in the balance of payments would have to be corrected by means of a reduction in aggregate expenditure. The required change is smaller the higher the propensity to import. This implies a negative relationship between reserves and the propensity to import. Frenkel argued that the propensity to import reflects the economy's openness and thus measures its vulnerability to external shocks. In this case the demand for reserves should be positively related to the import propensity. Some authors like Mathieson and Lizondo (1987) added a hypothesis of partial stock adjustment, thus also including the lagged dependent variable (Rt-1). These approaches suffer from some basic criticisms. First, the marginal cost of a balance of payment adjustment is wrongly interpreted as a permanent benefit of holding a dollar of reserves, while in fact a dollar of reserve can save a country from contraction only once. Second, the return on capital is not a proper measure for the cost of reserve. There are numerous additional costs associated with holding reserves such as administrative cost. Third, the benefits of holding reserves are more extensive than the ability to avoid a reduction in output in case of a balance of payment deficit. Dodsworth identified two additional benefits of holding reserves:

(i) Countries are able to acquire goods and services from abroad in the case of national emergencies.

(ii) Reserves may be used to signal a country's financial strength thereby increasing acceptability of public/ private financial instruments. In the case of the ECCB region, the

utility here is to maintain confidence in the EC dollar.

Despite these limitations the cost benefit approach remains a valid framework for assessing the utility of reserve pooling in the ECCB region. According to article 24 (2) of the ECCB agreement of 1983 the Bank must at all times maintain the external reserves in an amount not less than 60.0 per cent of the value of currency in circulation, and demand liabilities but excluding coins issued for commemorative purposes. In practice, the ECCB has a foreign asset cover well in excess of the prescribed 60.0 per cent requirement. In light of this foreign asset rule, it would be an interesting to utilise the cost benefit approach to see to what extent the ECCB region has maintained an inappropriately large proportion of the region's resources as foreign asset at the expense of domestic expenditure.

The optimization approach to reserve pooling though very attractive would not be pursued empirically in this paper largely because of the difficulties inherent in defining a cost function for reserves. Another theoretical approach to the notion of reserve pooling involves an examination of the framework of Dodsworth (1975, 1978). This framework is in actuality a modification of the theory of clubs developed earlier by Buchanan (1965) and Ng (1975). The main message of the theory of clubs is that if the utilisation pattern of two clubs are not highly positively correlated, then the membership of both clubs could be better off by sharing one another's facilities so as to even out crowding. The model assumes each country within an institutionalised regional group is faced in each time period (t) with a level of payments *D*t. These payments are met from current receipts *Ct* once *Dt* < *C*t and from a domestic reserve fund R if *D*t > *Ct*. The size of the reserve fund depends on some measure of dispersion of *Dt* above *C*t, and on a risk factor w. This risk factor reflects the probability (PR) of illiquidity arising after a

number of time periods, n, that is

$$w = Pr\ [\ \Sigma\ Dt > (\Sigma Ct + R)]$$

If the time horizon, n, is held constant, then a trade off curve can be drawn between reserve held and the risk factor w. The specification of this trade off curve will depend on the shape of the distribution of (Dt - Ct) over time. The trade off curve will be convex to the origin, asymptotic to the R axis and intersecting the w axis. As a special case if the distribution of (Dt – Ct) in the reserve pooling situation symmetric then the trade off curve will cut the w axis at 0.5

Figure 1 illustrates a reserve-pooling situation in a two country case. Initial trade - off curves for the countries separately are shown by T1 and T2: preferences are represented by the indifference map, a′, a″, a‴… and by b′, b″, b‴… which indicate desired initial combination of A1 and A2. Initial reserve holdings are thus R1+ R2. Suppose a pooling is instituted and trade-off curve for the two Tp2. Desired position under pooling are indicated by B1 and B2, which lie on indifference curves a‴ and b‴ countries if reserves are pooled is given by Tp. Tp can be disaggerated into the two newly effective trade-off curve, Tp and Tp2, i.e. Tp is the vertical summation of Tp1 and respectively. Assume the risk factor arrived at is wp, then total reserve holdings will consist of Rp1 + Rp2, country 1 would have moved from indifference curve a′ to a″, and country 2 from indifference curve b′ to b″. A number of critical points arise from Dodsworth's analysis:

(1) Benefits from reserve pooling arrangement depend not only on reserve economies but also on the differences in the preferences (risk adversity) of the members. The larger the differences in desired positions in the pooling situation the less inferior will a′(b′) be to a″(b″) as

suggested by figure 1.

(2) The choice of common risk factor affects the savings in reserve. If a conservative scheme is adopted that requires no member state' risk factor to be increased, then the reserve savings element will be reduced and if there are wide differences between factors may even be negative. This situation is more likely if a wide divergence in the risk adversity is combined with greater correlation between member's usage patterns.

(3) The size of the reserve saving will be affected by the cost sharing scheme. Cost sharing schemes should be inclined towards requiring the more risk adverse members of the group to contribute more than a proportionate share to the fund.

Although the model by Dodsworth provides a useful reference frame for analyzing reserve pooling in the ECCB region, there are some inherent limitations. Some of these limitations include:

(1) The analysis focus almost exclusively on the variability of payments and the risk of illiquidity. These are, however not the only factors which affect the demand for reserves in the ECCB region although they play a significant role;

(2) The Dodsworth model assumes implicitly that future deficits/surpluses of member states will be unaffected by the existence of the regional reserve pool. But reserve pooling creates the problem of moral hazard in which some member countries that are granted unlimited access to the reserve fund become more prone to fiscal indiscipline. This signals the need for some operational rules which employ some credit rationing devices to force likely abusers to exercise a more discipline stance in their foreign and domestic expenditure decisions.

SECTION 5: EMPIRICAL ANALYSIS

Gains From Reserve Pooling

The pooling of reserves offers participating countries two possible sources of gain. The first of these is access to increased reserve holdings while the second is a possible reduction in reserve variability. Dodsworth (1978) and Medhora (1992) utilised a notion of coverage in a way, which incorporates these two sources of gain. Coverage is defined as the ratio of reserve holdings to their variability. According to this formulation coverage will increase if there is an increase in reserve access or a decrease in variability. Dodswoth (1978) and Medhora (1992) defined coverage in country i, Ci as

$$Ci = PR/\ VAR(PR) \qquad (1)$$

Where PR is the average level of reserve during a time period and VAR (PR) is their variability during the same time period. In the case of a reserve pool, PR = Σ Ri, where Ri is the average level of the pool. It is critical to note that coverage under reserve pooling is higher than that in the autonomous state if the variability of the pool is lower than that of each country's reserve seperately or if the increase access to reserves outweighs the higher variability of the pool.

In the case of a partial pool, equation (1) becomes:

$$Ci = Ri+\Sigma pR\ /VAR\ [Ri +\Sigma pR] \qquad (2)$$

Where p is the degree of pooling $0<p<1$ and Ri is the total reserves of country i. That is, with partial pooling, country i's total access to reserves equals all its own reserves plus the partially

pooled reserves of all other members of the pool. In a 100% pooling scheme (i.e. p=1) equation (2) reduces to equation (1) because $\Sigma Ri = PR$.

The tables above show the pattern of reserve holdings and their variability between members of the ECCB region. The first column display average reserve holdings for each member state while the second and third columns display the standard deviation and the coefficient of variation respectively(Table 1(a), 1(b) and 1(c). This coefficient of variation is a statistical measure of the degree of variability of reserve holdings. Reserve variations are analyzed for the sub-periods 1984-1989 and 1990-1997 and for the whole period 1984-1997. As shown in table 1(a) in the period 1994-1997, the country with the most variable reserve was Monsterrat with that of St. Vincent and Grenadines being the least variable. Only Antigua and Barbuda, Grenada and St. Vincent and Grenadines had lower variability than the region. When one examines the 1984-1989 period as illustrated in figure 1(b), the imputed reserves of Dominica was the most variable while that of Grenada was the least variable. Only Monsterrat, Antigua and Barbuda and Grenada had reserve less variable than the region as a whole. An examination of the sub period 1990-1997 reveal, the imputed reserve with the most variability was Anguilla and Grenada while that of St. Vincent and Grenadines showed the least variability. The variability of the pool in the second sub period was less than that for the first.

Using equation (1) and (2), Tables 2(a) to 2(c) presents the numbers for coverage for each member of the ECCB region. The first column shows the coverage that each country would have enjoyed had it not belonged to the pool (defined simply as own reserve divided by their standard deviation. The remaining columns show the coverage the countries would enjoy under various pooling configurations. As shown in table 2(a) in the1984-989 sub-period, only Antigua and Barbuda and St. Vincent and Grenadines enjoyed greater coverage in a no pool state than under

pooling. The increased access to reserves could not compensate these countries for accepting higher variability in reserves of the pool. With a 50 per cent pooling configuration Anguilla had the highest coverage while Monsterrat had the lowest.

All the countries enjoyed higher coverage under a full pool than a partial pool. When one looks at the first sub-period 1984-1989, an interesting result emerges Antigua and Barbuda, Monsterrat and Grenada would have enjoyed higher coverage in the autonomous state than under the various pooling configurations. An examination of 1990-1997 sub-period from Table 2(c), reveal only St. Lucia and St. Vincent had higher coverage in the autonomous state than through pooling

To understand the beneficial impact of pooling one need to ascertain the level of reserves each country would have had to hold in an autonomous state to enjoy the level of coverage afforded by a pooling of reserves. Using Medhora's (1992) methodology, this level of reserves can be computed as follows:

$$HR_i = C_i . Var\ (R_i) \qquad (3)$$

That is the level of reserves that each country would have had to hold (HR_i), had it not belonged to the pool, but had it still wanted to maintain the pool the coverage actually afforded it by the pool (C_i), equals the coverage under pooling times the variability of own reserves Var (R_i).

Table 3(a) to 3(c) presents reserve savings computed if a 20.0 per cent partial pooling arrangement was instituted in the ECCB region. In the first column, actual reserves is taken from Table 1(a) to 1(c), and represents the average level of reserve each country held during each sub-period. The second column, hypothetical reserve, is calculated using equation 3. The gain/ loss column is calculated as hypothetical reserves minus actual reserves. The final column shows the gain or loss as a percentage of average actual reserves, to give some sense of who benefited and by how much.

As shown in Table 3(a) in the 1984-1997 period, the gain ranged from 3.4% for Grenada to 112.09% for Monsterrat. The large gain for Monsterrat was not surprising since that country had a low level of reserves coupled with the highest level of own reserve variability among member states. Belonging to the pool therefore would confer on Monsterrat the double benefit of increase access to reserves plus lower variability. Antigua and Barbuda and St. Vincent and Grenadines suffered losses to the tune of 14.95 per cent and 20.52 per cent respectively largely on account of their high own reserves and low own reserve variability. An examination of the 1984-1989 sub-period shows the gain range from 2.15 per cent in St. Vincent and Grenadines to 25.21 per cent in Anguilla. Anguilla enjoyed the greatest benefit on account of its low level of reserve and low own reserve variability. Grenada and Monsterrat suffered the largest loss from pooling of 32.46 per cent and 31.59 per cent respectively. Despite moderate levels of reserves these countries had low levels of own reserve variability and the increase access to reserves was not sufficient to compensate these countries for accepting higher variability in the pool. A look at the final sub-period 1990-1997 reveals the gain range from 13.35 per cent in Montserrat to 55.45 per cent in Anguilla. Countries with the greatest loss were St. Lucia and St.Vincent and Grenadines respectively.

Some important points emerge from this analysis. First, countries that are likely to gain the most are those which display relatively low levels of own reserve availability coupled with high levels of variability. Secondly, pooling will not deliver equal reserve gain to all member states. There is likely to be some asymmetry in the distribution of gains. It would be of great interest to compare the results of my findings with that of Medhora (1992) who did a similar a similar study on the West African Monetary Union. Medhora's analysis covered the period 1974-84 and 1985-90 and sought to investigate whether countries in the monetary union enjoyed greater coverage in

their 65.0 per cent pooling arrangement than in their autonomous state. He found during the period 1974-84, only Burkina Faso had a lower level of coverage in the pool than it would have had autonomously. During the period 1985-90, Togo was in a similar position, with higher autonomous coverage than under pooling. In each of these cases the level of variability of own reserves was so low that the increased access to other's reserves in the pool was not enough to compensate these countries for accepting the higher reserve variability of the pool. Interestingly Medhora found coverage actually decreased as he moved from a 65.0 per cent pool to a 100.0 per cent pool. He concluded there is an optimum degree of pooling that one can calculate for each country, by maximizing equation 2 with respect to p. A comparable result to Medhora's study is that countries that gained the most from pooling were those with low levels of own reserves and high levels of variability of own reserves. In the 1974-84 period he found the gains ranged from 39.0 per cent of actual reserves held in Niger to 178.0 per cent for Cote d'Ivoire. Burkina Faso losses from the arrangement amounted to 5.0 per cent of actual reserves held. During the sub-period 1985-90 Benin and Cote d' Ivoire's average reserve declined, while those of other member's rose. Benin, Cote d' Ivoire and Mali enjoyed the highest reserve savings from pooling while Togo suffered a 9.2 per cent loss.

Niamkey and Allechi (1994) found the gains increase with the degree of pooling. In an analysis of the countries in the West African Monetary Union using data in the period 1975-1988, found the gains increased with the degree of pooling. As they moved from a 65.0 per cent to a 100.0 per cent pooling configuration the gains increased from 37.7 per cent to 40.3 per cent. Additionally in their calculations of the coverage in the Central African Monetary Union using yearly data between 1975-88, found that Cameroon and Congo enjoyed a higher coverage with 65.0 per cent pooling than without pooling. Chad, Gabon and Central African Republic were

found to experience lower coverage with pooling than without.

SECTION 6: RESERVE MANAGEMENT

It would be an exercise in futility to discuss the notion of reserve pooling outside the framework of reserve management. The long-term variability of the pool is a function of the kind of management devoted to the fund as an improperly managed fund may cause some members to opt out. During the five-year period leading up to 1994, the ECCB enjoyed substantial capital gains from an average 4-year portfolio duration. The sudden downturn of the bond market precipitated by a series of Federal Reserve Board's tightening during 1994 left the bank feeling exposed to interest rate risk. The collapse of Barings Bank in 1995 further focussed attention on reserve management. This triggered a re-examination of not just its current duration but also the performance of its external money managers. No clear basis existed for evaluating the performance of managers even after returns were calculated. Performance attribution data were not available to enable evaluation of performance due to the market versus the portion due to security selection.

In November 1994, the World Bank made recommendations to the Bank on issues of reserve management after a initial request for technical assistance. Among these recommendations were that the bank engage in in-house training, hire a cadre of technical people, establish and utilize customized bench marks for investment decisions and utilise reputable money managers. Today with large-scale implementation of these proposals the ECCB's reserve management has improved.

One of the major purposes of the ECCB is to promote and maintain monetary stability.

One of the prerequisites for the achievement of monetary stability is that the society has confidence in its currency. The maintenance of a fixed exchange rate requires that the bank stands ready to purchase all foreign exchange offered for sale at the declared rate, and more importantly stands ready to sell foreign exchange when demanded at that rate. It is for this reason that the Bank must maintain and manage a pool of reserves to provide credibility for the fixed exchange rate.

The broad objectives of the reserve management function of the ECCB are:

(1) To provide sufficient reserves to support the value of the EC dollar consistent with the ECCB agreement 1983;

(2) To ensure a pool of reserves is available for balance of payments purposes;

The foreign reserve policy of the ECCB dictates the foreign reserve portfolio should be managed in a manner that would primarily:

(1) Preserve capital;

(2) Meet liquidity requirements; and

(3) Realize a satisfactory return.

In order to achieve the above, the total portfolio is divided into a liquidity trance, comprising 40 per cent of the portfolio and a core tranche, comprising 60.0 per cent. The liquidity tranche consist two components: overnight deposits at the Federal Reserve and money market instruments such as certificates of deposits, fixed deposits, bankers acceptances, US treasury bills and commercial paper. The core tranche consist cash, money market instruments and fixed income non-callable bonds .

The reserve management strategy of the bank is designed to deal with several types of risk:

interest rate risk, country risk, credit risk, currency risk and liquidity risk. To deal with interest rate risk the duration or the core tranche of the benchmark portfolio is set at a neutral duration of 2 years, with a standard deviation 0 .5. The duration of the liquidity tranche is set at 3 months with a standard deviation of 1 month. The downside of both should be a neutral stance i.e. a replication of the adopted benchmark. To insulate itself against country risk, investments are only exposed to countries rated AA or better, according to Moody's and its equivalent as measured by another international rating agency. To guard against credit risk several guidelines are followed. First, investments are exposed to the risk of financial institution with a rating of AAA or better according to Moody's. Second, investments are exposed to the debt of, or carrying the unconditional and irrevocable guarantee of state and provincial governments of the countries listed in the Investment Mandate. Third, investments may be exposed to the debt of the World Bank, Inter-American Development Bank and the Caribbean Development Bank. Four, investments in the debt of institutions not covered above, may be included upon specific approval from the Board of Directors. To insulate itself against currency risk not more then 10.0 per cent of the entire portfolio is exposed to non-US dollar denominated instruments. Additionally, hedging instrument like forward contracts, options, and swaps are permitted, but specifics should be presented to the Board of Directors for approval.

The major constraints of the ECCB's investment policy are:

(1) Investment Time Horizon: The investment horizon of the foreign reserve portfolio shall be five years.

(2) Liquidity: 40.0 per cent of the portfolio should comprise the liquidity tranche. This amount is considered to approximately 6 months of average currency sales.

(3) Legal and Regulatory requirements and General Standards: The ECCB's investment policy

shall be implemented within the constraints or the ECCB Agreement of 1983, and the financial regulations thereunder and the standards established by the Association for Investment Management and Research (AIMR)

CONCLUSIONS

Over the period 1984-97, Antigua and Barbuda enjoyed greater coverage in a no pool state versus pooling. The increased access to reserves could not compensate these countries for accepting increased variability in reserves. With an increase in the degree of pooling Anguilla enjoyed an increase in coverage generally. All countries in general appeared to have enjoyed greater coverage with full pooling. During the sub-period 1984-87, Grenada, Antigua and Barbuda and Montserrat had higher coverage in an autonomous state compared with the alternative pooling configurations. St. Lucia and St. Vincent and the Grenadines enjoyed higher coverage during the period 1990-97 under an autonomous state. In general countries most likely to gain most from pooling are those with a low level of won reserve availability combined with high levels of variability. The sources of variability in reserves given the nature of the monetary arrangement reflect in part changing external sector performance. Changes in the money supply also reflect variability in the receipt of exports and other capital flows. This nexus feeds into variability in bankers reserves and fixed deposits and fluctuations in demand for currency in circulation according to changing economic circumstances.

References

Allechi, M. and M. Niamkey. "Evaluating the Net Gains from the CFA Franc Zone Membership: A Different Perspective". *World Development*, Vol. 22(1994):1147-1160.

Bennet, K. "Trade and Payments in the Caribbean Common Market, the Case for a CARICOM Reserves Fund" Proceedings of the Caribbean Regional Monetary Studies Conference, 11th Annual Meeting, St. Kitts, 1979.

Bennet, K. "The Management of Foreign Exchange Reserves in Small Developing Countries". *Social and Economic Studies.* Vol 30(1982):156-71.

Buchanan, J. "An Economic Theory of Clubs" *Economica.* Vol. 32(1965):1-14

Dodsworth, J.R. "Reserve Pooling an Application of the Theory of Clubs" *Economia Internazionale.* Vol. 44(1992):209-22.

Farrell, T. W. and D. Worrell. Caribbean Monetary Integration, Caribbean Information Systems and Services, Port of Spain Trinidad and Tobago, 1994.

Frenkel, J.A. "The Demand for International Reserves by Developed and Less Developed Countries". *Economica.* (1977)

Heller, H. "Optimal International Reserves" *Economic Journal.* Vol. (1966):

Jager, H. "The Need for International Monetary Reserves, Exchange Rate Flexibility and Joining a Currency Area". *De Economist.* Vol. 27(1979):209-255.

Medhora, R. "The West African Monetary Union:Institutional Arrangements and the Link with France". *Canadian Journal of Development Studies.* Vol. 13(1992):409-425.

Ng, Y. "The Economic Theory of Clubs: Pareto Optimality Conditions". *Economica.* Vol 32(1965):291-298.

Thomas, C. Y. "Reserves Adequacy and Regional Cooperation in Reserve and Payments" mimeo, 5th Annual Conference of Regional Programme of Monetary Studies, 1973.

Wadhva, C. "Reserve Pooling in Asia and the Far East". *Pakistan Development Review.* Vol. 9(1969):309-329.

Worrell, D. "The Theory of Optimal Foreign Exchange Reserves in a Developing Country".*Social and Economic Studies.* Vol.25(1976):259-79.

Table 1(a) Mean Reserve Holding and Variability in the ECCB Region (1984-1997)

Country	Mean imputed Reserves in $ECM	Standard Deviation	Coefficient of Variation
Antigua and Barbuda	95.33	28.15	.29
Grenada	66.98	23.64	.35
St. Kitts and Nevis	56.17	30.4	.54
St. Lucia	115.44	47.63	.41
Dominica	43.44	19.04	.43
St. Vincent and Grenadines	67.13	17.21	.25
Anguilla	28.27	10.58	.37
Monsterrat	19.51	14.27	.73
Average	61.53	23.86	.38

Table 1(b) Mean Reserve Holding and Variability in the ECCB Region (1984-1989)

Country	Mean Imputed Reserves in $ECM	Standard Deviation	Coefficient of Variation
Antigua and Barbuda	64	16.44	.25
Grenada	50.65	7.60	.15
St. Kitts and Nevis	27.27	9.77	.36
ST. Lucia	68.3	29.29	.42
Dominica	27.09	12.63	.47
St. Vincent and Grenadines	52.51	14.90	.28
Anguilla	32.36	11.35	.35
Monsterrat	16.05	3.97	.25
Average	42.28	13.24	.31

Table 1(c) Mean Reserve Holding and Variability in the ECCB Region (1990-1997)

Country	Mean Imputed Reserves in $ECM	Standard Deviation	Coefficient of Variation
Antigua and Barbuda	118.83	26.32	.22
Grenada	79.23	24.00	.30
St. Kitts and Nevis	75.61	20.89	.28
St. Lucia	150.78	18.39	.12
Dominica	55.71	12.58	.23
St. Vincent and Grenadines	78.08	8.27	.11
Anguilla	29.25	8.83	.30
Monsterrat	22.1	5.02	.23
Average	76.19	15.54	.20

Table 2(a) Coverage With and Without Pooling in the ECCB Region (1984-1997)

Country	Coverage no Pool	Coverage 20% Pool	Coverage 50% Pool	Coverage 70% Pool	Coverage 100% Pool
Antigua and Barbuda	3.39	2.88	2.8	2.8	3.2
Grenada	2.83	2.93	2.7	2.82	3.2
St. Kitts and Nevis	1.84	2.59	2.79	2.77	3.2
St. Lucia	2.42	2.73	2.74	2.81	3.2
Dominica	2.28	2.85	2.79	2.52	3.2
St. Vincent and Grenadines	3.9	3.1	2.9	2.95	3.2
Anguilla	2.67	3.29	3.4	3.20	3.2
Monsterrat	1.36	2.9	2.9	2.79	3.2

Table 2(b) Coverage with and without pooling in the ECCB region (1984-1989)

Country	Coverage no Pool	Coverage 20% Pool	Coverage 50% Pool	Coverage 70% Pool	Coverage 100% Pool
Antigua and Barbuda	3.89	3.6	3.68	3.46	3.45
Grenada	6.66	4.56	3.85	3.57	3.45
St. Kitts and Nevis	2.79	3.35	3.54	3.41	3.45
St. Lucia	2.33	2.26	3.31	3.3	3.45
Dominica	2.14	3.19	3.34	3.39	3.45
St. Vincent and Grenadines	3.52	3.6	3.51	3.54	3.45
Anguilla	2.85	3.57	5.24	5.26	3.45
Monsterrat	4.04	2.73	3.47	3.44	3.45

Table 2(c) Coverage With and Without Pooling in the ECCB Region (1990-1997)

Country	Coverage no Pool	Coverage 20% Pool	Coverage 50 % Pool	Coverage 70% Pool	Coverage 100% Pool
Antigua and Barbuda	4.51	5.49	5.29	5.44	5.27
Grenada	3.3	4.51	5.14	4.85	5.27
St. Kitts and Nevis	3.62	4.78	5.6	5.39	5.27
St. Lucia	8.19	6.8	5.96	5.84	5.27
Dominica	4.43	5.55	5.61	5.5	5.27
St. Vincent	9.44	6.45	5.77	5.55	5.27
Anguilla	3.31	5.15	5.49	5.25	5.27
Monsterrat	4.4	4.99	5.74	5.48	5.27

Table 3(a) Reserve Gains and Losses Under Pooling in the ECCB Region (1984-1997)

Country	Actual Reserves in m $EC	Hypothetical Reserves in m $EC	Gain/Loss m $EC	As a % of Actual Reserves
Antigua and Barbuda	95.33	81.07	-14.26	-14.95
Grenada	66.98	69.27	2.29	3.4
St. Kitts and Nevis	56.17	78.74	22.57	40.18
St. Lucia	115.44	130.03	14.59	12.63
Dominica	43.44	54.26	10.82	24.91
St. Vincent and Grenadines	67.13	53.35	-13.78	-20.52
Anguilla	28.27	34.81	6.54	23.13
Monsterrat	19.51	41.38	21.87	112.09

Table 3(b) Reserve Gains and Losses Under Pooling in the ECCB Region (1984-1989)

Country	Actual Reserves in m $EC	Hypothetical Reserves in m $EC	Gain/Loss m $EC	As a % of Actual Reserves
Antigua and Barbuda	64.00	59.18	-4.82	-7.53
Grenada	50.65	34.66	-16.00	-31.59
St. Kitts and Nevis	27.27	32.72	5.47	20.05
St. Lucia	68.30	66.20	-2.1	-3.07
Dominica	27.09	39.66	12.57	
St. Vincent and Grenadines	52.51	53.64	1.13	2.15
Anguilla	32.36	40.52	8.16	25.21
Monsterrat	16.05	10.84	-5.21	-32.46

Table 3(c) Reserve Gains and Losses Under Pooling in the ECCB Region (1990-1997)

Country	Actual Reserves in $ECM	Hypothetical Reserves in $ECM	Gain/Loss m $ECM	As a % of Actual Reserves
Antigua and Barbuda	118.83	144.50	25.67	21.60
Grenada	79.23	108.24	29.01	36.61
St. Kitts and Nevis	75.61	99.85	24.24	32.06
St. Lucia	150.78	125.05	-25.73	-17.06
Dominica	55.71	69.82	14.11	25.32
St. Vincent and Grenadines	78.08	53.34	-24.74	-31.69
Anguilla	29.25	45.47	16.22	55.45
Monsterrat	22.10	25.05	2.95	13.35

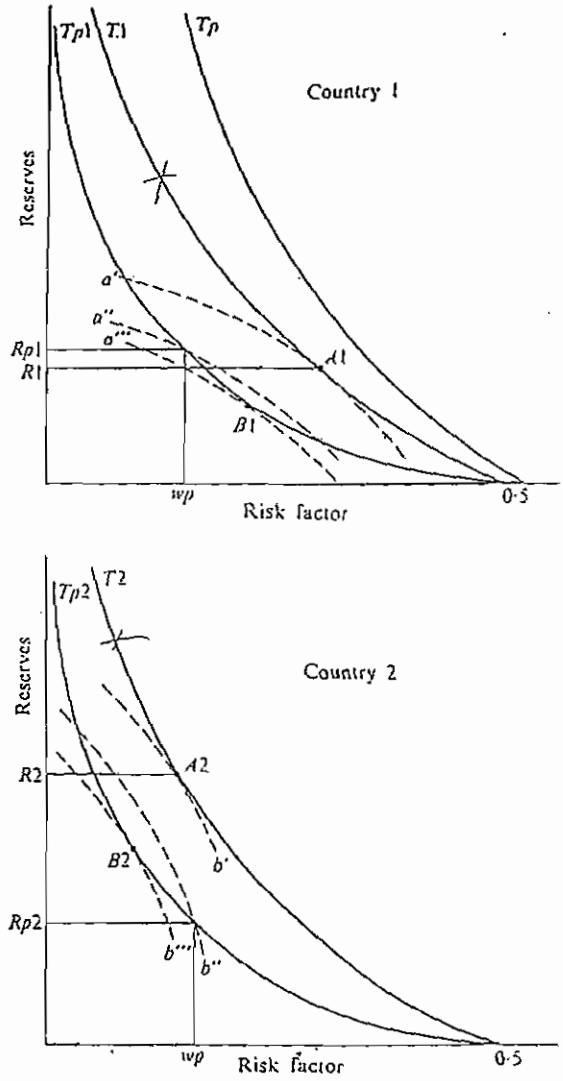

FIG. 1. The trade-off between reserve holdings and the risk factor.