International Risk-Sharing and Currency Unions: The CFA Zones

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Abstract

This paper explores income and consumption smoothing patterns among the member countries of each of the CFA zones—the CEMAC[2] and the WAEMU[3]—during the period 1980–2000. I find that for the CEMAC, only about 15 percent of shocks to GDP are smoothed through the standard channels (that is, capital market, credit market, and remittances). On the other hand, I find that 44 percent of shocks are smoothed via foreign aid from France, and 5 percent via central bank contributions, while reserves pooling provides no shock smoothing. For the WAEMU, I find that only 13 percent of shocks are smoothed through the standard channels, while 63 percent are smoothed via foreign aid from France, 7 percent via central bank contributions, and no smoothing via reserves pooling. The paper proposes policy recommendations to alleviate this insufficient degree of risk-sharing.

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[2] CEMAC stands for African Economic and Monetary Community.

[3] WAEMU stands for West African Economic and Monetary Union.

I. INTRODUCTION

It is usually claimed that mechanisms for achieving income insurance and consumption smoothing (or shock smoothing) are essential for the stability of a currency union. Without such mechanisms, countries in recession will have an incentive to leave the union. Central fiscal institutions can provide cross-country income insurance via a tax-transfer system and by allocating grants to governments in specific countries. Sala-i-Martin and Sachs (1992) were the first to stress this point, later amplified by Eichengreen (1993), Obstfeld and Rogoff (1996), and Sorensen and Yosha (1998). Market institutions can also provide risk-sharing. For example, members of a union can share risk via cross-ownership of productive assets, facilitated by a developed capital market, and may smooth their consumption by adjusting the composition and size of their asset portfolio in response to shocks (Sorensen and Yosha, 1998).

The central question of this study is to investigate the extent to which such mechanisms contribute to the stability of the CFA zones in Africa.[4] The CFA zones have had one of the longest experiences with a fixed exchange rate for a convertible currency and with regional

[4]There are two CFA zones with two different central banks, but both issue the same currency, the CFA franc. One, known as the West African Economic and Monetary Union (WAEMU), is in West Africa and includes Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. The other, known as the Central African Economic and Monetary Community (CEMAC), is in Central Africa and includes Cameroon, the Central African Republic, Chad, the Republic of Congo, Equatorial Guinea, and Gabon. All but one of the West African CFA countries are former French colonies. The same is true for the Central African CFA countries. The CFA is defined as Communauté Financière d'Afrique in the WAEMU, and as Coopération Financière en Afrique centrale in the CEMAC. Notice that like the CFA franc, Comoros issues its own Comorian franc, which is also pegged to the euro but the rate is different.

integration, including both common currency areas and preferential regional trade arrangements, of any group of developing countries. Since their establishment in the aftermath of World War II, the franc zones have survived decolonization, the collapse of the Bretton Woods exchange rate system, debt crises, and the end of the cold war. While many reasons might justify the sustainability of the zones, in this paper, I simply investigate to which degree cross-country risk-sharing within each of the two CFA zones might have contributed to this sustainability. The analysis helps identify the different channels of risk-sharing and quantify to what extent each of them contributes to the stability of the zones.

Some studies address the issue of risk-sharing among industrial countries. For example, Asdrubali, Sorensen, and Yosha (1996) study risk-sharing among U.S. states. Sorensen and Yosha (1998) analyze risk-sharing among OECD countries and among European Union members, and question the optimality of EMU arrangements. Obstfeld (1994a) tests the hypothesis of full risk-sharing among nine member countries of the Organization for Economic Cooperation and Development (OECD). However, I am unaware of any study that analyzes cross-country risk-sharing among developing countries, especially the CFA zone country members. My aim in this paper is to fill this gap in the literature. Thus, this paper investigates the pattern of cross-country risk-sharing within the CFA zones.

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My hope is that studying the CFA zones' unusual, but durable, institutional features will provide some lessons about the implementation of a common currency for other developing

countries, especially for the African Union, which aspires to the adoption of a single continental currency for Africa.

The paper applies shock smoothing techniques. In particular, I quantify the extent to which the mechanisms mentioned earlier help to achieve risk-sharing, that is, income insurance and consumption smoothing (or shock smoothing, for short) in the case of the CFA zones. I find that the proportion of shocks smoothed through the conventional channels mentioned above is quite small. Overall, in the CFA zones, less than 15 percent of shocks are smoothed through the conventional channels (that is, capital markets, credit markets, and remittances combined).

I then shift to analyzing shock smoothing via the pooling of foreign reserves by the two common central banks, and shock smoothing achieved through the contributions of the common central banks to the country members. In addition, I quantify the extent of shock smoothing through compensation from France, which is a strong partner for the sustainability of the zones.

Pooling of official reserves may be beneficial for the member countries because an adequate level of reserves held individually by each country would require a higher level of aggregate reserves than if the union as a whole were to continue to pool reserves, given that the inter-country correlation between shocks is less than perfect. The difference between an adequate level of reserves that would be held individually and the actual level of reserves for each country, given the pooling of reserves, provides additional resources that can contribute to consumption smoothing. In order to quantify the shocks smoothed via reserve pooling, I first

estimate the optimal level of reserve holdings in the CFA zones. I find that the size of international transactions represented by real GDP and the adjustment costs proxied by the average propensity to import, which have been key determinants of reserve holdings in other developing countries, especially in East Asia, are also key determinants in the CFA zones. Given the optimal level of reserve holdings, I compute the discrepancy between this level and the observed level of reserves to assess the proportion of shocks smoothed by this difference. I find that reserve pooling provides no shock smoothing for the CFA zones.

With regard to the central bank contributions, I find that they provide reasonable shock smoothing. For example, over the period 1980–2000, BCEAO[5] contributions smoothed about 7 percent of shocks while, BEAC[6] contributions smoothed about 5 percent of shocks.

The analysis in this paper reveals that shock smoothing via France's contributions is quite substantial. I find that about 63 percent of shocks are smoothed via France's contributions in the West African CFA zone, and 44 percent of shocks are smoothed via the same channel in the Central African CFA zone over the period 1980–2000. The findings in this paper suggest that capital and credit markets are not well integrated in either of the two CFA zones. Thus, there is a clear need for the CFA zone member countries to deepen regional capital and credit markets. I argue that creating public venture capital at a regional level might help promote

[5] BCEAO, which stands for the Central Bank of West African States, is the central bank for the West African CFA zone.

[6] BEAC, which stands for the Bank of Central African States, is the central bank for the Central African CFA zone.

free capital flows within each zone and alleviate the apparently insufficient degree of risk-sharing observed through the standard channels.

The paper is organized as follows. The next section presents the theoretical background underpinning the analysis in this paper. Section III describes the data and empirical techniques. Section IV presents the results and discussion. Finally, Section V concludes.

II. THEORETICAL BACKGROUND

The exercise in this paper is to estimate the proportion of output shocks absorbed by different channels (the standard ones and those specific to the CFA arrangements) and identify the channels which appear to be the most important. In order to have a better understanding of how the amount of risk-sharing or of shocks absorbed can be measured, this section proposes a simple risk-sharing model and a conceptual framework for measuring the different channels of risk-sharing. The model and conceptual framework follow Asdrubali, Sorensen, and Yosha (1996), and Sorensen and Yosha (1998).

A. A Simple Model

This simple model highlights the key equation that governs risk-sharing among countries. Suppose that the world consists of two countries, a home country (*H*) and a foreign country (*F*). Let us think of the gross domestic product (*GDP*) as being a tradable good. The period per capita output is an exogenous random variable with a commonly known probability distribution. I assume that the representative consumer in home and foreign countries is risk averse and maximizes the expected utility. The focus here is on risk-sharing between

countries and not within a country. Therefore, consumers within each country are assumed to be identical in the sense that they have the same utility function, the same stochastic endowment, and are subject to the same realization of uncertainty.

Assuming that asset markets are complete, the home country faces a single budget constraint in period zero and chooses a consumption plan by solving the following maximization problem:

$$\begin{aligned} &\max_{\{c_{x_t}^H\}} \int_0^\infty e^{-\delta t} \sum_{x_t} \sigma_{x_t} u\left(c_{x_t}^H\right) dt \\ &s.t. \int_0^\infty \sum_{x_t} p_{x_t} c_{x_t}^H dt \le \int_0^\infty \sum_{x_t} p_{x_t} GDP_{x_t}^H dt \end{aligned} \tag{1}$$

where $GDP_{x_t}^H$ and $c_{x_t}^H$ are the per capita output and consumption in state of nature x_t that occurs with probability σ_{x_t}, and P_{x_t} is the price in period zero of a period t state $\left(x_t\right)$ contingent unit of consumption. The discount factor is assumed to be common to all consumers and denoted by $\delta \in (0,1)$. The foreign country also solves a similar maximization problem. Prices are normalized in the following sense:

$$\int_0^\infty \sum_{x_t} p_{x_t} dt = 1. \tag{2}$$

Consequently, assuming that endowments are bounded makes the integral in the budget constraint well-defined.

Denoting the home country's Lagrange multiplier by μ^H, the first-order conditions with respect to consumption and μ^H can be written as follows:

$$\begin{aligned} e^{-\delta t}\sigma_{x_t}u'\left(c^H_{x_t}\right) &= \mu^H P_{x_t} \\ \int_0^\infty \sum_{x_t} p_{x_t} GDP^H_{x_t} dt &= \int_0^\infty \sum_{x_t} p_{x_t} c^H_{x_t} dt \end{aligned} \tag{3}$$

Let us denote the population of the home country by n^H, and the foreign country population by n^F. The market-clearing condition for any state of the nature x_t can be expressed as follows:

$$n^H c^H_{x_t} + n^F c^F_{x_t} = n^H GDP^H_{x_t} + n^F GDP^F_{x_t}. \tag{4}$$

Let us consider a CRRA utility function.[7] More precisely, consider the following utility:

$$u(c) = \frac{c^{1-\gamma}}{1-\gamma}. \tag{5}$$

Then $u'(c) = 1/c^\gamma$, and making use of equations (2), (3) and (4), one can derive an expression for the price of a state contingent security as follows:

[7] CRRA stands for constant relative risk aversion.

$$p_{x_t} = \frac{1}{\int_0^{\infty} e^{-\delta t} \sum_{x_t} \frac{\sigma_{x_t}}{n^H (c_{x_t}^H)^{\gamma} + n^F (c_{x_t}^F)^{\gamma}} dt} e^{-\delta t} \frac{\sigma_{x_t}}{n^H (c_{x_t}^H)^{\gamma} + n^F (c_{x_t}^F)^{\gamma}} . \quad (6)$$

Noticing that $\sum_{x_t} \sigma_{x_t} = 1$ and $\int_0^{\infty} e^{-\delta t} dt = 1/\delta,$ one can eliminate p_{x_t} using equations (2) and (6). In addition, using the market-clearing condition (4) and noticing that the world is a closed economy and consumes all its GDP, one can denote the world consumption by $c_{x_t}^W = (n^H GDP_{x_t}^H + n^F GDP_{x_t}^F)/(n^H + n^F)$ and get

$$c_{x_t}^H = k^H c_{x_t}^W , \quad (7)$$

where k^H is a constant which is specific for the home country. A similar equation can be derived for the foreign country, that is:

$$c_{x_t}^F = k^F c_{x_t}^W . \quad (8)$$

Equation (7) or (8) is fundamental, as will become clear below, and governs the dynamics of risk-sharing among countries.

Notice that the constant *k* does not depend either on time or the state of the world; *k* is simply country specific and only reflects each country's power in the risk-sharing arrangement. Therefore, from equation (7) or (8), one learns that the consumption of a country is the same fraction of world output in all periods and all states of the world. In other words, equation

(7) or (8) shows that risk is fully shared among countries if the consumption of each country co-moves with world consumption, but does not co-move with the country-specific shocks.

Using the limit case that is the logarithmic utility, one derives a closed-form solution for k^H. To this end, making use of the budget constraint—which binds at an optimum—and of equations (2) and (3), one can solve for k^H, that is

$$k^H = \delta \int_0^{\infty} e^{-\delta t} \sum_{x_t} \sigma_{x_t} \frac{n^H GDP_{x_t}^H}{n^H GDP_{x_t}^H + n^F GDP_{x_t}^F} dt . \tag{9}$$

One notices from equation (9) that the share of home-country consumption in world consumption is the discounted expected share of its future output in the world. Notice that full risk-sharing implies perfect consumption smoothing in the sense that standard intertemporal Euler equations can be derived from the full risk-sharing conditions, namely (7) or (8). But the reverse is not necessary true. As a matter of fact, Sorensen and Yosha (1998) noted that if asset markets are complete, there is full risk-sharing and perfect consumption smoothing. However, if asset markets are not complete, full risk-sharing will typically not be satisfied, but perfect consumption smoothing may still hold.

Taking the logarithms and the time differences of equation (7), the constant will disappear and one can get

$$\Delta \log c_{x_t}^H = \Delta \log(n^H GDP_{x_t}^H + n^F GDP_{x_t}^F) . \tag{10}$$

An important empirical implication of equation (7) is that under full risk-sharing, the consumption of an economic agent (a country here) is not sensitive to the agent's idiosyncratic shocks, in particular, income shocks. A number of studies have tested this proposition. For instance, Cochrane (1991), Mace (1991), Townsend (1994), and Hayashi and others (1996), using micro-data, test the hypothesis of full risk-sharing within a country. The bulk of these studies reject the hypothesis of full risk-sharing [(Cochrane (1991), Townsend (1994), and Hayashi and others (1996)]. Obstfeld (1994a), using macro-data, tests the hypothesis of full risk among nine OECD member countries by performing for each country i the time-series regression of $\Delta \log c_t^i$ on $\Delta \log c_t^W$ and expecting an estimated coefficient of unity in accordance with equation (10). While most of his coefficients are positive, they are less than unity, rejecting the hypothesis of full risk-sharing.

Asdrubali and others (1996) and Sorensen and Yosha (1998) reorient this literature from simply testing full risk-sharing to quantifying the extent to which risk is shared within a group of economic agents (countries in this case). As they rightly point out, even if full risk-sharing is rejected, it is interesting to identify the exact channels through which risk is shared and to quantify the amount of risk-sharing obtained via each channel. They develop a framework where the amount of risk shared through different channels can be estimated. This paper follows their path by taking equation (7) or (8) as a benchmark, quantifies the deviation from this benchmark, and interprets it as the amount of risk that is not shared. I now turn to the method of measuring the deviation from full risk-sharing.

B. Decomposition of the Cross-Sectional Variance of GDP

Before turning to the decomposition *per se,* I first elaborate on the potential channels of income insurance and consumption smoothing. Risk-sharing among countries can be achieved through a number of channels. Citizens or the government of a country can own claims on productive assets in other countries and the income earned on these assets can help smooth consumption in the presence of an idiosyncratic shock in that country. In other words, income in that country will co-move with output in other countries. This capital income coming from the country's ownership abroad as well as the labor income of residents working abroad explain the discrepancy between the country's *GDP* and its *GNP*. Thus, net factor income from abroad may contribute to income insurance and consumption smoothing. If full risk-sharing is satisfied at this level, then GNP will satisfy equation (7).

International transfers may also help a country absorb a negative shock and smooth consumption. These transfers are responsible for the discrepancy between a country's national income (*NI*) and its disposable national income (*DNI*). For a currency union, pooling reserves can also provide consumption smoothing for its country members. This is because some countries in the union may no longer need to hold as many reserves if they were to have their own central bank, and the reserve differences can be used to smooth consumption. This is particularly relevant for the two CFA zones, which each have a common central bank. There are other channels of consumption smoothing which are particularly relevant for the CFA zones, and I will elaborate on them below. For now, I wish to turn to the conceptual framework which helps clarify the quantification of the fraction of shock absorbed at different levels.

In order to estimate the amount of output shock absorbed or smoothed at different levels, I follow Asdrubali and others (1996) and Sorensen and Yosha (1998), and decompose the cross-sectional variance of *GDP*. For conciseness, the decomposition will follow the standard identities in the national accounts. I will later infer how to estimate the amount of risk shared through other channels. Consider the following accounting identities: $GNP = GDP + \text{net}$ factor income from abroad, $NI = GNP - \text{capital}$ depreciation, $DNI = NI + \text{international transfers}$, $C + G = DNI - \text{net saving}$, C and G stand for private and public consumption, respectively. Based on these identities, one can consider the following identity for a given country i: $GDP^i = \frac{GDP^i}{GNP^i}\frac{GNP^i}{NI^i}\frac{NI^i}{DNI^i}\frac{DNI^i}{C^i+G^i}\left(C^i + G^i\right)$, where all the magnitudes are in per capita terms.

If there is shock smoothing through net factor income flows, then $\frac{GDP^i}{GNP^i}$ should vary positively with GDP^i. By the same token, if depreciation of capital further contributes to income insurance, then $\frac{GNP^i}{NI^i}$ should positively vary with GDP^i.

Taking the logs and difference, multiplying both sides of the identity by $\Delta \log GDP^i$ (minus its mean), and taking the cross-sectional average lead to the following variance decomposition:

$$
\begin{aligned}
var\left[\Delta \log GDP^i\right] = cov\left[\Delta \log GDP^i, \Delta \log GDP^i - \Delta \log GNP^i\right] \\
+cov\left[\Delta \log GDP^i, \Delta \log GNP^i - \Delta \log NI^i\right] \\
+cov\left[\Delta \log GDP^i, \Delta \log NI^i - \Delta \log DNI^i\right] \\
+cov\left[\Delta \log GDP^i, \Delta \log DNI^i - \Delta \log\left(C^i + G^i\right)\right] \\
+cov\left[\Delta \log GDP^i, \Delta \log\left(C^i + G^i\right)\right]
\end{aligned}
\tag{11}
$$

Dividing by $var\left[\Delta \log GDP^i\right]$, one gets $1 = \beta_f + \beta_d + \beta_\tau + \beta_s + \beta_u$, where β_f is the ordinary least squares estimate of the slope in the cross-sectional regression of $\Delta \log GDP^i - \Delta \log GNP^i$ on $\Delta \log GDP^i$, β_d is the slope of the regression of $\Delta \log GNP^i - \Delta \log NI^i$ on $\Delta \log GDP^i$, and similarly for β_τ and β_s. β_u is the slope of the regression of $\Delta \log\left(C^i + G^i\right)$ on $\Delta \log GDP^i$. Following Asdrubali and others (1996) and Sorensen and Yosha (1998), the β coefficients will be interpreted as the proportion of smoothing achieved at each level, and β_u is the percentage of shocks not smoothed. Though the β coefficients theoretically sum to1, I do not impose any constraint on any of the β coefficients at any level, to be positive or less than 1. Therefore, if there is dis-smoothing at some level, it will be reflected in a negative value of β.

The empirical strategy just described results in the following regressions:

$$
\begin{aligned}
\Delta \log GDP^i - \Delta \log GNP^i &= \upsilon_{f,t} + \beta_f \Delta \log GDP^i + \varepsilon^i_{f,t} \\
\Delta \log GNP^i - \Delta \log NI^i &= \upsilon_{d,t} + \beta_d \Delta \log GDP^i + \varepsilon^i_{d,t} \\
\Delta \log NI^i - \Delta \log DNI^i &= \upsilon_{\tau,t} + \beta_\tau \Delta \log GDP^i + \varepsilon^i_{\tau,t} \\
\Delta \log DNI^i - \Delta \log \left(C^i + G^i \right) &= \upsilon_{s,t} + \beta_s \Delta \log GDP^i + \varepsilon^i_{s,t} \\
\Delta \log (C^i + G^i) &= \upsilon_{u,t} + \beta_{u,t} \Delta \log GDP^i + \varepsilon^i_{u,t}
\end{aligned}
\tag{12}
$$

Where $\upsilon_{.,t}$ are time fixed effects.

As it will become clear below, income insurance and consumption smoothing through these standards channels are not substantial for the CFA countries. Hence one needs to explore other channels of consumption smoothing which are specific to the CFA zones.

Risk-Sharing Through CFA-Zone Institutions

Beyond the standard channels of risk-sharing mentioned above, a number of arrangements provide additional risk sharing to the CFA zones. As will become clear in the results section, some of them are substantial. For example, each of the two zones has a common central bank and the member countries in each zone pool their reserves. Pooling of official reserves may be beneficial for the member countries because it can provide additional resources that can contribute to consumption smoothing as I explained earlier. In order to assess the portion of reserves that contributes to consumption smoothing, one first needs to estimate the adequate or optimal level of reserves that countries should hold individually. The literature on reserve holdings points to a number of determinants of the optimal level of reserve to hold. [8] They

[8] See for instance Aizenman and Marion (2002) and Edwards (1984)

include the size of international transactions, which is generally represented by real GDP, real GDP per capita, or population, the volatility of international receipts and payments, and adjustment costs. The volatility of international receipts and payments is usually measured by the standard deviation of the trend-adjusted changes in reserves over some previous period. The adjustment costs can be proxied by the marginal propensity or the average propensity to import. Notice that the propensity to import can also be interpreted to measure the economy's openness and vulnerability to external shocks. Some studies (e.g., Disyatat and Mathieson, 2001) include the volatility of the exchange rate as a determinant of reserve holding. Given that the CFA franc has been devalued only once since its inception in 1948, the volatility of the exchange rate may not be that important here.

To estimate the optimal level of reserves, I regress the observed level of official reserves on the variables mentioned above. The estimates of this regression are used to compute the optimal level of reserves. The benefit of reserve pooling is computed as the difference between the optimal level of reserves and the observed level of reserves. A positive value of this difference for a country suggests that in a pooling environment, the country holds less reserves than it would have held individually. This reserve difference can be used in other sectors for consumption smoothing. It is important to quantify the amount of risk-sharing through this channel to see whether it is substantial or not in the CFA context. To this end, let us denote the reserve pooling benefit by *RPB*. Following, the conceptual framework developed above, the amount of risk sharing from pooling reserves can be measured by the slope of the following regression:

$$\Delta \log GNP^i - \Delta \log\left(GNP^i + RPB^i\right) = \upsilon_{rpb,t} + \beta_{rpb}\Delta \log GDP^i + \varepsilon^i_{rpb,t}\,. \qquad (13)$$

Beyond the risk sharing coming from reserve pooling, the two central banks in the CFA zones also provide a special contribution to their country members in case of negative shocks.[9] I also estimate the amount of risk-sharing through this channel to see how this contributes to the sustainability of the zones. Denoting this contribution by *CBF* (central bank fund), the amount of risk sharing through this channel is given by the slope of the following regression:

$$\Delta \log GNP^i - \Delta \log\left(GNP^i + CBF^i\right) = \upsilon_{cbf,t} + \beta_{cbf}\Delta \log GDP^i + \varepsilon^i_{cbf,t}\,. \qquad (14)$$

Finally another risk-sharing channel, specific to the CFA arrangements, is the backing from France through aid. Indeed, historical analysis of past examples of formal currency unions among sovereign states reveals that one of the key characteristics that stands out as crucial to the fate of monetary unions is the presence or absence of a powerful state—a hegemon—willing and able to use its influence to push for and keep the arrangement functioning effectively in terms agreeable to all.[10] France, the anchor for the CFA zones, has played this role for the CFA zones since inception. It has provided substantial amounts of aid and technical assistance to the CFA member countries. Even though aid is not explicitly part of the arrangements, empirical evidence suggests that when the zone is hit by a negative terms

[9] Notice that these contributions were recently (2001) suppressed in WAEMU. Plans for such a move in CEMAC have stalled.

[10] For details, see Cohen (1993) and (2003).

of trade shock, France increases its financial support, thereby acting as a shock absorber**.** For example, over 1986-93, when the zone was experiencing high negative terms of trade shocks and was running high fiscal deficits of about 6 percent of GDP**,** France intervened and provided substantial non-project aid, especially budgetary support, which amounted to about 44 percent of total bilateral aid.[11] This reveals that France has often contributed to smoothing unexpected shocks by spontaneously intervening through non-project aid**.**

Thus**,** measuring the proportion of shocks absorbed in the CFA zones through France's aid might be important in accessing to which degree France's backing is useful. Denoting the aid from France by $AIDF$, the amount of risk sharing through France's backing is the slope of the following regression:

$$\Delta \log GNP^i - \Delta \log\left(GNP^i + AIDF^i\right) = \upsilon_{aidf,t} + \beta_{aidf}\Delta \log GDP^i + \varepsilon^i_{aidf,t}. \qquad (15)$$

I now turn to the data description and estimation technique.

III. DATA DESCRIPTION, SOURCES, AND ESTIMATION TECHNIQUE

Data on national account variables (*GDP, GNP, DNI, C,* and *G*) are extracted from the World Bank's *World Development Indicators* (*WDI*) database. I form a panel of countries with yearly data on these variables from 1980 to 2000. Because of missing data, in some cases

[11] Terms of trade shocks is defined as (trade/GDP)*(change in terms of trade). The cumulative deterioration in terms of trade over that period is estimated to around 40 percent (see Hadjimichael and Galy, 1997).

shorter periods are used. All data are in per capita terms and expressed in 1995 U.S. dollars. Data on national income—which is defined as *GNP – depreciation* —are not available because data on capital depreciation are not available for the CFA-zone countries. Consequently, I could not isolate the dis-smoothing that results from capital depreciation.

For the reserve regression, data on real GDP and real imports are from the *WDI* database. I compute the average propensity to import as the ratio of imports to GDP. Data on actual reserve holdings are denominated in U.S. dollars and have been deflated by the U.S. GDP deflator. Since developing countries have minimal gold holdings, their international reserves are measured as reserves minus gold. They usually include the reserve position in the IMF and special drawing rights. Data on reserves are from *WDI.* For the volatility of international receipts and payments, which is a determinant in the reserve regression, I follow Aizenman and Marion (2002) and use the volatility of real export receipts. The export data come from *WDI.* These data also cover the period 1980–2000. The two CFA-zone central bank contribution data come from the statistics compiled by the Banque de France and cover the period 1983–2000. Finally, data on France's aid are extracted from the OECD database and cover the period 1980–2000.

For the estimation I perform time-fixed effect regressions in order to control for eventual year-specific impacts on output growth rates. A typical coefficient of the time fixed effect regression is $\beta_y = \sum_t \sum_i \left(GDP_t^i - \overline{GDP_t}\right) y_t^i \Big/ \sum_t \sum_i \left(GDP_t^i - \overline{GDP_t}\right)^2$ where y is a left-hand-side variable, and $\overline{GDP_t}$ is the average *GDP* across countries in period *t*. In the cross-sectional

regression for period t, $\beta_{y,t} = \sum_i \left(GDP_t^i - \overline{GDP_t}\right) y_t^i \Big/ \sum_i \left(GDP_t^i - \overline{GDP_t}\right)^2$. Hence β_y is a weighted average of the $\beta_{y,t}$ coefficients with weights $\beta_{y,t} = \sum_i \left(GDP_t^i - \overline{GDP_t}\right)^2 \Big/ \sum_t \sum_i \left(GDP_t^i - \overline{GDP_t}\right)^2$. Thus, the least squares estimator gives higher weight to years with larger cross-sectional variation in the regressor as they provide more information about risk sharing. To take into account autocorrelation in the residuals, I assume that the error terms in each equation and in each country follow an $AR(1)$ process that is $\varepsilon_t^i = \rho \varepsilon_{t-1}^i + \mu_t^i$. Since the sample is relatively short, I assume that the autocorrelation parameter is identical across countries and equations. In fact, I use a two-step Generalized Least Squares (GLS) procedure to estimate the regressions in equations (12), (13), (14), and (15). This implicitly allows for country-specific variances of the error terms. I use differentiated data at the yearly frequency.

IV. Results and Discussion

A. Empirical Results and Analysis

I begin by presenting the estimates of the fraction of shocks to GDP absorbed at various levels of the standard smoothing channels for the CEMAC and the WAEMU. Tables 1a and 1b present these results. I analyze and compare the results of the two zones. As will become clear below, the shocks absorbed at these standard levels are not substantial. I then shift and present the estimates of the fraction of shocks absorbed through the CFA-specific institutions. The results are very revealing. I conclude this section by discussing these results.

Note that the standard channels refer to the capital markets (factor income), the credit markets (savings), and transfers from abroad. Before going further, also notice that for transfers, I use current transfers which consist of income transfers that carry no provisions for repayment between residents of the reporting country and the rest of the world. They are mainly remittances and exclude official development assistance (ODA) or grants from donors. The impact of ODA and grants, especially from France, will receive special attention below. For risk sharing within each zone, it would be helpful to get data on transfers coming only from other countries of the zone. But at this time, there are no data specifying the direction or sources of these transfers for the CFA member countries. Only data on transfers coming from the rest of the world are available. Despite the use of these broader transfers/remittances, smoothing through this channel is not substantial. This might suggest that the smoothing from only within CFA-zone transfers would not be substantial either**.** Notice that data from the OECD database specify the direction and sources of ODA and grants; this allows me to isolate the impact of France's backing for the two zones. As a last note before discussing the results, notice that there are no data available on capital depreciation for the CFA-zone countries. As a consequence, I could not perform the second regression in equation (12) and quantify the dis-smoothing coming from capital depreciation. However, based on the relation that the coefficients sum to 1, one can speculate about this dis-smoothing.

I run all the risk-sharing regressions first for the entire time period, second for the period before the 1994 devaluation, and third for the post-devaluation period. The results are presented in Tables 1a and 1b. The results reveal that the fraction of shocks not absorbed by

the standards channels is higher for the period before devaluation than for the post-devaluation period. This reflects the positive impact that devaluation as an adjustment instrument may have. Analyzing Tables 1a and 1b, one notices that the shocks absorbed through the standard channels are not substantial. None of the estimates of the coefficients β_f, β_τ, β_s, is significant, and no structural inference concerning the amount of shocks absorbed through each channel can be drawn from them. However, the estimates of β_u capturing the fraction of shocks not smoothed through these standard channels is highly significant, suggesting that over the period 1980–2000, about 85 percent of shocks are not absorbed through the standard channels for the CEMAC and 87 percent for the WAEMU. In other words, through the standard channels all together, only about 15 percent of shocks are smoothed in the CEMAC and only about 13 percent of shocks are smoothed in the WAEMU. The focus on the period 1980-2000 is explained by the fact that in this case, the sample is much larger and hence more reliable than for the periods 1980-93 and 1993-2000. The only purpose in splitting the sample is to check whether the 1994 devaluation has some impact in terms of the pattern of shock smoothing.

In order to put these findings into perspective, I compare them to other unions, especially the United States and Europe, for which a similar study was done. In this regard, it is worth mentioning that risk sharing can occur in any economic or monetary union regardless of the income level or the nature of shocks faced by member countries. While for the CFA zones less than 15 percent of shocks are globally smoothed through the standard channels, for the United States 81 percent of shocks are smoothed through these same channels. Capital markets only smoothed about 48 percent of shocks in the United States over the period 1981-

90 (see Table 2, which is from Sorensen and Yosha, 1998, for more details). This is a clear indication that capital markets are well integrated in the United States, but less integrated in the CFA zones.

For Europe, Marinheiro (2005), using the same methodology as in Sorensen and Yosha (1998) also analyzes the degree of risk sharing via different channels in the euro zone. He finds that over the longer period 1970-99, 25 percent of shocks are smoothed via the capital markets, 21 percent via the credit markets, and observes a dis-smoothing of 2 percent via transfers. In other words, these channels combined provide 44 percent of shocks smoothing. The euro was introduced only in 1999, yet the pattern of risk sharing is by far better than that in the franc zone where the CFA franc has been in place for over half a century. The pattern of risk sharing over these standard channels is likely to become even better in the euro area as impressionistic evidence suggests that capital and credit markets are becoming more integrated in EMU after the introduction of the euro. Comparing this with the franc zone where only about 15 percent of shocks are smoothed via the standard channels combined together, suggests that the CFA franc zone has performed poorly in terms of risk sharing through the standard channels.

Since I could not account for the dis-smoothing coming from capital depreciation, the fractions of shocks smoothed through the different channels sum to about 109 percent for both the CEMAC and the WAEMU (see the first columns in Tables 1a and 1b). This suggests that the dis-smoothing coming from capital depreciation accounts for about 9

percent. This is consistent with Sorensen and Yosha (1998)'s finding that capital depreciation accounts for 9 percent of shocks dis-smoothing in OECD countries.

The findings above clearly show that very little risk is shared through the standard channels. Given the quasi-inexistence of the standard shock-smoothing mechanisms, it appears important to investigate other risk-sharing channels in the CFA zones, which have survived since the union's inception in 1948. The results concerning these other channels reveal, as will soon become clear, that the backing from France contributes substantially to the sustainability of the CFA arrangements. I now turn to present the results relative to these other channels of the CFA zones. In particular, the results of the regressions (13), (14), and (15) are presented and analyzed. But before presenting these results, I first discuss the results of the reserve-holding regression. The results are presented in Table 3.

It appears that the size of international transactions represented by real GDP and the adjustment costs proxied by the average propensity to import, which have been key determinants of reserve holding in other developing countries, especially in East Asia, are also key determinants in the CFA zones. These variables are highly significant. The volatility of international receipts and payments measured by export volatility is not significant.

Real GDP, which is a scaling variable here, enters, as one would expect, with a positive sign. The propensity to import can be reinterpreted as the economy's openness and vulnerability to external shocks. Hence, its positive sign suggests that the demand for reserves increases as the economy faces greater external vulnerability. Since higher export receipts volatility

means that reserves hit their lower bound more frequently, one would expect that the central bank should be willing to hold a larger stock of reserves in order to incur less frequently the cost of restocking. Consequently, one would expect volatility of exports to be significant. This might be the case for emerging market countries with more diverse sources through which to accumulate reserves. In particular, as exports become more volatile, they can use other sources such as capital inflows—through portfolio investment for example—to accumulate reserves. But for CFA countries, the key source of reserves accumulation is the export of some commodity products. Once this sector experiences some volatility, there is no other fundamental source though which to accumulate reserves. Consequently, in the presence of export volatility, though the central bank might be willing to hold a larger stock of reserves as conjectured above, it might not be able to do so. This suggests that export volatility may not have a clear impact in this case. This might explain the non-significance of the export volatility. Using these estimates, I compute the reserve pooling benefits (*RPB*) as described earlier. This is finally used in regression (13).[12]

The results of regressions (13), (14), and (15) are presented in Tables 4a and 4b for the CEMAC and the WAEMU. Analyzing Tables 4a and 4b, one notices that pooling reserves smoothes no shock in the CFA zones. In other words, pooling reserves provides no benefits in terms of risk sharing or shock smoothing for the CFA member countries. The estimates of β_{rpb} are equal to zero regardless of the period of estimation for the two zones, and are significant overall. Thus, pooling reserves is not a determinant for the sustainability of the

[12] Notice that whether I take into account the export estimate or not, the result I reach later that reserve pooling provides, no significant benefit in the CFA zones is not altered.

arrangements. Let us now analyze the results of the global contribution by the two central banks to each member economy. The two central banks, BCEAO and BEAC, contribute to shock smoothing by lending to an affected country 20 percent of its fiscal revenue for the preceding year at a very concessional rate. The results in Tables 4a and 4b reveal that these contributions do contribute to shock smoothing. The estimates of the coefficient β_{cbf} are found to be significantly different from zero, suggesting that central bank contributions consistently participate in shock smoothing in the CFA zones. For example, over the period 1980–2000, 7 percent of shocks are smoothed through BCEAO contributions in the WAEMU, and 5 percent of shocks are smoothed through BEAC contributions in the CEMAC. These results suggest that the central bank contributions contribute to the sustainability of the CFA zones.

I now turn to the contributions from France. The results in Tables 4a and 4b reveal that shock smoothing via France's contributions is quite substantial. In the CEMAC for example, over the period 1980–2000, 44 percent of shocks are smoothed through France's Official Development Assistance (ODA) or grants. In the WAEMU, 63 percent of shocks are smoothed through this same channel. These results are highly significant and suggest that the backing from France is a key factor contributing to the sustainability of the zones.

While these estimates may appear high, they can be justified, especially when one looks at the very weak economic performance of the zone in the 80s and early 90s with negative terms of trade shocks. Over these periods, aid from France to the zone was particularly higher. Figures 1a and 1b display the evolution of aid from France to CEMAC and WAEMU.

From the figures, it is easy to see that aid from France was higher in the 80s and early 90s, reaching its peak over 1990-94 for both CEMAC and WAEMU.

In order to corroborate this shock absorption role by France, I investigate the evolution of aid from France with respect to the dynamics of terms of trade. To do this, I compute the correlation between terms of trade shocks and aid from France over 1970-2004. For the consolidated franc zone (CEMAC and WAEMU), this correlation stands at -11 percent. The negative correlation clearly supports the claim that France is playing a crucial role of shock absorption. For the WAEMU, the correlation is -4 percent and still confirms France's absorption role. For the CEMAC, I find a positive correlation of 3 percent, which might, at first glance, suggest that the negative overall correlation is primarily driven by the WAEMU. However, after a careful analysis of data, I find that over 1980-1984, the CEMAC experienced a positive terms of trade shocks of 11.6 percent on average and at the same time there was a modest increase in France's aid of about 0.3 percent. If one isolates this particular period, the correlation becomes negative at 6 percent. Thus, overall there is a negative correlation between terms of trade shocks and France's aid. More likely, it is not an increase in France's aid that triggers negative shocks in the zone, rather the other way around. In other words, though these correlations appear low, their negative signs do suggest that in general, negative shocks in the zone seem to be accompanied by an increase in France's aid, highlighting the shock absorber role by France's aid.

For further evidence about the importance of aid to the zone, I compute aid from France per capita for all the independent nations receiving France's aid. I ranked them in order to assess

whether the Franc zone countries enjoy some privilege compared to other non-Franc zone countries. Table 5 presents the results. The evidence shows that out of 160 independent nations receiving aid from France, the CFA zone member countries are among the top twenty-six. The only exception is Guinea-Bissau, which ranks 31. This might be due to the fact that it joined the zone only in 1997. Over 1960-2004, for the CFA zone member countries (except Guinea-Bissau), the annual average aid per capita expressed in 2000 U.S. dollar varies from $91 (Gabon) to $10.5 (Mali). At the same time, France's annual average aid for the non-CFA group (except Seychelles, Mauritius, and Madagascar) varies from about $3 (Rwanda) to $0.1 (Nigeria). Clearly, the CFA zone member countries seem to enjoy some privilege compared to other France's aid recipients. Also, if one looks at the real flows of official development assistance (ODA) to CEMAC and WAEMU from major donors such as France, the European Union (France excluded), the United States, and Japan during 1960-2004, it is easy to see that overall ODA from France has been the most important, as shown in Figures 2a and 2b. Overall, aid from France seems to have been crucial for shock absorption and thus for the sustainability of the CFA arrangements.

B. Discussion

In this subsection, I try to confront the findings of this paper with reality—the results seem very plausible. I then propose some policy recommendations to address the apparently insufficient degree of risk sharing through the standard channels.

The pattern of risk sharing found in this paper for the CFA zones seems to be consistent with reality. For example, the capital markets in the CFA zones are weak and not well integrated.

For many years, there was no common stock exchange market in the WAEMU. Only recently (September 1998) has the Côte d'Ivoire stock exchange market been effectively extended to serve the entire WAEMU market. A closer look at this newly instituted common stock exchange market in the WAEMU reveals that out of 46 listed firms, only 3 are from Benin, 2 from Senegal, 1 from Burkina Faso, 1 from Mali, and 1 from Togo. Most of the firms listed are from Côte d'Ivoire.[13] This is an illustration of how capital markets are not well integrated in the WAEMU and that there is no substantial cross-border ownership in the zone. The situation in the CEMAC is not better. While the decision has been made to create a regional stock exchange market to serve the entire CEMAC zone, its implementation seems to be slow.

Concerning the credit market, there is no dynamic common credit market for the zones. In the first place, the saving rates are low in most of the CFA-member countries. Moreover, pension funds are usually invested in domestic claims, especially in real estate. For example, it is very difficult for investors in Mali to borrow from private banks in Benin. It is worth mentioning that the recent initiative taken by the WAEMU authorities to create a regional bank of solidarity, which will finance part of the private sector in the entire zone, is a move in the right direction. [14]

[13] More precisely, Côte d'Ivoire alone counts 37 listed firms, the last firm listed being the West African Development Bank known as BOAD.

[14] Part of the private sector that is denied credit in the existing credit market. The purpose of the new bank is to finance small and medium-size projects that could not otherwise get financing because they lack collateral. The credit ceiling of the bank is US$50,000.

The result concerning the net transfers, which in this case bowl down mainly to remittances net of transfers from home to abroad, seems puzzling as one would expect a more substantial role in smoothing shock by this channel. However, it might suggest that it is not clear that transfers from citizens abroad increase when there is a negative shock in the CFA zones. The result may also be due to bad quality data or unrecorded remittances. Unrecorded data are sometimes estimated at several multiples of recorded data, and this is serous problem in Africa. It is also worth mentioning that there is a growing number middle income families in Africa sending their children abroad to study without scholarships. These families often make transfers to abroad to support their children. These outflow transfers also contribute to lowering the net transfers from abroad, and thereby reducing their impacts in absorbing shocks. To summarize, income insurance and consumption smoothing through the standard channels are not substantial in the CFA zones.

This paper finds that pooling reserves does not significantly contribute to risk sharing in the CFA zone. While this finding might initially appear surprising, it confirms the assertion often made that CFA-zone countries hold more international reserves than needed. For example, the reserve cover ratio[15] for these countries amounted to an estimated 120 percent in WAEMU, while the requirement for this ratio is only a minimum of 20 percent. This obviously limits the expected benefits to them of reserves pooling in terms of risk sharing or shock smoothing. It is conceivable that this ratio could be "safely" reduced without undue pressure being put on the exchange rate, thereby freeing resources for enhanced consumption smoothing in the zone.

[15] Gross official reserves divided by short-term domestic liabilities.

The analysis in this paper clearly suggests that shock smoothing through the standard channels is not substantial. However, mechanisms for achieving income insurance and consumption smoothing—especially through the standard channels—are essential for the stability of a currency union. For example, in United States, Asdrubali, Sorensen and Yosha (1996) found that over the period 1981-90, 48 percent of shocks to gross state product are smoothed via capital markets, and 19 percent are smoothed via credit markets. For the period 1971-80, they found 34 percent for the capital markets and 45 percent for the credit markets, while these results for 1964-70 are, respectively, 27 and 37 percent. In the CFA zones, the shock smoothing through these two channels combined is less than 15 percent, as more than 85 percent of shocks are not smoothed through the standard channels. This calls for deepening the capital and credit markets in the CFA zones.

The deepening of capital markets requires dynamic stock exchange markets, which cannot be effective without the existence of a critical mass of enterprises capable and willing to be listed. To this end, this paper proposes the creation of *public venture capital*. Empirical and theoretical evidences suggest that asymmetric information results in a pool of entrepreneurial projects that are excluded from private funding. Thus, in a number of industrial countries, some government programs have been created for the purpose of encouraging the emergence of new businesses. For example, Vaillancourt (1997) documents that 44 percent of the stock of venture capital in Canada in 1994 was in the form of public funds.[16] The United States Small Business Administration also provides financing to start-up businesses. Similarly,

[16] Funds financed by the government or funds which benefit from tax incentives.

governments in the United Kingdom, France, Belgium, and the Netherlands also have in place programs for financial assistance for unemployed workers who start businesses.[17] Such programs are missing in the CFA zones. Authorities in the CEMAC and WAEMU should consider creating in each of their zones public venture capital at a regional level.

Public venture capital programs would provide both financial assistance and managerial advice in order to alleviate the credit constraints I mentioned earlier. In addition, they would enhance the ability of new enterprises to grow and meet the necessary standards to be listed in the stock exchange markets. The rationale of having such programs at a regional level lies in the fact that this would promote cross-border ownership, which is necessary for the capital markets to serve as mechanisms of cross-country risk sharing. The point is that creating regional stock exchange markets is not enough for risk sharing to take place. In an environment of market failure—especially imperfect credit markets—it is equally important that governments help with the emergence of new firms and regional multinational corporations, which could potentially be listed on the stock exchange markets. Clearly, governments in the CFA zones should not only provide more incentives for cross-border ownership, but also for labor mobility within each zone.

Finally, the creation of regional banks, where credits from different countries can be pooled, are badly needed. This would help promote free capital flows within each zone and alleviate the apparently insufficient degree of risk sharing observed through the standard channels.

[17] See Secrieru and Vigneault (2004) for a survey.

V. Conclusions

I have presented evidence that little risk sharing or shock smoothing is achieved through the standard channels—capital market, credit market, and remittances—in the CFA zones. Globally, these channels together smooth less than 15 percent of output shocks. A general picture that emerges from this analysis is that capital and credit markets are not well integrated in the CFA zones.

I further investigate other channels of shock smoothing specific to the CFA zones, namely benefits from reserve pooling, contributions from the central banks, and contributions from France. The analysis reveals that reserves pooling provides no shock smoothing in the CFA zones. I find that the contributions from the central bank in each zone smooth about 7 percent for the West African CFA zone and about 5 percent for the Central African CFA zone. Finally, I find that about 63 percent of shocks are smoothed via France's contributions in WAEMU and about 44 percent of shocks are smoothed via the same channel in the CEMAC.

In order to put the results in perspective, I compare them with the pattern of risk-sharing in the United States, and find that they are insufficient. I suggest that deepening capital and credit markets in the CFA zones would be helpful. In particular, I argue that creating public venture capital at a regional level might help promote free capital flows within each zone and alleviate the apparently insufficient degree of risk sharing observed through the standard channels.

Table 1a. Income and Consumption Smoothing by National Accounts Categories for the CEMAC
(In percent)

	1980–2000	1980–1993	1994–2000
Factor income	14	32	-8
	(0.95)	(1.56)	(-0.36)
Transfers	2	1	-1
	(0.56)	(0.23)	(-0.11)
Savings	8	-35	45
	(0.54)	(-1.39)	(1.09)
Not smoothed	85	91	78
	(9.05)	(7.61)	(7.08)

T-statistics in parentheses

Table 1b. Income and Consumption Smoothing by National Accounts Categories for the WAEMU
(In percent)

	1980–2000	1980–1993	1994–2000
Factor income	11	-1	7
	(0.83)	(-0.03)	(0.2)
Transfers	5	5	5
	(1.15)	(0.91)	(0.41)
Savings	6	-7	91
	(0.23)	(-0.23)	(1.04)
Not smoothed	87	93	75
	(10.53)	(8.04)	(8.17)

T-statistics in parentheses.

Table 2. Income and Consumption Smoothing Among EC and OECD

Countries and Among U.S. States
(In percent)

	OECD* 1981-90	EC6 1981-90	U.S. States 1981-90
Capital Markets	15	8	48
	(4)	(10)	(4)
Transfers	2	7	14
	(1)	(3)	(1)
Consumption Smoothing	26	3	19
	(5)	(11)	(9)
Not Smoothed	57	82	19
	(5)	(9)	(8)

Source: Sorensen and Yosha (1998).
Notes:
OECD*:Austria, Belgium, Denmark, Finland, France, Germany, Italy, Sweden, United Kingdom, United States, Japan, Australia, Canada.
EC6: Belgium, Denmark, France, Germany, Italy, United Kingdom.
The U.S. states column is from Asdrubali, Sorensen, and Yosha (1996).
T-statistics in parentheses.

Table 3. Reserves Regression for the CFA Zones

Dependent Variable: Log Real Reserves	
Real GDP	0.329
	(2.04)
Exports volatility	-0.117
	(-1.75)
Real imports	0.702
	(3.31)
Constant	8.897
	(2.55)
Number of observations	414
Number of countries	13
R –squared	0.12

Real GDP: Log GDP per capita (1995 US dollar).
Exports Volatility: Log Volatility of Exports of Goods and Services (1995 US dollar).
Real Imports: Log Imports of Goods and Services as share of GDP (1995 US dollar).
T-statistics in parentheses.

Table 4a. Income and Consumption Smoothing by CFA-Specific Institutions for the CEMAC
(In percent)

	1980–2000	1980–1993	1994–2000
Net ODA by France	44	19	71
	(2.66)	(0.96)	(1.11)
Grant by France	44	19	70
	(2.63)	(0.97)	(1.1)
Contribution by BEAC	5	8	2
	(2.61)	(2.99)	(0.6)
Reserves (pooling)	0	0	0
	(2.76)	(-0.44)	(3.85)

T-statistics in parentheses.

Table 4b. Income and Consumption Smoothing by CFA-Specific Institutions for WAEMU
(In percent)

	1980–2000	1980–1993	1994–2000
Net ODA by France	63	61	45
	(3.46)	(2.43)	(1.01)
Grant by France	63	61	45
	(3.43)	(2.44)	(0.99)
Contribution by BCEAO	7	5	7
	(4.41)	(2.87)	(2.67)
Reserves (pooling)	0	0	0
	(0.90)	(2.69)	(-1.34)

T-statistics in parentheses

Table 5 : Ranking of Annual Average Aid from France per capita, by Recipient
1960—2004 (in 2000 U.S. Dollar)

Djibouti	181.73
Seychelles	101.46
Vanuatu	99.18
Gabon	91.00
Comoros	49.34
São Tomé & Príncipe	45.14
Congo, Republic of	30.61
Algeria	29.59
Senegal	28.69
Central African Rep.	27.53
Equatorial Guinea	24.83
Mauritania	23.42
Mauritius	22.82
Côte d'Ivoire	22.63
St. Lucia	17.37
Cape Verde	16.90
Tunisia	16.06
Cameroon	15.13
Chad	14.30
Dominica	14.17
Niger	12.68
Madagascar	12.39
Togo	11.89
Burkina Faso	10.99
Benin	10.65
Mali	10.51
Morocco	9.97
Grenada	9.92
Lebanon	7.88
St. Kitts and Nevis	6.90
Guinea-Bissau	6.36

*Top 31 countries with highest annual average per capita aid received from France.
Source: Based on OECD Statistics Online and WDI 2006

Figure 1a. 5-Year Average of Aggregate Aid from France to CEMAC
(In 2000 U.S. dollars)

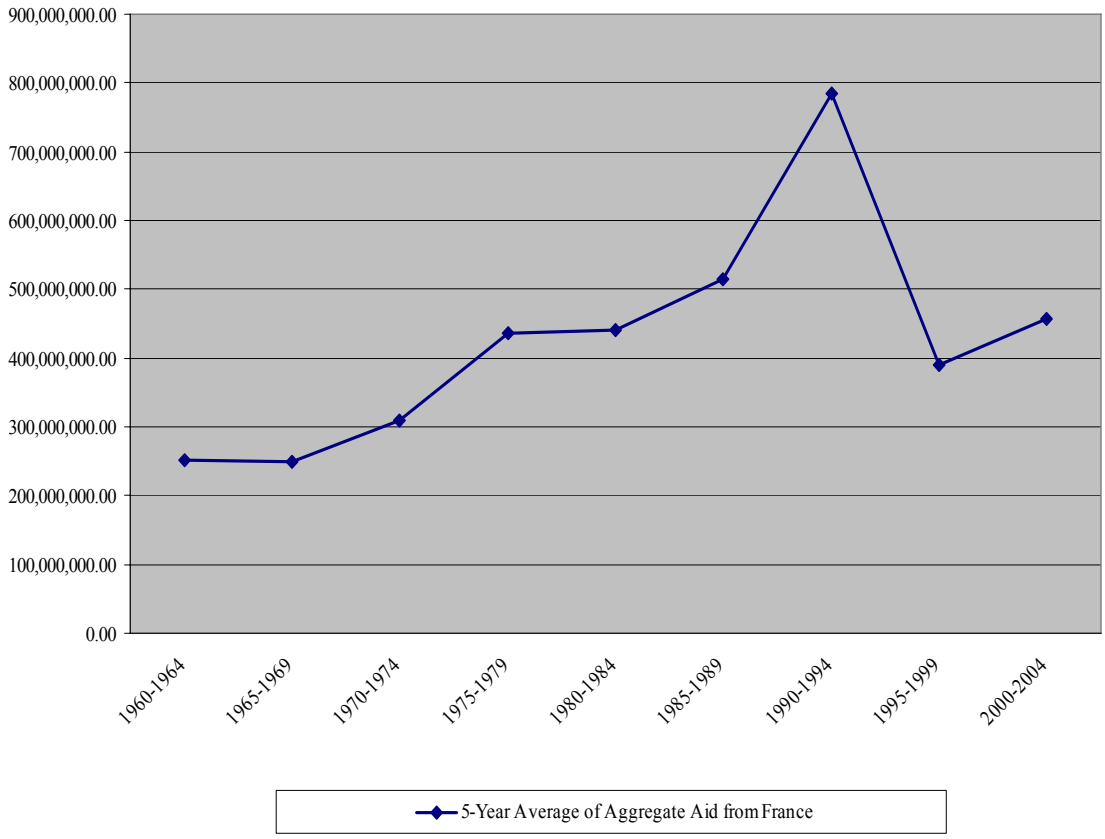


Figure 1b. 5-Year Average of Aggregate Aid from France to WAEMU
(In 2000 U.S. dollars)

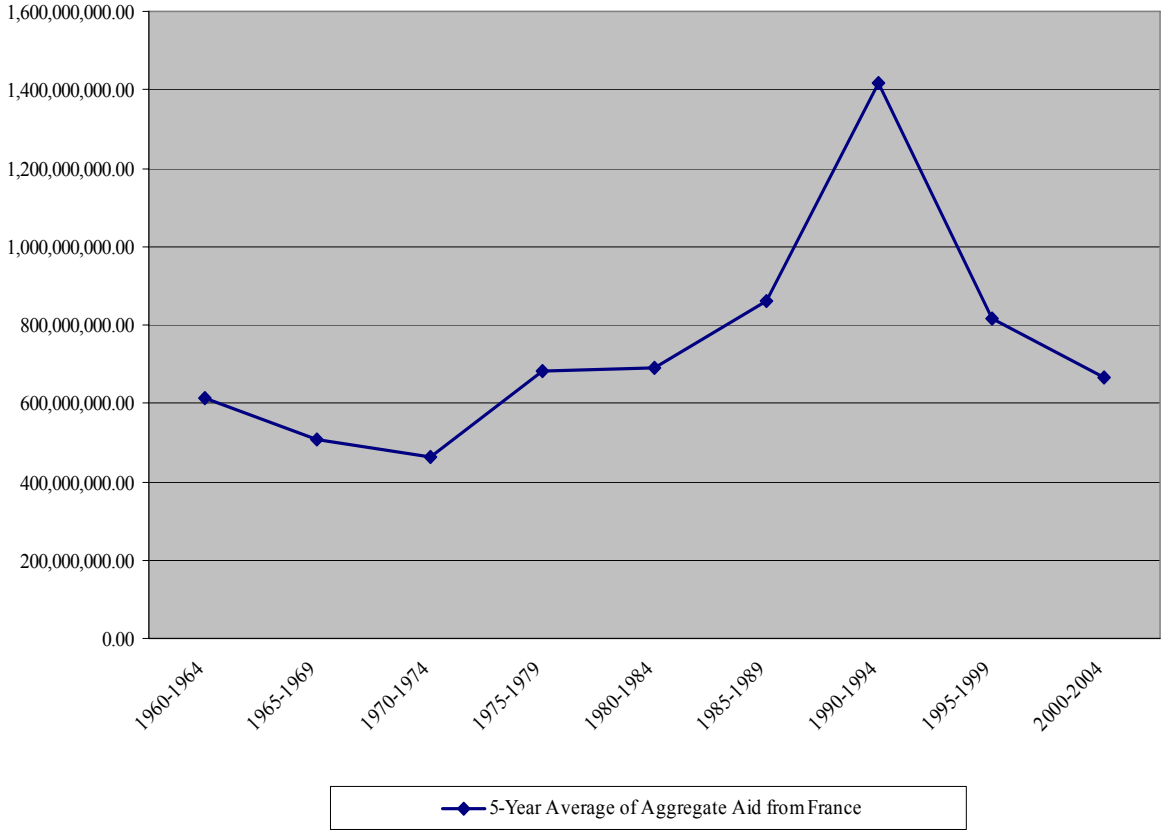


Figure 2a. Real Flows of Official Development Assistance to CEMAC, 1960–2004
(In 2000 U.S. dollars)

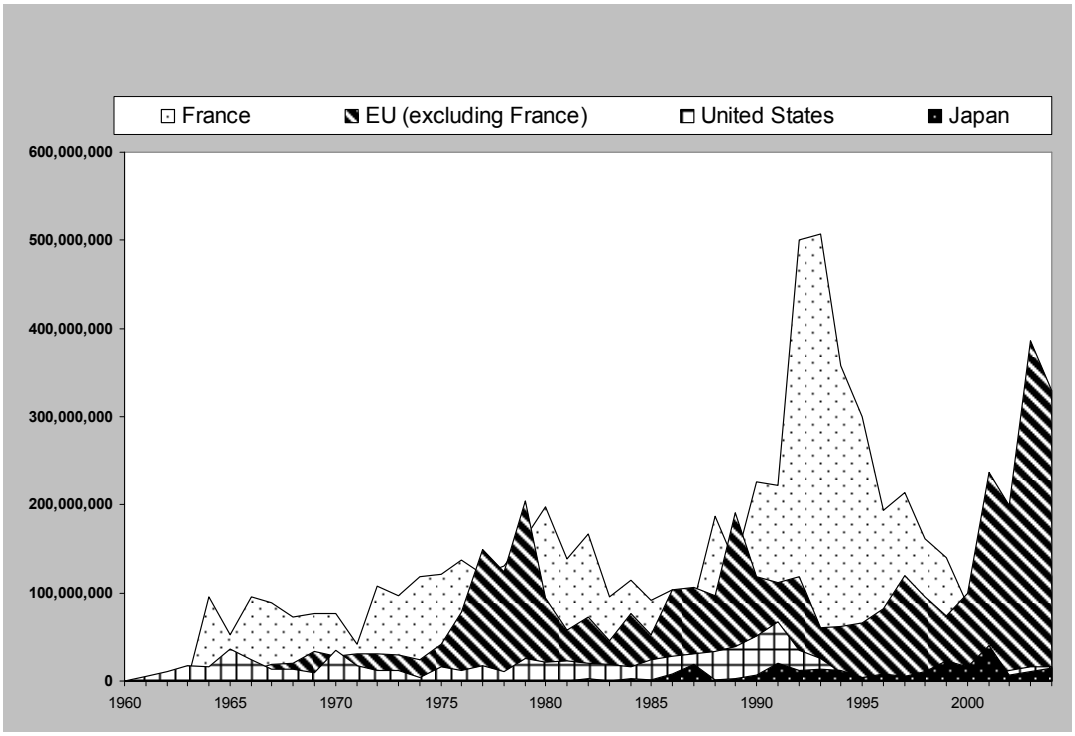
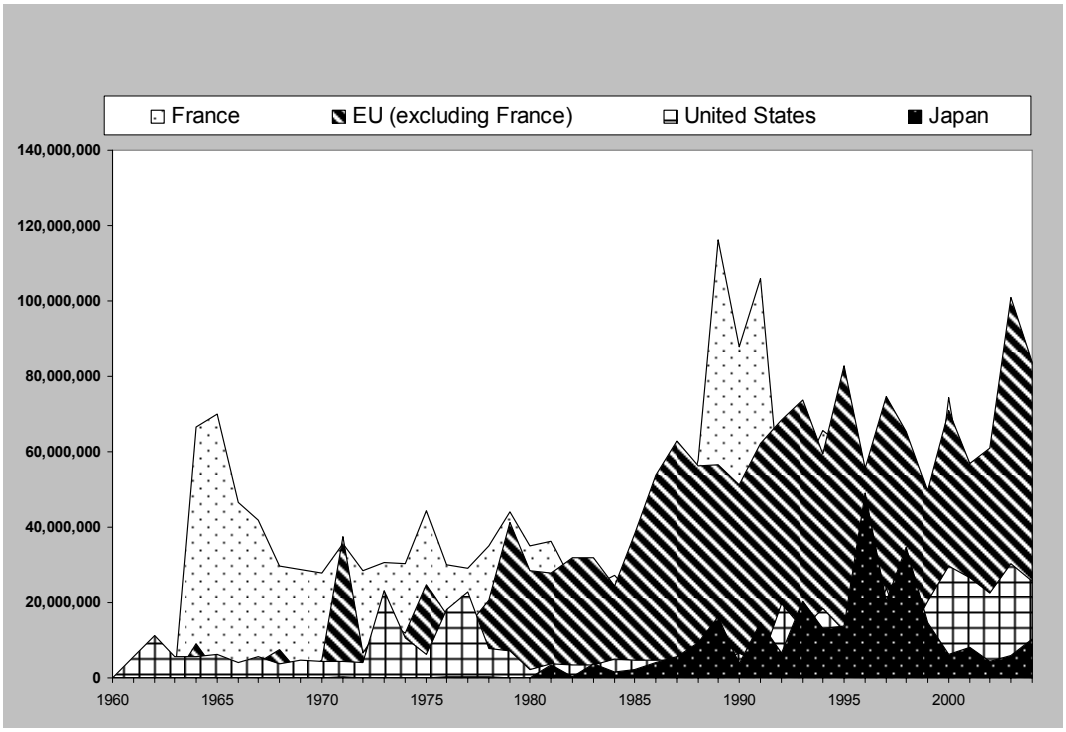


Figure 2b. Real Flows of Official Development Assistance to WAEMU, 1960–2004
(In 2000 U.S. dollars)



References

Aizenman, Joshua, and Nancy Marion, 2002, "The High Demand for International Reserves in the Far East: What's Going On?" NBER Working Paper No. 9266 (Cambridge, Massachusetts: National Bureau of Economic Research).

——, 2002, "International Reserves Holding with Sovereign Risk and Costly Tax Collection," NBER Working Paper No. 9154 (Cambridge, Massachusetts: National Bureau of Economic Research).

Arreaza, Adriana, Bent E. Sorensen, and Oved Yosha, 1998, "Consumption Smoothing Through Fiscal Policy in OECD and EU Countries," NBER Working Paper No. 6372 (Cambridge, Massachusetts: National Bureau of Economic Research).

Asdrubali Pierfederico, Bent E. Sorensen, and Oved Yosha, 1996, "Channels of Interstate Risk-Sharing: United States 1963–1990," *The Quarterly Journal of Economics*, Vol. 111 (November), pp. 1081–1110.

Cochrane, John H., 1991, "A Simple Test of Consumption Insurance," *Journal of Political Economy*, Vol. 99 (October), pp. 957–76.

Cohen, Benjamin J. 2003. "Monetary Union: The Political Dimension," in James W. Dean, Dominik Salvatore, and Thomas D. Willett (eds), The Dollarization Debate (Oxford University Press).

Cohen, Benjamin J. 1993. "Beyond EMU: The Problem of Sustainability," *Economics and Politics,* Vol. 5 (July), No. 2, pp 187-202.

Disyatat, P., and D. Mathieson, 2001, "Currency Crises and the Demand for Foreign Reserves," IMF Working Paper 01/49 (Washington: International Monetary Fund).

Edwards, Sebastian, 1984, "The Demand for International Reserves and Monetary Equilibrium: Some Evidence from Developing Countries," *Review of Economics and Statistics*, Vol. 66 (August), pp. 495–500.

Eichengreen, B., 1993, "European Monetary Unification," *Journal of Economic Literature*, Vol. 31 (September), pp. 1321–57.

Flood, Robert P., and Nancy Marion, 2001, "Holding International Reserves in an Era of High Capital Mobility," in *Brookings Trade Forum 2001*, ed. by Susan M. Collins and Dani Rodrik (Washington: Brookings Institution).

Frenkel, J., and B. Jovanovic, 1981, "Optimal International Reserves: A Stochastic Framework," *Economic Journal*, Vol. 91 (June), pp. 507–14.

Hayashi, Fumio, Joseph Altonji, and Laurence Kotlikoff, 1996, "Risk-Sharing Between and Within Families," *Econometrica*, Vol. 64 (March), pp. 261–94.

Mace, Barbara J., 1991, "Full Insurance in the Presence of Aggregate Uncertainty," *Journal of Political Economy*, Vol. 99 (October), pp. 928–56.

Marinheiro, Carlos F., 2005, "Output Smoothing in EMU and OECD: Can We Forego Government Contribution? A Risk Sharing Approach" in Paul De Grauwe and Jacques Mélitz, *"Prospects for Monetary Unions after the Euro*", Cambridge, MA: MIT Press.

Obstfeld, Maurice, 1994a, "Are Industrial-Countries Consumption Risks Globally Diversified?" in *Capital Mobility: The Impact on Consumption, Investment, and Growth*, ed. by Leonardo Leiderman and Assaf Razin (New York: Cambridge University).

——, 1994b, "Evaluating Risky Consumption Paths: The Role of International Substitutability," *European Economic Review*, Vol. 38, No. 7, pp. 1471–86.

——, and Kenneth Rogoff, 1996, *Foundations of International Macroeconomics* (Cambridge, Massachusetts: MIT Press).

Persson, Torsten, and Guido Tabellini, 1996, "Federal Fiscal Constitutions: Risk-Sharing and Moral Hazard," *Econometrica*, Vol. 64 (May), pp. 623–46.

Sala-i-Martin, Xavier, and Jeffrey Sachs, 1992, "Fiscal Federalism and Optimum Currency Areas: Evidence for Europe from the United States," in *Establishing a Central Bank: Issues in Europe and Lessons from the U.S.*, ed, by Matthew Cansoneri, Vittorio Grilli, and Paul Masson (London: Cambridge University).

Secrieru, Oana, and Marianne Vigneault, 2004, "Public Venture Capital. Occupational Choice, and Entrepreneurship," *Topics in Economic Analysis & Policy*, Vol. 4, No 1, Article 25.

Sorensen, Bent E., and Oved Yosha, 1998, "International Risk-Sharing and European Monetary Unification," *Journal of International Economics*, Vol. 45, No. 2, pp. 211–38.

Townsend, Robert M., 1994, "Risk and Insurance in Village India," *Econometrica*, Vol. 62 (May), pp. 539–91.

Vaillancourt, François, 1997, "Labour-Sponsored Venture Capital Funds in Canada Institutional Aspects, Tax Expenditures, and Employment creation," in *Growth in Canada*, ed. by Halpern, Industry Canada Research Series (Calgary: University of Calgary).