# 貨幣危機日期的認定

## 馬可夫轉換模型的應用

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## 摘要

本研究目的為建立一個全面性且長期的認定貨幣危機日期系統, 以三種馬可夫轉模型與 Hadi 方法來分別認定在國際貨幣基金中的 138 個會員國貨幣危機發生的日期。資料使用 1970 年到 2003 年的月資料。實證結果顯示簡單的馬可夫轉換模型較能認定出著名危機的發生日期, 而 GARCH 下的馬可夫轉換模型與 Hadi 方法較無法涵蓋著名危機的日期, 然而 GARCH 馬可夫轉換模型所認定的危機日期品質卻較其他兩種模型為佳。此外, 本文亦明確指出導致馬可夫轉換模型應用於貨幣危機日期的認定結果不理想的可能原因。



**關鍵詞**：馬可夫轉換模型、貨幣危機認定、危機臨界值選取

**JEL分類代號**：C25, C49, G21

## 一、前言

自 1990 年以來，世界各國陸續發生一連串的貨幣危機（currency crises）事件，如：在 1992 年到 1993 年發生在歐洲的貨幣機制危機（Exchange Rate Mechanism crisis, ERM crisis）、1994 年的墨西哥危機（Mexican crisis）、1997 年重創東南亞金融市場的亞洲金融危機（Asian financial crisis）、1998 年的俄羅斯盧布危機（Russia Ruble crisis）與近期的阿根廷危機（Argentina crisis）等。因此，吸引了眾多的經濟學家相繼投入研究貨幣危機的成因，並試圖從各種不同的方法與角度來建構一個系統性的危機預警機制。

在以計量模型來建立危機預警研究時，學者經常面臨一個問題，就是迴歸方程式左邊的應變數（危機日期）要如何界定。如果認定危機的時間太早或太晚，都會使得方程式右邊的自變數的解釋能力下降或喪失解釋能力。舉例而言，在正確設定之下，國內生產毛額的下跌是會使得危機發生的機率升高，反之亦然，可是在認定危機的日期不明確下，當發現國內生產毛額的下跌與危機發生的機率有正相關時，將無法確定究竟是國內生產毛額下跌造成貨幣危機，或是貨幣危機造成國民生產毛額下跌的因果關係。有鑑於此，正確認定危機的日期是研究者所必須達成的首要目標。

然而，過去學者所界定危機的日期，不外乎是觀察一國是否從固定匯率制度（fixed exchange rate regime）轉變為浮動匯率制度（flexible exchange rate regime），或是憑藉金融學者的經驗與主觀認知來判斷一國在何時有發生危機，以上稱為以市場事件作為認定危機的事件方法，例如：Dornbusch, Goldfajn and Valdés（1995）僅以金融雜誌來判別智利可能發生貨幣危機，而 Bris, Koskinen and Pons（2002）則觀察政府或央行是否有所謂的棄守匯率或名目匯率貶值的事件發生來認定危機日期。故以此所判別的危機日期是相當的隨意（ad hoc），而可能造成選擇性的偏誤。

而後 Eichengreen, Rose and Wyplosz (1995) 提出以量化方法（quantitative

method）來界定貨幣危機的日期，相對於傳統事件方法來說，認定方法已從主觀質化的方法逐漸轉化為較為客觀量化的方法。然而指標方法卻需面臨另一個主觀臨界值的選擇。[1]

有鑑於此，本文試圖以 Eichengreen, Rose and Wyplosz（1995）提出的外匯市場投機指標（index of speculative pressure, ISP）作為危機認定的依據，以此可消除傳統事件方法所造成的選擇性偏誤，再者利用 Hamilton（1989）所提出的馬可夫轉換模型（Markov regime-switching model），以模型內生化外匯投機指標臨界值，來避免主觀臨界值的選定的問題。並有別於傳統的文獻，如：Abiad（2003）只應用在 1972 年到 1999 年的亞洲五國（印尼、南韓、馬來西亞、菲律賓與泰國）與 Matinez-Peria（2002）則只探討 1979 年到 1993 年發生歐洲貨幣機制危機的國家（比利時、丹麥、法國、愛爾蘭、義大利、西班牙與英國），本文廣泛的應用在長期與多個國家（包括工業國家、新興工業國家與開發中國家），並系統化的認定危機日期。此外，本文也分別探討簡單的馬可夫轉換模型、一階自我相關 (first order autoregressive) 的馬可夫轉換模型以及考慮 GARCH（generalize autoregressive conditional heteroskedasticity）下的馬可夫轉換模型所認定的危機日期的差異，並整理近年來以馬可夫轉換模型來研究貨幣危機的文獻，以及明確指出以馬可夫轉換模型應用在貨幣危機日期的認定上可能的潛在問題。

本文共分六個章節，依序如下：第二章是回顧由事件方法到指標化方法的相關文獻，並明確指出傳統方法有哪些缺失，其後整理說明近三年來以馬可夫轉換模型來研究貨幣危機的文獻。第三章則簡單的敘述本文採用的三種馬可夫轉換模型之設定。第四章則是說明本文外匯投機指標的設定、Hadi 尋找極端值方法（Hadi's outlier detection method）與資料的處理過程。第五章則是討論實證結果與馬可夫模型應用在貨幣危機的問題。第六章總結全文。

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[1] 當外匯市場投機指標 $ISP = \frac{\Delta r}{r}\frac{1}{\sigma_r} + \Delta i \frac{1}{\sigma_i} + \frac{\Delta E}{E}\frac{1}{\sigma_E} > T$（$E$ 為名目匯率、$r$ 為外匯準備、$i$ 為國內短期利率、$T$ 為臨界值以及 $\sigma_r, \sigma_i, \sigma_E$ 表示為各元素的標準差）時，即表示發生貨幣危機。

## 二、文獻回顧

### 2.1 應用傳統方法的文獻

在過去，界定貨幣危機的方式即為利用所謂的事件方法來檢定（identify）貨幣危機發生的日期。也就是說，研究人員透過金融報導、金融刊物、或只觀察各國匯率制度的變動與單純性匯率劇烈的貶值來主觀決定該國是否有發生貨幣危機。例如：在 Dornbusch, Goldfajn and Valdés（1995）一文中，作者界定智利危機（Chile crisis）開始的日期，僅利用歐元雜誌（Euromoney）內文載明智利於 1978 年發生投機攻擊事件即判定該年為危機之初。而在表 1 中，菲律賓、西班牙與土耳其等國，在 1990 年到 1998 年的匯率制度並無改變，然而不可否認的，她們的確經歷過一些著名的貨幣危機（亞洲金融危機、歐洲貨幣機制危機與 1994 年的土耳其危機）。此外，同樣經歷過亞洲金融危機的馬來西亞，匯率在貨幣危機之後依舊沒有貶值的情況發生。因此，由事件方法認定的危機是會有選擇性偏誤的產生的。

其後，由 Eichengreen, Rose and Wyplosz（1995）首先以外匯市場投機指標作為界定發生貨幣危機發生時點的依據，雖然 Flood and Marion（1999）批評此量化方法無法單純的以極值（extreme value）捕捉貨幣危機從不確定性到被預期到的動態過程與危機真實的發生日期，但以量化方法來界定貨幣危機的日期依舊被普遍的採用。（如：Kaminsky and Reinhart, 1999 與 Glick and Hutchison, 2001）然而使用量化方法，卻必須面對主觀選定臨界值的難題，如：Eichengreen, Rose and Wyplosz (1995) 選定 2 個標準差而 Kaminsky and Reinhart（1999）則選定 3 個標準差。因此，學者們試圖尋找一個模型，希望可以透過模型使得資料本身來決定其臨界值的大小，不以研究者的偏好來設定，而馬可夫轉換模型正好提供了研究者所需的解決方法。

近年，馬可夫轉換模型被廣泛運用在預測、解釋台灣的景氣循環（如：Huang, Kuan and Lin, 1998、Huang, 1999 與 Chen and Lin, 2000），而國外應用在貨幣危機

上的文章也與日俱增（如：Jeanne and Mason, 2000、Martinez-Peria, 2002 與 Abiad, 2003）上。此模型的主要特性在於假定不知道結構改變的時點，讓資料透過模型來決定自身的狀態是處於危機（crisis）或是平靜（tranquil），這不僅可以提供更適切的解釋與預測能力（Abiad, 2003），並可以避免量化方法的一些缺點：

1. 主觀臨界值的選定。例如：Edison（2003）選定 2.5 個標準差，而 Kaminsky, Lizondo and Reinhart（1998）則選定 3 個標準差為臨界值等。雖然大多數的文獻皆有做過穩健性檢定（robust test）而證明所選定的標準差與其他的設定結果並無太大差異，然而並無法避免主觀設定臨界值的產生。
2. 人為序列相關（serial correlations）的產生（Abiad, 2003）。在傳統方法中，假如危機發生後的一段期間，將會視為同一個危機。如：Eichengreen, Rose, and Wyplosz（1996）選定一季為一個排除窗（exclusion window）而 Frankel and Rose（1996）則選定為 3 年。排除窗以數學式表示，即指 $C_t = 1 \Rightarrow \Pr(C_{t+j} = 1) = 0 \text{ for } j = 1,2,3\ldots,J$，$J$ 則為排除窗的寬度（width）。也就是說，一個危機時期一定跟隨著 $J$ 期的非危機時期。這使得觀察值之間不再是獨立且互不相關的分佈。
3. 訊息的流失（Abiad, 2003）。傳統的量化方法將連續的被解釋變數轉換為二元的間斷的變數值，可能會造成在被解釋變數中某些隱含的資訊流失。

**2.2 馬可夫轉換模型應用在貨幣危機的文獻**

運用馬可夫轉換模型來研究貨幣危機的文獻主要是包含幾個面向：

1. 首先 Jeanne and Mason（2000）使用固定轉換機率（constant transition probability）的兩狀態（two-state）馬可夫轉換模型，[2]研究在 1987 年到 1993 年間是否為傳染效果（contagion effect）導致法國發生貨幣危機 其他如：Boinet et al.（2002）與 Plata and Schrooten（2003）則以相同的方法，單純的運用在

[2] 即狀態間的轉換機率（由狀態 1 轉變為狀態 2 或 1 的機率）是固定不變的。反之，會隨著時間與狀態改變的則為變動轉換機率（time-varying transition probability）。

解釋阿根廷在 1990 年間所發生的貨幣危機是否為基本面惡化還是傳染效果的影響。

2. 其後 Matinez-Peria（2002）轉而使用變動轉換機率的兩狀態馬可夫轉換模型，研究七個參與歐洲匯率整合機制下的國家，在 1979 年到 1993 年間受到投機性攻擊所造成的貨幣危機，是否可以用此模型來更精確的認定危機發生的日期（crisis episodes）。 而 Fratzscher（2003）則廣泛的運用在二十四個新興市場國家來探討各種組合性指標（如：傳染性指標與基本面指標等）在危機發生的前是否會發出警訊（signals）。
3. 利用變動轉換機率的兩狀態馬可夫結構轉換模型來預測危機，如： Mariano et al.（2002）、Cerra and Saxena（2002）與 Abiad（2003）。其中，Mariano et al.（2002）挑選出東南亞的四個國家，試圖找出在 1974 年到 1998 年間的貨幣危機，並以各種變數的組合模型來預測在危機發生前，找出最能顯示危機將要發生機率最高的決定性指標組合。而 Cerra and Saxena（2002）則發現在印尼 1985 年到 1997 年間，南韓與泰國發生貨幣危機之後，會顯著的增加印尼危機發生的可能性。
4. Brunetti et al.（2003）除利用非固定轉換機率的兩狀態馬可夫結構轉換模型外，並加入 GARCH 的設定，[3]研究在 1984 年到 2001 年間東南亞四國的貨幣危機。評估在加入 GARCH 後，是否能更為精準的預測危機，以及找出預測危機能力最高的變數組合。

在表 2 與以上的文獻發展中，可以發現在貨幣危機日期的認定上，並沒有將馬可夫轉換模型以系統性方式來應用在多國樣本，並且存在地區性（如侷限在亞洲或是歐洲），或是只涵蓋新興國家與工業國家。而大部分研究的樣本亦只包含在 1980 年後的 15 到 20 年的期間，亦為目前研究貨幣危機所不足的地方。

[3] 假設資料中的條件變異數（conditional variance）會受前期變數影響其變動狀態。

## 三、馬可夫轉換模型

### 3.1 模型背景

Hamilton（1989）研究戰後美國（1952：Ⅱ　1984：Ⅳ）的實質國民生產毛額(real GNP)資料, 提供了美國經濟研究所(National Bureau of Economic Research, NBER）之外的另一個認定景氣循環的方法。Hamilton 假設模型具有自我迴歸（autoregressive）與不同狀態本身的變異程度是一樣的。而不同狀態的存在，主要是馬可夫轉換模型允許截距項隨狀態變數（state variable）變動所致。而 Hamilton（1996）則進一步擴展假設，允許解釋變數的係數、殘差項的變異數, 亦可隨狀態變數變動。但本文欲以較簡單的馬可夫轉換模型, 單純設定狀態的不同僅為截距項不同的方式, 使認定貨幣危機的臨界值透過模型內生化, 故選定的模型近似於 Hamilton（1989）之模型。

本文模型是延伸 Hamilton（1989）所使用的馬可夫轉換模型, 假設資料本身可以區分為兩類：標準差較大且平均數較大、標準差較小且平均數較小的狀態, 並假設狀態變數間的關係存在一階馬可夫鏈（first order Markov Chain）關係。[4]

### 3.2 簡單固定轉換機率馬可夫轉換模型

以下我們將馬可夫轉換模型, 簡單設定為截距項可隨狀態變數變動, 以一般的通式表示如下：

$$\mathrm{ISP}_t = \beta_{S_t} + e_{S_t}, \quad t = 1,2,\ldots,T$$
$$e_{S_t} \sim N(0, \sigma^2_{S_t}),$$
$$\beta_{S_t} = \beta_0(1 - S_t) + \beta_1 S_t,$$
$$\sigma^2_{S_t} = \sigma^2_0(1 - S_t) + \sigma^2_1 S_t,$$

[4]假設一隨機狀態變數（$S_t$）具有轉換機率（$p_{ij,t}$）為

$p_{ij,t} = p(S_t = j | S_{t-1} = i, S_{t-2} = k..., S_{t-n} = l), n = 1,2,....., N$ ， $i$、$j$、$k$、$l$ 代表狀態變數。當 *n=1* 時, 表示此轉換機率由 *t-1* 期狀態 *i* 變成 *t* 期的狀態 *j* 的機率值, 僅與 *t-1* 期的狀態 *i* 有關, 而與 *t-1* 期之前的狀態並無關係。此時，狀態變數值如果為有限且可數的數值，則將此隨機過程稱為一階馬可夫鏈。同理，*t=N* 時，t 期轉換機率值與 *t-1* 到 *t-N* 期的狀態都有關，則稱為 *N* 階馬可夫鏈。

$S_t = 0 \text{ or } 1$

其中 $S_t$ 等於狀態變數，而當 $S_t = 0$ 表示處於平靜（tranquil）的狀態；當 $S_t = 1$ 表示處於貨幣危機的狀態。

而轉換機率（transition probability）表示為：

$$\Pr(S_t = 1 | S_{t-1} = 1) = P$$
$$\Pr(S_t = 0 | S_{t-1} = 0) = Q$$

其中 $P$ 表示前一期處於貨幣危機狀態下，當期仍然發生貨幣危機的機率值；而前一期處於平靜狀態下，當期仍然是平靜的機率值為 $Q$。

因為本文主要是利用事後資料來認定在時間數列下的轉折點，故採用全期機率來觀察貨幣危機發生的時點。而以下全期機率的推導是採用 Kim's Smoothing Algorithm 所計算的：[5]

首先考慮在全期資訊下 $S_t = j$ 與 $S_{t+1} = k$ 聯合機率可分解成下式

$$p(S_t = j, S_{t+1} = k \mid \psi_T)$$
$$= \frac{p(S_{t+1} = k \mid \psi_T) \times p(S_t = j \mid \psi_t) \times p(S_{t+1} = k \mid S_t = j)}{p(S_{t+1} = k \mid \psi_t)} \quad (1)$$

$$p(S_t = j \mid \psi_T) = \sum_{k=0}^{1} p(S_t = j, S_{t+1} = k | \psi_T) \quad (2)$$

在給定一個初始的當期機率 $p(S_T \mid \psi_T)$ 之下，代入（1）式得到 $p(S_{T-1} = j, S_T = k \mid \psi_T)$ 的機率，再代入（2）式可得到 T-1 期全期機率 $p(S_{T-1} = j \mid \psi_T)$。$p(S_{T-1} = j \mid \psi_T)$ 再依序代回（1）、（2）兩式，又可得到在 T-2 期的全期機率 $p(S_{T-2} = j \mid \psi_T)$，如此遞迴的演算至 $t$=1，即得到所有的全期機率值。

### 3.3 一階自我相關固定轉換機率馬可夫轉換模型

在簡單的馬可夫轉換模型設定之下，並沒有考慮到危機發生的持續性（persistence），換言之，較合理化的設定是必須考量危機狀態的相互影響，亦即一但在第 $t$ 期發生貨幣危機後，而在第 $t+1$ 期同樣發生危機的機率一定也會增

[5]詳細的推導過程與證明請參閱 Kim and Nelson（1999）。

加。加入一階自我相關的模型設定如下：

$$\mathrm{ISP}_t = \beta_{S_t} + \alpha_{S_t}\mathrm{ISP}_{t-1} + e_{S_t}, \quad t = 1,2,\ldots,T$$
$$e_{S_t} \sim N(0,\sigma_{S_t}^2),$$
$$\beta_{S_t} = \beta_0(1-S_t) + \beta_1 S_t,$$
$$\sigma_{S_t}^2 = \sigma_0^2(1-S_t) + \sigma_1^2 S_t,$$
$$S_t = 0 \text{ or } 1$$

而以上的模型當期機率的計算與參數的估計方法與簡單的馬可夫轉換模型是相同的，而全期機率亦使用 Kim's Smoothing Algorithm 來衡量。

### 3.4 GARCH 固定轉換機率馬可夫轉換模型

因為大部分高頻率的財務時間序列資料，都會產生波動聚集（volatility cluster）的效果，如：Brunetti and Lildholdt（2002）在實證上發現名目匯率在產生大幅度的變動後亦會伴隨著大幅度的變動，反之亦然。所以本文進一步探討以高頻率的外匯投機指標在考量 GARCH（1,1）下的馬可夫轉換模型，能否更為精確的認定貨幣危機的時點。本文則延續 Gray（1996）的設定，因為在 Gray 的模型中，允許條件期望值與條件變異數的所有參數可以隨狀態改變，這不僅改善 Hamilton（1989）中的馬可夫轉換模型只能捕捉不同狀態下的條件期望值的變動，卻無法描述條件變異數的行為的缺點，並且避免 Hamilton and Susmel（1994）的 SWARCH 模型中，條件變異數在不同狀態下只會單純的呈現某種比例關係的限制。

加入 GARCH 的馬可夫模型設定如下：

$$\mathrm{ISP}_t = \mu_{S_t,t} + \varepsilon_{S_t,t} = \alpha_{S_t} + \beta_{S_t}\mathrm{ISP}_{t-1} + \varepsilon_{S_t,t},\ t = 1,2,\ldots,T$$
$$\varepsilon_{S_t,t} = \sqrt{h_{S_t,t}}\,z_t,\ z_t \sim i.i.d.(0,1)$$
$$h_{S_t,t} = w_{S_t} + a_{S_t}\varepsilon_{t-1}^2 + b_{S_t}h_{t-1}$$
$$h_t = E[\mathrm{ISP}_t^2 | \psi_{t-1}] - E[\mathrm{ISP}_t | \psi_{t-1}]^2$$
$$\varepsilon_t = \mathrm{ISP}_t - E[\mathrm{ISP}_t | \psi_{t-1}]$$
$$S_t = 0,1$$

其中我們使用最大概似估計法（maximum likelihood estimates, MLE）或 Kim and

Nelson（1999）稱之為準最大概似法（quasi-maximum likelihood estimates, QMLE）來估計模型的參數值。並同樣運用 Kim's Smoothing Algorithm 來估計全期機率值。[6]

## 四、外匯市場投機指標與資料處理

### 4.1 外匯市場投機指標

本文採用 Eichengreen, Rose and Wyplosz（1995）所提出的外匯市場投機指標，並簡化表示為：

$$ISP = \frac{\Delta r}{r}\frac{1}{\sigma_r} + \Delta i \frac{1}{\sigma_i} + \frac{\Delta e}{e}\frac{1}{\sigma_e}$$

其中$\sigma_r, \sigma_i, \sigma_e$分別表示外匯存底、短期利率與實質匯率的標準差。

而外匯市場投機指標主要包含三個成分：實質匯率、外匯存底與短期利率。因為在受到投機性攻擊或是貨幣危機時，政府可以在外匯市場拋售外匯，或是同時在國內市場提高短期利率來降低外匯需求，而一旦前兩項貨幣工具都告失效後，政府才會棄守匯率而反應在匯率上。再者，當一國的通貨膨脹率相對於他國而處於高水準的狀態時，而在名目匯率中會自然的向上調整，所以本文採取實質匯率來避免這種非危機的情況發生。

### 4.2 Hadi 尋找極端值方法

Hadi（1992, 1994）建構一種尋找極端值（outlier）的數學方法，而又因為認定貨幣危機的日期如同是在外匯市場投機指標中尋找極端值，本文使用此方法與三種馬可夫轉換模型所認定的危機日期結果做一比較。而 Hadi 方法的程式已內建於 STATA，故可簡易的運用在本文中。

[6] 我們根據 Kim and Nelson (1999)所描述的方法進行模型估計。所有的程式皆以 EViews 寫成。

### 4.3 資料處理

本文是使用國際貨幣基金會（International Money Funds, IMF）所出版的國際金融統計光碟（International Financial Statistics CD-ROM, IFS CD-ROM），來計算 138 個國家在 1970 年 1 月到 2003 年 11 月的外匯市場投機指標。[7]在指標中，實質匯率的計算方式是使用該國名目匯率（line RF）乘上美國或是德國的消費者物價指數（如該國位於歐洲地區則以德國的消費者物價指數作為計算標準，反之則使用消費者物價指數）並除以該國的消費者物價指數（line 64），並使用扣除金塊存量的外匯存底（line 1LD）代表該國的外匯存底，而以最可以反應短期效果的貨幣市場利率（line 60b）作為該國短期利率的代表。資料處理大致是依據以上的準則去計算，而一部分國家如缺少該項資料的話，則依照項目內重要性依序選擇，[8]如皆無法選擇的話則放棄選取該國。而樣本對象是從國際貨幣基金 183 個會員國中挑選其中的 138 個國家。

## 五、實證結果

### 5.1 個案研究

以下藉由幾個著名的危機事件，如：智利危機、歐洲貨幣機制危機、墨西哥危機、東南亞金融危機、俄羅斯盧布危機、土耳其金融危機（Turkish crisis）、阿

[7] 138 個樣本國家包括：Albania, Algeria, Angola, Argentina, Armenia, Aruba, Austria, Australia, Azerbaijan, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Bolivia, Botswana, Brazil, Bulgaria, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African, Chad, Chile, China, Colombia, Congo Republic, Costa Rica, Croatia, Cyprus, Czech, Denmark, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guyana, Haiti, Hong Kong, Honduras, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Kyrgyz, Lao People's Dem. Rep, Latvia, Lithuania, Luxembourg, Macao, Macedonia, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritius, Mexico, Moldova, Mongolia, Mozambique, Myanmar, Namibia, Netherlands Antilles, Nepal, Netherlands, New Zealand, Nigeria, Niger, Norway, Oman, Pakistan, Panama, Papu New Guinea, Paraguay, Peru, Philippines, Portugal, Romania, Russia, Rwanda, Samoa, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Slovak, Slovenia, Solomon Islands, South Africa, Spain, Sri Lanka, St. Kitts and Nevis, St. Lucia, Swaziland, Sweden, Switzerland, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Uganda, United Kingdom, Ukraine, Uruguay, USA, Venezuela, Zambia 與 Zimbabwe。

[8] 如利率資料如果沒有貨幣市場利率（line 60b）則依序選擇國庫券利率（line 60C）、存款率（line 60L）、借款率（line 60P）、折現率（line 60）。

根廷危機，來初步評估馬可夫轉換模型認定的結果（表３）。

**1. 1982 年的智利債務危機**

在 1982 年，智利政府因償還不起因債務而衍生的龐大利息而產生大幅度貨幣貶值的危機。而實證結果顯示三種馬可夫轉換模型與 Hadi 方法皆能夠認定這段危機期間，與 Dornbusch, Goldfajn and Valdés（1995）、Jotzo（1999）與 Kaminsky and Reinhart（1999）所認定的危機日期相一致，然而以 GARCH 下的馬可轉換模型在 1978 年與 1982 年間卻認定出 4 次危機，這似乎顯示在相同危機的認定上 GARCH 下的馬可夫轉換模型缺少較為合理的經濟解釋。

**2. 1992 年到 1993 年的歐洲貨幣機制危機**

挪威、瑞典與芬蘭在 1992 年發生政府放棄固定匯率制度（歐洲貨幣機制），而採行浮動匯率制度的危機事件。而以三種馬可夫轉換模型來認定的結果，除了 GARCH 馬可夫轉換模型在芬蘭與瑞典的日期認定上有較差的表現外，而其他的結果皆顯示以馬可夫轉換模型來認定的日期不只與其他文獻相一致，甚至認定出在制度改變前就產生的危機訊號。然而在其他國家中，如：比利時、法國、義大利、英國與西班牙，一階自我相關與 GARCH 馬可夫轉換模型認定出沒有危機的各別就有三個國家，雖然簡單的馬可夫轉換模型較能合理認定這些國家的危機日期，然而在認定英國的危機中，卻發生該國的貨幣危機從 1992 年一直持續至 2003 年的認定結果，而 Hadi 方法卻無法認定任何一個確實有發生過貨幣危機的國家。

**3. 1994 年的墨西哥危機**

墨西哥在 1994 年底與 1982 年發生的智利危機一樣，政府同樣無法償還大量的債務利息而產生名目匯率大量貶值甚至產生制度的改變。以結果而言，GARCH 下的馬可夫轉換模型與 Hadi 方法兩者皆無法認定出危機日期。

**4. 1997 年的東南亞金融危機**

1997 年 7 月首先由泰國央行宣布放棄固定匯率制度開始，而後引發制度改變的貨幣危機蔓延至馬來西亞、韓國，或是其他沒有發生大規模匯率變動，但是損失大量外匯或是有提高短期利率現象的國家，如：印尼、菲律賓。而結果顯示

在東南亞金融危機日期的認定上，大部分的危機日期都有被準確的認定到，然而GARCH 下的馬可轉換模型在印尼與馬來西亞的結果卻顯示沒有危機發生，以及Hadi 方法亦無法認定出菲律賓有發生貨幣危機的結果。

**5. 1998 年的俄羅斯盧布危機**

受到東南亞金融危機與世界石油價格下跌而引發的經常帳赤字的雙重打擊，俄羅斯在 1998 年 5 月發生了大幅度的貨幣貶值與股市暴跌。實證結果顯示俄羅斯的危機日期可以為簡單模型與一階自我相關的馬可夫轉換模型所認定出來，而 GARCH 下的馬可夫轉換模型雖無法涵蓋危機的期間，但卻認定了危機事件發生之前的日期，而至於 Hadi 的方法則無法認定此期間所發生的危機日期。

**6. 2001 年的土耳其金融危機**

土耳其在 2001 年爆發金融危機，其中貨幣在 1 個月中貶值近 3 分之 1。就本文結果而言，而以簡單與一階自我相關的馬可夫模型較能認定出該年發生金融危機，相反的以 GARCH 下的馬可夫轉換模型同樣無法在該年認定出危機日期。

**7. 2002 年的阿根廷危機**

在阿根廷政府在 2002 年的 1 月正式宣布無法償還高達 1500 億美元的外債以後，外匯存底流失與名目匯率貶值的情況十分嚴重。而就結果而言，三種馬可轉換模型皆能涵蓋危機事件發生的日期，但是 Hadi 的方法仍然無法認定出此危機。

就以上初步的檢驗結果可知，以簡單的馬可夫轉換模型用來界定著名的貨幣危機，較一階自我相關的馬可夫轉換模型與在 GARCH 下的馬可夫轉換模型所認定的方式為佳，而 Hadi 的方法則傾向於認定出較少的危機點或沒有發生過危機。而以表 5 可以更明確的表示，在假設 Hadi 所認定的危機日期為真下，由訊號噪音比（signal to noise ratio）可以評估三種馬可夫轉換模型所認定出危機日期的能力，而簡單馬可夫轉換模型與一階自我相關馬可夫轉換模型的比率皆在 1.5 到 2 之間，這都表示兩個馬可夫轉換模型的確存在過度認定危機點的問題，而相對而言 GARCH 馬可夫轉換模型則提供較佳的認定能力，但值得注意的，三種馬可夫轉換模型所認定的危機點彼此亦存在許多的差異。

**5.2 以馬可夫轉換模型來認定危機日期的可能缺失**

針對以馬可夫轉換模型界定出危機日期的不良結果，本文有以下的推論

**1. 兩狀態馬可夫轉換模型本身的限制**

因為本文使用兩狀態馬可夫轉換模型，是故模型本身會將時間序列資料強迫分成兩個不同平均數構成的狀態，如此將使得在時間序列呈現規律波動的國家或是歷史上沒有發生過貨幣危機的國家，如：奧地利與瑞士，由馬可夫轉換模型也一定會認定出危機期間來。

**2. 模型本身具有過度配適（over-fit）的問題**

Fratzscher（2003）一文中指出，在樣本具有多狀態（multiple regimes）下使用馬可夫轉換模型，雖然比起單一狀態模型可以得到較佳的配適能力，不過在一些情況下模型所估計的係數值常常會過大或是係數的正負符號相反的結果。故在本文所認定的危機結果（在表 3 中的英國發生貨幣危機的日期持續了近 20 年，而美國貨幣危機的期間亦持續了 13 年之久），亦可得到馬可夫轉換模型的確具有過度配適的問題。

**3. 樣本國家時間序列的特性**

本文利用 logit 模型來檢驗 138 個國家的外匯市場投機指標的時間序列，由表 6 可以得知當時間序列上的觀察值越多，而利用三種馬可夫轉換模型所認定的危機個數或是危機期間皆會顯著的變多。而這也隱含著兩種意義，其一，呼應前述推論，由兩狀態馬可夫轉換模型認定的國家一定會有危機發生，所以沒有發生過危機的國家亦會認定出有發生危機的情況；其二，選取的樣本時間不能太長，否則模型會認定出較多的危機日期。

此外，當樣本國家的時間序列中觀察值高低幅度的落差越大，反而會減少危機數目與危機期間。而這也明確的指出當一國如果發生貨幣危機時，會使得外匯市場投機指標的上升幅度變大，並使危機狀態的平均數增加，而原本由模型所認定為危機的日期亦會改變認定為平靜的期間。如圖 1 所示，印尼在 1997 年經歷

過貨幣危機，而在 1997 年以前的時間序列一直是呈現著穩定波動的情形，所以使用 1997 年以前的資料來認定危機日期，與奧地利與瑞士的結果相同，由馬可夫轉換模型所認定的危機日期很多，而一旦樣本包含 1997 年的危機時，所認定的危機點亦顯著的減少。

**4. GARCH 下的馬可夫轉換模型設定的問題**

從 138 個樣本國家的外匯市場投機指標得知，只有 31 個國家的樣本時間序列呈現厚尾（fat-tail），而觀察外匯市場投機指標的條件變動性（conditional volatility）的情況也較不顯著。而在其他的文獻，如：Brunetti et al.（2003），所使用的樣本資料的條件變動性與厚尾的情況也並沒有很明顯的顯現出來，所以資料在何種情況下需要加入 GARCH 設定，是需要先清楚判定的。

**5. 外匯市場投機指標的限制**

雖然有許多文獻採用外匯市場投機指標作為認定危機的基礎(如：Kaminsky and Reinhart, 1999 與 Cerra and Saxena, 2002 與 Fratzscher, 2003)，但危機較像是極端值（outlier）的尋找，而且是罕見的極端值，是故高指標值不代表貨幣危機發生（如：突發性的天災或戰爭產生、政府法令的改變），低指標值亦不代表沒有產生過危機（政府可以透過其他手段來威嚇投機客，如：限制換取外匯）。同理，透過馬可夫轉換模型決定兩種狀態下，低平均值不一定能代表沒有危機的狀態，而高平均值也不一定沒有貨幣危機的發生。

## 六、結論

本文建構了138個國際貨幣基金會的會員國在1970年到2003年間貨幣危機的發生時間，並透過三種馬可夫轉換模型來系統性的認定貨幣危機的日期。馬可夫轉換模型改善了事件方法所產生的選擇性偏誤的問題，以及排除了量化方法中臨界值與排除窗的設定。

然而實證結果發現，簡單的馬可夫轉換模型較能認定大多數著名的危機日期，在加入一階自我相關的馬可夫轉換模型並無法明顯改善模型認定危機的能力，而加入GARCH的馬可夫轉換模型反而會使得認定著名危機的表現更差。但值得注意的是，GARCH下的馬可夫轉換模型所認定的危機日期反而比起其他兩種模型所認定的日期品質為佳。

而本文亦明確指出馬可夫轉換模型不適用於認定貨幣危機日期的可能原因，並提供一些證據顯示樣本的統計特性，如：樣本觀察期間的長短、樣本波動性、偏態與峰態對於馬可夫轉換模型所認定的危機結果表現是具有決定性的因素的。

未來將挑選出一些解釋變數，並以所建構危機日期的基礎與相關的計量模型（probit或logit模型），尋找造成貨幣危機的決定性因素；或是採用時間變動機率的馬可夫轉換模型來同時決定危機時點與決定性的解釋變數。不過值得注意的是，以時間變動機率的馬可夫轉換模型會隨解釋變數置入的多寡而影響模型結果的收斂與否。再者Cerra and Saxena (2002)的實証結果顯示，使用變動轉換機率的馬可夫轉換模型會產生較多的危機警訊，故需要更為謹慎的選取解釋變數。

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表 1　貨幣危機日期的比較

| | Annual Report on exchange arrangements and exchange restrictions (AREAER) | Bris, Koskinen and Pons (2002) | Dornbusch, Goldfajn and Valdés (1995) | Jotzo (1999) | Glick and Hutchison (1999) | Kaminsky and Reinhart (1999) |
|---|---|---|---|---|---|---|
| 涵蓋期間 | 1990-1998 | 1985-2000 | 1970s-1995 | 1980-1998 | 1975-1997 | 1970-present |
| 認定危機方法 | 匯率制度變動的日期 | 政府或央行宣布讓匯率浮動、匯率貶值 | 金融刊物、各項總體指標（如 GDP、失業率）惡化，作人為判別 | 棄守固定匯率、單一事件發生：外匯流失、匯率貶值 | 指標平均值以上兩個標準差即為危機點 | 指標平均值以上三個標準差即為危機點 |
| ARGENTINA | 1991M1#, | 1995M1 | | | 1975-1976, 1982-1983, 1989-1991 | 1970M6, 1975M6, 1981M2, 1986M9 1989M4, 1990M2 2002M2 |
| BRAZIL | 1990M3~, 1994M7~, | 1995M3 | | | 1982-1983, 1987, 1990-1991, 1995 | 1983M2, 1986M11 1989M7, 1990M11 1991M10, 1999M1 |
| CHILE | No | | 1978-1982 | 1982M6 | 1985 | 1971M12, 1972M8 1973M10, 1974M12 1976M1, 1982M8 1984M9 |
| FINLAND | 1992M9*, 1996M10~, | 1992M9 | 1988-1992 | | 1977-1978, 1982, 1991-1993 | 1973M6, 1982M10 1991M11, 1992M9 |
| MEXICO | 1994M12*, | 1994M12 | 1978-1982 1990-1994 | 1982M2 1994M12 | 1976-, 1982, 1985, 1994-1995 | 1976M9, 1982M2 1982M12, 1994M12 1998M1 |
| MALAYSIA | 1992M12*, | 1997M7 | | | 1986, 1997 | 1975M7, 1997M8 1998M6 |

| | | | | | |
|---|---|---|---|---|---|
| NORWAY | 1992M12*, | 1992M12 | | 1978, 1986, 1992 | 1973M6, 1978M2<br>1986M5, 1992M12<br>1998M7, 1999M7<br>2000M11 |
| PHILIPPINES | No | 1997M7 | | 1983-1984, 1986<br>1997 | 1970M2, 1983M10<br>1984M6, 1986M2<br>1997M12 |
| SPAIN | No | 1993M5 | | 1976-1977, 1982, 1992-1993 | 1976M2, 1977M7<br>1982M12, 1992M9<br>1993M5 |
| SWEDEN | 1992M11*, | 1992M11 | | 1977, 1981-1982<br>1992-1993 | 1977M8, 1981M9<br>1982M10, 1992M11 |
| THAILAND | 1997M7*, | 1997M7 | 1997M7 | 1981, 1984, 1997 | 1978M11, 1981M7<br>1984M11, 1998M1<br>1999M9, 2000M7 |
| TURKEY | No | 1994M3 | | 1978-1980, 1994 | 1970M8, 1980M1<br>1994M3, 2001M2 |
| VENEZUELA | 1993M9~, 1994M7#,<br>1996M4 | 1995M12 | | 1984, 1986, 1994-1996 | 1986M12, 1989M3<br>1994M2, 1994M5<br>1995M12 |

註 1：Kaminsky and Reinhart（1999）指標是採用名目匯率與外匯存底的組合性指標，而 Glick and Hutchison (2001)則採用實質匯率與外匯存底的組合。

註 2：*表示匯率制度由固定變為獨立浮動或是管理浮動制度，#表示匯率制度由浮動變為固定匯率，而~則是表示同一個匯率制度間細目的轉變。（如：釘住一種貨幣與一籃貨幣皆為固定匯率制度。）

資料來源：本研究

表 2 近年在貨幣危機上應用馬可夫轉換模型的研究

| 研究者 | 研究方法 | 樣本國家與樣本時間 | 指標 | 重要發現 |
|---|---|---|---|---|
| Abiad (2003) | 時間變動機率的馬可夫轉換模型 | 印尼、馬來西亞、菲律賓、韓國與泰國，而資料採用從 1972 年到 1999 年的月資料 | 3 個分類: Macro economic indicators, capital flow indicators, financial fragility indicators 22* 預警系統指標 | 作者正確的預測近 2/3 的樣本內的危機期間，並且提供了許多較小比例的錯誤訊號。而在樣本外的預測下，馬來西亞與菲律賓共出現了 2/5 的危機警訊。 |
| Boinet, Napolitano and Spagnolo (2002) | 固定轉換機率的馬可夫轉換模型 | 阿根廷，資料採用從 1992 年到 2001 年的季資料 | 4 個基本面指標: The growth rate, The deficit to GDP ratio, The real exchange rate, The trade balance as a ratio of GDP | 作者在實證下發現個體的自我實現（self-fulfilling）在貨幣危機中扮演著一個很重要的觸發因素。而且兩狀態的模型設計，允許意外貶值預期的發生，使得模型的顯著表現的更佳。 |
| Brunetti, Mariano, Scotti and Tan (2003) | 加入 GARCH 設定下的時間變動機率馬可夫轉換模型 | 馬來西亞、菲律賓、新加坡與泰國，而資料採用從 1984 年到 2001 年的月資料 | 7 個變數: Exchange rate return/devaluation, M2 ratio, real domestic credit/GDP, real effective exchange rate devaluation, domestic-US real interest rate differential on deposits, stock index returns and volatility, banking sector return and volatility. | 作者發現匯率貶值率中存在著異質變異（heteroskedasticity）的特性，所以模型設定隱含著不只是假設狀態與狀態間會相互變動，並且依循著 GARCH 的過程作轉變。 |
| Cerra and Saxena (2002) | 時間變動機率的馬可夫轉換模型 | 印尼，採用的樣本時間為從 1985 年到 1997 年的月資料 | 8 個變數: Private claims to GDP, domestic credit to GDP, foreign liabilities to GDP, foreign assets to M1, interest rate spread, trade balance, term of trade, political confidence | 在泰國與韓國所發生的貨幣危機，透過股票市場或是其他金融市場會間接並顯著的影響印尼發生貨幣危機的機率。 |
| Jeanne and Masson (2000) | 固定轉換機率的馬可夫轉換模型 | 法國，而資料為 1987 年到 1993 年的月資料 | 3 個基本面變數: The unemployment rate, The trade balance as ratio to GDP, The percentage deviation of the real effective exchange rate and one time trend variable. | 在模型假設貶值預期呈現一種太陽黑子的狀態中，作者發現實證模型的表現優於其他沒有產生結構轉換的模型（如：線性模型）。 |

| | | | | |
|---|---|---|---|---|
| Fratzscher (2003) | 時間變動機率的馬可夫轉換模型 | 24* 開放的新興國家，而資料為從 1986 年到 1998 年的月資料 | 2 個分類:<br>1. 傳染面:<br>Contagion from real sector, and financial sector (Bank contagion and equity market contagion)<br>2. 基本面:18*個變數 | 一旦考慮國與國之間產生的實質整合（real integration），如貿易整合或金融整合，以及金融依賴（financial interdependence）都會顯著的增加亞洲金融危機的預測能力。 |
| Mariano, Abiad, Gultekin, Shabbir and Tan (2002) | 時間變動機率的馬可夫轉換模型 | 印尼、馬來西亞、菲律賓與泰國，而資料為 1974 年到 1998 年的月資料 | 3 個預警變數:<br>Real exchange rate overvaluation (relative trend), Growth in domestic credit, M2/Reserves | 使用向量自我迴歸的馬可夫轉換模型（Markov-switching-VAR）可以提供一個可分析的架構，來研究傳染效果對貨幣危機產生的影響。實證結果雖然發現這些亞洲國家都受到傳染效果的影響，但在菲律賓與泰國的危機發生前，卻出現了較弱的危機訊號。 |
| Matinez Peria (2002) | 時間變動機率的馬可夫轉換模型 | 7* 個參與歐洲貨幣機制的會員國，而資料是採用從 1979 年到 1993 年的月資料 | 6 個變數:<br>Domestic credit growth, trade balance, real exchange rate, interest rate differentials, unemployment rate, government surplus | 馬可夫轉換模型改善了認定投機性攻擊與貨幣危機日期的能力。而實證發現國家的預算赤字（budget deficits）與人的預期都會影響貨幣危機發生的機率。 |
| Plata and Schrooten (2003) | 固定轉換機率的馬可夫轉換模型 | 阿根廷，資料採用從 1994 年到 2001 年的月資料 | 4 個分類: Capital account indicators, Current account indicators, Financial sector indicators, and Real sector indicator<br>7 個指標: Index of pressure, M2/reserves, bank deposits, domestic credit, imports, M1, output | 作者發現個體的預期是可能觸發阿根廷聯繫匯率制度（currency board）發生崩潰的決定性因素，並且指出自我實現的預期因素是造成匯率制度發生重組或是發生貨幣危機的要素，並非一定取決於不好的基本面（weak fundamentals）。 |

註：*表示為以下敘述

1.22 個危機預警指標包括 deviations of real exchange rate from trend, current account balance/GDP, export growth rate, M2/reserves level, M2/reserves growth rate, reserves , growth rate, growth rate of real domestic credit（deflated by nominal GDP）, industrial production growth rate, real GDP growth rate（interpolated from quarterly GDP）, stock market performance growth rate, real interest rate, LIBOR, bank assets/GDP growth rate, short term debt/reserves, non-FDI capital flows; stock relative to GDP, portfolio flows（share in stock of total capital flows）, bank reserves/total bank liabilities, bank deposit/M2 level, bank deposit/M2 growth rate, loan/deposits level, and loan/deposits growth rate.

2. 24 個新興市場國家包括：Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Peru, Venezuela; China, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand; Czech Republic, Hungary, Jordan, Poland, Russia, South Africa, Turkey.

3. 18 個指標包括：total foreign debt/GDP, total short term debt/GDP, total short term debt/total foreign debt, total capital inflows/ GDP, short-capital inflows/GDP, short term to total capital inflows,（exports + imports）/GDP, current account, real effective exchange rate（REER）relative to 1990, and the change in REER during the prior one or two years, ratio of total foreign exchange reserves to either M2 or to imports, rate of credit expansion to the private sector relative to GDP, government deficit/GDP, government debt/GDP, changes in interest rates, growth rates in industrial countries, US$ exchange rate change to Japanese yen and German mark.

4. 7 個 ERM 國家包括：Belgium, Denmark, France, Ireland, Italy, Spain, and the UK

資料來源：本研究

表 3　三種馬可夫轉換模型所界定的危機日期比較

| | 樣本期間 | 簡單模型下的馬可夫轉換模型 | 一階自我相關下的馬可轉換模型 | GARCH 下的馬可夫轉換模型 |
|---|---|---|---|---|
| ARGENTINA | 1978M3~2003M11 | 1978M4~1980M3; 1981M6~1983M5; 1985M11~1986M8; 1988M9~1991M7; 1992M2~1992M12; 2002M1~2003M2; | 1981M6~1981M6; 1982M1~M2; 1982M4~1982M10; 1983M1~1983M1; 1983M7~1983M7; 1985M7~1985M11; 1986M2~1986M2; 1986M9~1986M9; 1988M8~1988M10; 1989M3~1989M7; 1989M12~1990M7; 1990M11~1991M4; 1992M1~1992M3; 2002M1~2002M6; 2003M1~2003M5; | 1978M4~1978M4; 1981M2~1981M2; 1981M4~1981M4; 1981M6~1981M6; 1981M10~1981M10; 1982M5~1982M5; 1982M7~1982M7; 1983M1~1983M1; 1983M7~1983M7; 1983M9~1983M9; 1983M12~1983M12; 1984M11~1984M11; 1985M2~1985M2; 1986M9~1986M9; 1989M4~1989M4; 1989M6~1989M6; 1989M12~1989M12; 1990M2~1990M2; 1990M4~1990M4; 1991M2~1991M2; 2002M1~2002M1; 2002M5~2002M5; 2003M1~2003M1 |
| AUSTRIA* | 1970M1~1998M12 | 1970M2~1970M7; 1974M4~1974M10; 1976M9~1978M2; 1979M7~1982M2; 1983M10~1985M7; 1988M7~1990M3; 1991M4~1992M4; 1996M4~1998M9; | 1970M2~1970M4; 1972M3~1973M1; 1973M8~1974M9; 1975M8~1977M11; 1979M3~1981M9; 1982M9~1983M2; 1983M5~1985M3; 1988M1~1989M6; 1989M9~1989M11; 1990M11~1992M2; 1992M10~1993M2; 1993M5~1993M9; 1994M12~1994M12; 1995M6~1998M6; | 1970M2~1970M2 |
| AUSTRALIA | 1970M7~1997M6 | 1970M18~1971M1; 1973M2~1976M1; 1977M6~1982M5; 1984M3~1985M1; 1985M7~1986M9; 1988M6~1990M3; 1993M8~1997M3; | 1970M8~1974M8; 1974M11~1975M4; 1976M2~1976M11; 1977M2~1977M11; 1978M1~1982M4; 1984M4~1984M11; 1985M5~1987M7; 1987M10~1997M6; | 1970M8~1970M8; 1971M12~1971M12; 1973M1~1973M1; 1974M7~1974M7; 1974M10~1974M10; 1975M5~1975M5; 1975M8~1975M8; 1975M12~1975M12; 1977M1~1977M1; 1977M5~1977M5; 1977M7~1977M7; 1977M12~1977M12; 1980M10~1980M10; 1981M2~1981M2; 1982M1~1982M1; 1982M5~1982M5; 1982M7~1982M7; 1982M9~1982M9; 1982M11~1982M11; 1983M1~1983M1; 1983M8~1983M8; 1984M1~1984M1; 1984M4~1984M4; 1984M10~1984M10; 1984M12~1984M12; 1985M2~1985M2; 1985M6~1985M6; 1985M11~1985M11; 1986M2~1986M2; 1986M7~1986M7; 1986M11~1986M11; 1987M4~1987M4; 1987M6~1987M6; 1987M11~1987M11; 1988M1~1988M1; 1988M4~1988M4; 1988M9~1988M9; 1988M11~1988M11; 1989M3~1989M3; 1989M5~1989M5; 1989M11~1989M11; 1990M3~1990M3; |

| | | | | |
|---|---|---|---|---|
| | | | | 1994M1~1994M1; |
| BELGIUM* | 1970M1~ 2003M11 | 1973M6~1975M2; 1976M6~1977M7; 1978M3~1979M2; 1979M9~1980M10; 1981M9~19682M8; 1984M4~1985M1; 1985M10~1987M6; 1989M7~1993M11; 1995M1~1995M9; | 1973M6~1973M6; 1980M3~1980M3; | 1970M7~1970M7; 1973M6~1973M6; 1974M2~1974M2; 1975M2~1975M2; 1977M9~1977M9; 1979M3~1979M3; 1980M3~1980M3; 1981M2~1981M2; 1983M4~1983M4; 1992M12~1992M12; 1993M8~1993M8; 1993M11~1993M11; 1994M8~1994M8; 1996M3~1996M3 |
| BRAZIL | 1970M1~ 1995M6 | 1970M2~1970M12; 1972M6~1973M10; 1984M4~1985M3; 1989M12~1990M2; 1990M12~1991M2; 1992M3~1993M1; 1995M6~1995M6; | 1989M12~1990M4; 1990M12~1991M4; 1992M3~1992M3; 1992M8~1993M3; 1994M7~1994M7; | 1982M9~1982M9; 1984M1~1984M1; 1989M1~1989M1; 1989M10~1989M10; 1989M12~1990M3; 1990M10~1990M10; 1990M12~1990M12; 1991M2~1991M3; 1992M1~1992M1; 1992M3~1992M3; 1994M7~1994M7; |
| CHILE | 1978M1~ 2003M10 | 1978M2~1981M3; 1982M7~1986M9; 1988M1~1988M11; 1989M6~1993M2; 1994M8~1995M7; | 1981M4~1981M12; 1984M4~1984M9; 1986M9~1987M4; 1993M5~1993M8; 1995M4~2003M10; | 1978M2~1978M2; 1978M5~1978M5; 1979M3~1979M3; 1979M8~1979M8; 1982M7~1982M7; 1983M7~1983M7; 1984M1~1984M1; 1984M10~1984M10; 1985M10~1985M10; 1986M3~1986M3; 1989M6~1989M6; 1992M11~1992M11; |
| DENMMARK* | 1973M1~ 2003M11 | 1974M2~1974M12; 1976M4~1977M3; 1979M11~1980M11; 1981M5~1983M2; 1984M4~1985M5; 1988M12~1990M4; 1991M5~1993M11; 1996M12~1999M3; 1999M11~2001M8; | 1973M8~1984M5; 1992M11~1994M4; | 1975M5~1975M5; 1976M9~1976M9; 1976M11~1976M11; 1977M4~1977M4; 1977M9~1977M9; 1977M12~1977M12; 1978M6~1978M8; 1978M11~1978M12; 1980M2~1980M2; 1981M2~1981M2; 1982M10~1982M11; 1983M4~1983M4; 1983M9~1983M10; 1985M12~1985M12; 1987M5~1987M5; 1993M3~1993M3; |
| FINLAND* | 1976M1~ 2002M12 | 1976M5~1977M9; 1978M12~1979M12; 1981M1~1985M3; 1987M7~1988M5; 1989M9~1990M4; 1991M7~1992M4; 1997M7~1998M12; 2000M3~2002M2; | 1979M7~1980M9; 1981M4~1983M11; 1984M12~1985M5; 1986M4~1986M7; 1986M9~1986M11; 1988M1~1990M2; 1991M1~1992M8; 1994M12~1998M12; | 1970M4~1970M4; 1970M6~1970M8; 1974M1~1974M1; 1975M1~1975M1; 1976M1~1976M1; 1977M1~1977M1; 1980M3~1980M4; 1981M4~1981M4; 1981M10~1981M10; 1982M5~1982M5; 1982M9~1982M101983M8~1983M8; 1983M12~1983M12; 1985M7~1985M7; 1986M5~1986M5; 1987M5~1987M5; 1989M7~1989M7; 1992M11~1992M11; 1993M7~1993M7; 1996M3~1996M3; 1997M3~1997M3; 1998M6~1998M6; |

| | | | | |
|---|---|---|---|---|
| FRANCE* | 1970M1~ 2003M10 | 1974M1~1975M10; 1980M6~1983M7; 1988M8~1989M11; 1991M6~1992M4; 1993M1~1994M6; 1997M3~1998M4; | 1970M5~1970M9; 1974M1~1974M1; 1975M1~1975M1; 1976M1~1976M1; 1977M1~1977M1; 1981M10~1981M10; 1983M8~1983M8; 1985M7~1985M8; 1986M5~1986M5; 1987M5~1987M5; 1997M3~1997M3; | 1987M8~1987M8; |
| GERMANY* | 1979M1~ 2003M11 | 1979M2~1982M3; 1983M12~1985M7; 1988M6~1989M12; 1990M12~1992M6; 1996M4~2003M1; | 1979M5~1979M9; 1979M11~1980M12; 1981M4~1981M8; 1981M11~1982M1; 1982M3~1982M11; 1983M1~1985M3; 1985M5~1986M12; 1987M2~1987M10; 1988M2~1989M11; 1990M3~1992M5; 1995M11~1993M7; 1993M10~1994M7; 1994M9~1996M2; 1996M4~2003M11; | 1979M2~1979M2; 1979M10~1979M10; 1982M2~1982M2; 1982M5~1982M5; 1982M12~1982M12; 1985M2~1985M2; 1985M4~1985M4; 1987M1~1987M1; 1987M11~1987M11; 1988M1~1988M1; 1989M12~1989M12; 1992M9~1992M9; 1993M8~1993M8; 1994M6~1994M6; 1994M8~1994M8; 1995M3~1995M3; 1996M3~1996M3; |
| GREECE* | 1970M1~ 2003M8 | 1970M2~1971M3; 1974M1~1977M3; 1978M7~1979M5; 1979M9~1985M12; 1988M5~1991M10; 1992M11~1993M11; 1997M8~1998M9; 1999M11~2000M12; | 1970M2~1970M6; 1974M1~1974M9; 1979M9~1980M6; 1981M2~1982M10; 1984M2~1985M4; 1989M5~1989M10; 1997M7~1998M3; | 1971M1~1971M1; 1972M9~1972M9; 1974M1~1974M1; 1975M1~1975M1; 1978M6~1978M6; 1979M6~1979M6; 1979M9~1979M9; 1980M9~1980M9; 1983M1~1983M1; 1984M1~1984M1; 1986M1~1986M1; 1988M1~1988M1; 1988M3~1988M3; 1989M1~1989M1; 1991M7~1991M7; 1995M5~1995M5; 1995M7~1995M7; 1997M7~1997M7; |
| INDONESIA | 1975M4~ 2003M9 | 1976M5~1977M12; 1997M10~2000M6; | 1976M4~1977M10; 1978M11~1978M12; 1979M11~1979M12; 1983M3~1983M4; 1985M2~1985M3; 1986M9~1986M10; 1987M9~1987M9; 1988M8~1988M8; 1989M7~1989M8; 1991M2~1991M6; 1997M8~1999M10; 2000M5~2000M10; | NO CRISIS |
| IRELAND* | 1970M1~ 2002M12 | 1972M9~1974M9; 1976M5~1977M3; 1978M11~1980M6; 1981M5~1984M2; 1984M7~1985M5; 1988M12~1990M5; 1991M6~1993M8; 1994M4~1994M9; 1996M4~1998M11; | 1971M12~1971M12; 1974M8~1975M3; 1977M3~1977M12; 1980M6~1980M7; 1984M2~1984M3; 1985M4~1986M2; 1987M7~1988M3; 1990M4~1991M1; 1993M3~1993M4; 1993M9~1994M2; 1998M12~1998M12; | 1984M3~1984M3; 1993M3~1993M3; 1993M9~1993M9; |
| ITALY* | 1972M1~ 2003M10 | 1972M2~1973M12; 1980M1~1981M3; 1982M5~1985M8; 1988M4~1990M1; 1991M4~1992M8; 1993M9~1996M2; 1997M2~1998M12; | 1974M2~1977M11; | 1972M2~1972M2; 1974M9~1974M9; 1975M1~1975M1; 1975M4~1975M4; 1976M11~1976M11; 1977M4~1977M4; 1977M9~1977M9; 1977M11~1977M11; 1978M5~1978M5; 1979M3~1979M3; 1979M12~1979M12; 1980M3~1980M3; 1981M4~1981M4; 1983M4~1983M4; 1983M12~1983M12; |

| | | | | |
|---|---|---|---|---|
| | | | | 1987M5~1987M5; 1987M11~1987M11; 1992M9~1992M9; 1993M9~1993M9; 1995M3~1995M3; 1996M3~1996M3; |
| KOREA | 1970M1~2003M10 | 1972M1~1972M12; 1975M9~1977M12; 1982M1~1982M12; 1988M2~1989M7; 1997M1~2000M3; | 1971M7~1971M7; 1972M1~1972M1; 1972M7~1972M7; 1972M12~1973M1; 1973M12~1974M2; 1974M12~1975M2; 1975M7~1975M12; 1976M3~1976M4; 1976M12~1977M1; 1978M1~1978M1; 1979M1~1979M1; 1980M1~1980M2; 1981M1~1981M2; 1982M1~1982M1; 1983M1~1983M1; 1987M1~1987M1; 1988M2~1989M3; 1996M7~1996M7; 1997M7~1997M7; 1997M11~1998M4; 1998M7~1999M1; 1999M7~1999M7; | 1971M1~1971M1; 1971M7~1971M7; 1972M1~1972M1; 1972M7~1972M7; 1973M1~1973M1; 1974M12~1974M12; 1975M9~1975M9; 1976M3~1976M3; 1976M12~1976M12; 1978M1~1978;1; 1979M1~1979M1; 1980M1~1980M1; 1980M10~1980M10; 1981M1~1981M1; 1982M1~1982M1; 1983M1~1983M11985M3~1985M3; 1986M7~1986M7; 1987M1~1987M1; 1988M3~1988M3; 1988M12~1988M12; 1996M7~1996M7; 1996M12~1996M12; 1997M7~1997M7; 1997M11~1997M11; 1998M7~1998M7; 1998M11~1998M11; 1999M7~1999M7 |
| LUXEMBOURG* | 1992M12~1999M4 | 1997M2~1998M1; | 1994M4~1994M4; 1997M1~1997M12; 1999M2~1999M4; | NO CRISIS |
| MALAYSIA | 1970M1~2003M10 | 1974M2~1974M9; 1976M3~1977M6; 1985M7~1986M3; 1986M11~1987M10; 1992M8~1994M11; 1997M9~2000M3; | 1974M2~1987M11; 1992M7~1993M2; 1993M11~1995M1; 1997M5~1999M6; | 1984M10~1984M10; |
| MEXICO | 1976M1~2003M11 | 1976M9~1977M12; 1982M1~1989M8; 1990M6~1992M5; 1994M6~1998M1; 1998M9~1999M2; | 1976M6~1978M1; 1981M6~1985M8; 1986M12~1988M6; 1988M12~1991M6; 1993M11~1994M4; 1994M12~1996M11; 1998M8~1998M9; 1999M9~1999M9; | NO CRISIS |
| NETHERLANDS* | 1970M1~1998M12 | 1973M8~1973M9; 1973M12~1974M7; 1976M4~1977M3; 1978M5~1979M1; 1981M5~1982M5; 1983M11~1985M8; 1988M8~1990M2; 1991M4~1992M4; 1996M2~1998M12; | 1970M2~1982M7; | 1970M10~1970M10; 1973M7~1973M8; 1973M10~1973M12; 1976M8~1976M101978M10~1978M10; 1979M10~1979M10; 1980M3~1980M3; 1982M1~1982M1; |
| NORWAY | 1970M1~2003M11 | 1970M2~1970M8; 1972M8~1975M5; 1976M8~1977M7; 1977M12~1978M11; 1980M1~1980M9; 1983M8~1984M1; 1985M12~1988M5; 1990M1~1991M3; | 1992M10~1993M1; 1993M11~1994M1; | 1970M2~1970M2; 1992M10~1992M12; 1993M9~1993M11; 1998M8~1998M8 |

| | | | | |
|---|---|---|---|---|
| | | 1991M10~1992M12; 1994M6~1996M4; 1997M12~1999M8; 2000M11~2003M5; | | |
| PHILIPPINES | 1970M1~2003M10 | 1970M2~1970M12; 1981M2~1985M5; 1987M11~1991M1; 1995M5~1996M3; 1997M8~1998M9; 2000M6~2001M10; 2003M3~2003M10; | 1970M5~1970M10; 1971M4~1974M11; 1975M1~1975M11; 1976M1~1978M4; 1978M6~1979M11; 1980M2~1980M11; 1981M3~1983M8; 1986M5~1986M6; 1987M6~1987M8; 1988M1~1989M5; 1989M7~1989M7; 1992M6~1993M7; 1993M11~1994M6; 1994M9~1995M4; 1996M1~1996M4; 1996M11~1997M6; 1998M6~1998M6; 1999M8~2000M4; 2000M7~2000M10; 2001M3~2001M11; 2002M1~2002M4; 2002M7~2003M1; 2003M7~2003M10; | 1970M2~1970M3; 1970M12~1971M3; 1971M12~1971M12; 1974M12~1974M12; 1975M12~1975M12; 1978M5~1978M5; 1979M5~1979M5; 1979M12~1979M12; 1980M12~1980M12; 1982M10~1982M10; 1983M9~1983M10; 1984M2~1984M2; 1984M6~1984M6; 1984M10~1984M10; 1984M12~1985M2; 1985M4~1985M4; 1985M6~1985M12; 1986M3~1986M3; 1986M8~1987M3; 1987M9~1987M9; 1987M12~1987M12; 1989M6~1989M6; 1989M10~1989M11; 1990M1~1990M1; 1990M5~1990M6; 1990M9~1990M10; 1991M1~1991M5; 1991M9~1992M4; 1993M3~1993M3; 1993M8~1993M8; 1994M8~1994M8; 1995M2~1995M2; 1995M5~1995M5; 1995M8~1995M9; 1995M11~1995M11; 1996M5~1996M5; 1996M8~1996M8; 1997M8~1997M11; 1998M1~1998M1; 1998M8~1998M1; 1999M7~1999M7; 2000M12~2001M2; 2001M12~2001M12; 2002M5~2002M5; 2003M2~2003M4; |
| RUSSIA | 1996M1~2003M8 | 1996M7~1997M4; 1997M11~1998M6; 1999M5~2000M5; 2001M4~2001M7; 2001M9~2003M8; | 1997M6~1997M10; 1998M1~2001M1; 2001M3~2001M6; | 1996M4~1996M7; 1996M11~1996M11; 1997M3~1997M3; 1977M5~1997M5; 1997M11~1997M11; 2001M2~2001M2; 2001M8~2001M9; |
| SINGAPORE | 1974M4~2003M10 | 1974M7~1974M10; 1975M10~1977M8; 1979M3~1981M2; 1982M12~1983M1; 1983M12~1985M10; 1986M10~1989M5; 1996M3~1999M5; 1999M11~2002M4; | 1974M10~1981M2; 1983M4~1989M10; 2000M1~2003M10; | 1981M3~1981M3; 1981M11~1981M11; 1982M3~1982M3; 1982M11~1982M11; 1983M3~1983M3; 1989M11~1989M11; 1990M10~1990M10; 1991M1~1991M1; 1991M5~1991M5; 1991M9~1991M9; 1992M5~1992M5; 1992M10~1992M10; 1992M12~1992M12; 1993M10~1993M10; 1994M12~1994M12; 1995M7~1995M7; 1996M10~1996M10; 1998M10~1998M10; 1999M2~1999M2; 1999M10~1999M10; |
| SPAIN* | 1975M1~2003M10 | 1975M11~1977M11; 1980M4~1984M2; 1989M3~1989M9; 1992M10~1994M3; | 1975M2~1976M9; 1977M6~1985M3; 1992M9~1993M12; | 1978M2~1978M2; 1979M6~1979M6; 1979M8~1979M8; 1979M12~1979M12; 1981M3~1981M3; 1981M12~1981M12; |

| | | | | |
|---|---|---|---|---|
| | | 1997M5~1998M4; 1974M1~1974M10; 1979M10~1982M4; 1983M12~1985M7; 1988M11~1990M4; 1991M6~1992M6; 1996M10~1998M8; 1999M8~2001M8; | | 1983M10~1983M10; |
| SWEDEN* | 1970M1~2002M12 | 1970M2~1970M6; 1974M3~1975M4; 1976M10~1977M9; 1979M7~1983M10; 1984M5~1985M6; 1988M6~1990M3; 1992M11~1993M11; 1994M10~1995M9; 1997M2~1998M10; 1999M7~2002M4; | 1970M2~1970M5; 1970M9~1975M3; 1975M9~1976M9; 1976M11~1977M8; 1978M2~1985M2; 1986M10~1989M6; 1991M6~1992M9; 1994M6~2002M12; | 1976M10~1976M10; 1977M10~1977M10; |
| SWITZERLAND* | 1970M1~2003M11 | 1974M1~1974M10; 1979M10~1982M4; 1983M12~1985M7; 1988M11~1990M4; 1991M6~1992M6; 1996M10~1998M8; 1999M8~2001M8; | 1971M8~1972M8; | 1970M8~1972M9; 1974M10~1975M2; 1977M10~1979M1; 1981M3~1982M6; |
| THAILAND | 1977M1~2003M11 | 1979M2~1982M7; 1984M5~1985M8; 1997M5~1998M9; 2000M6~2001M10; | 1979M10~1980M5; 1980M12~1983M11; 1984M11~1987M7; 1988M2~1988M5; 1997M6~1999M11; | 1979M10~1979M10; 1980M2~1980M2; 1981M5~1981M5; 1981M7~1981M7; 1983M11~1983M11; 1987M4~1987M4; 1988M4~1988M4; 1997M7~1997M7; 1998M6~1998M6; |
| TURKEY | 1970M1~2003M9 | 1970M2~1973M10; 1980M2~1982M11; 1983M12~1984M12; 1987M3~1987M5; 1989M8~1991M12; 1994M1~1996M3; 1977M7~1998M6; 2001M3~2003M9; | 1970M9~1971M5; 1971M9~1979M2; 1979M4~1979M12; 1980M3~1980M6; 1980M8~1980M12; 1981M2~1981M4; 1981M8~1983M11; 1984M2~1984M11; 1985M1~1987M12; 1988M3~1988M11; 1989M3~1989M12; 1990M2~1990M12; 1991M3~1993M12; 1994M5~1994M5; 1994M8~1994M9; 1994M11~1994M12; 1995M5~1995M6; 1995M8~1995M9; 1995M12~1997M6; 1997M8~1998M6; 1998M8~1999M11; 2000M1~2001M1; 2001M7~2002M1; 2002M5~2003M5; 2003M7~2003M9; | 1970M2~1970M2; 1971M6~1971M6; 1971M8~1971M8; 1979M3~1979M3; 1980M1~1980M1; 1981M1~1981M1; 1983M12~1983M12; 1984M12~1984M12; 1989M2~1989M2; 1990M1~1990M1; 1991M1~1991M; 1994M1~1994M1; 1994M4~1994M4; 1997M7~1997M7; 1998M7~1998M7; 1999M12~1999M12; 2003M6~2003M6; |
| UK* | 1970M1~2003M10 | 1970M2~1970M12; 1974M8~1974M11; 1975M7~1976M3; 1978M6~1978M9; 1979M4~1980M10; 1982M7~1984M5; 1988M7~1988M10; 1991M7~1992M5; 1992M9~2003M10; | 1971M2~1993M10; | 1970M2~1970M2; |

| | | | | |
|---|---|---|---|---|
| USA | 1979M1~2003M11 | 1979M2~1980M6; 1983M8~1984M9; 1985M11~1989M4; 1990M7~1998M2; 1998M12~2000M12; 2002M7~2003M11; | 1983M11~1989M3; 1990M10~2003M11; | 1979M2~1979M3; 1979M9~1979M11; 1980M3~1980M3; 1980M5~1980M5; 1980M10~1980M11; 1981M1~1981M2; 1981M5~1981M5; 1982M2~1982M2; 1983M7~1983M8; 1984M10~1984M10; 1987M4~1987M4; 1989M5~1989M6; 1990M5~1990M6; |

註：*表示在實質匯率的計算上是以德國的消費者物價指數作為計算的標準

資料來源：本研究

表４

| 國家 | Hadi 方法 (5%顯著水準) | Hadi 方法 (10%顯著水準) |
|---|---|---|
| ALGERIA | 1991M2~1991M4; 1994M12~1994M12; | 1991M2~1992M4; 1994M12~1994M12; |
| ARGENTINA | 1982M7~1982M8; 1989M5~1989M6; | 1982M7~1982M8; 1989M5~1989M6; |
| AZERBAIJAN | 1999M3~1999M3; 2000M4~2000M4; | 1999M3~1999M3; 2000M4~2000M4; |
| BELARUS | 2000M1~2000M1; | 2000M1~2000M1; |
| BRAZIL | 1989M12~1990M2; 1995M6~1995M6; | 1989M12~1990M2; 1995M6~1995M6; |
| BULGARIA | 1996M10~1996M10; 1996M12~1997M2; | 1996M10~1997M2; |
| CAMBODIA | NO CRISIS | 1998M7~1998M7; |
| CAMEROON | 1994M1~.1994M5; | 1994M1~1994M5; |
| CENTRAL AFRICAN | 1994M1~1994M6; | 1994M1~1994M6; |
| CHAD | 1994M1~1994M2; | 1994M1~1994M2; |
| CHILE | 1982M11~1982M11; 1984M11~1984M11; | 1982M10~1982M11; 1984M11~1984M11; |
| CHINA | 2001M2~2001M2; 2002M2~2002M2; | 2001M2~2001M2; 2002M2~2002M2; |
| CONGO REPUBLIC | 1994M1~1994M7; | 1994M1~1994M7; |
| CYPRUS | 1975M1~1975M12; | 1975M1~1975M12; |
| ECUADOR | 2000M1~2000M1; | 2000M1~2000M1; |
| EGYPT | NO CRISIS | 1979M4~1979M4; |
| EL SALVADOR | 1986M1~1986M3; 1986M6~1986M12; | 1986M1~1986M3; 1986M6~1986M12; |
| ETHIOPIA | 1993M1~1993M9; | 1993M1~1993M9; |
| GABON | 1979M8~1979M8; 1994M1~1994M2; | 1979M8~1979M8; 1994M1~1994M5; |
| GAMBIA | 2003M4~2003M5; | 2003M4~2003M5; |
| GHANA | 1984M5~1984M9; | 1984M5~1984M9; |
| GRENADA | NO CRISIS | 1987M5~1987M5; |
| HONDURAS | 1990M4~1991M2; | 1990M4~1991M2; |
| INDIA | NO CRISIS | 1991M7~1991M8; |
| INDONESIA | 1998M1~1998M9; | 1997M12~1998M11; |
| ISRAEL | 1984M8~1984M10; | 1984M7~1984M10; |
| JORDON | 1989M3~1989M3; | 1989M3~1989M3; |
| KENYA | 1993M7~1993M10; | 1993M7~1993M10; |
| KOREA | 1997M12~1998M3; | 1997M12~1998M3; |
| KUWAIT | NO CRISIS | 1979M4~1979M12; |
| LITHUANIA | 1994M8~1994M8; | 1994M8~1994M8 |
| MALAWI | NO CRISIS | 1994M12~1994M12; |
| MALAYSIA | 1998M1~1998M1; | 1998M1~1998M1; 1998M6~1998M6; |
| MOLDOVA | 1998M11~1999M10; | 1998M11~1999M10; |
| NEW ZEALAND | NO CRISIS | 1985M3~1985M3; 1985M5~1985M5; |
| PAKISTAN | NO CRISIS | 1972M8~1973M1; |

| | | |
|---|---|---|
| PAPU NEW GUINEA | 1998M7~1998M9; | 1998M4~1998M4; 1998M6~1998M10; |
| PERU | 1990M6~1990M7; | 1990M6~1990M7; |
| RUSSIA | 2001M8~2001M8; | 2001M8~2001M8; |
| RWANDA | NO CRISIS | 1990M11~1991M10; 1995M11~1996M2; |
| SRI LANKA | 2000M11~2001M7; | 2000M11~2001M7; |
| ST.LUCIA | 1985M5~1985M8; 1985M10~1985M12; | 1985M5~1985M8; 1985M10~1985M12; |
| THAILAND | 1997M11~1998M3; 1998M6~1998M6; | 1997M11~1998M3; 1998M6~1998M6; |
| TURKEY | 1994M4~1994M6; | 1994M4~1994M6; |
| UGANDA | 1982M4~1982M4; | 1982M4~1982M4; |
| UKRAINE | 1993M12~1994M4; 1995M5~1995M5; | 1993M12~1994M4; 1995M5~1995M5; |
| | 1997M8~1997M8; 1998M5~1998M5; | 1997M8~1997M8; 1998M5~1998M5; |
| | 2000M8~2000M8; | 2000M8~2000M8; |

資料來源：本研究

表 5 以本文之研究方法所認定之危機訊號的比較表

| | | Hadi 5%顯著水準 | | Hadi 10%顯著水準 | |
|---|---|---|---|---|---|
| | | Y | N | Y | N |
| 簡單模型的馬可 | Y | 140 | 15,195 | 182 | 15,153 |
| 夫轉換模型 | N | 25 | 19,966 | 26 | 19,965 |
| 訊號噪音比 | | 1.96 | | 2.03 | |

| | | Hadi 5%顯著水準 | | Hadi 10%顯著水準 | |
|---|---|---|---|---|---|
| | | Y | N | Y | N |
| 一階自我相關的 | Y | 98 | 12,899 | 121 | 12,876 |
| 馬可轉換模型 | N | 67 | 22,262 | 87 | 22,242 |
| 訊號噪音比 | | 1.62 | | 1.59 | |

| | | Hadi 5%顯著水準 | | Hadi 10%顯著水準 | |
|---|---|---|---|---|---|
| | | Y | N | Y | N |
| GARCH 下的馬可 | Y | 38 | 2,353 | 40 | 2,351 |
| 夫轉換模型 | N | 127 | 32,808 | 168 | 32,767 |
| 訊號噪音比 | | 3.44 | | 2.87 | |

| | | 一階自我相關的馬可轉換模型 | | GARCH 下的馬可夫轉換模型 | |
|---|---|---|---|---|---|
| | | Y | N | Y | N |
| 簡單模型的馬可 | Y | 7,048 | 8,287 | 1,122 | 14,213 |
| 夫轉換模型 | N | 5,949 | 14,042 | 1,269 | 18,722 |
| 訊號噪音比 | | 1.46 | | 1.09 | |
| GARCH 下的馬可 | Y | 1,220 | 1,171 | | |
| 夫轉換模型 | N | 11,777 | 21,158 | | |
| 訊號噪音比 | | 1.79 | | | |

註：訊號噪音比（signal to noise ratio）意指，在假設 B 模型為真時，來評估 A 模型的危機訊號給予的能力強弱，比率的計算公式表示為 $\frac{A}{A+C}\Big/\frac{B}{B+D}$，以下為矩陣的排列順序。

資料來源：本研究

| | | B 模型 | |
|---|---|---|---|
| A | | Y | N |
| 模型 | Y | A | B |
| | N | C | D |

表 6　以 logit 模型檢驗馬可夫轉換模型所認定的危機個數與危機期間

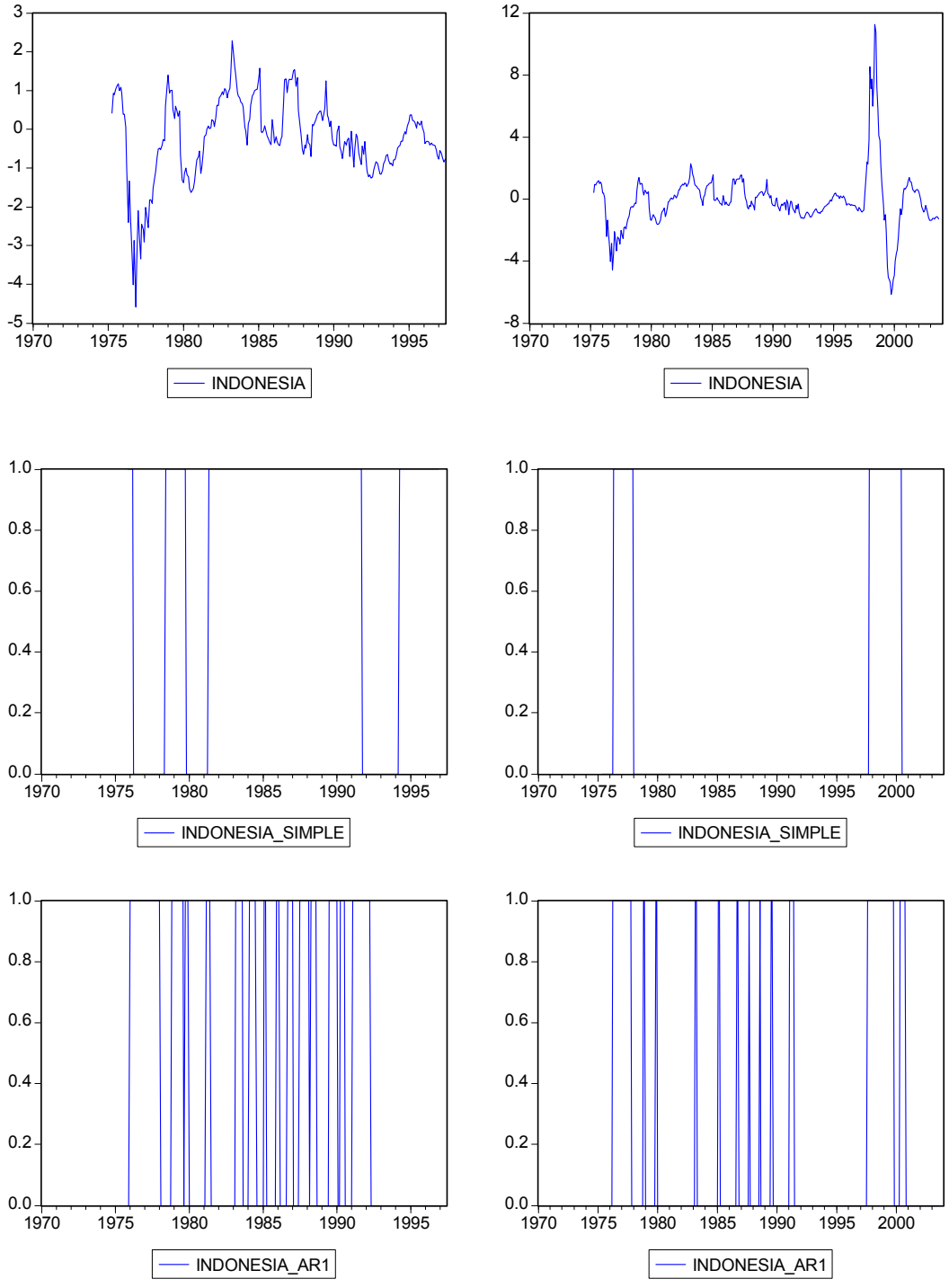
| | | 解釋變數 | | | |
|---|---|---|---|---|---|
| | | 偏態 | 峰態 | 間距 | 觀察樣本 |
| 危機個數 | 簡單馬可夫轉換模型 | -0.326 | 0.005 | -0.299 | 0.014 |
| | | (-1.353) | (0.067) | (-3.560) *** | (5.316)*** |
| | 一階自我相關的馬可夫轉換模型 | -0.716 | -0.088 | -0.085 | 0.005 |
| | | (-2.930)*** | (-1.105) | (-1.231) | (2.728)*** |
| | 考慮 GARCH 下的馬可夫轉換模型 | 0.051 | 0.112 | -0.196 | 0.006 |
| | | (0.300) | (2.118)** | (-3.002)*** | (3.353)*** |
| 危機期間 | 簡單馬可夫轉換模型 | 0.115 | 0.139 | -0.333 | 0.012 |
| | | (0.618) | (2.486)** | (-4.319)*** | (5.114)*** |
| | 一階自我相關的馬可夫轉換模型 | 0.239 | 0.056 | -0.140 | 0.006 |
| | | (1.397) | (1.130) | (-2.237)** | (3.005)*** |
| | 考慮 GARCH 下的馬可夫轉換模型 | 0.035 | 0.068 | -0.113 | 0.004 |
| | | (0.214) | (1.388) | (-1.854)* | (2.374)** |

註 1：間距代表在一個樣本國家下的外匯市場投機指標的時間序列中最大值與最小值的差距

註 2：*、**、***分別代表解釋變數的顯著水準在 10%、5%與 1%

資料來源：本研究

圖 1　印尼在經歷 1997 年貨幣危機前後（以 1997 年 6 月作分界）由簡單與一階自我相關馬可夫轉換模型所認定的結果比較



# Identifying Currency Crises

## An application of Markov-switching model


## Abstract

We apply the Markov-switching models to the identification of currency crises in a sample of 138 IMF member countries. We try three specifications: a simple switching model in which the two states have different mean and variance, a model with autoregressive mean, and a GARCH switching model in which conditional mean and conditional variance are allowed to vary. Using monthly data ranging from 1970 to 2003, we compare the results of crises classification with Hadi's outlier detection method. We find that regime-switching models can identify most well known crisis episodes, but they tend to identify too much crises, and the results are not robust to different model specifications. We discuss potential reasons that lead to the unsatisfactory performance of the regime-switching models in currency crises identification.



**Key words:** Markov-switching model, choice of crisis threshold, currency crises identification

**JEL codes:** C25, C49, G21

表３ 三種馬可夫轉換模型所界定的危機日期比較

| | 樣本期間 | 簡單模型下的馬可夫轉換模型 | 一階自我相關下的馬可轉換模型 | GARCH 下的馬可夫轉換模型 |
|---|---|---|---|---|
| ALBANIA | 1994M12~2003M9 | 1995M9~1998M4; 1999M6~2003M9; | 1995M3~1995M4; 1995M7~1995M9; 1996M9~1996M9; 1997M1~1997M2; 1998M1~1998M6; 1999M4~1999M5; 2000M4~2000M5; | 1998M3~2003M9; |
| ALGERIA | 1975M1~2003M1 | 1986M10~1991M12; 1994M4~1995M4; 1999M4~1999M9; | 1976M6~1976M6; 1986M10~1986M10; 1987M10~1987M10; 1989M5~1989M6; 1990M5~1990M7; 1990M12~1992M12; 1994M4~1994M6; 1994M12~1995M6; 1995M12~1996M1; 1998M2~1998M2; 1998M11~1998M11; 1999M2~1999M2; 2000M1~2000M1; 2000M10~2000M11; 2001M10~2001M10; | 1986M10~1986M10; 1989M4~1989M5; 1991M1~1992M12; 1994M3~1994M6; 1994M11~1995M5; 1995M12~1996M1; |
| ANGOLA | 1996M12~2001M4 | 1997M8~1999M12; | 1997M1~1997M2; 1997M4~1997M7; 1997M10~1999M8; 2000M7~2001M1; 2001M4~2001M4; | 1997M8~1997M8; 2000M1~2000M1; |
| ARGENTINA | 1978M3~2003M11 | 1978M4~1980M3; 1981M6~1983M5; 1985M11~1986M8; 1988M9~1991M7; 1992M2~1992M12; 2002M1~2003M2; | 1981M6~1981M6; 1982M1~M2; 1982M4~1982M10; 1983M1~1983M1; 1983M7~1983M7; 1985M7~1985M11; 1986M2~1986M2; 1986M9~1986M9; 1988M8~1988M10; 1989M3~1989M7; 1989M12~1990M7; 1990M11~1991M4; 1992M1~1992M3; 2002M1~2002M6; 2003M1~2003M5; | 1978M4~1978M4; 1981M2~1981M2; 1981M4~1981M4; 1981M6~1981M6; 1981M10~1981M10; 1982M5~1982M5; 1982M7~1982M7; 1983M1~1983M1; 1983M7~1983M7; 1983M9~1983M9; 1983M12~1983M12; 1984M11~1984M11; 1985M2~1985M2; 1986M9~1986M9; 1989M4~1989M4; 1989M6~1989M6; 1989M12~1989M12; 1990M2~1990M2; 1990M4~1990M4; 1991M2~1991M2; 2002M1~2002M1; 2002M5~2002M5; 2003M1~2003M1 |
| ARMENIA | 1996M4~2003M10 | 1997M4~2003M10; | 1996M10~1996M11; 1997M4~1997M11; 1998M8~1998M12; 2001M5~2000M5; 2001M2~2003M10; | NO CRISIS |
| ARUBA | 1987M1~2003M10 | 1987M8~1990M12; 1994M12~2001M6; 2003M6~2003M10; | 1988M1~1994M9; 1995M3~1998M8; | 1998M9~1998M9; 2000M8~2000M8; |
| AUSTRIA* | 1970M1~1998M12 | 1970M2~1970M7; 1974M4~1974M10; 1976M9~1978M2; 1979M7~1982M2; 1983M10~1985M7; 1988M7~1990M3; 1991M4~1992M4; 1996M4~1998M9; | 1970M2~1970M4; 1972M3~1973M1; 1973M8~1974M9; 1975M8~1977M11; 1979M3~1981M9; 1982M9~1983M2; 1983M5~1985M3; 1988M1~1989M6; 1989M9~1989M11; 1990M11~1992M2; 1992M10~1993M2; 1993M5~1993M9; 1994M12~1994M12; 1995M6~1998M6; | 1970M2~1970M2 |
| AUSTRALIA | 1970M7~1997M6 | 1970M18~1971M1; 1973M2~1976M1; 1977M6~1982M5; 1984M3~1985M1; | 1970M8~1974M8; 1974M11~1975M4; 1976M2~1976M11; 1977M2~1977M11; 1978M1~1982M4; 1984M4~1984M11; 1985M5~1987M7; 1987M10~1997M6; | 1970M8~1970M8; 1971M12~1971M12; 1973M1~1973M1; 1974M7~1974M7; 1974M10~1974M10; 1975M5~1975M5; |

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| AZERBAIJAN | 1997M3~2003M3 | 1997M4~1998M1; 1999M3~1999M3; 2000M4~2000M4; | 1997M4~1997M7; 1997M11~1997M11; 1998M2~1998M3; 1998M6~1998M6; 1999M3~1999M4; 1999M6~1999M6; 1999M11~1999M11; 2000M4~2000M5; 2000M11~2000M11; 2002M9~2002M9; | 1999M3~1999M4; 2000M4~2000M5; |
| BAHRAIN | 1986M7~2001M9 | 1987M1~1990M12; 1993M9~1997M3; 1997M11~2000M12; | 1986M9~1987M6; 1987M11~1988M5; 1988M8~1988M11; 1989M4~1991M1; 1991M6~1991M7; 1991M10~1991M10; 1991M12~1992M6; 1992M8~1994M2; 1994M5~1994M7; 1995M1~2000M2; 2000M4~2000M4; 2000M9~2001M2; | NO CRISIS |
| BANGLADESH | 1994M7~2003M4 | 1996M2~1998M4; 2000M8~2001M9; | 2000M8~2000M10; | 2000M8~2000M8; |
| BARBADOS | 1970M1~2003M7 | 1970M2~1971M12; 1976M5~1977M11; 1979M11~1982M8; 1984M3~1985M5; 1985M11~1992M5; 1993M9~1996M3; 1997M11~2000M6; 2002M6~2003M7; | 1971M12~1973M2; 1973M11~1974M2; 1974M11~1976M7; 1978M2~1978M3; 1981M10~1983M10; 1992M5~1993M5; 1998M10~1999M1; | 1970M2~1970M2; 1971M1~1971M1; 1972M1~1972M1; 1973M1~1973M1; 1973M6~1973M6; 1973M10~1973M10; 1974M12~1974M12; 1975M7~1975M7; 1975M12~1975M12; 1976M7~1976M7; 1978M11~1978M11; 1981M11~1981M11; 1982M7~1982M7; 1982M10~1982M10; 1983M1~1983M1; 1983M4~1983M4; 1983M10~1983M10; 1987M5~1987M5; 1992M6~1992M6; 1992M8~1992M8; 1993M2~1993M2; 1997M1~1997M1; 1998M10~1998M10; 1999M1~1999M1; |

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| BELARUS | 1996M9~2003M9 | 1999M5~2001M1; | 1998M12~1998M12; 2000M1~2000M2; | 1998M12~1998M12; 2000M1~2000M2; |
| BELGIUM* | 1970M1~2003M11 | 1973M6~1975M2; 1976M6~1977M7; 1978M3~1979M2; 1979M9~1980M10; 1981M9~19682M8; 1984M4~1985M1; 1985M10~1987M6; 1989M7~1993M11; 1995M1~1995M9; | 1973M6~1973M6; 1980M3~1980M3; | 1970M7~1970M7; 1973M6~1973M6; 1974M2~1974M2; 1975M2~1975M2; 1977M9~1977M9; 1979M3~1979M3; 1980M3~1980M3; 1981M2~1981M2; 1983M4~1983M4; 1992M12~1992M12; 1993M8~1993M8; 1993M11~1993M11; 1994M8~1994M8; 1996M3~1996M3 |
| BOLIVIA | 1996M1~2003M11 | 1996M2~1996M3; 1998M5~1999M12; 2001M1~2003M4; | 1996M2~1996M2; 2001M1~2001M1; | NO CRISIS |
| BOTSWANA | 1981M1~2003M9 | 1981M2~1983M6; 1984M9~1985M12; 1989M1~1989M6; 1990M12~1992M2; 1992M12~1993M12; 1996M2~1997M3; 1998M6~2002M9; | 1981M3~1982M1; 1982M3~1982M6; 1982M8~1983M6; 1983M9~1984M7; 1984M9~19894M12; 1985M2~1985M12; 1986M7~1986M8; 1986M10~1987M3; 1987M7~1987M8; 1987M10~1988M12; 1989M2~1990M8; 1990M12~1990M12; 1991M2~1991M8; 1992M2~1992M5; 1992M8~1993M5; 1993M8~1994M1; 1994M5~1995M3; 1995M5~1997M3; 1997M5~1998M5; 1998M8~2001M11; 2002M1~2002M11; 2003M1~2003M9; | 1981M2~1981M2; 1981M4~1981M5; 1981M10~1981M11; 1982M2~1982M2; 1982M5~1982M5; 1982M7~1982M7; 1982M10~1982M12; 1983M2~1983M3; 1983M6~1983M7; 1983M11~1983M11; 1984M1~1984M2; 1984M4~1984M5; 1984M8~1984M8; 1984M10~1984M10; 1985M1~1985M1; 1985M3~1985M4; 1985M6~1985M6; 1985M10~1985M10; 1985M12~1986M1; 1986M4~1986M4; 1986M9~1986M9; 1987M2~1987M2; 1987M4~1987M5; 1987M9~1987M9; 1988M2~1988M7; 1988M9~1988M9; 1988M12~1989M1; 1989M6~1989M7; 1989M12~1989M12; 1990M5~1990M5; 1990M7~1990M9; 1990M11~1990M11; 1991M1~1991M1; 1991M7~1991M11; 1992M1~1992M1; 1992M6~1992M6; 1992M11~1992M12; 1993M3~1993M3; 1993M5~1993M6; 1993M9~1993M9; 1994M1~1994M1; 1994M7~1994M7; 1994M12~1995M4; 1995M9~1995M10; 1996M1~1996M2; 1996M4~1996M4; 1996M6~1996M6; 1996M8~1996M8; 1997M1~1997M2; 1997M4~1997M4; 1998M1~1998M1; 1998M5~1998M7; 1998M10~1998M10; 1999M1~1999M1; 1999M4~1999M4; 1999M6~1999M7; 1999M10~1999M10; 1999M12~1999M12; 2000M3~2000M3; 2000M9~2000M9; |

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| BRAZIL | 1970M1~1995M6 | 1970M2~1970M12; 1972M6~1973M10; 1984M4~1985M3; 1989M12~1990M2; 1990M12~1991M2; 1992M3~1993M1; 1995M6~1995M6; | 1989M12~1990M4; 1990M12~1991M4; 1992M3~1992M3; 1992M8~1993M3; 1994M7~1994M7; | 1982M9~1982M9; 1984M1~1984M1; 1989M1~1989M1; 1989M10~1989M10; 1989M12~1990M3; 1990M10~1990M10; 1990M12~1990M12; 1991M2~1991M3; 1992M1~1992M1; 1992M3~1992M3; 1994M7~1994M7; |
| BULGARIA | 1994M12~2003M10 | 1995M1~1998M6; | 1995M9~1996M2; 1998M6~2003M10; | 1995M7~1995M7; 1996M5~1996M5; 1996M10~1996M11; 1997M3~1997M3; 1997M9~1997M9; 2001M6~2001M6; |
| BURUNDI | 1978M1~2003M8 | 1979M10~1980M7; 1983M11~1984M10; 1987M8~1988M12; 1990M1~1990M11; 1991M7~1993M4; 1997M11~2002M11; | 1979M10~1979M11; 1980M1~1980M1; 1980M10~1980M12; 1983M11~1983M12; 1984M11~1984M12; 1985M5~1985M5; 1985M9~1985M9; 1986M8~1986M9; 1987M1~1987M1; 1987M8~1987M9; 1988M1~1988M1; 1989M1~1989M3; 1989M5~1989M8; 1989M12~1990M1; 1991M1~1991M2; 1991M7~1991M8; 1992M2~1992M2; 1992M5~1992M8; 1992M11~1992M11; 1993M5~1993M7; 1993M9~1993M9; 1993M11~1993M11; 1994M5~1994M5; 1994M7~1994M7; 1997M11~1997M11; 1998M7~1998M7; 1998M10~1998M11; 1999M7~1999M7; 1999M10~1999M10; 2000M7~2000M7; 2001M2~2001M2; 2001M6~2001M7; 2002M2~2002M3; 2002M9~2002M12; 2003M3~2003M6; | 1979M10~1979M10; 1987M1~1987M1; 1987M8~1987M8; 1989M12~1990M1; 1991M7~1991M8; 1992M5~1992M7; 1993M5~1993M5; 1997M11~1997M11; 1998M10~1998M11; 2000M7~2000M7; 2001M5~2001M7; 2002M9~2002M12; 2003M3~2003M5; |
| CAMBODIA | 1995M10~2003M10 | 1997M10~1998M10; | 1995M11~1996M6; 1997M8~1998M9; 1999M8~1999M8; | NO CRISIS |
| CAMEROON | 1980M1~2002M12 | 1981M5~1981M9; 1985M10~1988M1; 1994M1~1995M11; 2000M6~2001M4; | 1981M1~1981M1; 1994M1~1994M1; 1994M6~1994M6; 1994M12~1995M1; 1995M6~1995M6; 1995M12~1995M12; 2000M5~2001M5; | 1985M7~1985M7; 1994M1~1994M1; 1994M12~1994M12; 1995M12~1995M12; 2000M6~2000M6; |
| CANADA | 1972M1~2003M10 | 1982M7~1983M11; 1986M12~1989M2; 1991M1~1991M12; 2003M3~2003M10 | 1978M8~1984M6; 1985M2~1985M6; 1985M11~1989M3; 1991M1~1991M5; 1992M8~1995M4; 1998M8~1998M8; | 1981M11~1981M11; 1987M1~1987M1; |
| CAPE VERDE | 1993M1~2003M5 | 1993M2~1997M1; 1997M8~1998M11; 2000M8~2002M2; | 1993M2~1994M12; 1995M2~1995M12; 1996M2~1997M2; 1997M4~1997M7; 1997M9~1997M11; 1998M1~1998M12; 1999M3~1999M5; 1999M7~1999M11; 2000M3~2000M3; 2000M5~2000M5; 2000M7~2000M11; 2001M1~2001M5; 2001M7~2002M5; 2002M7~2003M2; 2003M4~2003M5; | 1993M2~1993M2; |

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| CENTRAL AFRICAN | 1982M1~2002M5 | 1985M9~1987M2; 1993M7~1995M11; | 1994M1~1994M1; 1994M6~1994M6; 1994M12~1995M1; 1995M6~1995M6; 1995M12~1995M12; | 1994M1~1994M1 |
| CHAD | 1983M12~2003M5 | 1987M10~1989M10; 1990M10~1991M11; 1992M12~1995M11; 1999M4~2000M11; | 1987M10~1987M10; 1987M12~1988M1; 1988M10~1988M10; 1989M1~1989M1; 1990M10~1990M10; 1991M10~1991M10; 1994M1~1994M4; 1994M6~1994M6; 1994M12~1995M1; 1995M12~1995M12; | NO CRISIS |
| CHILE | 1978M1~2003M10 | 1978M2~1981M3; 1982M7~1986M9; 1988M1~1988M11; 1989M6~1993M2; 1994M8~1995M7; | 1981M4~1981M12; 1984M4~1984M9; 1986M9~1987M4; 1993M5~1993M8; 1995M4~2003M10; | 1978M2~1978M2; 1978M5~1978M5; 1979M3~1979M3; 1979M8~1979M8; 1982M7~1982M7; 1983M7~1983M7; 1984M1~1984M1; 1984M10~1984M10; 1985M10~1985M10; 1986M3~1986M3; 1989M6~1989M6; 1992M11~1992M11; |
| CHINA | 1988M1~2003M9 | 1988M9~1990M3; 1992M6~1994M5; 2000M6~2002M2; | 1988M9~1988M9; 1989M2~1989M2; 1989M6~1989M6; 1989M9~1989M9; 1990M2~1990M2; 1990M4~1990M4; 1990M6~1990M6; 1990M8~1990M8; 1991M8~1991M8; 1992M4~1992M4; 1992M7~1992M7; 1993M5~1993M5; 1994M5~1994M5; 1994M7~1994M7; 1994M10~1994M10; 1995M1~1995M1; 1996M5~1996M5; 1996M8~1996M8; 1997M5~1997M5; 1997M8~1997M8; 1997M10~1997M10; 1998M10~1998M10; 1998M12~1998M12; 1999M6~1999M6; 1999M12~1999M12; 2000M6~2000M6; 2000M9~2000M11; 2001M2~2001M3; 2002M2~2002M3; | 2001M2~2001M3; 2002M2~2002M3; |
| COLOMBIA | 1987M1~2003M10 | 1987M10~1991M5; 1995M3~1996M8; 1997M11~1999M10; 2000M3~2001M10; 2002M~2003M10; | 1987M9~1987M12; 1988M2~1988M2; 1989M4~1989M6; 1990M10~1990M10; 1993M2~1993M6; 1995M2~1995M3; 1996M1~1996M1; 1996M7~1996M7; 1997M8~1998M10; 1999M7~1999M8; 2000M3~2000M6; 2000M12~2001M2; 2002M7~2003M3; | 1994M3~1994M3; 1995M3~1995M3; 1999M7~1999M7; |
| CONGO REPUBLIC | 1991M1~2003M6 | 1991M2~1993M8; 1995M12~1999M11; 2001M1~2003M6; | 1991M2~1993M11; 1994M5~1994M8; 1996M1~1999M10; 2000M11~2003M6; | 1993M12~1994M1; 1994M9~1994M9; 1994M12~1995M1; 1995M9~1995M9; 1995M12~1995M12; 1999M12~1999M12; 2000M3~2000M3; 2000M5~2000M6; 2000M10~2000M10; |
| COSTA RICA | 1983M1~2003M11 | 1984M7~1990M2; 1994M8~1995M2; 1997M4~2003M11; | 1983M6~1983M9; 1984M3~1984M9; 1985M2~1987M2; 1987M5~1988M2; 1988M5~1988M9; 1988M11~1990M2; 1991M3~1991M8; 1992M7~1993M1; 1993M8~1993M8; 1993M10~1994M2; 1994M6~1994M7; 1994M10~1995M1; 1995M5~1996M1; 1996M7~1998M12; 1999M6~1999M12; 2000M6~2002M12; | 1991M11~1992M3; |

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| CROATIA | 1993M12~2003M10 | 1995M9~2003M10; | 1994M1~1994M1; 1994M10~1994M11; 1996M10~1996M11; 1997M9~1998M1; 2000M3~2000M3; | NO CRISIS |
| CYPRUS | 1970M6~2003M10 | 1973M12~1976M8; 1979M12~1985M8; 1988M11~1990M1; 1991M4~1992M2; 1992M10~1993M12; 1995M8~1996M11; 1997M12~1999M12; 2000M7~2001M7; | 1975M1~1975M1; 1976M1~1976M1; 1976M7~1976M7; 1981M9~1981M12; 1982M8~1982M9; 1989M12~1989M12; 1991M3~1991M4; 1993M9~1993M9; 1994M6~1994M6; 1996M12~1996M12; 1997M6~1997M6; 1997M12~1997M12; 2000M8~2000M8; 2001M8~2001M10; 2001M12~2002M9; 2002M12~2003M1; | 1975M1~1975M1; 1976M1~1976M1; 1976M7~1976M7; 1978M5~1978M5; 1979M10~1979M10; 1981M9~1981M9; 1982M9~1982M9; 1985M2~1985M2; 1986M12~1986M12; 1989M7~1989M7; 1989M12~1989M12; 1991M3~1991M3; 1992M3~1992M3; 1993M9~1993M9; 1994M1~1994M1; 1994M6~1994M6; 1995M1~1995M1; 1995M9~1995M9; 1996M12~1996M12; 1997M6~1997M6; 1997M12~1997M12; 1999M11~1999M11; 2000M1~2000M1; 2000M5~2000M5; 2000M8~2000M8; 2001M8~2001M8; 2001M12~2001M12; 2002M2~2002M2; 2002M6~2002M6; 2002M8~2002M8; 2002M12~2002M12; 2003M5~2003M5; 2003M7~2003M7; |
| CZECH | 1994M1~2003M10 | 1994M2~1994M2; 1996M2~1998M10; 1999M11~2002M3; 2003M7~2003M10; | 1997M5~1997M5; 1998M5~1998M5; | 1994M3~1994M3; 1997M5~1997M5; 1998M5~1998M5; |
| DENMMARK* | 1973M1~2003M11 | 1974M2~1974M12; 1976M4~1977M3; 1979M11~1980M11; 1981M5~1983M2; 1984M4~1985M5; 1988M12~1990M4; 1991M5~1993M11; 1996M12~1999M3; 1999M11~2001M8; | 1973M8~1984M5; 1992M11~1994M4; | 1975M5~1975M5; 1976M9~1976M9; 1976M11~1976M11; 1977M4~1977M4; 1977M9~1977M9; 1977M12~1977M12; 1978M6~1978M8; 1978M11~1978M12; 1980M2~1980M2; 1981M2~1981M2; 1982M10~1982M11; 1983M4~1983M4; 1983M9~1983M10; 1985M12~1985M12; 1987M5~1987M5; 1993M3~1993M3; |
| DOMINICA | 1982M12~2003M9 | 1983M11~1984M3; 1990M4~1990M12; 1993M4~1995M3; 1999M1~1999M6; 2000M7~2001M6; | 1985M9~1985M11; 1986M1~1986M5; 1988M11~1989M2; 1989M10~1989M12; 1990M9~1990M10; 1991M4~1991M12; 1992M5~1992M12; 1993M2~1993M3; 1993M5~1994M9; 1995M7~1995M12; 1996M2~1998M12; 1999M2~1999M6; 1999M9~1999M12; 2000M2~2000M6; 2000M8~2003M9; | 1983M2~1983M6; 1983M9~1984M1; 1984M4~1984M6; 1984M10~1985M1; 1985M3~1985M6; 1985M8~1985M8; 1985M12~1985M12; 1986M7~1986M9; 1986M12~1987M3; 1987M5~1987M10; 1987M12~1988M3; 1988M6~1988M10; 1989M3~1989M4; 1989M6~1989M8; 1990M1~1990M1; 1990M3~1990M4; 1990M8~1990M8; 1991M1~1991M1; 1991M3~1991M3; 1992M1~1992M1; 1992M4~1992M4; |

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| DOMINICAN REPUBLIC | 1996M12~2003M5 | 2002M10~2003M5; | 1997M1~1998M8; 1999M8~2000M10; 2001M10~2003M5; | 1997M1~1997M1; |
| ECUADOR | 1971M3~2003M10 | 1975M1~1983M6; 2001M9~2003M10; | 1971M10~1972M4; 1973M9~1974M2; 1974M8~1977M9; 1977M11~1983M7; 1985M3~1985M11; 1986M2~1988M8; 1988M10~1989M7; 1990M2~1990M10; 1991M1~1992M8; 1995M8~1995M11; 1997M2~1999M6; 2000M6~2000M11; 2001M5~2003M10; | 1972M5~1972M5; 1972M9~1972M9; 1973M5~1973M5; 1974M7~1974M7; 1977M10~1977M10; 1981M12~1981M12; 1983M8~1983M8; 1984M10~1984M10; 1985M12~1985M12; 1989M9~1989M9; 1992M9~1992M9; 1993M6~1993M6; 1994M2~1994M2; 1995M2~1995M2; 1996M2~1996M2; 2000M1~2000M1; 2001M2~2001M2; |
| EGYPT | 1977M1~2003M7 | 1977M2~1979M12; 1980M12~1982M6; 1989M5~1992M2; 1999M8~2002M8; | 1977M7~1977M9; 1977M11~1977M11; 1978M2~1978M2; 1978M8~1978M12; 1979M2~1979M3; 1979M5~1979M5; 1979M7~1979M12; 1980M2~1980M3; 1980M7~1980M10; 1981M2~1981M3; 1981M8~1982M6; 1982M8~1986M7; 1986M10~1987M8; 1987M10~1989M4; 1989M6~1989M7; 1989M10~1990M3; 1990M6~1990M6; 1990M10~1990M10; 1990M12~1990M12; 1991M2~1991M2; 1991M4~1991M4; 1991M6~1991M6; 1991M10~1991M10; 1991M10~1992M2; 1992M4~1994M10; 1994M12~1995M10; 1995M12~1996M1; 1996M3~1996M12; 1997M3~1997M12; 1998M2~1998M6; 1998M8~M10; 1999M1~1999M10; 2000M1~20001M3; 2001M6~2002M3; 2002M5~2002M10; 2002M12~2003M7; | 1977M2~1977M3; 1977M8~1977M8; 1977M10~1977M10; 1977M12~1977M12; 1978M3~1978M3; 1978M5~1978M6; 1979M1~1979M1; 1979M4~1979M4; 1979M6~1979M6; 1980M1~1980M1; 1980M4~1980M5; 1980M11~1980M12; 1981M4~1981M4; 1981M6~1981M7; 1982M7~1982M7; 1985M9~1985M91985M11~1985M11; 1986M8~1986M9; 1987M9~1987M9; 1988M4~1988M4; 1988M8~1988M8; 1989M5~1989M5; 1989M8~1989M8; 1990M5~1990M5; 1990M7~1990M7; 1990M9~1990M9; 1990M11~1990M11; 1991M1~1991M1; 1991M3~1991M3; 1991M7~1991M7; 1991M11~1991M11; 1992M3~1992M3; 1993M3~1993M3; 1993M6~1993M6; 1994M11~1994M11; 1995M11~1995M111996M2~1996M2; 1997M1~1997M2; 1998M1~1998M1; 1998M7~19998M7; 1998M11~1998M11; 1992M2~1992M2; 1999M4~1999M4; 1999M6~1999M6; 1999M9~1999M9; 1999M11~1999M12; 2000M9~2000M9; 2001M4~2001M4; 2001M10~2001M10; 2002M4~2002M4; |

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| EL SALVADOR | 1984M1~2000M12 | 1986M1~1986M12; 1990M10~1991M4; 1993M3~1993M5; | 1984M2~1985M12; 1986M2~1986M3; 1986M7~1986M12; 1987M2~1989M7; 1989M9~1990M3; 1990M6~1990M7; 1990M9~1990M9; 1990M11~1991M4; 1991M6~1992M10; 1992M12~1993M10; 1993M12~2000M12; | NO CRISIS |
| ESTONIA | 1994M2~2003M11 | 1996M11~1998M10; 1999M5~2002M4; | 1994M4~1997M10; 1997M12~2003M11; | NO CRISIS |
| ETHIOPIA | 1986M12~2003M8 | 1990M4~1991M10; 1991M12~1994M6; 1996M9~1997M2; 2002M3~2003M8; | 1990M4~1990M4; 1991M3~1991M4; 1991M6~1991M7; 1991M10~1991M10; 1992M1~1992M1; 1992M3~1992M4; 1992M6~1992M7; 1992M10~1992M10; 1993M1~1993M1; 1993M3~1993M3; 1993M10~1993M10; 1996M9~1996M9; 1997M9~1997M9; 2002M3~2002M3; 2003M4~2003M4; | 1987M5~1987M5; 1990M4~1990M4; 1991M4~1991M4;1991M6~1991M6; 1992M1~1992M1; 1992M3~1992M3; 1992M6~1992M6; 1992M10~1992M10; 1993M1~1993M1; 1993M3~1993M3; 1993M10~1993M10; 1994M7~1994M7; 1995M7~1995M7; 1996M6~1996M6; 1996M9~1996M9; 1997M9~1997M9; 1999M9~1999M9; 2001M7~2001M7; 2002M3~2002M3; 2003M4~2003M4; |
| FIJI | 1978M12~2003M10 | 1979M11~1984M3; 1988M9~1990M4; 1991M4~1993M11; 1996M2~2002M3; | 1978M12~1978M12; 1981M1~1981M1; 1981M4~1981M8; 1982M1~1982M1; 1985M7~1985M7; 1987M5~1987M7; 1987M10~1987M10; 1988M5~1988M11; 1989M5~1989M5; 1989M10~1989M10; 1992M7~1992M7; 1992M10~1992M10; 1998M1~1998M1; 1999M1~1999M1; | 1978M12~1978M12; 1979M12~1979M12; 1981M1~1981M1; 1981M8~1981M8; 1982M1~1982M1; 1985M7~1985M7; 1987M7~1987M7; 1987M10~1987M10; 1988M5~1988M5; 1988M7~1988M7; 1988M10~1988M10; 1989M5~1989M5; 1989M10~1989M10; 1992M7~1992M7; 1992M10~1992M10; 1998M1~1998M1; 1999M1~1999M1; |
| FINLAND* | 1976M1~2002M12 | 1976M5~1977M9; 1978M12~1979M12; 1981M1~1985M3; 1987M7~1988M5; 1989M9~1990M4; 1991M7~1992M4; 1997M7~1998M12; 2000M3~2002M2; | 1979M7~1980M9; 1981M4~1983M11; 1984M12~1985M5; 1986M4~1986M7; 1986M9~1986M11; 1988M1~1990M2; 1991M1~1992M8; 1994M12~1998M12; | 1970M4~1970M4; 1970M6~1970M8; 1974M1~1974M1; 1975M1~1975M1; 1976M1~1976M1; 1977M1~1977M1; 1980M3~1980M4; 1981M4~1981M4; 1981M10~1981M10; 1982M5~1982M5; 1982M9~1982M101983M8~1983M8; 1983M12~1983M12; 1985M7~1985M7; 1986M5~1986M5; 1987M5~1987M5; 1989M7~1989M7; 1992M11~1992M11; 1993M7~1993M7; 1996M3~1996M3; 1997M3~1997M3; 1998M6~1998M6; |
| FRANCE* | 1970M1~2003M10 | 1974M1~1975M10; 1980M6~1983M7; 1988M8~1989M11; 1991M6~1992M4; | 1970M5~1970M9; 1974M1~1974M1; 1975M1~1975M1; 1976M1~1976M1; 1977M1~1977M1; 1981M10~1981M10; 1983M8~1983M8; 1985M7~1985M8; | 1987M8~1987M8; |

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| GABON | 1970M1~ 2000M12 | 1975M4~1975M12; 1976M6~1976M6; 1979M8~1979M11; 1981M5~1981M9; 1986M2~1987M5; 1988M8~1989M5; 1990M7~1990M11; 1994M1~1995M11; 2000M3~2000M12; | 1975M4~1975M4; 1976M6~1976M7; 1979M2~1979M5; 1979M8~1979M10; 1980M10~1980M10; 1981M5~1981M5; 1988M8~1988M8; 1989M8~1989M8; 1990M7~1990M8; 1990M11~1990M12; 1991M2~1991M3; 1991M6~1991M7; 1992M8~1992M8; 1993M8~1993M8; 1994M1~1994M3; 1994M6~1994M7; 1994M10~1995M2; 1995M6~1995M7; 1995M10~1995M12; 1999M10~2000M12; | 1976M1~1976M1; 1976M6~1976M6; 1979M8~1979M8; 1981M5~1981M5; 1988M8~1988M8; 1992M8~1992M8; 1994M1~1994M1; 2000M12~2000M12; |
| GAMBIA | 1978M1~ 2003M5 | 1980M10~1983M4; 1984M4~1985M4; 1986M1~1989M3; 2000M11~2003M5; | 1980M9~1981M2; 1981M6~1981M9; 1984M2~1984M6; 1985M1~1986M5; 1986M7~1988M1; 1989M1~1989M4; 1993M3~1993M3; 1994M3~1994M3; 2002M12~2002M12; 2003M4~2003M5; | 1986M1~1986M12; 2002M12~2003M5; |
| GEORGIA | 1996M10~ 2003M2 | 1998M10~1999M7; | 1998M10~1998M11; 1999M1~1999M1; 1999M12~1999M12; | 1998M10~1999M1; 1999M4~1999M4; |
| GERMANY* | 1979M1~ 2003M11 | 1979M2~1982M3; 1983M12~1985M7; 1988M6~1989M12; 1990M12~1992M6; 1996M4~2003M1; | 1979M5~1979M9; 1979M11~1980M12; 1981M4~1981M8; 1981M11~1982M1; 1982M3~1982M11; 1983M1~1985M3; 1985M5~1986M12; 1987M2~1987M10; 1988M2~1989M11; 1990M3~1992M5; 1995M11~1993M7; 1993M10~1994M7; 1994M9~1996M2; 1996M4~2003M11; | 1979M2~1979M2; 1979M10~1979M10; 1982M2~1982M2; 1982M5~1982M5; 1982M12~1982M12; 1985M2~1985M2; 1985M4~1985M4; 1987M1~1987M1; 1987M11~1987M11; 1988M1~1988M1; 1989M12~1989M12; 1992M9~1992M9; 1993M8~1993M8; 1994M6~1994M6; 1994M8~1994M8; 1995M3~1995M3; 1996M3~1996M3; |
| GHANA | 1970M1~ 2003M10 | 1972M8~1974M4; 1975M8~1976M4; 1977M2~1978M7; 1980M4~1980M7; 1982M6~1986M2; 1989M9~1990M10; 1991M10~1994M12; 1998M11~2000M3; 2001M112003M10; | 1971M5~1971M6; 1972M8~1972M9; 1972M12~1973M7; 1975M9~1975M9; 1976M4~1976M5; 1977M3~1977M7; 1978M2~1978M9; 1978M12~1979M1; 1981M9~1981M9; 1982M6~1982M6; 1982M9~1982M9; 1983M5~1983M6; 1983M10~1985M6; 1987M3~1987M3; 1987M7~1987M7; 1989M9~1990M1; 1990M9~1990M11; 1991M10~1992M3; 1992M8~1992M12; 1993M3~1993M3; 1993M12~1994M1; 1994M3~1994M4; 1994M6~1994M8; 1994M12~1995M1; 1998M11~1999M1; 1999M4~1999M4; 2000M1~2000M1; 2000M4~2000M4; 2002M5~2002M11; 2003M2~2003M6; | 1983M10~1983M10; 1984M10~1984M10; 1987M7~1987M7; 1993M12~1993M12; 2000M4~2000M4; |
| GREECE* | 1970M1~ 2003M8 | 1970M2~1971M3; 1974M1~1977M3; 1978M7~1979M5; 1979M9~1985M12; 1988M5~1991M10; | 1970M2~1970M6; 1974M1~1974M9; 1979M9~1980M6; 1981M2~1982M10; 1984M2~1985M4; 1989M5~1989M10; 1997M7~1998M3; | 1971M1~1971M1; 1972M9~1972M9; 1974M1~1974M1; 1975M1~1975M1; 1978M6~1978M6; 1979M6~1979M6; 1979M9~1979M9; 1980M9~1980M9; 1983M1~1983M1; |

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| GRENADA | 1981M1~1999M12 | 1982M2~1983M4; 1984M6~1985M3; 1985M5~1986M10; 1988M4~1989M11; 1993M1~1999M12; | 1988M1~1989M7; 1993M6~1999M12; | 1981M3~1982M10; 1987M11~1990M1; 1993M6~1999M12; |
| GUATEMALA | 1979M1~2003M1 | 1979M12~1982M10; 1986M6~1989M3; 1990M2~1991M3; 1999M2~2000M4; | 1981M10~1981M10; 1982M10~1982M11; 1983M4~1983M5; 1983M8~1983M8; 1983M10~1983M10; 1984M1~1984M5; 1984M8~1984M8; 1984M10~1984M10; 1985M1~1985M1; 1986M6~1986M6; 1986M11~1986M11; 1987M6~1987M6; 1989M4~1989M4; 1989M7~1989M7; 1990M2~1990M2; 1990M4~1990M4; 1990M9~1990M11; 1991M3~1991M7; 1991M11~1992M1; 1992M3~1992M4; 1992M6~1992M6; 1992M11~1992M11; 1993M1~1993M1; 1999M9~1999M9; 2001M11~2001M11; 2002M11~2002M11; | 1979M2~1979M2; 1981M10~1981M10; 1982M10~1982M10; 1983M5~1983M5; 1984M1~1984M1; 1984M5~1984M5; 1986M6~1986M6; 1987M6~1987M6; 1989M4~1989M4; 1990M4~1990M4; 1991M4~1991M4; 1993M1~1993M1; 1999M9~1999M9; 2001M11~2001M11; |
| GUYANA | 1995M1~2002M12 | 1998M10~1999M12; | 1998M7~1998M11; 1999M1~1999M3; 2001M1~2001M2; | NO CRISIS |
| HAITI | 1997M10~2003M9 | 2000M2~2001M7; 2002M11~2003M9; | 2002M11~2002M11; 2003M2~2003M2; | NO CRISIS |
| HONG KONG | 1997M12~2003M10 | 1999M2~2001M1; 2002M7~2003M10; | 1998M8~1998M8; 2003M1~2003M1; | NO CRISIS |
| HONDURAS | 1983M1~2003M10 | 1990M2~1991M5; 1993M6~1996M10; | 1990M3~1999M4; | 1990M3~1990M4; |
| HUNGARY | 1990M8~2003M9 | 1990M9~1991M6; 1993M7~2002M3; | 1990M9~1990M11; 1991M4~1991M5; 1992M8~1993M5; 1993M9~2002M11; 2003M8~2003M9; | 1990M9~1990M9; |
| ICELAND | 1984M1~2003M4 | 1984M9~1985M7; 1987M10~1990M3; 1991M3~1992M1; 1992M12~2002M4; | 1994M6~2000M6; | 1984M9~1984M9; 1984M12~1984M12; 1985M7~1985M7; 1985M12~1985M12; 1986M7~1986M7; 1988M1~1988M1; 1988M9~1988M9; 1989M7~1989M7; 1990M1~1990M1; 1992M12~1992M12; |
| INDIA | 1970M1~2003M9 | 1971M1~1971M12; 1974M7~1976M6; 1981M5~1982M12; 1984M6~1985M7; | 1971M1~1971M1; 1971M12~1972M1; 1973M5~1973M5; 1974M5~1974M7; 1975M3~1975M7; 1976M5~1976M7; 1976M11~1976M12; 1981M7~1981M7; | 1971M1~1971M1; 1972M1~1972M1; 1974M5~1974M5; 1974M7~1974M7; 1975M7~1975M7; 1976M12~1976M12; |

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| INDONESIA | 1975M4~2003M9 | 1976M5~1977M12; 1997M10~2000M6; | 1976M4~1977M10; 1978M11~1978M12; 1979M11~1979M12; 1983M3~1983M4; 1985M2~1985M3; 1986M9~1986M10; 1987M9~1987M9; 1988M8~1988M8; 1989M7~1989M8; 1991M2~1991M6; 1997M8~1999M10; 2000M5~2000M10; | NO CRISIS |
| IRELAND* | 1970M1~2002M12 | 1972M9~1974M9; 1976M5~1977M3; 1978M11~1980M6; 1981M5~1984M2; 1984M7~1985M5; 1988M12~1990M5; 1991M6~1993M8; 1994M4~1994M9; 1996M4~1998M11; | 1971M12~1971M12; 1974M8~1975M3; 1977M3~1977M12; 1980M6~1980M7; 1984M2~1984M3; 1985M4~1986M2; 1987M7~1988M3; 1990M4~1991M1; 1993M3~1993M4; 1993M9~1994M2; 1998M12~1998M12; | 1984M3~1984M3; 1993M3~1993M3; 1993M9~1993M9; |
| ISRAEL | 1980M1~2003M9 | 1981M5~1981M11; 1983M10~1988M7; 1992M12~1993M4; 1995M1~1995M10; 1996M11~1998M2; | 1981M5~1981M6; 1983M9~1984M11; 1985M4~1985M11; 1986M3~1986M9; 1988M10~1988M12; 1989M10~1989M12; 1991M10~1991M10; 1992M11~1993M3; 1993M9~1993M10; 1995M10~1995M10; 1997M5~1997M6; | 1984M11~1984M11; |
| ITALY* | 1972M1~2003M10 | 1972M2~1973M12; 1980M1~1981M3; 1982M5~1985M8; 1988M4~1990M1; 1991M4~1992M8; 1993M9~1996M2; 1997M2~1998M12; | 1974M2~1977M11; | 1972M2~1972M2; 1974M9~1974M9; 1975M1~1975M1; 1975M4~1975M4; 1976M11~1976M11; 1977M4~1977M4; 1977M9~1977M9; 1977M11~1977M11; 1978M5~1978M5; 1979M3~1979M3; 1979M12~1979M12; 1980M3~1980M3; 1981M4~1981M4; 1983M4~1983M4; 1983M12~1983M12; 1987M5~1987M5; 1987M11~1987M11; 1992M9~1992M9; 1993M9~1993M9; 1995M3~1995M3; 1996M3~1996M3; |
| JAMAICA | 1970M1~2003M9 | 1983M11~1984M11; 1990M1~1990M9; 1991M9~1992M6; 1993M10~1994M6; 1996M1~1996M5; 2003M2~2003M9; | 1973M1~1973M1; 1974M1~1974M1; 1977M10~1983M1; 1983M11~1984M5; 1984M7~1985M9; 1986M4~1986M6; 1987M5~1987M8; 1987M11~1988M2; 1989M8~1989M12; 1990M11~1990M11; 1991M6~1994M2; 1994M7~19952; 1995M9~1996M1; 1996M8~1997M1; 1997M10~1997M10; 2002M11~2003M3; | 1998M1~1998M1; |
| JAPAN | 1970M1~ | 1970M2~1970M10; 1973M5~1975M5; | 1971M5~1972M10; 1979M2~1981M6; 1996M3~1996M4; | 1970M2~1970M2; 1971M8~1971M8; 1972M5~1972M5; |

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| JORDON | 1970M1~<br>2003M8 | 1977M2~1988M10;<br>1994M12~1993M11;<br>1994M12~1997M9; 1998M8~1999M8;<br>~ | 1977M2~1980M11; 1981M1~1982M8; 1982M10~1988M9; 1990M9~1991M1;<br>1991M3~1993M11; 1994M1~1949M11; 1995M1~1998M7; 1998M9~1999M6;<br>2000M2~2000M12; 2001M3~2003M3; | NO CRISIS |
| KAZAKHSTAN | 1994M12~<br>2003M11 | 1996M5~2003M11; | 1996M7~1999M2; 1999M6~2003M11; | 1995M3~1995M3; 1995M6~1995M6; 1995M8~1995M8;<br>1995M10~1995M10; 1995M12~1995M12; 1996M3~1996M3;<br>1996M6~1996M6; 1997M10~1997M10; 1999M4~1999M4;<br>2000M4~2000M4; |
| KENYA | 1973M1~<br>2003M8 | 1977M3~1978M4; 1981M3~1982M6;<br>1993M3~1997M6; 2003M4~2003M8; | 1981M9~1981M11; 1982M10~1982M12; 1993M2~1993M7; 1993M11~1996M7;<br>1997M7~1997M8; 1998M5~1998M8; 1999M6~1999M6; | 1976M11~1976M11; 1982M10~1982M10;<br>1982M12~1982M12; 1993M3~1993M3; 1993M5~1993M5;<br>1993M7~1993M7; 1993M11~1993M11; 1994M11~1994M11;<br>1995M5~1995M5; 1995M7~1995M7; 1995M10~1995M10;<br>1996M5~1996M5; 1997M8~1997M8; 1998M8~1998M8;<br>1999M6~1999M6; |
| KOREA | 1970M1~<br>2003M10 | 1972M1~1972M12; 1975M9~1977M12;<br>1982M1~1982M12; 1988M2~1989M7;<br>1997M1~2000M3; | 1971M7~1971M7; 1972M1~1972M1; 1972M7~1972M7; 1972M12~1973M1;<br>1973M12~1974M2; 1974M12~1975M2; 1975M7~1975M12; 1976M3~1976M4;<br>1976M12~1977M1; 1978M1~1978M1; 1979M1~1979M1; 1980M1~1980M2;<br>1981M1~1981M2; 1982M1~1982M1; 1983M1~1983M1; 1987M1~1987M1;<br>1988M2~1989M3; 1996M7~1996M7; 1997M7~1997M7; 1997M11~1998M4;<br>1998M7~1999M1; 1999M7~1999M7; | 1971M1~1971M1; 1971M7~1971M7; 1972M1~1972M1;<br>1972M7~1972M7; 1973M1~1973M1; 1974M12~1974M12;<br>1975M9~1975M9; 1976M3~1976M3; 1976M12~1976M12;<br>1978M1~1978;1; 1979M1~1979M1; 1980M1~1980M1;<br>1980M10~1980M10; 1981M1~1981M1; 1982M1~1982M1;<br>1983M1~1983M11985M3~1985M3; 1986M7~1986M7;<br>1987M1~1987M1; 1988M3~1988M3; 1988M12~1988M12;<br>1996M7~1996M7; 1996M12~1996M12; 1997M7~1997M7;<br>1997M11~1997M11; 1998M7~1998M7; 1998M11~1998M11;<br>1999M7~1999M7 |
| KUWAIT | 1976M1~ | 1977M11~1978M4; 1978M12~1980M6; | 1978M5~19785; 1979M1~1979M1; 1980M1~1980M1; 1982M11~1982M11; | NO CRISIS |

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| KYRGYZ | 1996M7~2003M10 | 1996M12~1997M3; 1998M7~1999M8; | 1996M8~2000M5; | 1996M12~1996M12; 1997M4~1997M4; 1997M8~1997M8; 1997M12~1997M12; 1998M4~1998M4; 1998M6~1998M6; 1999M10~1999M10; 1999M12~1999M12; 2000M5~2000M5; |
| LAO PEOPLE'S DEM. REP | 1994M12~2003M8 | 1997M12~1998M10; | 2001M2~2001M4; 2002M2~2002M4; | 2001M2~2001M4; 2002M2~2002M4; |
| LATVIA | 1994M7~2003M10 | 1995M12~1996M4; 1997M8~2001M11; 2002M11~2003M10; | 1995M7~2003M10; | 1995M2~1995M2; 1995M4~1995M4; 1995M6~1995M6; 1996M5~1996M5; 1999M10~1999M10; 2000M5~2000M5; 2001M11~2001M11; |
| LITHUANIA | 1993M12~2003M10 | 1995M10~2003M10; | 1995M11~2003M10; | 1994M3~1994M12; 1995M9~1995M10; |
| LUXEMBOURG* | 1992M12~1999M4 | 1997M2~1998M1; | 1994M4~1994M4; 1997M1~1997M12; 1999M2~1999M4; | NO CRISIS |
| MACAO | 1999M1~2003M9 | 1999M2~2001M2; | 1999M2~2000M2; | NO CRISIS |
| MACEDONIA | 1995M1~2003M6 | 1996M4~2000M12; 2001M6~2003M6; | 1995M6~1995M9; 1995M11~2000M11; 2001M2~2001M11; 2002M2~2003M6; | NO CRISIS |
| MADAGASCAR | 1992M12~2003M6 | 1994M5~1995M4; 1999M4~2000M7; | 1994M5~1994M5; 1995M2~1995M2; 1995M5~1995M5; 1996M4~1996M4; 1996M7~1996M7; 1996M10~1996M10; 1997M4~1997M4; 1997M7~1997M7; 1999M1~1999M1; 1999M10~1999M10; 2002M4~2002M4; 2003M4~2003M4; | 1994M5~1994M5; 1995M5~1995M5; 1996M4~1996M4; 1996M7~1996M7; 1997M4~1997M4; 1997M7~1997M7; 1999M1~1999M1; |
| MALAWI | 1981M1~2003M5 | 1981M2~1984M5; 1985M2~1987M7; 1989M7~1995M7; 1997M10~2001M7; 2002M6~2003M5; | 1981M5~1982M3; 1982M7~1983M8; 1985M4~1986M3; 1986M5~1987M6; 1989M3~1993M5; 1993M7~1993M11; 1997M5~1998M7; 1998M11~1999M8; 1999M11~2000M11; 2002M8~2003M5; | 1981M2~1981M2; |
| MALAYSIA | 1970M1~2003M10 | 1974M2~1974M9; 1976M3~1977M6; 1985M7~1986M3; 1986M11~1987M10; | 1974M2~1987M11; 1992M7~1993M2; 1993M11~1995M1; 1997M5~1999M6; | 1984M10~1984M10; |

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| MALI | 1988M7~2003M8 | 1988M8~1989M3; 1991M3~1993M9; 1996M6~2002M3; | 1991M3~1992M7; 1992M9~1993M6; 1995M2~2003M8; | 1989M3~1989M4; 1989M9~1989M11; 1990M1~1990M1; 1990M8~1990M9; 1992M8~1992M8; 1993M8~1993M8; 1993M10~1993M10; 1994M1~1994M1; 1994M10~1994M10; 1995M1~1995M1; |
| MALTA | 1970M1~2003M9 | 1970M2~1971M3; 1971M9~1972M8; 1978M1~1981M2; 1982M1~1988M3; 1988M12~1992M11; 1995M3~1999M4; 2000M7~2001M7; | 1970M2~1970M3; 1970M5~1970M9; 1970M11~1971M3; 1971M5~1971M7; 1971M11~1971M11; 1972M2~1972M2; 1972M4~1972M8; 1972M10~1973M2; 1973M5~1973M6; 1973M8~1974M5; 1974M8~1981M12; 1982M2~1982M12; 1983M2~1983M12; 1984M2~1985M11; 1986M1~1986M3; 1986M5~1986M11; 1987M2~1987M12; 1988M1~1988M11; 1989M1~1992M10; 1993M1~1993M11; 1994M1~1994M2; 1994M4~1994M10; 1995M1~1995M2; 1995M4~1995M10; 1996M1~1996M6; 1996M8~1996M8; 1996M10~1997M3; 1997M6~1997M6; 1997M8~1997M8; 1997M10~1998M3; 1998M6~1999M4; 1999M7~1999M8; 1999M10~2000M5; 2000M7~2001M7; 2001M9~2001M10; 2001M12~2001M12; 2002M2~2002M10; 2003M2~2003M9; | 1970M2~1970M2; 1970M4~1970M4; 1971M4~1971M4; 1971M8~1972M3; 1972M9~1972M9; 1973M3~1973M3; 1982M1~1982M1; 1983M1~1983M1; 1985M12~1985M12; 1986M12~1986M12; 1987M12~1987M12; 1988M12~1988M12; 1992M11~1992M12; 1993M12~1993M12; 1994M11~1994M12; 1995M3~1995M3; 1995M11~1995M12; 1996M7~1996M9; 1997M4~1997M9; 1999M5~1999M6; 2000M6~2000M6; 2001M10~2002M1; 2002M11~2003M1 |
| MAURITIUS | 1980M1~2003M11 | 1980M2~1980M3; 1981M5~1985M10; 1988M12~1990M4; 1993M7~1995M6; 1996M12~1999M9; 2001M2~2002M1; | 1993M7~1993M8; | 1980M2~1980M2; 1993M7~1993M7; |
| MEXICO | 1976M1~2003M11 | 1976M9~1977M12; 1982M1~1989M8; 1990M6~1992M5; 1994M6~1998M1; 1998M9~1999M2; | 1976M6~1978M1; 1981M6~1985M8; 1986M12~1988M6; 1988M12~1991M6; 1993M11~1994M4; 1994M12~1996M11; 1998M8~1998M9; 1999M9~1999M9; | NO CRISIS |
| MOLDOVA | 1996M8~2003M6 | 1998M11~1999M10; | 1998M11~1999M10; | 1999M2~1999M9; 2001M6~2003M6; |
| MONGOLIA | 1993M12~2002M9 | 1995M1~2002M9; | 1994M6~2000M2; 2000M4~2002M6; | NO CRISIS |
| MOZAMBIQUE | 1995M1~2003M2 | 1995M2~1996M1; 1998M7~2003M2; | 1997M9~2003M2; | NO CRISIS |
| MYANMAR | 1976M4~2003M2 | 1976M5~1986M1; 1990M6~1991M9; 1995M12~1997M6; 2000M4~2001M6; | 1989M4~1989M5; 1990M1~1990M1; 1990M3~1990M6; 1991M6~1991M6; 1996M1~1996M1; 1997M1~1997M1; 1999M4~1999M4; 2001M8~2001M8; | 1976M5~1976M5; 1990M6~1990M6; 1996M1~1996M1; |

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| NAMIBIA | 1993M1~ 2003M10 | 1995M6~1997M5; 1998M7~1999M5; 2000M11~2002M11; | 1994M11~1995M8; 1995M11~1998M4; 1998M9~1999M5; 1999M9~2001M11; 2002M1~2002M11; 2003M1~2003M7; | NO CRISIS |
| NETHERLANDS ANTILLES | 1981M1~ 2003M6 | 1984M2~1985M11; 1991M3~1992M3; | 1981M10~1981M10; 1982M5~1983M2; 1983M5~1983M7; 1984M1~1984M2; 1985M10~1987M2; 1988M1~1988M2; 1990M1~1990M1; 1990M10~1991M3; 1991M8~1991M10; 1992M2~1992M8; 1993M12~1994M1; 1994M11~1995M1; 19895M10~1995M10; 1998M6~1999M2; 1999M4~1999M6; 1999M10~2001M9; 2002M2~2002M6; 2003M2~2003M6; | 1982M7~1982M7; 1986M2~1986M2; 1990M1~1990M1; 1991M3~1991M3; 1991M10~1991M10; 1999M10~1999M10; 1999M12~1999M12; 2000M8~2000M8; 2000M12~2000M12; 2002M2~2002M2; 2003M2~2003M2; |
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| NETHERLANDS* | 1970M1~ 1998M12 | 1973M8~1973M9; 1973M12~1974M7; 1976M4~1977M3; 1978M5~1979M1; 1981M5~1982M5; 1983M11~1985M8; 1988M8~1990M2; 1991M4~1992M4; 1996M2~1998M12; | 1970M2~1982M7; | 1970M10~1970M10; 1973M7~1973M8; 1973M10~1973M12; 1976M8~1976M101978M10~1978M10; 1979M10~1979M10; 1980M3~1980M3; 1982M1~1982M1; |
| NEW ZEALAND | 1970M1~ 2003M10 | 1974M6~1977M10; 1979M2~1982M6; 1984M1~1985M12; 1997M8~1998M10; 1999M12~2001M8; | 1981M11~1988M7; | 1981M12~1982M3; 1982M12~1983M1; 1984M1~1984M2; 1984M11~1984M11; 1990M9~1990M9; |
| NIGERIA | 1971M1~ 2003M3 | 1974M2~1975M7; 1979M8~1980M6; 1982M2~1982M11; 1986M10~1987M12; 1991M1~1995M11; 1996M10~1997M12; 1999M1~2000M2; 2000M6~2001M4; 2001M6~2003M3; | 1974M7~1975M5; 1986M10~1987M1; 1987M6~1988M1; 1990M1~1990M1; 1990M12~1991M2; 1992M1~1992M3; 1993M10~1994M2; 1994M10~1995M1; 1995M7~1995M12; 1998M1~1998M2; 1999M1~1999M1; 2000M1~2000M1; 2001M6~2001M8; 2002M4~2002M10; | 1974M4~1974M11; 1986M10~1987M3; 1990M11~1991M2; 1993M7~1994M4; 1995M5~1995M9; 1996M11~1997M3; 1999M1~1999M9; 2001M6~2001M11; 2002M5; 2002M9; |
| NIGER | 1970M1~ 2003M8 | 1973M12~1974M12; 1975M7~1976M6; 1980M2~1983M9; 1984M10~1985M6; 1988M6~1990M6; 1991M3~1992M5; 1992M8~1993M9; 1994M1~1994M2; | 1970M3~1970M8; 1973M1~1973M1; 1975M7~1975M7; 1976M7~1976M7; 1980M4~1980M4; 1981M4~1981M5; 1981M10~1981M11; 1982M4~1982M6; 1982M10~1982M10; 1983M4~1983M4; 1983M10~1983M10; 1984M2~1984M2; 1984M6~1984M10; 1985M2~19852; 1985M4~1985M4; 1989M1~1989M1; | 1970M7~1970M7; 1973M1~1973M1; 1975M7~1975M7; 1976M7~1976M7; 1980M4~1980M4; 1981M4~1981M4; 1981M10~1981M10; 1982M4~1982M4; 1983M4~1983M4; 1983M10~1983M10; 1984M2~1984M2; 1984M7~1984M7; |

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| NORWAY | 1970M1~2003M11 | 1970M2~1970M8; 1972M8~1975M5; 1976M8~1977M7; 1977M12~1978M11; 1980M1~1980M9; 1983M8~1984M1; 1985M12~1988M5; 1990M1~1991M3; 1991M10~1992M12; 1994M6~1996M4; 1997M12~1999M8; 2000M11~2003M5; | 1992M10~1993M1; 1993M11~1994M1; | 1970M2~1970M2; 1992M10~1992M12; 1993M9~1993M11; 1998M8~1998M8 |
| OMAN | 2000M6~2003M8 | 2000M7~2001M2; | 2001M2~2002M6; | NO CRISIS |
| PAKISTAN | 1970M1~2003M9 | 1970M2~1972M3; 1973M6~1980M9; 1981M2~1982M6; 1984M3~1991M4; 1992M12~1993M2; 1993M8~1993M12; 1995M1~1996M4; 1996M10~1997M8; 1998M3~1998M6; 2000M7~2001M5; | 1970M2~1972M4; 1972M7~1973M4; 1973M7~1981M1; 1981M3~1991M4; 1991M9~1992M3; 2002M8~2003M9; | 1993M5~1993M5; 1993M7~1993M7; 1994M9~1994M9; 1995M11~1995M11; 1998M10~1998M10; 1999M10~1999M10 |
| PANAMA | 1997M12~2003M8 | 1999M5~2001M8; | 1998M12~1998M12; 1999M6~1999M6; 1999M8~1999M8; 2000M5~2000M5; 2001M3~2001M3; 2001M7~2001M7; 2002M2~2002M2; 2003M6~2003M6; | NO CRISIS |
| PAPU NEW GUINEA | 1975M10~2003M10 | 1975M11~1976M10; 1981M5~1982M8; 1985M1~1986M3; 1987M1~1987M4; 1990M1~1990M8; 1994M10~1997M5; 1997M11~2001M3; 2001M5~2001M9; 2002M8~2003M8; | 197M11~1976M7; 1994M9~2002M1; | 1975M11~1975M11; 1976M7~1976M12; 1980M12~1981M4; 1982M3~1982M4; 1985M4~1985M6; 1988M10~1988M11; 1990M3~1990M6; 1991M3~1991M8; 1993M7~1993M9; 1996M9~1996M10; 1997M7~1997M10; 1999M1~1999M2; 2000M9~2000M11; |
| PARAGUAY | 1990M12~2003M7 | 1992M8~1993M11; 1997M12~1999M6; 2000M8~2003M3; | 1991M1~1998M4; 1998M6~1998M12; 2002M1~2002M6; | 1991M1~1991M1; |
| PERU | 1970M1~2003M10 | 1971M2~1971M10; 1972M6~1974M8; 1975M8~1976M4; 1977M7~1977M10; | 1976M7~1976M7; 1977M6~1977M8; 1977M10~1977M11; 1978M11~1980M8; 1987M11~1991M12; 1992M8~1992M8; | 1976M6~1976M8; 1977M7~1977M12; 1978M11~1978M12; 1979M11~1979M11; 1987M11~1988M1; 1988M8~1988M11; |

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| PHILIPPINES | 1970M1~2003M10 | 1970M2~1970M12; 1981M2~1985M5; 1987M11~1991M1; 1995M5~1996M3; 1997M8~1998M9; 2000M6~2001M10; 2003M3~2003M10; | 1970M5~1970M10; 1971M4~1974M11; 1975M1~1975M11; 1976M1~1978M4; 1978M6~1979M11; 1980M2~1980M11; 1981M3~1983M8; 1986M5~1986M6; 1987M6~1987M8; 1988M1~1989M5; 1989M7~1989M7; 1992M6~1993M7; 1993M11~1994M6; 1994M9~1995M4; 1996M1~1996M4; 1996M11~1997M6; 1998M6~1998M6; 1999M8~2000M4; 2000M7~2000M10; 2001M3~2001M11; 2002M1~2002M4; 2002M7~2003M1; 2003M7~2003M10; | 1970M2~1970M3; 1970M12~1971M3; 1971M12~1971M12; 1974M12~1974M12; 1975M12~1975M12; 1978M5~1978M5; 1979M5~1979M5; 1979M12~1979M12; 1980M12~1980M12; 1982M10~1982M10; 1983M9~1983M10; 1984M2~1984M2; 1984M6~1984M6; 1984M10~1984M10; 1984M12~1985M2; 1985M4~1985M4; 1985M6~1985M12; 1986M3~1986M3; 1986M8~1987M3; 1987M9~1987M9; 1987M12~1987M12; 1989M6~1989M6; 1989M10~1989M11; 1990M1~1990M1; 1990M5~1990M6; 1990M9~1990M10; 1991M1~1991M5; 1991M9~1992M4; 1993M3~1993M3; 1993M8~1993M8; 1994M8~1994M8; 1995M2~1995M2; 1995M5~1995M5; 1995M8~1995M9; 1995M11~1995M11; 1996M5~1996M5; 1996M8~1996M8; 1997M8~1997M11; 1998M1~1998M1; 1998M8~1998M1; 1999M7~1999M7; 2000M12~2001M2; 2001M12~2001M12; 2002M5~2002M5; 2003M2~2003M4; |
| PORTUGAL* | 1976M12~2000M3 | 1977M1~1978M7; 1979M7~1985M4; 1988M10~1989M8; 1991M4~1992M3; 1992M11~1998M12; | 1979M8~1984M2; 1986M12~1998M12; | 1977M1~1977M1; 1977M7~1978M11; 1984M3~1984M3; 1985M4~1985M12; 1986M5~1986M6; |
| ROMANIA | 1994M12~2003M10 | 1996M1~1997M11; 1998M6~2002M7; | 1997M1~1997M1; 1998M1~1998M1; | 1997M1~1997M1; 1998M1~1998M1; |
| RUSSIA | 1996M1~2003M8 | 1996M7~1997M4; 1997M11~1998M6; 1999M5~2000M5; 2001M4~2001M7; 2001M9~2003M8; | 1997M6~1997M10; 1998M1~2001M1; 2001M3~2001M6; | 1996M4~1996M7; 1996M11~1996M11; 1997M3~1997M3; 1977M5~1997M5; 1997M11~1997M11; 2001M2~2001M2; 2001M8~2001M9; |
| RWANDA | 1970M1~2003M10 | 1970M4~1971M5; 1972M5~1978M12; 1986M4~1987M7; 1990M9~1993M5; 1994M8~1998M6; | 1970M4~1970M10; 1971M1~1971M6; 1972M6~1973M11; 1974M2~1974M4; 1976M1~1976M1; 1976M9~1976M9; 1979M11~1979M11; 1980M11~1980M11; 1990M11~1990M11; 1991M11~1991M12; 1995M3~1995M8; 1996M3~1996M3; | 1970M4~1970M4; 1970M7~1970M7; 1971M6~1971M6; 1972M11~1972M11; 1973M5~1973M5; 1973M8~1973M8; 1979M11~1979M11; 1980M11~1980M11; |

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| SAMOA | 1983M12~2003M10 | NO CRISIS | 1984M2~1984M2; 1984M4~1984M5; 1984M7~1984M8; 1984M10~1984M10; 1985M4~1985M6; 1985M9~1985M9; 1985M11~1986M2; 1986M4~1986M8; 1986M10~1987M2; 1987M4~1987M8; 1987M10~1989M10; 1989M12~1990M2; 1990M4~1990M9; 1991M2~1991M2; 1991M4~1991M10; 1992M2~1992M7; 1992M9~1992M10; 1992M12~1993M7; 1993M9~1994M12; 1995M2~1997M12; 1998M2~2003M10; | 1984M2~1984M2; 1984M4~1984M5; 1984M7~19984M8; 1984M10~1984M10; 1985M3~1985M7; 1985M9~1985M9; 1985M11~1986M2; 1986M4~1986M8; 1986M10~1987M2; 1987M4~1987M8; 1987M10~1989M5; 1989M7~1989M10; 1989M12~1990M2; 1990M4~1990M9; 1990M11~1990M11; 1991M2~1991M2; 1991M4~1991M10; 1992M2~1992M7; 1992M9~1992M10; 1992M12~1993M7; 1993M9~1994M12; 1995M2~1997M12; 1998M2~2001M2; 2001M4~2002M7; 2002M9~2003M10; |
| SAUDI ARABIA | 1998M1~2003M9 | 1998M2~2001M3; 2002M9~2003M9; | 2000M2~2000M2; 2000M4~2000M4; | NO CRISIS |
| SENEGAL | 1970M1~2003M8 | 1970M2~1974M12; 1975M7~1985M9; 1987M7~1993M9; 1994M1~1994M6; 1995M10~2003M8; | 1973M1~1973M1; 1974M1~1974M1; 1974M11~1975M1; 1975M7~1975M7; 1976M1~1976M2; 1976M7~1976M7; 1977M2~1977M3; 1977M6~1977M6; 1980M4~1980M4; 1981M4~1981M5; 1982M4~1982M4; 1983M4~1983M4; 1983M6~1983M6; 1984M3~1984M4; 1988M12~1988M12; 1989M12~1989M12; 1992M8~1992M8; 1993M8~1993M8; 1993M10~1993M10; 1994M1~1994M2; 1994M7~1995M6; 1995M8~1995M10; | 1970M2~1970M2; 1973M1~1973M1; 1974M1~1974M1; 1974M6~1974M6; 1974M11~1974M11; 1975M7~1975M7; 1976M1~1976M1; 1976M7~1976M7; 1980M4~1980M4; 1981M4~1981M4; 1982M4~1982M4; 1983M4~1983M4; 1983M12~1983M12; 1987M3~1987M3; 1988M12~1988M12; 1992M8~1992M8; 1993M10~1993M10; 1994M1~1994M1; 1994M7~1994M7; 1994M10~1994M10; 1995M1~1995M1; 1995M6~1995M6; 1995M8~1995M8; |
| SEYCHELLES | 1980M7~2003M9 | 1980M8~1981M2; 1981M6~1985M8; 1986M9~1987M4; 1988M8~1990M7; 1991M4~1998M7; 2000M1~2002M8; | 1980M8~1981M2; 1981M5~1985M8; 1985M10~1986M8; 1987M1~1987M5; 1987M12~1991M2; 1991M6~1992M3; 1992M5~1998M8; 1998M10~1999M6; 1999M11~2003M6; 2003M8~2003M9; | 1980M8~1980M8; |
| SIERRA LEONE | 1987M10~2003M9 | 1988M7~1990M12; 1991M11~1992M8; 1995M5~1996M9; 1998M4~2000M5; | 1988M6~1988M10; 1989M4~1989M4; 1990M1~1990M2; 1990M4~1990M5; 1990M7~1990M7; 1990M9~1990M10; 1990M12~1991M4; 1991M7~1991M8; | 1992M1~1992M1; 1996M10~1996M10; 2000M1~2000M1; |

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| SINGAPORE | 1974M4~2003M10 | 1974M7~1974M10; 1975M10~1977M8; 1979M3~1981M2; 1982M12~1983M1; 1983M12~1985M10; 1986M10~1989M5; 1996M3~1999M5; 1999M11~2002M4; | 1974M10~1981M2; 1983M4~1989M10; 2000M1~2003M10; | 1981M3~1981M3; 1981M11~1981M11; 1982M3~1982M3; 1982M11~1982M11; 1983M3~1983M3; 1989M11~1989M11; 1990M10~1990M10; 1991M1~1991M1; 1991M5~1991M5; 1991M9~1991M9; 1992M5~1992M5; 1992M10~1992M10; 1992M12~1992M12; 1993M10~1993M10; 1994M12~1994M12; 1995M7~1995M7; 1996M10~1996M10; 1998M10~1998M10; 1999M2~1999M2; 1999M10~1999M10; |
| SLOVAK | 1994M1~2003M10 | 1996M4~2000M1; 2001M2~2002M6; | 1994M8~1994M8; 1995M8~1995M8; | 1994M8~1994M8; 1999M5~1999M5; |
| SLOVENIA | 1992M12~2003M10 | 1993M6~1994M5; 1995M12~2002M4; | 1993M9~2003M10; | NO CRISIS |
| SOLOMON ISLANDS | 1982M1~2000M1 | 1982M2~1984M5; 1985M1~1987M9; 1989M6~1991M1; 1991M12~1992M10; 1998M1~1999M2; | 1983M2~1983M4; 1985M6~1985M9; 1998M1~1998M2; 1999M7~1999M7; | 1998M1~1998M1; 1999M7~1999M7; |
| SOUTH AFRICA | 1970M1~2003M10 | 1970M8~1972M2; 1974M2~1977M3; 1981M4~1982M12; 1983M12~1985M10; 1988M2~1990M2; 1993M5~1994M6; 1995M10~1997M3; 1998M6~1999M5; 2000M9~2002M11; | 1975M12~1976M5; 1980M6~1988M8; 1989M5~1989M8; 1990M3~1990M5; 1994M12~1995M8; 1997M2~1998M8; 1999M6~1999M8; 2001M12~2001M12; 2002M12~2002M12; | 1983M8~1983M8; 1986M9~1986M9; 1997M4~1997M5; 1999M6~1999M7; |
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| | | 1996M10~1998M8; 1999M8~2001M8; | | |
| SRI LANKA | 1970M1~2003M7 | 1989M4~1990M2; 2000M10~2001M10; | 1976M12~1977M1; 1977M5~1977M6; 1977M10~1978M5; 1978M11~1978M12; 1989M6~1989M6; 1990M5~1990M7; 1990M10~1991M1; 1991M7~1991M8; 1992M1~1992M1 1992M7~1992M8; 2000M10~2000M11; | 1973M1~1973M1; 1974M3~1974M3; 1975M9~1975M9; 1976M11~1977M1; 1977M5~1977M5; 1977M10~1978M5; 1978M11~1978M11; 1980M4~1980M4; 1981M4~1981M4; 1982M6~1982M6; 1986M12~1986M12; 1988M3~1988M3; 1989M6~1989M6; 1990M5~1990M6; 1990M10~1991M1; 1991M6~1991M8; 1992M1~1992M1; 1992M7~1992M8; |
| ST. KITTS AND NEVIS | 1982M1~2000M4 | 1982M2~1984M3; 1985M11~1986M3; 1987M3~1989M6; 1990M5~1991M7; 1993M7~1996M12; 1999M12~2000M4; | 1984M4~1984M5; 1985M2~1985M5; 1989M9~1989M9; 2000M1~2000M1; | 1982M2~1982M2; 1983M6~1983M6; 1984M5~1984M6; 1985M1~1985M1; 1986M1~1986M1; 1986M10-1986M10; 1987M3~1987M4; 1991M1~1991M1; 1992M4~1992M4; 2001M2~2001M11; 2002M10~2002M10; |
| ST.LUCIA | 1981M1~2002M12 | 1984M5~1987M10; 2001M2~2001M11 | 1984M5~1987M5; 2001M2~2002M1; 2002M10~2002M12; | 1983M6~1983M6; 1984M5~1984M6; 1985M1~1985M1; 1986M1~1986M1; 1986M10~1986M10; 1987M3~1987M4; 1991M1~1991M1; 1992M4~1992M4; 2001M2~2001M11; 2002M10~2002M10; |
| SWAZILAND | 1975M4~2003M9 | 1981M6~1983M2; 1984M1~1985M10; 1988M7~1989M11; 1991M5~1992M3; 1995M7~1997M5; 1998M6~1999M5; 2000M9~2002M11; | 1976M3~1983M1; 1983M4~1985M3; 1986M10~1999M5; 1999M7~2003M9; | 1975M6~1975M9; 1976M1~1976M2; 1983M2~1983M3; 1985M4~1985M4; 1985M6~1985M7; 1985M12~1986M1; 1986M8~1986M9; 1990M6~1990M6; 1999M5~1999M7; 2002M11~2002M12; |
| SWEDEN* | 1970M1~2002M12 | 1970M2~1970M6; 1974M3~1975M4; 1976M10~1977M9; 1979M7~1983M10; 1984M5~1985M6; 1988M6~1990M3; 1992M11~1993M11; 1994M10~1995M9; 1997M2~1998M10; 1999M7~2002M4; | 1970M2~1970M5; 1970M9~1975M3; 1975M9~1976M9; 1976M11~1977M8; 1978M2~1985M2; 1986M10~1989M6; 1991M6~1992M9; 1994M6~2002M12; | 1976M10~1976M10; 1977M10~1977M10; |
| SWITZERLAND* | 1970M1~2003M11 | 1974M1~1974M10; 1979M10~1982M4; 1983M12~1985M7; 1988M11~1990M4; 1991M6~1992M6; 1996M10~1998M8; 1999M8~2001M8; | 1971M8~1972M8; | 1970M8~1972M9; 1974M10~1975M2; 1977M10~1979M1; 1981M3~1982M6; |

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| THAILAND | 1977M1~ 2003M11 | 1979M2~1982M7; 1984M5~1985M8; 1997M5~1998M9; 2000M6~2001M10; | 1979M10~1980M5; 1980M12~1983M11; 1984M11~1987M7; 1988M2~1988M5; 1997M6~1999M11; | 1979M10~1979M10; 1980M2~1980M2; 1981M5~1981M5; 1981M7~1981M7; 1983M11~1983M11; 1987M4~1987M4; 1988M4~1988M4; 1997M7~1997M7; 1998M6~1998M6; |
| TOGO | 1971M1~ 2003M8 | 1972M11~1974M4; 1975M7~1976M10; 1977M10~1978M7; 1979M10~1981M2; 1982M4~1983M5; 1983M12~1985M6; 1988M2~1990M1; 1991M3~1992M4; 1992M9~1993M9; 1994M1~1994M12; 1996M12~2001M7; | 1975M6~1975M7; 1976M7~1976M11; 1978M9~1979M11; 1981M3~1982M5; 1983M4~1983M5; 1993M10~1997M2; 1998M2~1998M7; 2001M11~2003M1; | 1971M4~1972M12; 1973M2~1973M12; 1974M3~1974M5; 1974M7~1975M4; 1975M9~1976M6; 1977M1~1977M6; 1977M9~1978M6; 1980M8~1980M8; 1980M11~1980M12; 1982M7~1983M3; 1983M8~1983M9; 1984M5~1985M3; 1985M9~1989M6; 1990M6~1991M1; 1991M10~1991M10; 1992M10~1993M7; 1997M4~1997M5; 1998M9~2000M10; 2003M7~2003M8; |
| TONGA | 1991M1~ 2003M7 | 1991M6~1992M3; 1993M7~1999M3; 1999M11~2002M11; | 1991M6~1991M6; 1991M11~1991M11; 1992M7~1992M7; 1992M11~1992M11; 1993M7~1993M8; 1993M11~1993M11; 1994M3~1994M3; 1995M10~1995M11; 1996M11~1996M11; 1997M3~1997M3; 1997M8~1997M10; 1998M3~1998M5; 1998M10~1998M10; 1998M12~1999M11; 2000M2~2000M2; 2000M8~2000M8; 2000M10~2000M10; 2001M3~2001M3; 2001M6~2001M12; 2002M6~2002M7; 2002M12~2002M12; 2003M5~2003M7; | 1991M11~1991M11; 1992M7~1992M7; 1993M7~1993M7; 1997M8~1997M10; 1999M5~1999M5; 1999M8~1999M9; 2002M6~2002M7; 2003M5~2003M7; |
| TRINIDAD AND TOBAGO | 1970M1~ 2003M3 | 1970M2~1971M2; 1971M12~1972M10; 1973M4~1976M5; 1985M1~1991M1; 1991M9~1998M12; 2001M5~2002M12; | 1972M1~1972M1; 1972M7~1973M1; 1973M7~1973M8; 1973M12~1976M6; 1977M3~1977M6; 1985M12~1986M1; 1986M12~1987M1; 1988M8~1991M12; 1992M11~1993M4; 1994M2~1996M3; 1996M9~1998M9; 1999M1~1999M2; 2000M2~2000M5; 2000M9~2000M9; 2001M5~2002M1; 2002M7~2003M1; | 1970M2~1970M2; 1973M8~1973M8; 1974M7~1974M7; 1976M6~1976M6; 1977M6~1977M6; 1985M12~1985M12; 1986M12~1987M1; 1988M8~1988M8; 1989M6~1989M11; 1992M11~1992M11; 1993M4~1993M4; 1994M4~1994M5; 1995M10~1995M11; 1996M9~1996M; 1997M2~1997M2; 1997M9~1997M10; 1998M9~1998M9; 1999M1~1999M1; 2001M5~2001M5; 2002M8~2002M8; |
| TUNISIA | 1988M7~ 2003M9 | 1989M4~1992M3; 1993M1~1993M10; 1996M2~1996M11; 1997M7~1998M12; 1999M9~2002M4; | 1989M9~1989M9; 1993M11~1993M11; | 1989M3~1989M3; 1989M9~1989M9; 1990M9~1990M9; 1992M4~1992M4; 1993M11~1993M11; 1994M11~1994M11; 1999M9~1999M9; |
| TURKEY | 1970M1~ 2003M9 | 1970M2~1973M10; 1980M2~1982M11; 1983M12~1984M12; 1987M3~1987M5; 1989M8~1991M12; 1994M1~1996M3; | 1970M9~1971M5; 1971M9~1979M2; 1979M4~1979M12; 1980M3~1980M6; 1980M8~1980M12; 1981M2~1981M4; 1981M8~1983M11; 1984M2~1984M11; 1985M1~1987M12; 1988M3~1988M11; 1989M3~1989M12; 1990M2~1990M12; | 1970M2~1970M2; 1971M6~1971M6; 1971M8~1971M8; 1979M3~1979M3; 1980M1~1980M1; 1981M1~1981M1; 1983M12~1983M12; 1984M12~1984M12; 1989M2~1989M2; |

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| UGANDA | 1982M4~ 2003M9 | 1984M1~1984M1; 1984M4~1984M6; 1990M10~1991M7; 1992M12~1995M7; 2001M6~2002M4; | 1984M1~1984M1; 1985M7~1985M7; 1986M5~1986M5; 1987M5~1987M7; 1987M11~1988M1; 1988M4~1988M11; 1989M7~1989M7; 1990M2~1990M3; 1990M9~1991M2; 1991M8~1991M9; 1992M12~1993M1; 1993M12~1994M1; 1995M4~1995M5; 2001M4~2001M8; 2002M4~2002M4; | 1984M1~1984M1; 1987M11~1987M11; 1988M4~1988M4; 1988M7~1988M7; 1989M7~1989M7; 1990M2~1990M2; 1990M10~1990M10; |
| UK* | 1970M1~ 2003M10 | 1970M2~1970M12; 1974M8~1974M11; 1975M7~1976M3; 1978M6~1978M9; 1979M4~1980M10; 1982M7~1984M5; 1988M7~1988M10; 1991M7~1992M5; 1992M9~2003M10; | 1971M2~1993M10; | 1970M2~1970M2; |
| UKRAINE | 1993M12~ 2003M7 | 1994M1~1996M4; 1996M10~1997M5; 1997M8~1997M8; 1998M3~1999M3; 2000M8~2000M8; 2003M6~2003M6; | 1998M1~1998M3; 1998M5~1998M7; 1998M11~1998M12; 1999M2~1999M2; 1999M4~1999M5; 1999M7~1999M7; 1999M12~1999M12; 2000M2~2000M2; 2000M4~2000M5; 2000M8~2000M9; 2001M2~2001M2; | 1995M3~1995M3; 1995M5~1995M6; 1995M8~1995M8; 1995M10~1995M10; 1995M12~1995M12; 1996M3~1996M3; 1996M5~1996M5; 1996M10~1996M10; 1997M8~1997M9; 1998M5~1998M5; 1999M7~1999M7; 2000M8~2000M9; |
| URUGUAY | 1977M7~ 2002M7 | 1982M3~1983M11; 1984M10~1985M9; 187M10~1990M7; 2001M10~2002M7; | 1978M12~1979M3; 1980M3~1980M7; 1982M9~1985M2; 1985M9~1987M11; 1989M12~1993M9; 2002M1~2002M7; | NO CRISIS |
| USA | 1979M1~ 2003M11 | 1979M2~1980M6; 1983M8~1984M9; 1985M11~1989M4; 1990M7~1998M2; 1998M12~2000M12; 2002M7~2003M11; | 1983M11~1989M3; 1990M10~2003M11; | 1979M2~1979M3; 1979M9~1979M11; 1980M3~1980M3; 1980M5~1980M5; 1980M10~1980M11; 1981M1~1981M2; 1981M5~1981M5; 1982M2~1982M2; 1983M7~1983M8; 1984M10~1984M10; 1987M4~1987M4; 1989M5~1989M6; 1990M5~1990M6; |
| VENEZUELA | 1970M1~ 2003M9 | 1971M9~1972M3; 1974M2~1975M11; 1978M9~1979M6; 1984M3~1985M2; 1986M12~1987M11; 1989M2~1990M3; 1990M10~1991M10; 1992M12~1995M7; 1996M1~1998M12; | 1970M4~1973M10; 1973M12~1974M2; 1974M7~1974M7; 1975M1~1975M2; 1975M7~1975M11; 1976M1~1976M1; 1976M3~1979M11; 1980M1~1980M4; 1980M6~1980M7; 1980M9~1980M11; 1981M1~1981M2; 1981M5~1981M6; 1981M9~1982M9; 1982M11~1983M7; 1983M11~1984M2; 1984M4~1985M1; 1985M4~1986M11; 1987M1~1987M11; 1988M1~1989M1; 1989M4~1989M5; | NO CRISIS |

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| | | 1999M8~2000M7; 2002M1~2003M9; | 1989M7~1989M9; 1990M4~1990M5; 1990M8~1990M9; 1991M2~1991M6; 1991M11~1992M10; 1993M1~1993M2; 1993M4~1993M4; 1993M9~1994M2; 1994M5~1994M5; 1994M12~1994M12; 1995M2~1995M3; 1995M9~1995M11; 1996M2~1996M3; 1996M7~1996M9; 1996M11~1996M11; 1997M1~1997M3; 1997M6~1997M7; 1997M9~1997M9; 1997M11~1997M12; 1998M2~1998M12; 1999M2~1999M5; 1999M9~2000M7; 2000M9~2001M8; 2001M10~2001M12; 2002M3~2002M3; 2002M5~2002M5; 2002M8~2002M12; | |
| ZAMBIA | 1986M1~2002M12 | 1986M2~1987M4; 1989M12~1993M12; 1995M7~1997M3; 1998M7~2000M11; 2002M1~2002M12; | 1986M2~1986M8; 1987M6~1987M8; 1987M11~1988M3; 1988M6~1992M11; 1993M2~1993M8; 1993M10~1994M8; 1994M10~1994M12; 1995M4~2000M11; 2001M8~2001M10; 2002M1~2002M12; | 1986M8~1986M11; 1987M2~1987M5; 1987M9~1987M10; 1988M2~1988M2; 1988M4~1988M5; 1990M1~1990M1; 1991M1~1991M1; 1991M7~1991M7; 1992M2~1992M2; 1992M10~1993M1; 1993M9~1993M9; 1994M2~1994M2; 1994M9~1994M9; 1995M1~1995M3; 1997M3~1997M3; 1998M1~19981; 2000M12~2001M3; 2001M11~2001M12; 2002M6~2002M6; 2002M9~2002M9; 2002M12~2002M12; |
| ZIMBABWE | 1979M1~2002M12 | 1980M3~1982M8; 1999M9~2000M7; | 1985M9~1986M5; 1987M6~1987M6; 1991M8~1994M1; 198M9~1998M12; 2000M8~2000M12; 2001M8~2002M1; | NO CRISIS |

註：*表示在實質匯率的計算上是以德國的消費者物價指數作為計算的標準

資料來源：本研究